

Ongoing Monitoring Report (November 2022 – October 2023)

RAAF Base Learmonth

304700525



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Executive Summary

Introduction

Cardno, now Stantec (Cardno), were engaged by the Australian Department of Defence (“Defence”) to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP)¹ at the Royal Australian Air Force (RAAF) Base Learmonth, Western Australia (WA) (Figure 1, Appendix A).

The OMP, developed as part of the PFAS Management Area Plan (PMAP)², outlines the rationale and scope for the monitoring of the concentrations and extent of PFAS in groundwater, seepage water, surface water and sediment, associated with Defence’s historical use of legacy aqueous film forming foam (AFFF) at the RAAF Base Learmonth, WA (‘the site’). The OMP was designed to target areas where there is a potentially elevated risk to a receptor (for example, to people or the environment).

Two main sources of PFAS were identified on-site during a Detailed Site Investigation (DSI) in 2018 (GHD, 2018)³: Source Area 1 – Maintenance Area and Source Area 2 – Fuel Farm (Figure 2, Appendix A). These source areas have been monitored through the OMP since 2019. The OMP includes sampling and analysis not only from the site, but also from a number of surrounding (off-site) waterways. The site and these surrounding areas are collectively referred to as the ‘Management Area’. The Management Area is shown in Figure 2, Appendix A of this report.

Objectives

The objective of the OMP is to assess changes in the nature and extent of PFAS within the environment. The OMP used the monitoring network developed as part of the PMAP to monitor the concentrations of PFAS in and around the site.

Monitoring Scope

The November 2022 – October 2023 monitoring period consists of two biannual monitoring events (November 2022 and June 2023). The scope of work for the biannual monitoring events comprised monitoring of 49 groundwater wells, six water seepage locations and 49 collocated sediment and surface water locations, as specified in the OMP. The OMP outlines the requirement for a first flush sampling event after the first heavy rainfall of the wet season to gain an understanding of PFAS concentrations and distribution just after heavy rainfall. During the November 2022 – October 2023 monitoring period insufficient rainfall occurred during the wet season and a first flush sampling event could not be completed.

Groundwater elevation data was collected from 49 groundwater wells during the biannual monitoring events. Works were conducted in accordance with the Sampling and Analysis Quality Plan (SAQP, Appendix B) (Cardno, 2023), except as summarised in Section 3.6 of this report.

The current geographical coverage of the monitoring network, targeting source areas, migration pathways and receptor areas, is considered adequate for monitoring PFAS in groundwater, seepage water, surface water runoff and sediment, to provide an early detection of significant changes in migration.

What is an ‘order of magnitude’?

This refers to something decreasing or increasing by multiples of ten. For instance, an increase from 10 to 100 is an order of magnitude increase. When assessing changes in PFAS concentrations at an individual location, all concentrations are considered when determining trends, but order of magnitude changes are discussed separately as they represent a significant change in concentrations from what was reported in the previous event.

If a change is close to established health or environmental criteria, it will also be considered significant.

¹ The OMP is publically available at <https://www.defence.gov.au/about/locations-property/pfas/pfas-management-sites/raaf-base-learmonth>, and is found as Attachment 1 of the PFAS Management Area Plan

² Defence, 2019, [RAAF Learmonth – PFAS Management Area Plan](#)

³ Publically available at <https://www.defence.gov.au/about/locations-property/pfas/pfas-management-sites/raaf-base-learmonth>

Groundwater Results

Groundwater Flow Direction

The local groundwater flow pattern (GHD, 2018) at the site was observed to be following the regional flow regime; that is, flowing toward Exmouth Gulf to the east. The groundwater from the site tends to flow towards an area of groundwater depression between the site and the coast (Figures 5 and 6, Appendix A). This groundwater depression is naturally occurring due to the surface and subsurface conditions, including a very slow groundwater flow beneath the site and the tide mechanisms bringing salt water from the Exmouth Gulf inland. This means that water preferentially flows towards the depression. As a result, the area has elevated salinity and there is very little overall flow to the surface waters located to the east. It is noted, however, that groundwater levels in wells near the coast are influenced by the ocean tides.

The results of the OMP monitoring events supported the historical gauging results and groundwater flow directions, with some locations closer to the coast indicating a slight preferential flow to the coast.

PFAS Concentrations

PFAS concentrations in groundwater generally remained within the same order of magnitude as historical data and didn't display any seasonal variability. That is, there was no notable difference between the concentrations measured in the two biannual sampling events even though they are during different seasons.

All monitoring wells have data over a sufficient time period to conduct trend analysis to support the interpretation. The results indicated stable trends in PFAS concentrations for the majority of the monitoring wells. This means that no increasing or decreasing trend in the PFAS concentrations was interpreted, therefore there are no changes in our understanding of PFAS movement around the site.

PFAS concentrations within the on-site source areas ranged between below the Limit of Reporting (LOR: <0.01 µg/L) to 59.3 µg/L which is above the Heads of Environmental Protection Authorities Australia and New Zealand (HEPA, 2020) criteria for recreational use (2.0 µg/L). The November 2022 – October 2023 monitoring data generally remained of the same order of magnitude as historical results at each monitoring well.

The highest Sum of Per-FluoroOctane Sulfonate (PFOS) and Per-FluoroHexane Sulfonate (PFHxS) (PFOS+PFHxS) concentrations in groundwater outside of the source areas were reported at on-site well, MW172, located down-gradient to the Source Area 1 - Maintenance Area. PFOS+PFHxS concentrations were reported above the historical range in November 2022 at MW104 located down-gradient to the Source Area 2 – Fuel Farm, however, the concentration decreased to within the historical range in June 2023.

The PFAS concentrations for the off-site pathway and receptor monitoring wells were generally consistent and remained within the same order of magnitude between the monitoring events of the November 2022 to October 2023 monitoring period, as well as historical concentrations. The exception to this was at MW137 (offsite receptor) which reported PFOS and PFOS+PFHxS one order of magnitude above the historical range in November 2022, but returned to below the LOR in June 2023.

The November 2022 – October 2023 groundwater analytical data, supported by gauging records, supports the current understanding of the conceptual site model (CSM) that groundwater flow is not the primary migration pathway for PFAS.

What is a 'limit of reporting'?

The limit of reporting (LOR) is the lowest concentration level that the laboratory is able to measure in a sample with a reasonable degree of certainty. Where monitoring shows <LOR, it means that if PFAS is present in the sample it is too low for the laboratory to measure with any degree of certainty.

Seepage Water Results

Seepage water is groundwater that is moving to the surface (with groundwater flow and tide effect mechanisms). The monitoring of seepage water provides data to assess the potential risk of PFAS migrating from groundwater to the Exmouth Gulf environment. During this monitoring period, there was no PFAS concentrations reported above the laboratory LOR in any seepage water sample. This indicates the absence of a complete migration pathway from groundwater to the marine water of the Exmouth Gulf.

Surface Water Results

Surface water sampling was limited during the November 2022 – October 2023 monitoring period due to lower than average rainfall. No samples were collected within the site drain or off-site drainage channels.

PFAS concentrations in surface water samples across the receptor area were predominantly below the laboratory LOR during the monitoring period except for SW211 and SW300 (WAPET Creek northern reach). There were no new maximum concentrations or guideline exceedances reported off-site. Overall, the PFAS concentrations at surface water sampling locations are consistent with historically recorded concentrations.

Sediment/Surface Soil Results

Sediment (wet samples) and surface soil (dry samples) are sampled to provide an indication regarding the movement of PFAS in the environment. PFAS concentrations within the on-site drains remained within the same order of magnitude as historical data with the exception of SS174, SS231, SS234 and SS277. These samples were taken within or close to source areas, and reported new PFOS+PFHxS minimums with an order of magnitude change. This could be related to the lower than average rainfall during the monitoring period.

PFAS concentrations within the receptor area were not reported above the laboratory LOR for most locations. New concentration maximums for PFOS and PFOS+PFHxS were reported during the June 2023 monitoring event at SD300 and SD301 in the northern reach and SS301 in the southern reach. It is noted that the observed increases at these locations do not represent an order of magnitude change from historical results. These increases were not reflected in the surface water samples. These are considered isolated occurrences and given the low concentrations, these do not change the current understanding of the CSM.

Risk Summary

The evaluation of analytical results suggests the nature and extent of PFAS in groundwater, seepage water, surface water or sediment remains consistent with that reported from previous investigations despite slight fluctuations in PFAS concentrations at individual locations.

The understanding of PFAS source areas presented in the DSI (GHD, 2018) is supported by the OMP monitoring data, with the highest PFAS concentrations consistently detected within the two previously identified on-site source areas (namely the Fuel Farm and the Maintenance Area, refer to Figure 2, Appendix A).

The pathways for PFAS exposure and risks to human health (such as recreational anglers in the Management Area) and ecological receptors (such as land and aquatic flora and fauna) presented in the DSI (GHD, 2018) have been reviewed and are still considered to be applicable. The OMP monitoring data collected as part of the November 2022 – October 2023 monitoring period does not suggest any significant changes to these mechanisms or risks.

Information gathered during the monitoring period supports the conclusion made in earlier investigations, that PFAS poses a low risk to recreational anglers with respect to bioaccumulation in commonly caught fish species, and that PFAS poses a low risk to the commercial prawn fisheries of the Exmouth Gulf Managed Prawn Fishery.

The OMP contains management response triggers, which are concentrations that would trigger an additional assessment and risk analysis to determine if additional management is required. None of the management response triggers were observed in the November 2022 – October 2023 monitoring period.

The nature and extent of PFAS across all media has not changed from the understanding presented in the DSI (GHD, 2018) and the PFAS Management Area Plan (PMAP). Based on the current available data there is no significant change to the risk profile of the Management Area.

Conclusions

The following conclusions are based on the data collected during the monitoring period:

- > The November 2022 – October 2023 monitoring results met the objective of the OMP and monitoring was carried out in accordance with the SAQP.
- > Overall, the concentrations of PFAS across the media and locations sampled are generally consistent and within the same order of magnitude as historical data.
- > The highest PFAS concentrations in groundwater were recorded at Source Area 2 - Fuel Farm and Source Area 1 – Maintenance Area. However, there is no evidence of a change in PFAS movement

towards off-site sensitive receptors. This is supported by the groundwater levels recorded and inferred groundwater flow direction.

- > The November 2022 – October 2023 seepage water results did not show any evidence of PFAS concentrations migrating from impacted groundwater to down-gradient receptors.
- > Below average rainfall occurred during the November 2022 – October 2023 monitoring period, which resulted in less surface water samples collected in comparison with previous monitoring years, and no first flush monitoring event being undertaken. However, most surface water locations in the receptor area were sampled in the November 2022 and June 2023 monitoring events and no new maximum concentration or guideline exceedance were reported.
- > Sediment/surface soil concentrations recorded during the November 2022 – October 2023 monitoring period were generally within the same order of magnitude as historical data. An order of magnitude change was noted with new minimums recorded at four locations within the site drains. This could be related to the lower than average rainfall during the monitoring period.
- > Statistical analysis indicated that mostly stable or increasing trends were observed at monitoring locations targeting Source Area 1. This indicates the source area continues to contribute to the PFAS concentrations in groundwater through leaching from impacted soils. However, decreasing trends were also observed at Source Area 1 (MW211) and Source Area 2 (MW151, MW238).
- > Statistical analysis outcomes for the pathways and receptor monitoring zones indicated that there were stable trends or no statistically significant trends for most locations. Only two groundwater samples from the pathways and receptor monitoring zones reported PFAS detections above the LOR.
- > Based on the current available data there is no significant change to the risk profile of the Management Area (low and acceptable).

The OMP is currently being reviewed with consideration of the OMP data collected to date to ensure that the ongoing monitoring program continues to appropriately monitor the PFAS extent within the Management Area.

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Chemical Names

DO	Dissolved Oxygen
EC	Electrical conductivity
ORP	Oxidation reduction potential
PFAS	Per- and Poly-fluoroalkyl Substances
PFHxS	Per-fluorohexane Sulfonate
PFOA	Per-fluorooctanoic Acid
PFOS	Per-fluorooctane Sulfonate

Technical Terms

AFFF	Aqueous Film-Forming Foam
ASS	Acid Sulphate Soils
CoV	Coefficient of Variation
CF	Confidence Factor
DSI	Detailed Site Investigation
EPA	Environment Protection Agency
HEPA	Heads of Environmental Protection Authorities
LOR	Limit of Reporting
MAR	Mandatory Auditors Report
NEMP	National Environmental Management Plan
QA	Quality Assurance
QAQC	Quality Assurance Quality Control
QC	Quality Control
RWL	Reduced water level
SAQP	Sampling and Analysis Quality Plan
SMP	Site Management Plan
SRV	Site Remediation and Validation Report
TEC	Threatened Ecological Community
VAR	Voluntary Auditors Report
UST	Underground storage tanks

Units

ha	Hectares
km	kilometres
m	metres
mbgl	Metres Below Ground Level
mAHD	Metres above Australian height datum
mbTOC	Metres below Top of Casing
mg/kg	Milligram per Kilogram
µg/L	Micrograms per litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity— Water)

Site Specific

OLA	Ordnance Loading Area
OMR	Ongoing Monitoring Report
OMP	Ongoing Monitoring Plan
PMAP	PFAS Management Area Plan
RAAF	Royal Australian Air Force

1 Introduction

The Australian Department of Defence (“Defence”) engaged Cardno, now Stantec (Cardno) to undertake the November 2022 and June 2023 groundwater, seepage water, surface water and sediment monitoring events at Royal Australian Air Force (RAAF) Base Learmonth (‘the site’) as part of the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP).

The site is located approximately 30 km south of Exmouth, Western Australia (WA) and is displayed in Figure 1, Appendix A.

1.1 Background

The OMP outlines the rationale and scope for the monitoring of the concentrations and extent of PFAS in groundwater, seepage water, surface water and sediment originating from the site. The monitoring program consists of biannual monitoring events, as well a ‘first flush’ surface water and sediment monitoring event conducted immediately (or as close as possible) following the first heavy rainfall event of the wet season.

The OMP applies not only to the site, but also the surrounding areas that, together with the site, make up the ‘Management Area’. For the purposes of this report:

- > The ‘site’ is defined as RAAF Base Learmonth; and
- > The ‘Management Area’ is defined in the PFAS Management Area Plan (PMAP) as comprising the site, plus the land to the east of the site, including the salt pan, drainage channels, WAPET Creek, and extends to Exmouth Gulf.

During the November 2022 – October 2023 monitoring period insufficient rainfall occurred during the wet season and no first flush sampling event was completed.

1.2 Purpose and Objectives

The specific objectives of the monitoring specified in the OMP are to:

- > Evaluate the nature and extent (geographically and over time) of PFAS impacts in groundwater, seepage water and surface water pathways associated with the site sources of PFAS derived from historical use of Aqueous Film-Forming Foam (AFFF);
- > Monitor the migration of PFAS in groundwater and surface water from the site;
- > Provide confirmation of the current understanding of risk; and
- > Provide supporting data for assessment of management actions, where relevant.

The purposes of the Ongoing Monitoring Report (OMR) are to:

- > Inform Defence and key stakeholders of PFAS trends in surface water, groundwater and sediment;
- > Assess any variations in the distribution of PFAS for the site and how this changes the understanding of the conceptual site model and risk profile; and
- > Provide recommendations for any potential changes in the location and frequency of sampling which may be incorporated in the revision of the OMP.

1.3 Scope of Work

The OMP was carried out in accordance with the scope and limitations presented in Cardno’s Sampling and Analysis Quality Plan (SAQP, Appendix B):

- > Cardno, June 2023, *PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) RAAF Base Learmonth*. Rev.9

The assessment included the following main components:

1. Undertake the November 2022 groundwater, surface water, seepage water and sediment monitoring event:
 - Gauging of 49 single and multi-level groundwater monitoring wells;

- Sampling of 32 single level groundwater monitoring wells;
 - Sampling of 17 multilevel groundwater monitoring wells;
 - Sampling of six seepage water locations;
 - Sampling of 13 surface water locations; and
 - Sampling of 49 surface soil/sediment locations.
2. Undertake the June 2023 groundwater, surface water, seepage water and sediment monitoring event:
- Gauging of 48 single and multi-level groundwater monitoring wells;
 - Sampling of 32 single level groundwater monitoring wells;
 - Sampling of 16 multilevel groundwater monitoring wells;
 - Sampling of six seepage water locations;
 - Sampling of 11 surface water locations; and
 - Sampling of 49 surface soil/sediment locations.
3. Data assessment and reporting for the November 2022 – October 2023 monitoring period.

1.4 Standards of Assessment and Limitations

This OMR has been prepared in general accordance with the current industry standards for an assessment of this type for the purpose, objectives and scope identified in this report.

This report is not any of the following:

- > A Mandatory Audit Report (MAR) or Voluntary Audit Report (VAR) as defined under the *Contaminated Sites Act 2003* (CS Act).
- > A Geotechnical Assessment.
- > A Detailed Site Investigation (DSI).
- > A Detailed Hydrogeological Assessment.
- > A Remediation Action Plan (RAP) or Site Remediation & Validation (SRV) report.
- > A Site Management Plan (SMP).

2 Site Setting

The site is situated on the North West Cape in the Pilbara Region of WA, in Learmonth, which is situated approximately 30 kilometres (km) south of the township of Exmouth. The site covers an area of approximately 2,550 hectares (ha).

The buildings and associated infrastructure and support services include:

- > Runway, taxi way and aprons;
- > Aircraft hangars, shelters and Ordnance Loading Areas (OLAs);
- > Civilian Airport terminal;
- > Maintenance and workshop areas;
- > Explosive storage and preparation area;
- > Power stations;
- > General administration;
- > Domestic housing;
- > Fuel farm (former and current);
- > Former sewage treatment ponds;
- > Site potable water bore-field; and
- > There are also multiple Underground Storage Tanks (USTs) and septic tanks across the site.

2.1 Site Definition and Planning

The site location is presented in Figure 1, Appendix A. Site identification details are presented in Table 2-1.

Table 2-1 Site Identification Details

Details	Description
Address	Minilya-Exmouth Road, Learmonth, WA 6707
Land Description	RAAF Base Learmonth
Owner	Commonwealth of Australia
Planning Zone / Land use	Public Purposes – Commonwealth Government
Local Government Authority	Shire of Exmouth

2.2 Surrounding Land Uses and Zoning

The surrounding land uses are outlined in Table 2-2.

Table 2-2 Surrounding Land Uses

Direction	Land Use
North	Kailis Hatchery, Potshot Memorial and pastoral land.
East	WAPET Creek, Solar Observatory, Bureau of Meteorology, pastoral land (Exmouth Gulf Station), Exmouth Gulf further east used for commercial aquaculture (prawn fishing).
West	Site supply bore-field, pastoral land, Cape Range National Park further west.
South	Various landfills, and pastoral land.

2.3 Management Area Description

The OMP includes sampling and analysis from the site and several surrounding (off-site) waterways. The site and these surrounding areas are collectively referred to as the 'Management Area' (GHD, 2018). The Management Area boundaries are presented in Figure 2, Appendix A.

The monitoring zones include the source areas, the pathways (on-site and off-site drainage channels) and the receptor areas consisting of WAPET Creek and the Exmouth Gulf.

2.4 Environmental Setting

Key details defining the site are summarised in Table 2-3.

Table 2-3 Site Environmental Setting Key Details

Setting	Description
Climate	The region has a hot, semi-arid climate, with a wet and dry season. The maximum temperatures range between 38°C (January) and 24.4°C (July) while minimum temperatures range between 11.5°C (July) and 24.1°C (February), Bureau of Meteorology (BoM, 2024). Rainfall occurs generally between January and July with monsoonal showers between January and late April. August to December is generally dry. The highest volume of rainfall typically occurs during the month of June with a mean monthly rainfall amount of 43.5 mm.
Topography	The site is located on a coastal plain and is generally flat. The elevation on-site ranges between 0 and 20 meters relative to the Australian Height Datum (m AHD). To the west of the site, the elevation at the coastal ranges increases 220 m AHD.
Acid Sulfate Soil	A review of the Acid Sulfate Soils (ASS) risk mapping, available on the WA Atlas online database indicates the following: - To the north of the site is classified as having a moderate to low risk of ASS occurring within the top 3.0 m of natural soil but high to moderate risk of ASS beyond 3.0 m of natural soil surface. - The salt pan to the east is classified as having a high to moderate risk of ASS occurring in the top 3.0 m of natural soil.
Hydrology	The Exmouth Gulf is located approximately 600 m east of the site at its closest point. The site is also crossed west to east by three ephemeral creeks. The site contains a number of constructed drains that direct surface water towards drainage channels that discharge into WAPET Creek (Central and Southern Channels) or Exmouth Gulf (Northern Channel). Monitoring conducted as part of the OMP confirms that the water flow in these drains is limited to high rainfall events. The Northern Channel is inundated with seawater during high tides from the coast to the boundary of site. WAPET Creek is located to the east of the site and is lined with mangroves. Water flows tidally in and out of the creek and low-lying areas around the creek are periodically inundated. - The Northern Drainage Channel discharges directly to the Exmouth Gulf. It is a constructed drain on-site but links to a wide natural channel off-site that cuts through the coastal dunes. - The Central Drainage Channel discharges into the northern reach of WAPET Creek. It is a straight constructed channel for its entire length. - The Southern Drainage Channel discharges into the southern reach of WAPET Creek. It is a constructed drain on-site but links to a natural channel off-site that meanders across low lying salt pan topography. Stock drinking from these drainage channels have been observed during previous monitoring events.
Geology	Regional Geology The site is underlain by quaternary age alluvial, aeolian and littoral sediments superimposed on the coastal plain (Geological Survey of Western Australia 1980). Further inland are Quaternary alluvium and colluvium deposits that have been derived from erosion of the Cape Ranges. The deposits include clays, silts, sands and gravels. The Cape Range forms the highlands to the west of the site and are composed of Tertiary-aged Cape Range limestone units. The coastal areas are fringed by Holocene aged beach and sand dunes consisting of quartz and calcarenite sands. An older Quaternary dune unit is located to the south of the site and dune forms are visible. Intertidal flats and mangrove swamps occur immediately west of the coastal sands and are associated with estuarine creeks. Site Specific Geology The findings of intrusive investigative works at the site, undertaken by GHD between January and June 2018, were broadly consistent with the regional geology described above. To the west of the site - the geology encountered comprised of colluvium, sands and sandy clay underlain by limestone rock layer.

Setting	Description
	- On-site – generally sands and clays were observed at the surface, underlain by colluvium/alluvium, gravels and sands and then weathered limestone rock. - Salt pan area to the east of site – generally sands and clays were observed at the surface, underlain by alluvium/colluvium and then shallow limestone rock. Outcrops of limestone displaying fossilised coral were observed along the southern reach of WAPET Creek.
Hydrogeology	Groundwater Occurrence – The Quaternary and Tertiary geology units are hydraulically connected and form a major, unconfined aquifer. Groundwater in the Quaternary units is considered to be perched and discontinuous. The superficial Quaternary layers (dunes, colluvium, alluvium) are considered to be no more than 20 m in thickness. Coastal dunes may also contain relatively fresh groundwater but of limited extent (lenses). This has not been assessed. The main regional aquifer occurs predominantly within the Tulki Limestone (within permeable beds and the karst system) on the flanks of the range and the Mandu Limestone (within joints and minor permeable beds) on the crest of the range. These units extend to depths of greater than 150 m. Depth to Groundwater – During the November 2022 monitoring event, depth to groundwater was observed to range approximately between 1.37 metres below ground level (mbgl) and 6.56 mbgl with elevations ranging from 0.093 mAHD (MW181) to 1.429 mAHD (MW112). During the June 2023 monitoring event depth to groundwater was recorded beneath the site at levels between 1.44 mbgl and 6.81 mbgl with elevations ranging from -0.291 mAHD (MW127) to 1.052 mAHD (MW113). Refer Figures 5 and 6, Appendix A. Groundwater Flow Direction – The local groundwater flow pattern (GHD, 2018) at the site was observed to be following the regional flow regime; that is, flowing toward the east. The calculated hydraulic gradient of groundwater across the site was low and in the order of 0.0003 to 0.0005 m/m. The groundwater flow direction and hydraulic gradients greatly restricts the flow of contaminated groundwater from the site to WAPET Creek or Exmouth Gulf. Instead, groundwater from the site tends to flow towards an area of groundwater depression with elevated salinity that lies between the site and the coast, with there being very little net flow to surface waters further to the east. Groundwater levels in wells near the coast are expected to be influenced by tidal pressure. The results of the OMP monitoring events supported the historical gauging results and groundwater flow directions, with some locations closer to the coast indicating a slight gradient to the coast. Salinity – The results of the monitoring events in November 2022 and June 2023 were consistent with previous monitoring events, and indicated groundwater was generally brackish to saline in the western wells, with the groundwater becoming more saline closer to the coast. The saltwater wedge is expected to extend 5.0 km inland from the east coast (Martin, 1990). The DSI (GHD, 2018) identified the water was fresher in the shallow groundwater aquifer, likely due to rain infiltration. The salinity distribution in the inferred discharge area to the east of the site is likely to have significant influence on PFAS migration and discharge (GHD, 2018). Groundwater flow towards the east is restricted by the preferential groundwater recharge zone through the coastal dunes. Groundwater Use – The DWER groundwater database found no registered abstraction bores within a 1.0 km radius of the site. The site is down-gradient from the nearest potable water supply which is sourced from a series of wells near the base of Cape Range, 3 km to the west of the site.
Environmental Sensitive Areas	The site is near the Cape Range National Park and Ningaloo Reef to the east. - No Threatened Ecological Communities (TECs) with national environmental significance, were identified in the EPBC Act Protected Matters Report generated on July 11, 2024. - Five priority flora species and 36 threatened or priority fauna species are known or expected to be present within 10 km of the site. - The mangrove wetlands are not listed on the Ramsar Convention on Wetlands of International Importance. It does however constitute a sensitive receptor.

2.5 Source Areas and Monitoring Zones

There are multiple monitoring areas, where PFAS was detected in soil or groundwater at concentrations exceeding the adopted assessment levels. These include (refer to Figure 2, Appendix A):

- > Maintenance Area (Source Area 1);
- > Former and Current Fuel Farm (Source Area 2);
- > Southern Drainage Channel (Pathway);
- > Central Drainage Channel (Pathway);
- > Northern Drainage Channel (Pathway); and
- > WAPET Creek Northern Reach (Receptor).

The results of the DSI (GHD, 2018), confirmed by the OMP monitoring data collected to date, indicated that the two main source areas were the Fuel Farm and the Maintenance Area. PFAS were found to be present in all environmental media tested (soils, groundwater, sediments, and surface water where present) in these source areas. PFAS were also detected at lower concentrations at a number of other locations across the site.

3 Sampling and Analytical Methodology

3.1 Sampling Dates

A summary of the dates for each monitoring event of the November 2022 – October 2023 monitoring period is presented in Table 3-1.

Table 3-1 Summary of Sampling Dates

Monitoring event	OMP Activity	Sampling Period
November 2022	Groundwater monitoring (sampling and gauging)	22 to 23 November 2022
	Surface water, seepage water, surface soil and sediment sampling	
June 2023	Groundwater monitoring (sampling and gauging)	28 June 2023
	Surface water, seepage water, surface soil and sediment sampling	

3.2 Groundwater Monitoring

Sampling of groundwater monitoring locations was conducted in accordance with the SAQP (Cardno 2023, Appendix B), applying methods set out in Section 6.3.3 of the SAQP. Deviations from the SAQP that occurred during the monitoring period can be found in Section 3.6.

The monitoring network includes 32 single level monitoring wells and 17 multilevel monitoring wells. For the multilevel monitoring wells, only the shallowest (non-dry) screened interval was sampled. The groundwater wells monitored as part of the OMP are presented in Table 3-2 and are shown in Figure 3, Appendix A.

Table 3-2 Groundwater Monitoring Well Locations

Monitoring Area	Monitoring Well ID
Source Area 1 - Maintenance Area	MW018, MW021, MW112, MW113, MW114, MW115, MW162, MW163, MW164, MW165, MW166, MW167, MW168, MW211, MW233.
Source Area 2 - Fuel Farm (Former and Current)	MW105, MW148D, MW148S, MW151, MW159, MW238.
On-site Pathway	MW102, MW103, MW104, MW122, MW124, MW126, MW127, MW170, MW172,
Off-site Pathway – Area west of WAPET Creek	MW143, MW144, MW145, MW146, MW147, MW180, MW181.
Off-site Pathway – Northern Drainage Channel	MW134, MW135, MW175.
Off-site Pathway – Central Drainage Channel	MW138.
Off-site Pathway – Southern Drainage Channel	MW139, MW140.
Off-site Receptor	MW137, MW141, MW176, MW177, MW178, MW179.

3.3 Seepage Water Monitoring

Seepage water monitoring locations were chosen to assess the inferred groundwater discharge zone along the coast. They include locations near the mouth of WAPET Creek, the Northern Drainage Channel, a low point in the dunes near the southern reach and other locations along the coast. Seepage water monitoring and sampling were conducted in accordance with the SAQP (Cardno 2023, Appendix B), applying methods set out in Section 6.3.3 of the SAQP. The seepage water monitoring locations monitored as part of the OMP are listed in Table 3-3 and are shown in Figure 3, Appendix A.

Table 3-3 Seepage Water Monitoring Locations

Monitoring Area	Location ID
Off-site Receptor (Exmouth Gulf)	OTH103, OTH106, OTH107, OTH129, OTH132, OTH134.

3.4 Surface Water Monitoring

Monitoring of surface water locations was conducted in accordance with the SAQP (Cardno 2023, Appendix B), applying methods set out in Section 6.4.3 of the SAQP. The surface water locations monitored as part of the OMP are presented in Table 3-4 and are shown in Figure 4, Appendix A.

Table 3-4 Surface Water Monitoring Locations

Monitoring Area	Location ID
Source Area 1 - Maintenance Area	SW121, SW122, SW123, SW124, SW125, SW277, SW278
Source Area 2 - Fuel Farm (Former and Current)	SW113, SW114, SW219, SW234, SW235
1b, 2b and 3b On-Site drains (Pathway)	SW176, SW279, SW157, SW231, SW265, SW166, SW168, SW174, SW243
1d Southern Drainage Channel (Pathway)	SW199, SW200, SW298, SW301
1e Central Drainage Channel (Pathway)	SW108, SW170, SW227, SW291, SW292, SW293, SW198
2c Northern Drainage Channel (Pathway)	SW189, SW190, SW192, SW193, SW288
1f Southern reach of WAPET Creek (Receptor)	SW205, SW207, SW208
1g Northern reach of WAPET Creek (Receptor)	SW001, SW209, SW210, SW211, SW300, SW302, SW303, SW304, SW305

3.5 Sediment/Surface Soil Monitoring

Sampling of sediment/surface soil monitoring locations was conducted in accordance with the SAQP (Cardno 2023, Appendix B), applying methods set out in Section 6.4.4 of the SAQP. The sampling locations monitored as part of the OMP are presented in Table 3-5 and are shown in Figure 4, Appendix A.

Table 3-5 Sediment/Surface Soil Monitoring Locations

Monitoring Area	Location ID
Source Area 1 - Maintenance Area	SS121, SS122, SS123, SS124, SS125, SS277, SS278
Source Area 2 - Fuel Farm (Former and Current)	SS113, SS114, SD219, SS234, SS235
1b, 2b and 3b On-Site drains (Pathway)	SS176, SS279, SS157, SS231, SS265, SS166, SS168, SS174, SS243
1d Southern Drainage Channel (Pathway)	SD199, SD200, SS298, SS301
1e Central Drainage Channel (Pathway)	SS108, SS170, SS227, SS291, SS292, SS293, SS198
2c Northern Drainage Channel (Pathway)	SS189, SS190, SS192, SS193, SS288
1f Southern reach of WAPET Creek (Receptor)	SD205, SD207, SD208
1g Northern reach of WAPET Creek (Receptor)	SD209, SD210, SD211, SD300, SD301, SD302, SD303, SD304, SD305
Note: 'SS' = shallow soil (dry), 'SD' = sediment (wet)	

3.6 Deviations from the OMP SAQP

Deviations from the SAQP for the November 2022 – October 2023 monitoring period are summarised in Table 3-6.

Table 3-6 Summary of deviations from the OMP SAQP

Location ID	Deviation	Comments
November 2022		
SW108, SW113, SW114, SW121, SW122, SW123, SW124, SW125, SW157, SW166, SW168, SW170, SW174, SW176, SW189, SW190, SW192, SW193, SW198, SW199, SW200, SW219, SW227, SW231, SW234, SW235, SW243, SW265, SW277, SW278, SW279, SW288, SW291, SW292, SW293, SW298.	Not sampled for surface water	These surface water monitoring locations were found dry. No impact on the OMP – These locations have never been sampled for surface water as always been dry (sediment samples were collected at these locations and analysed for PFAS).
First Flush 2023		
All Locations	Not Sampled	The first flush monitoring event was not undertaken as not enough rainfall was recorded to trigger a monitoring event, as per the OMP and SAQP. Previous first flush events have not shown significant differences in the results compared to biannual events therefore this deviation is considered to have a limited impact on the OMP.
June 2023		
SW108, SW113, SW114, SW121, SW122, SW123, SW124, SW125, SW157, SW166, SW168, SW170, SW174, SW176, SW189, SW190, SW192, SW193, SW198, SW199, SW200, SW205, SW219, SW227, SW231, SW234, SW235, SW243, SW265, SW277, SW278, SW279, SW288, SW291, SW292, SW293, SW298, SW301.	Not sampled for surface water	These surface water monitoring locations were found dry. No impact on the OMP – sediment samples were collected at these locations and analysed for PFAS.
MW138	Not sampled	Bores casings (multi-level) have been damaged at 0.9 metres below Top of Casing (mbTOC). Medium impact – PFAS concentrations have been detected at this monitoring location since the start of the OMP. This well is located off-site along the central drainage channel exiting the site.

3.7 Changes to the Monitoring Network Condition

It is noted that MW138 (located in the central drainage channel) bore casings have been damaged at 0.9 mbTOC and can no longer be sampled for groundwater. A replacement well was installed in May 2024. No other change to the monitoring network condition was noted.

4 Quality Control / Quality Assurance

A critical aspect of site assessments is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process which includes a review of the following data quality indicators, as described in the SAQP:

- > QA documentation;
- > Bias;
- > Data Representativeness;
- > Data Precision & Accuracy;
- > Laboratory Performance;
- > Data Comparability; and
- > Data Set Completeness.

A detailed review of the Quality Assurance/Quality Control (QA/QC) aspects was completed during the monitoring events and are included within the factual reports presented in Appendix C.

4.1 Summary

The laboratory has undertaken different Quality Control (QC) measures in all sets of sample analysis which validate the accuracy of their techniques. The laboratory is appropriately certified for environmental sample analysis. It is considered that the results are accurate and reliable for the purposes of this assessment.

The data validation process has concluded that there are no significant systematic errors in the data collection process. Therefore, the data set used as the basis for the surface water, groundwater and sediment assessment is considered valid and complete.

5 Assessment Criteria

5.1 Groundwater, Seepage Water and Surface Water

The assessment levels adopted for groundwater and surface water in this OMP are based upon the Heads of Environmental Protection Authorities (HEPA) Australia and New Zealand (2020) PFAS National Environmental Management Plan 2.0 (NEMP) (HEPA 2020) and findings of the DSI (GHD 2018). The adopted assessment criteria for groundwater and surface water are detailed in Table 5-1.

Table 5-1 Criteria for Groundwater, Seepage Water and Surface water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS µg/L	PFOA ¹	
Human Health – Recreational Water	2 ²	10	NHMRC 2019, HEPA 2020
Ecological – 99% species protection	0.00023 ³	19	HEPA 2020
- Per-fluorooctanoic Acid (PFOA) - Sum of Per-fluorooctane Sulfonate (PFOS) and Per-fluorohexane Sulfonate (PFHxS). - PFOS only; Practical screening guideline of 0.01 µg/L is based on typical current laboratory limit of reporting. Therefore, it should be noted that warning and action levels would not be relevant until the detection limits are reduced or the screening levels are increased (HEPA 2020).			

5.2 Sediment

It is noted that there are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment. The sediment concentrations are compared to the historical range of ongoing monitoring results and new maximum concentrations or first-time detections at each sediment sampling location are recorded.

6 Contextual and Ancillary Information

6.1 Additional Analytical Data

All data available on the ESdat database at the time of reporting for each OMP monitoring location was utilised to form the basis of the interpretations and conclusions presented in this report.

6.2 Remediation and Infrastructure Projects

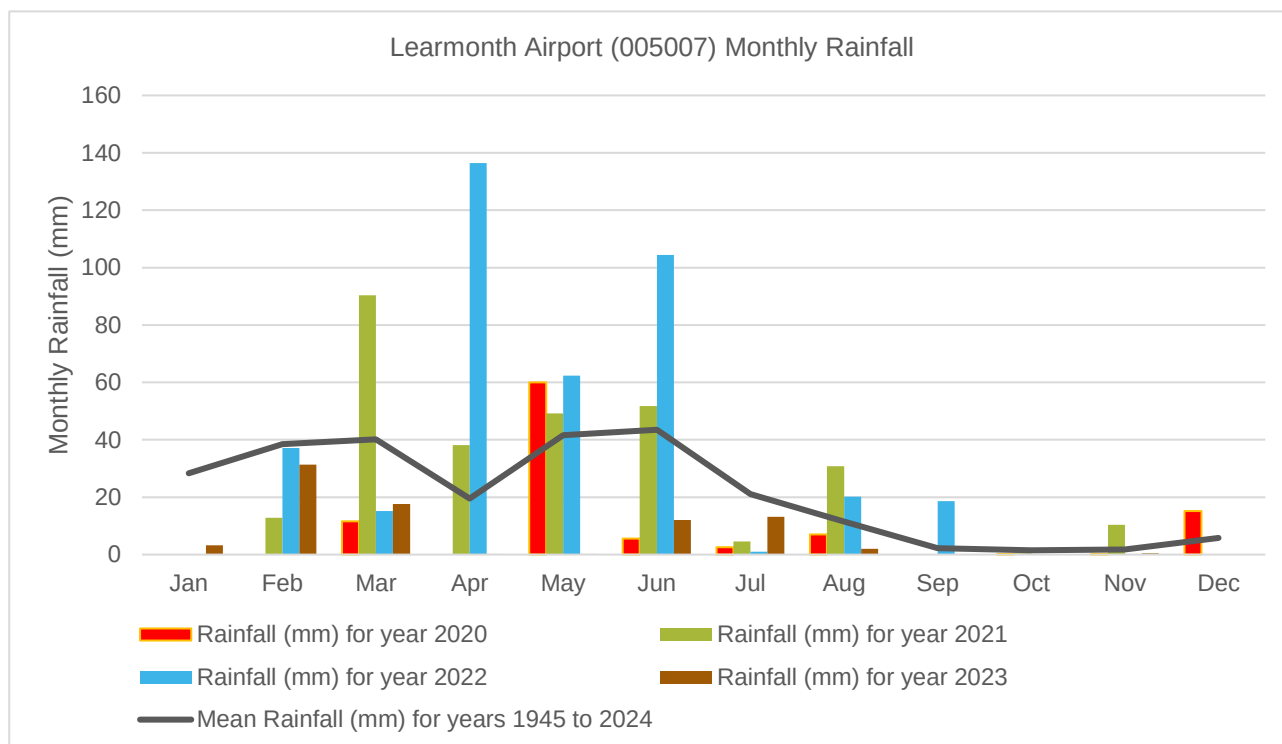
No remediation project or infrastructure works that could affect the interpretation of monitoring results were undertaken at the site during the monitoring period.

6.3 Climate

Rainfall can potentially influence PFAS migration and groundwater levels. Monthly rainfall for January 2019 to December 2023 obtained from the Bureau of Meteorology (BoM) Learmonth Airport Station No 005007 is displayed in Figure 6-1.

The monthly rainfall amounts for the November 2022 – October 2023 monitoring period were below the average rainfall for 1945 to 2024. It is noted that these climatic conditions have not affected the groundwater gradient or flow direction for the Management Area. No flooding of the low-lying areas between the site and WAPET Creek or to the north of the site was observed during the monitoring events. The first flush event trigger (heavy rainfall benchmark, i.e. a daily rainfall amount) was not met during the monitoring period.

Figure 6-1 Monthly rainfall and long term mean monthly rainfall for Learmonth Airport (station 005007) (BoM, 2024)



7 Monitoring Data Summary

The November 2022 and June 2023 monitoring results are presented within the factual reports provided in Appendix C. Field and laboratory results are summarised in Tables 1 to 5 in Appendix D. This section presents a summary of the monitoring data for the November 2022 to October 2023 monitoring period.

7.1 Groundwater

7.1.1 Groundwater Geochemical Parameters

Groundwater geochemical parameters (dissolved oxygen [DO], electrical conductivity [EC], pH and oxidation-reduction potential [ORP]) recorded during the November 2022 and June 2023 monitoring events are summarised in Table 7-1 and provided in Table 4, Appendix D.

An assessment of geochemical parameters has been made with reference to the following literature:

- > CRC CARE. (2010). *A Technical Guide for Demonstrating Monitored Natural Attenuation of Petroleum Hydrocarbons in Groundwater*. Technical Report No. 15. Adelaide: Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE).
- > CRC CARE. (2018). *Guideline on Validation and Closure. Version 1.0*. CRC CARE.
- > Domenico, P. S. (1997). *Physical and Chemical Hydrogeology*. Second Edition.
- > NGWA. (2017). *Information Brief: Brackish Groundwater*. National Ground Water Association.

The geochemical parameters were generally within the historical ranges recorded for the site. No noticeable seasonal variability was observed.

Table 7-1 Groundwater Geochemical Parameters

Parameter	November 2022	June 2023
DO	0.0 mg/L (MW140) – 7.24 mg/L (MW238) <i>Anaerobic to Aerobic conditions</i>	0.78 mg/L (MW168) – 4.65 mg/L (MW163) <i>Aerobic conditions</i>
EC	1,997 µS/cm (MW211) – 106,157 µS/cm (MW140) <i>Marginal to saline water</i>	1,845 µS/cm (MW211) – 92,335 µS/cm (MW177) <i>Marginal to saline water</i>
pH	5.6 (MW168) – 8.18 (MW238) <i>Acidic to slightly alkaline conditions</i>	6.78 (MW115) – 8.33 (MW211) <i>Near neutral to slightly alkaline conditions</i>
Eh (Field ORP+200)	63.3 mV (MW176) – 271.8 mV (MW168) <i>Oxidising groundwater conditions.</i>	27.2 mV (MW175) – 358.8 mV (MW140) <i>Oxidising groundwater conditions.</i>

Notes:

Eh derived by adding the field ORP with the calibration factor of 200 mV.

7.1.2 Groundwater Elevations and Migration Contours

Groundwater levels recorded during the November 2022 and June 2023 monitoring events and the inferred flow directions are summarised in Table 7-2. Gauging data is provided in Table 3, Appendix D. Figure 5, Appendix A, presents the inferred groundwater contours for the November 2022 monitoring event and Figure 6, Appendix A, presents the inferred groundwater contours for the June 2023 monitoring event.

Groundwater elevations and flow direction for the monitoring period were consistent with historical data. It is noted that the well gauging data is limited to the existing OMP network and was collected over several days and tide cycles, however wells close to the coast were generally gauged during outgoing tides. This has been considered when interpreting the inferred groundwater contours and flow direction.

The groundwater was interpreted to be flowing towards an area of groundwater depression that lies between the site and the coast, with there being very little net flow to surface waters further to the east. The June 2023 groundwater Reduced Water Levels (RWL) were marginally (on average 0.15 mAHD) lower than the November 2022 levels and were generally lower than reported in previous monitoring periods for this time of year. This is likely due to the lack of rainfall reported in the 2023 wet season.

Table 7-2 Groundwater Levels and Flow Direction

Item	November 2022	June 2023
Depths to groundwater	1.37 (MW179) – 6.56 (MW114)	1.44 (MW179) – 6.81 (MW114)
Groundwater elevation	0.093 mAHD (MW181) to 1.429 mAHD (MW112)	-0.291 mAHD (MW127) to 1.052 mAHD (MW113)
Inferred direction of groundwater flow	Groundwater was interpreted to flow towards an area of groundwater depression that lies between the site and the coast, with there being very little net flow to surface waters further to the east.	
Seasonal difference in groundwater elevation	Groundwater levels were on average 0.15 m deeper during the June 2023 event than the November 2022 event.	

7.1.3 On-site Source Areas Summary Results

The source areas at the site are:

- > Source Area 1 – Maintenance Area; and
- > Source Area 2 – Fuel Farm (former and current).

Groundwater monitoring well locations are displayed in Figure 3, Appendix A.

7.1.3.1 Source Area 1 – Maintenance Area

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the reporting period and the historical concentration ranges for Source Area 1 monitoring locations are presented in Table 7-3, with a trend graph for the PFOS+PFHxS concentrations plotted in Figure 7-1.

It is noted there is data available for PFOA and PFOS for selected monitoring wells from September 2010 across Source Area 1. Where available this data has been assessed as part of this investigation. However, it is also noted that PFHxS was not reported until 2018.

PFAS was detected above the LOR in 13 out of 15 groundwater samples from the Maintenance Area monitoring wells. The highest PFOA, PFOS and PFOS+PFHxS concentrations were recorded at MW233 in June 2023 and lowest concentrations were reported at MW113 and MW114 (in a vacant area up-gradient), with concentrations reported below the LOR for both monitoring events.

The guideline exceedances for the monitoring period are summarised below:

- > PFOS was reported above the adopted ecological criteria (99% species protection level for fresh and marine water, herein referred to as FW99%, LOR value of 0.01 µg/L adopted instead of guideline value of 0.00023 µg/L) in all 13 wells where PFAS was detected.
- > PFOS+PFHxS exceeded the HEPA (2020) recreational use criteria (2.0 µg/L) at MW162, MW163, MW164, MW211 and MW233 in both monitoring events.
- > There were no PFOA exceedances of the recreational water (10 µg/L) or FW99% (19 µg/L) criteria in any of the monitoring wells.

No new exceedances or first-time detections were reported for the November 2022 to October 2023 monitoring period. New maximum and minimum concentrations were reported as highlighted in the below table and summarised below:

- > New maximum PFOS concentrations were reported at monitoring wells MW021, MW115, MW162, MW168 and MW233 in November 2022 and/or June 2023. The greatest concentrations were reported in June 2023 for MW021, MW115, MW162 and MW233 while the MW168 reported the same PFOS concentrations in both November 2022 and June 2023 events.
- > New maximum PFOS+PFHxS concentrations were reported at monitoring wells MW115 and MW233 in June 2023.
- > New maximum PFOA concentrations were reported at monitoring wells MW018, MW115 and MW233 in June 2023, and at MW166 in November 2022. The PFOA concentration at MW166 decreased slightly in June 2023 to within the historical range.
- > A new minimum concentration for PFOA was reported at MW164 in November 2022 and again in June 2023.

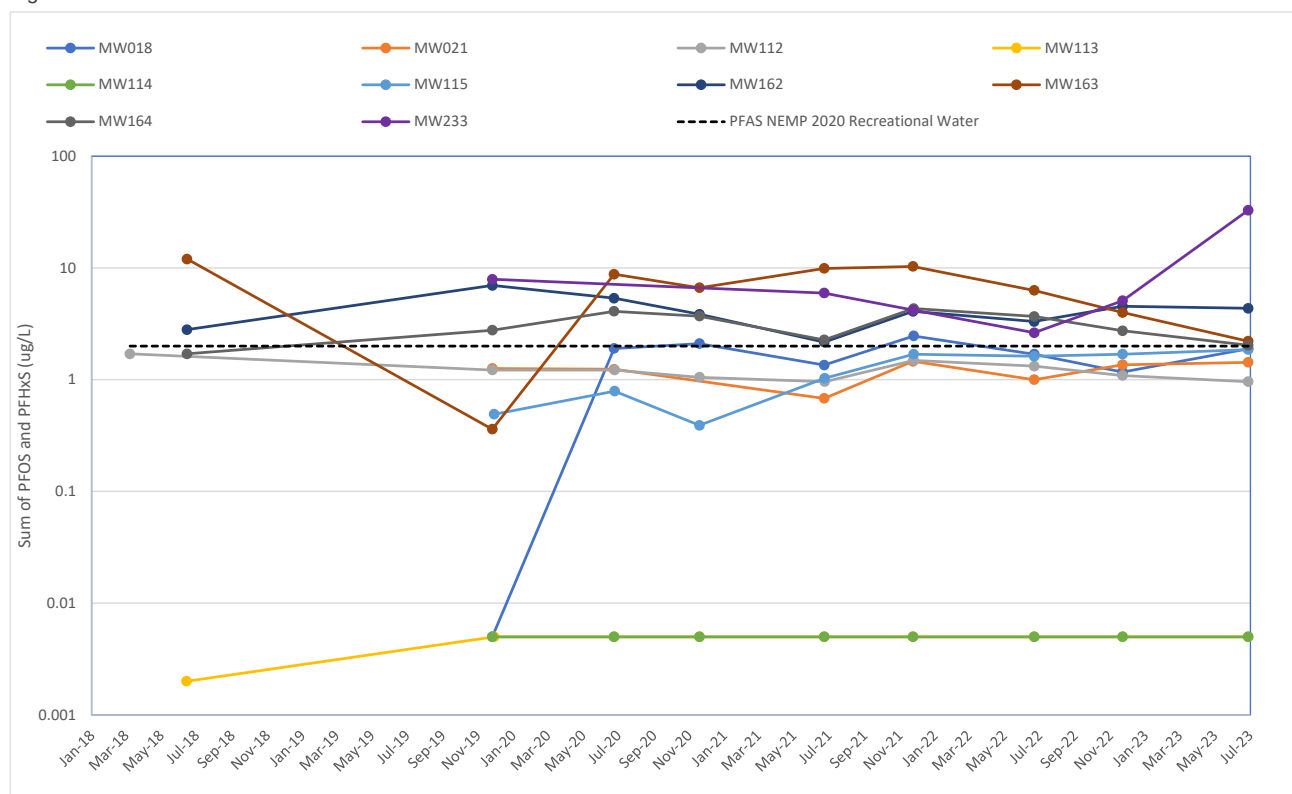
- > All new minimum/maximum concentrations were reported within the same order of magnitude as the historical range.

Table 7-3 Source Area 1 – Maintenance Area. Groundwater PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
MW018	PFOS	<0.01 – 2.50	0.40	0.82
	PFOS and PFHxS	<0.01 – 2.93	1.17	1.89
	PFOA	<0.01 – 0.09	0.54	0.06
MW021	PFOS	<0.01 – 0.42	0.45	0.61
	PFOS and PFHxS	0.31 – 1.46	1.36	1.43
	PFOA	<0.01 – 0.02	0.02	0.02
MW112	PFOS	0.56 – 1.10	0.65	0.57
	PFOS and PFHxS	0.96 – 1.70	1.09	0.96
	PFOA	<0.05 - 0.02	0.01	0.01
MW113	PFOS	<0.01 – 0.002	<0.01	<0.01
	PFOS and PFHxS	<0.01 – 0.003	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
MW114	PFOS	<0.01 - 0.002	<0.01	<0.01
	PFOS and PFHxS	<0.01 – 0.004	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
MW115	PFOS	0.020 – 0.29	0.31	0.46
	PFOS and PFHxS	0.18 – 1.69	1.69	1.86
	PFOA	<0.01 - 0.03	0.03	0.04
MW162	PFOS	0.13 - 0.37	0.39	0.44
	PFOS and PFHxS	2.17 – 6.97	4.53	4.35
	PFOA	0.05 – 0.12	0.11	0.12
MW163	PFOS	0.10 - 5.0	1.49	0.77
	PFOS and PFHxS	0.36 – 12	3.99	2.21
	PFOA	<0.05 - 0.32	0.11	0.06
MW164	PFOS	0.38 – 2.01	1.70	1.27
	PFOS and PFHxS	1.70 – 4.33	2.74	2.03
	PFOA	0.058 – 0.12	0.04	0.03
MW165	PFOS	<0.01 - 0.02	0.02	0.02
	PFOS and PFHxS	<0.01 - 0.08	0.03	0.03
	PFOA	<0.01 - 0.002	<0.01	<0.01
MW166	PFOS	0.16 – 0.47	0.27	0.26
	PFOS and PFHxS	0.29 – 0.95	0.51	0.54
	PFOA	0.03 – 0.15	0.18	0.14
MW167	PFOS	0.49 – 1.22	0.86	0.88
	PFOS and PFHxS	1.18 – 2.58	1.79	1.60
	PFOA	0.12 – 0.18	0.14	0.17
MW168	PFOS	0.03 - 0.12	0.15	0.15
	PFOS and PFHxS	0.54 – 1.34	1.24	1.12

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
MW211	PFOA	0.01 - 0.04	0.03	0.03
	PFOS	2.81 – 6.2	4.63	5.84
	PFOS and PFHxS	4.13 – 8	5.59	6.48
	PFOA	0.06 – 0.17	0.06	0.06
MW233	PFOS	1.06 – 6.7	1.55	8.15
	PFOS and PFHxS	2.63 – 8.6	5.08	32.8
	PFOA	0.11 – 0.71	0.17	1.04
New Maximum		New Minimum	New Exceedance	

Figure 7-1 Source Area 1 – Maintenance Area PFOS+PFHxS Concentration Trends



Note: A logarithmic scale is used for the vertical axis.

7.1.3.2 Source Area 2 – Fuel Farm

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the reporting period and the historical concentration ranges for Source Area 2 monitoring locations are presented in Table 7-4, with a trend graph for the PFOS+PFHxS concentrations plotted in Figure 7-2.

Five of the six groundwater monitoring wells from Source Area 2 reported detectable PFAS concentrations with up-gradient well MW159 not reporting concentrations above the LOR. The highest PFOA, PFOS and PFOS+PFHxS concentrations were recorded in MW151, MW148S and MW238 located within the fuel farm.

The guideline exceedances for the monitoring period are summarised below:

- > All five samples with detectable PFAS concentrations exceeded the FW99% criteria for PFOS.
- > PFOS+PFHxS exceeded the HEPA (2020) recreational use criteria (2.0 µg/L) at MW148D, MW148S, MW151 and MW238 in both monitoring events.
- > There were no PFOA exceedances of the recreational water (10 µg/L) or FW99% (19 µg/L) criteria in any of the monitoring wells.

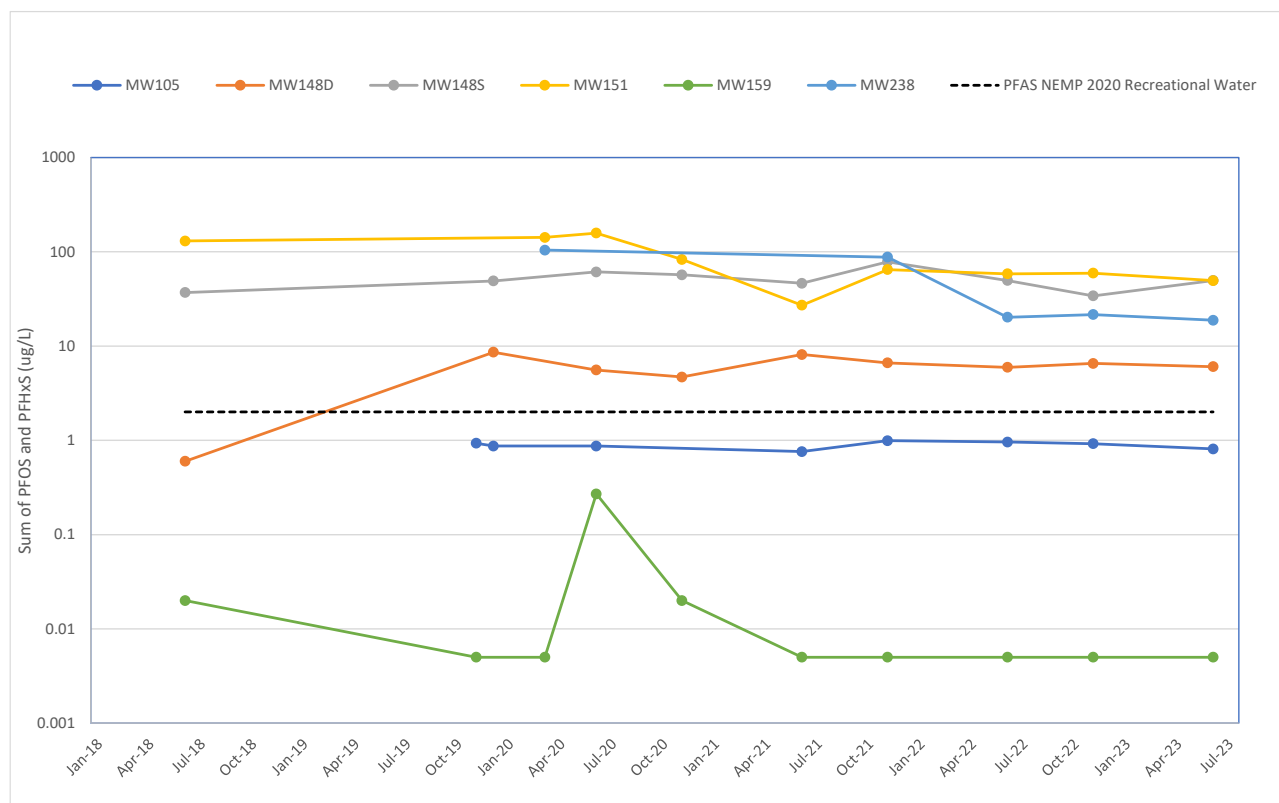
No new exceedances or first-time detections were reported for the November 2022 to October 2023 monitoring period. New minimum concentrations were reported as highlighted in the table and summarised below:

- > New minimum concentration for PFOS at MW105 in November 2022, with the same concentration reported in June 2023.
- > New minimum concentrations reported for PFOS+PFHxS and PFOA at MW148S in November 2022, with a slight increase back to historical range observed in June 2023.
- > New minimum concentration for PFOS reported at MW238 in November 2022 and again in June 2023 and a new minimum for the PFOS+PFHxS in June 2022. Noting that only three historical results are available for this well.

Table 7-4 Source Area 2 – Fuel Farm. Groundwater PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
MW105	PFOS	0.031 – 0.05	0.03	0.03
	PFOS and PFHxS	0.771 – 0.99	0.92	0.81
	PFOA	<0.01 - 0.011	0.01	0.01
MW148D	PFOS	0.25 – 3.13	2.13	2.04
	PFOS and PFHxS	0.60 - 8.60	6.54	6.04
	PFOA	0.019 - 0.35	0.25	0.21
MW148S	PFOS	9.40 – 33.1	13.8	21.9
	PFOS and PFHxS	37.00 – 78.3	34.1	49.6
	PFOA	1.40 - 2.73	0.9	1.47
MW151	PFOS	13.90 – 72.6	26.3	24.8
	PFOS and PFHxS	27.10 – 158	59.3	49.5
	PFOA	1.59 - 6.6	2.08	2.03
MW159	PFOS	<0.001 - 0.02	<0.01	<0.01
	PFOS and PFHxS	<0.001 - 0.020	<0.01	<0.01
	PFOA	<0.001 - 0.01	<0.01	<0.01
MW238	PFOS	11.4 - 53.90	9.58	9.02
	PFOS and PFHxS	20.2 - 104.00	21.6	18.8
	PFOA	0.59 - 4.42	0.82	0.66
New Maximum		New Minimum	New Exceedance	

Figure 7-2 Source Area 2 – Fuel Farm PFOS+PFHxS Concentration Trends



Note: A logarithmic scale is used for the vertical axis.

7.1.4 On-site Pathway

The on-site groundwater pathway represents the area between the on-site source area and the eastern site boundaries. A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the on-site pathway area monitoring locations are presented in Table 7-5, with a trend graph for the PFOS+PFHxS concentrations plotted in Figure 7-3.

Four of the nine groundwater samples from the on-site pathway reported detectable PFAS concentrations. The highest PFOA, PFOS and PFOS+PFHxS concentrations were recorded in MW172, located near Source Area 1 – Maintenance Area.

The guideline exceedances for the monitoring period are summarised below:

- > Two locations, MW103 and MW172 exceeded the FW99% criteria for PFOS.
- > PFOS+PFHxS exceeded the HEPA (2020) recreational use criteria (2.0 µg/L) at MW172 in both monitoring events.
- > There were no PFOA exceedances of the recreational water (10 µg/L) or FW99% (19 µg/L) criteria in any of the monitoring wells.
- > No new exceedances or first-time detections were reported for the November 2022 to October 2023 monitoring period.

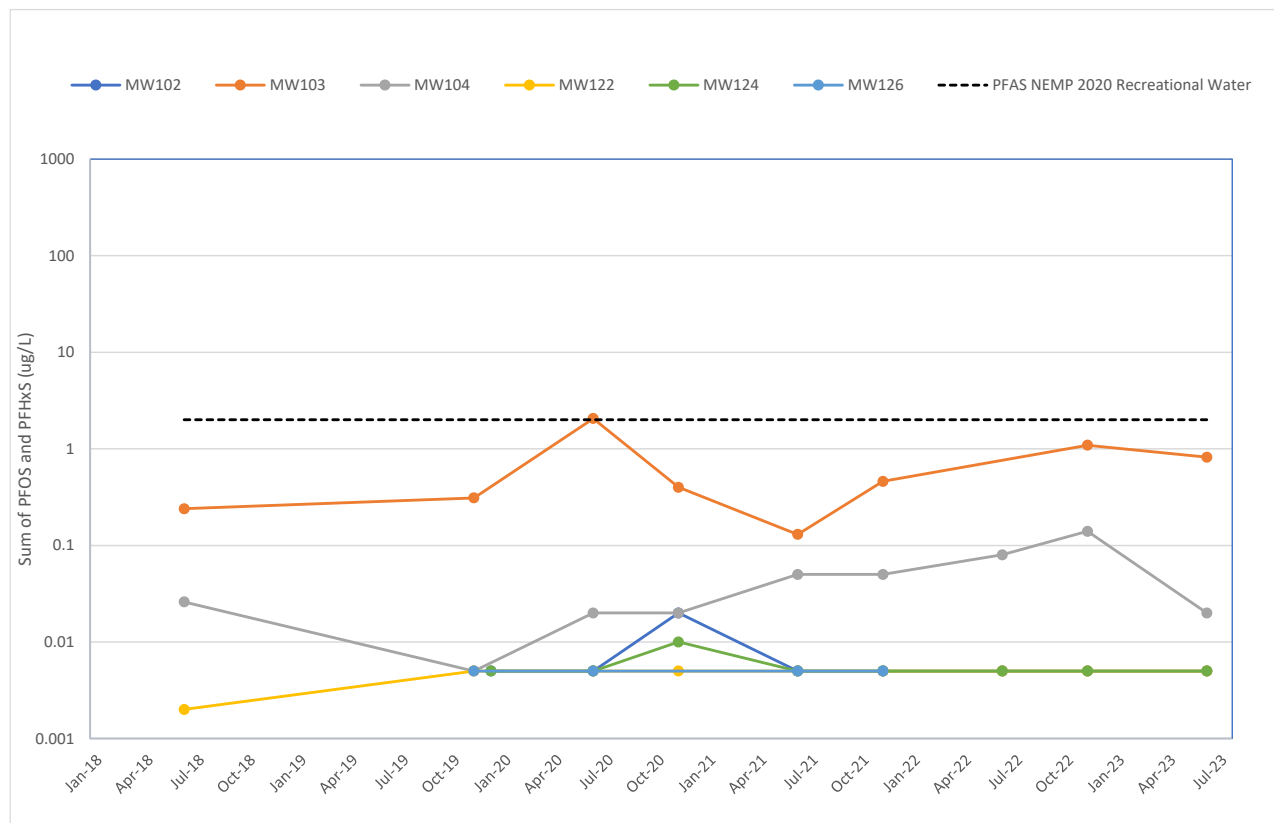
New maximum and minimum concentrations were reported as highlighted in the table and summarised below:

- > New minimum concentrations reported for PFOS+PFHxS and PFOA at MW172 in November 2022, followed by a slight increase back to historical range in June 2023.
- > New maximum concentration for PFOS+PFHxS reported at MW104 in November 2022, followed by a decrease to within the historical range in June 2023.

Table 7-5 On-site pathway. Groundwater PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
MW102	PFOS	<0.01 – 0.02	<0.01	<0.01
	PFOS and PFHxS	<0.01– 0.02	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01
MW103	PFOS	0.004 – 0.36	0.04	0.04
	PFOS and PFHxS	0.13 – 2.06	1.09	0.82
	PFOA	<0.01 – 0.07	<0.01	<0.01
MW104	PFOS	<0.01 – 0.02	<0.01	<0.01
	PFOS and PFHxS	<0.01 – 0.08	0.14	0.02
	PFOA	<0.01	<0.01	<0.01
MW122	PFOS	<0.001 - 0.001	<0.01	<0.01
	PFOS and PFHxS	<0.001 - 0.002	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01
MW124	PFOS	<0.01 – 0.005	<0.01	<0.01
	PFOS and PFHxS	<0.01 – 0.007	<0.01	<0.01
	PFOA	<0.001 – 0.001	<0.01	<0.01
MW126	PFOS	<0.001 – 0.009	<0.01	<0.01
	PFOS and PFHxS	<0.001 – 0.009	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01
MW127	PFOS	<0.01	<0.01	<0.01
	PFOS and PFHxS	<0.01	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01
MW170	PFOS	<0.01 - 0.03	<0.01	<0.01
	PFOS and PFHxS	0.17 - 0.52	0.45	0.47
	PFOA	<0.01 – 0.001	<0.01	<0.01
MW172	PFOS	0.51 - 5.46	1.28	2.3
	PFOS and PFHxS	6.3 - 45.40	6.09	10.2
	PFOA	0.3 - 1.12	0.25	0.4
New Maximum		New Minimum		New Exceedance

Figure 7-3 On-site Pathways PFOS+PFHxS Concentration Trends



Note: A logarithmic scale is used for the vertical axis.

7.1.5 Off-site Pathways

The off-site pathway areas are identified as:

- > Area west of WAPET Creek;
- > Northern Drainage Channel;
- > Central Drainage Channel; and
- > Southern Drainage Channel.

The groundwater results for these areas are discussed in the following sections.

7.1.5.1 Off-site Area west of WAPET Creek

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the reporting period and the historical concentration ranges for the off-site area to the west of WAPET Creek monitoring locations are presented in Table 7-6.

During the November 2022 – October 2023 monitoring period concentrations above the LOR for PFOA, PFOS or PFOS+PFHxS were not recorded in any of the seven monitoring wells across the area.

Table 7-6 Area west of WAPET Creek. Groundwater PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
MW143	PFOS	<0.001 – 0.001	<0.01	<0.01
	PFOS and PFHxS	<0.001 – 0.001	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
MW144	PFOS	<0.001 – 0.002	<0.01	<0.01
	PFOS and PFHxS	<0.001 - 0.002	<0.01	<0.01
	PFOA	<0.001 - 0.002	<0.01	<0.01
MW145	PFOS	<0.001 – 0.001	<0.01	<0.01
	PFOS and PFHxS	<0.001	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
MW146	PFOS	<0.001 – 0.005	<0.01	<0.01
	PFOS and PFHxS	<0.001 – 0.005	<0.01	<0.01
	PFOA	<0.001 – 0.003	<0.01	<0.01
MW147	PFOS	0.002 – 0.005	<0.01	<0.01
	PFOS and PFHxS	0.0002 – 0.007	<0.01	<0.01
	PFOA	<0.001 – 0.002	<0.01	<0.01
MW180	PFOS	<0.01 – 0.12	<0.01	<0.01
	PFOS and PFHxS	<0.01 – 0.12	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
MW181	PFOS	<0.01 – 0.11	<0.01	<0.01
	PFOS and PFHxS	<0.01 – 0.11	<0.01	<0.01
	PFOA	<0.01 – 0.002	<0.01	<0.01
New Maximum		New Minimum	New Exceedance	

Note:

MW000 – multi-level monitoring well, the shallowest screen interval sample results have been used for the assessment.

7.1.5.2 Off-site Northern Drainage Channel

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the reporting period and the historical concentration ranges for the off-site Northern Drainage Channel monitoring locations are presented in Table 7-7.

During the November 2022 – October 2023 monitoring period, no concentrations above the LOR for PFOA, PFOS, or PFOS+PFHxS were recorded in any of the three monitoring wells across the area.

Table 7-7 Northern Drainage Channel Groundwater PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
MW134	PFOS	<0.001– 0.02	<0.01	<0.01
	PFOS and PFHxS	<0.001– 0.02	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
MW135	PFOS	<0.01 – 0.09	<0.01	<0.01
	PFOS and PFHxS	<0.01 – 0.2	<0.01	<0.01
	PFOA	<0.001 – 0.003	<0.01	<0.01
MW175	PFOS	<0.01 – 0.04	<0.01	<0.01
	PFOS and PFHxS	<0.01 – 0.06	<0.01	<0.01
	PFOA	<0.01 – 0.01	<0.01	<0.01
New Maximum		New Minimum	New Exceedance	

Note:

MW000 – multi-level monitoring well, the shallowest screen interval sample results have been used for the assessment.

7.1.5.3 Off-site Central Drainage Channel

A single groundwater monitoring well (MW138) is in the Central Drainage Channel monitoring area near the site boundary. A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the reporting period and the historical concentration ranges for the off-site Central Drainage monitoring location is presented in Table 7-8.

PFAS concentrations recorded during the November 2022 – October 2023 monitoring period were within the range of historical results. MW138 exceeded the FW99% for PFOS.

Table 7-8 Central Drainage Channel Groundwater PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
MW138	PFOS	<0.01 – 0.87	0.41	
	PFOS and PFHxS	<0.01 – 1.01	0.52	NS
	PFOA	<0.01 – 0.02	0.02	
New Maximum		New Minimum	New Exceedance	

Note:

MW000 – multilevel monitoring well, the shallowest screen interval sample results have been used for the assessment.

NS = Not Sampled. MW138 was damaged (refer to Section 3.6).

7.1.5.4 Off-site Southern Drainage Channel

Two groundwater monitoring wells (MW139 and MW140) are in the Southern Drainage Channel monitoring area. A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the off-site Southern Drainage Channel monitoring locations is presented in Table 7-9.

No PFAS concentrations were recorded above the laboratory LOR during the monitoring period.

Table 7-9 Southern Drainage Channel Groundwater PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
MW139	PFOS	<0.001– 0.01	<0.01	<0.01
	PFOS and PFHxS	<0.001– 0.04	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
MW140	PFOS	<0.001 – 0.003	<0.01	<0.01
	PFOS and PFHxS	<0.001 – 0.003	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01
New Maximum		New Minimum	New Exceedance	

Note:

MW000 – multilevel monitoring well, the shallowest screen interval sample results have been used for the assessment.

7.1.6 Off-site Receptors – WAPET Creek and Exmouth Gulf

Six groundwater monitoring wells are monitoring the receptor area east of WAPET Creek as displayed in Figure 3, Appendix A. A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the receptor area monitoring locations are presented in Table 7-10.

One of the six groundwater monitoring locations reported detectable PFAS concentrations, MW137, located down-gradient of the Central Drainage Channel.

- > MW137 exceeded the FW99% criteria for PFOS in November 2022 but was below the LOR in June 2023.
- > There were no PFOA or PFOS+PFHxS exceedances of the assessment criteria in any of the monitoring wells.

No new exceedances or first-time detections were reported for the November 2022 to October 2023 monitoring period. New maximum concentrations were reported as highlighted in the table and summarised below:

- > New maximum concentrations for PFOS and PFOS+PFHxS reported at MW137 in November 2022, followed by a decrease to below the LOR in June 2023.

Table 7-10 Off-site receptor area Groundwater PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
MW137	PFOS	<0.01 – 0.004	0.02	<0.01
	PFOS and PFHxS	<0.01 – 0.011	0.03	<0.01
	PFOA	<0.01	<0.01	<0.01
MW141	PFOS	<0.001 – 0.003	<0.01	<0.01
	PFOS and PFHxS	<0.001 - 0.003	<0.01	<0.01
	PFOA	<0.001 - 0.002	<0.01	<0.01
MW176	PFOS	<0.01 – 0.01	<0.01	<0.01
	PFOS and PFHxS	<0.01 – 0.01	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
MW177	PFOS	<0.01 – 0.01	<0.01	<0.01
	PFOS and PFHxS	<0.01 – 0.01	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
MW178	PFOS	<0.01 – 0.004	<0.01	<0.01
	PFOS and PFHxS	<0.01 – 0.008	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
MW179	PFOS	<0.01 – 0.010	<0.01	<0.01
	PFOS and PFHxS	<0.01 – 0.019	<0.01	<0.01
	PFOA	<0.01 – 0.001	<0.01	<0.01
New Maximum		New Minimum	New Exceedance	

Note:

MW000 – multi-level monitoring well, the shallowest screen interval sample results have been used for the assessment.

7.2 Seepage Water

As part of the OMP, seepage water is sampled to assess the changes in PFAS concentrations at the receptor, down-gradient of the identified source areas, including water discharged to the Exmouth Gulf. Seepage water samples were therefore collected during outgoing tidal cycles.

7.2.1 Seepage Water Geochemical Parameters

Seepage water geochemical parameters recorded during the November 2022 and June 2023 monitoring events are summarised in Table 7-11 and provided within Table 4, Appendix D.

Table 7-11 Seepage Water Geochemical Parameters

Parameter	November 2022	June 2023
DO	2.88 - 8.2 mg/L <i>Aerobic conditions.</i>	2.81 - 7.56 mg/L <i>Aerobic conditions.</i>
EC	53,233 – 57,508 µS/cm <i>Highly Saline Conditions.</i>	37,323 – 62,086 µS/cm <i>Highly Saline Conditions.</i>
pH	6.95 - 8.17 <i>Near neutral to slightly alkaline conditions.</i>	7.8 - 8.36 <i>Near neutral to slightly alkaline conditions.</i>
Eh (Field ORP+200)	105 - 298.6mV <i>Oxidising conditions.</i>	65.1 - 348.2 mV <i>Oxidising conditions.</i>

Notes:

Eh derived by adding the field ORP with the calibration factor of 200 mV.

7.2.2 Seepage Water Summary Results

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the seepage water monitoring locations are presented in Table 7-12, the tabulated analytical results are provided in Table 1, Appendix D.

During the November 2022 and June 2023 monitoring events, there were no detections of PFOS, Sum of PFOS and PFHxS or PFOA above the LOR.

Table 7-12 Seepage Water PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
OTH103	PFOS	<0.001 – 0.14	<0.01	<0.01
	PFOS and PFHxS	<0.001 – 0.14	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
OTH106	PFOS	<0.001 – 0.001	<0.01	<0.01
	PFOS and PFHxS	<0.001 – 0.001	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
OTH107	PFOS	<0.001 - 0.01	<0.01	<0.01
	PFOS and PFHxS	<0.001 - 0.01	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
OTH129	PFOS	<0.001 - 0.15	<0.01	<0.01
	PFOS and PFHxS	<0.001 - 0.15	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
OTH132	PFOS	<0.001 - 0.01	<0.01	<0.01
	PFOS and PFHxS	<0.001 - 0.01	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
OTH134	PFOS	<0.001 - 0.11	<0.01	<0.01
	PFOS and PFHxS	<0.001 - 0.13	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01

7.3 Surface Water

The monitoring of surface water across the Management Area assesses the PFAS extent and changes in surface water migrating from the site to WAPET Creek through the drainage channels.

Surface water has been sampled since February 2018. It is noted that several locations have not been regularly sampled due to being dry most of the time. All locations sampled for sediment/surface soil are also monitored for surface water and a sample is collected if surface water is present.

7.3.1 Surface Water Geochemical Parameters

Surface water geochemical parameters recorded during the November 2022 and June 2023 monitoring events are summarised in Table 7-13 and provided within Table 5, Appendix D.

Table 7-13 Surface Water Geochemical Parameters

Parameter	November 2022	June 2023
DO	1.27 - 4.6 mg/L <i>Aerobic conditions.</i>	3.13 - 6.29 mg/L <i>Aerobic conditions.</i>
EC	49,375 – 94,406 µS/cm <i>Highly Saline Conditions.</i>	43,088 – 85,075 µS/cm <i>Highly Saline Conditions.</i>
pH	7.64 - 8.61 <i>Near neutral to slightly alkaline conditions.</i>	7.79 - 8.07 <i>Near neutral to slightly alkaline conditions.</i>
Eh (Field ORP+200)	107.8 - 313.5 mV <i>Oxidising conditions.</i>	233.1 - 355.2 mV <i>Oxidising conditions.</i>

7.3.2 On-site Pathway

The on-site surface water pathways are the on-site drains. A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the on-site pathway area surface water monitoring locations are presented in Table 7-14. Tabulated analytical results are provided in Table 1, Appendix D.

It is noted that all locations were dry; therefore, the results have not been plotted.

Table 7-14 On-site pathway area Surface Water PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
SW114	PFOS	0.081~		
	PFOS and PFHxS	0.081~	NS	NS
	PFOA	<0.001~		
SW121	PFOS	0.18~		
	PFOS and PFHxS	0.24~	NS	NS
	PFOA	0.004~		
SW122	PFOS	1.3~		
	PFOS and PFHxS	1.4~	NS	NS
	PFOA	1.1~		
SW123	PFOS	0.43~		
	PFOS and PFHxS	0.48~	NS	NS
	PFOA	0.004~		
SW219	PFOS	0.002 - 0.34		
	PFOS and PFHxS	0.002 – 0.38	NS	NS
	PFOA	<0.001 - <0.01		
SW265	PFOS	0.052 – 0.22		
	PFOS and PFHxS	0.052 – 0.22	NS	NS
	PFOA	<0.001		
SW157	PFOS	0.15		
	PFOS and PFHxS	0.15	NS	NS
	PFOA	<0.01		
SW170	PFOS	0.08		
	PFOS and PFHxS	0.08	NS	NS
	PFOA	<0.01		
New Maximum		New Minimum	New Exceedance	

Note: NS: Not Sampled – Refer to Section 3.6 for details

7.3.3 Off-site Pathways

The off-site pathway areas for surface water are identified as:

- > Northern Drainage Channel;
- > Central Drainage Channel; and
- > Southern Drainage Channel.

The surface water results for these areas are discussed in the following sections.

7.3.3.1 Northern Drainage Channel

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the off-site Northern Drainage Channel pathway area surface water monitoring locations are presented in Table 7-15. Tabulated analytical data is provided in Table 1, Appendix D.

It is noted that all locations were dry; therefore, the results have not been plotted.

Table 7-15 Northern Drainage Channel Surface Water PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
SW189	PFOS	0.04 – 0.45	NS	NS
	PFOS and PFHxS	0.04 – 0.45		
	PFOA	<0.01		
SW190	PFOS	0.2 - 0.26	NS	NS
	PFOS and PFHxS	0.22 - 0.27		
	PFOA	<0.01		
SW192	PFOS	0.07	NS	NS
	PFOS and PFHxS	0.16 – 0.18		
	PFOA	<0.01		
SW193	PFOS	<0.01 – 0.26	NS	NS
	PFOS and PFHxS	<0.01 – 0.26		
	PFOA	<0.01		
SW288	PFOS	0.02 - 0.17	NS	NS
	PFOS and PFHxS	0.02 - 0.19		
	PFOA	<0.001		
New Maximum		New Minimum		New Exceedance

Notes:

NS: Not Sampled – Refer to Section 3.6 for details

7.3.3.2 Central Drainage Channel

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the off-site Central Drainage Channel pathway area surface water monitoring locations are presented in Table 7-16. Tabulated analytical data is provided in Table 1, Appendix D.

It is noted that all locations were dry; therefore, the results have not been plotted.

Table 7-16 Central Drainage Channel Surface Water PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
SW291	PFOS	0.038	NS	NS
	PFOS and PFHxS	0.040		
	PFOA	<0.001		
SW293	PFOS	0.050	NS	NS
	PFOS and PFHxS	0.050		
	PFOA	<0.001		
SW227	PFOS	0.11	NS	NS
	PFOS and PFHxS	0.11		
	PFOA	<0.01		
New Maximum		New Minimum		New Exceedance

Notes:

NS: Not Sampled – Refer to Section 3.6 for details

7.3.3.3 Southern Drainage Channel

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the off-site Southern Drainage Channel pathway area surface water monitoring locations are presented in Table 7-17. Tabulated analytical data is provided in Table 1, Appendix D.

It is noted that all locations were dry; therefore, the results have not been plotted.

Table 7-17 Southern Drainage Channel Surface Water PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
SW199	PFOS	<0.01 – 0.04	NS	NS
	PFOS and PFHxS	<0.01 – 0.04		
	PFOA	<0.01		
SW200	PFOS	<0.01 - 0.003	NS	NS
	PFOS and PFHxS	<0.01 - 0.003		
	PFOA	<0.001 - <0.01		
SW298	PFOS	<0.01 - 0.005	NS	NS
	PFOS and PFHxS	<0.01 - 0.005		
	PFOA	<0.001 - <0.01		
New Maximum		New Minimum		New Exceedance

Note:

NS: Not Sampled – Refer to Section 3.6 for details

7.3.4 WAPET Creek Receptor Area

The WAPET Creek receptor area is divided into two areas:

- > WAPET Creek Northern Reach; and

> WAPET Creek Southern Reach.

The surface water results for these areas are discussed in the following sections.

7.3.4.1 WAPET Creek Northern Reach Receptor Area

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the WAPET Creek Northern Reach receptor area surface water monitoring locations are presented in Table 7-18. Tabulated analytical data is provided in Table 1, Appendix D. It is noted that the monitoring locations predominantly recorded concentrations below the laboratory LOR during the monitoring events, and therefore, the results have not been plotted.

During the monitoring period all sampling locations reported concentrations below the laboratory LOR or detectable concentrations were within the historical range. No first-time detections, or new exceedance of a guideline value were reported during the November 2022 – October 2023 monitoring period.

Table 7-18 WAPET Creek Northern Reach Surface Water PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
SW001	PFOS	<0.01 – 0.01	<0.01	<0.01
	PFOS and PFHxS	<0.01 – 0.01	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01
SW209	PFOS	<0.001 - 0.12	<0.01	<0.01
	PFOS and PFHxS	<0.001 - 0.12	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
SW210	PFOS	<0.001 - 0.06	<0.01	<0.01
	PFOS and PFHxS	<0.001 - 0.06	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
SW211	PFOS	<0.001 - 0.06	<0.01	0.06
	PFOS and PFHxS	<0.001 – 0.06	<0.01	0.06
	PFOA	<0.001	<0.01	<0.01
SW300	PFOS	<0.001 - 0.02	<0.01	0.01
	PFOS and PFHxS	<0.001 - 0.02	<0.01	0.01
	PFOA	<0.001	<0.01	<0.01
SW301	PFOS	<0.01 - 0.034	<0.01	NS
	PFOS and PFHxS	<0.01 - 0.034	<0.01	
	PFOA	<0.001	<0.01	
SW302	PFOS	<0.01 - 0.22	<0.01	<0.01
	PFOS and PFHxS	<0.01 - 0.22	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
SW303	PFOS	<0.01 - 0.12	<0.01	<0.01
	PFOS and PFHxS	<0.01 - 0.12	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
SW304	PFOS	<0.01 - 0.17	<0.01	<0.01
	PFOS and PFHxS	<0.01 - 0.18	<0.01	<0.01
	PFOA	<0.01 - 0.003	<0.01	<0.01
New Maximum		New Minimum	New Exceedance	

Note: NS: Not Sampled – Refer to Section 3.6 for details

7.3.4.2 WAPET Creek Southern Reach receptor area

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the WAPET Creek Southern Reach receptor area surface water monitoring locations are presented in Table 7-19. Tabulated analytical data is provided in Table 1, Appendix D.

It is noted that the sample locations recorded concentrations below the laboratory LOR during the monitoring events and therefore the results have not been plotted.

Table 7-19 WAPET Creek Southern Reach Surface Water PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2022 (µg/L)	Jun 2023 (µg/L)
SW205	PFOS	<0.001	<0.01	NS
	PFOS and PFHxS	<0.001	<0.01	
	PFOA	<0.001	<0.01	
SW207	PFOS	<0.001 - 0.05	<0.01	<0.01
	PFOS and PFHxS	<0.001 - 0.05	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
SW208	PFOS	<0.001	<0.01	<0.01
	PFOS and PFHxS	<0.001	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
SW305	PFOS	<0.001 - 0.02	<0.01	<0.01
	PFOS and PFHxS	<0.001 - 0.02	<0.01	<0.01
	PFOA	<0.001	<0.01	<0.01
New Maximum		New Minimum	New Exceedance	

Note:

NS: Not Sampled – Refer to Section 3.6 for details

7.4 Sediment/Surface Soil

The monitoring of sediment/surface soil across the Management Area assesses the PFAS extent and changes in surface water source areas migrating to WAPET Creek and assists in determining changes attributable to seasonal fluctuations. Sediment/surface soil has been sampled periodically since February 2018.

7.4.1 On-site Pathway Area

The on-site pathway area for sediment/surface soil are the on-site drains. A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the reporting period and the historical concentration ranges for the on-site pathway area sediment/surface soil sampling locations are presented in Table 7-20. Tabulated analytical data is provided in Table 2, Appendix D.

New minimum and maximum concentrations were recorded in sediment/surface soil sampling locations across the on-site pathway area. The concentrations remained within the same order of magnitude as historical data with the exception of SS174, SS231, SS234 and SS277 which reported new PFOS and PFOS+PFHxS minimums with an order of magnitude change.

Table 7-20 On-site pathway area Sediment/Surface Soil PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (mg/kg)	Nov 2022 (mg/kg)	Jun 2023 (mg/kg)
SS108	PFOS	0.0006 – 0.0207	0.0040	0.0005
	PFOS and PFHxS	0.0006 – 0.0207	0.0040	0.0005
	PFOA	<0.0001	<0.0002	<0.0002
SS113	PFOS	0.0002 – 0.1	0.0233	<0.0002
	PFOS and PFHxS	0.0002 – 0.1	0.0233	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
SS114	PFOS	<0.0002 – 0.0390	0.0003	<0.0002
	PFOS and PFHxS	<0.0002 – 0.0390	0.0012	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
SS121	PFOS	0.011 – 0.8400	0.0681	0.100
	PFOS and PFHxS	0.011 – 0.8400	0.0681	0.100
	PFOA	<0.0001 – 0.0022	<0.0002	<0.0002
SS122	PFOS	0.0056 – 0.0452	0.0863	<0.0002
	PFOS and PFHxS	0.0069 – 0.0452	0.0863	<0.0002
	PFOA	<0.0001 – 0.0004	<0.0002	<0.0002
SS123	PFOS	0.0344 – 0.1270	0.0274	0.0090
	PFOS and PFHxS	0.0344 – 0.1270	0.0279	0.0092
	PFOA	<0.0001	<0.0002	<0.0002
SS124	PFOS	0.0022 - 0.365	0.0662	<0.0002
	PFOS and PFHxS	0.0022 - 0.365	0.0662	<0.0002
	PFOA	<0.0001 – 0.0004	<0.0002	<0.0002
SS125	PFOS	0.0005 - 0.1410	0.0282	<0.0002
	PFOS and PFHxS	0.0005 - 0.1410	0.0282	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
SS157	PFOS	0.0007 – 0.0322	0.0038	0.0076
	PFOS and PFHxS	0.0007 – 0.0322	0.0038	0.0083
	PFOA	<0.0002 - 0.0021	<0.0002	<0.0002
SS166	PFOS	0.0004 - 0.0022	0.0003	0.0027
	PFOS and PFHxS	0.0004 - 0.0022	0.0003	0.0027
	PFOA	<0.0001	<0.0002	<0.0002
SS168	PFOS	0.0004 - 0.0022	0.0004	0.0013
	PFOS and PFHxS	0.0004 - 0.0022	0.0007	0.0013
	PFOA	<0.0001	<0.0002	<0.0002
SS170	PFOS	0.0008 - 0.0055	0.0050	0.0040
	PFOS and PFHxS	0.0008 - 0.0055	0.0050	0.0040
	PFOA	<0.0001	<0.0002	<0.0002
SS174	PFOS	0.011 – 0.2450	0.0013	0.0086
	PFOS and PFHxS	0.011 - 0.2450	0.0013	0.0086
	PFOA	<0.0001	<0.0002	<0.0002
SS176	PFOS	0.0005 – 0.0243	0.0011	0.0003
	PFOS and PFHxS	0.0005 – 0.0243	0.0011	0.0003

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (mg/kg)	Nov 2022 (mg/kg)	Jun 2023 (mg/kg)
SD219	PFOA	<0.0001	<0.0002	<0.0002
	PFOS	0.0001 - 0.0384	0.0031	0.0019
	PFOS and PFHxS	0.0001 - 0.0384	0.0031	0.0019
	PFOA	<0.0001	<0.0002	<0.0002
SS231	PFOS	0.0022 – 0.0832	0.0181	<0.0002
	PFOS and PFHxS	0.0024 – 0.0836	0.0181	<0.0002
	PFOA	<0.0001– 0.0004	<0.0002	<0.0002
SS234	PFOS	0.0082 – 0.0700	0.0593	0.0008
	PFOS and PFHxS	0.0082 – 0.0700	0.0593	0.0008
	PFOA	0.0002 – 0.0014	0.0002	<0.0002
SS235	PFOS	0.0004 – 0.0760	0.0554	0.0713
	PFOS and PFHxS	0.0004 – 0.0760	0.0570	0.0720
	PFOA	<0.0002 - 0.0005	0.0003	<0.0002
SS243	PFOS	0.0051 – 0.0760	0.0104	0.0202
	PFOS and PFHxS	0.0051 – 0.0760	0.0104	0.0202
	PFOA	<0.0001	<0.0002	<0.0002
SS265	PFOS	0.0003 – 0.0161	0.0040	<0.0002
	PFOS and PFHxS	0.0003 – 0.0165	0.0040	<0.0002
	PFOA	<0.0001– 0.0003	<0.0002	<0.0002
SS277	PFOS	0.0012 – 0.0703	0.0043	<0.0002
	PFOS and PFHxS	0.0012 – 0.0703	0.0043	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
SS278	PFOS	0.0003 - 0.0494	0.0018	<0.0002
	PFOS and PFHxS	0.0003 - 0.0494	0.0018	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
SS279	PFOS	0.0003 - 0.0074	0.0022	0.0102
	PFOS and PFHxS	0.0003 - 0.0086	0.0022	0.0102
	PFOA	<0.0001	<0.0002	<0.0002
New Maximum		New Minimum		

7.4.2 Off-site Pathway Areas

The Off-site pathway areas for sediment/surface soil are identified as:

- > Northern Drainage Channel;
- > Central Drainage Channel; and
- > Southern Drainage Channel.

7.4.2.1 Northern Drainage Channel

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the Northern Drainage Channel sediment/surface soil sampling locations are presented in Table 7-21. Tabulated analytical data is provided in Table 2, Appendix D.

A new concentration minimum for PFOS+PFHxS was reported at SS189 in June 2023 (within same order of magnitude as historical dataset).

Table 7-21 Northern Drainage Channel Sediment/Surface Soil PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (mg/kg)	Nov 2022 (mg/kg)	June 2023 (mg/kg)
SS189	PFOS	0.0003 – 0.0109	0.0034	0.0003
	PFOS and PFHxS	0.0005 – 0.0111	0.0034	0.0003
	PFOA	<0.0001 - 0.0003	<0.0002	<0.0002
SS190	PFOS	0.0019 - 0.0349	0.0078	0.0114
	PFOS and PFHxS	0.0019 - 0.0355	0.0078	0.0114
	PFOA	<0.0001	<0.0002	<0.0002
SS192	PFOS	<0.0001 - 0.0046	<0.0002	0.0005
	PFOS and PFHxS	<0.0001 - 0.0046	<0.0002	0.0005
	PFOA	<0.0001	<0.0002	<0.0002
SS193	PFOS	<0.0002 – 0.0026	0.0014	0.0005
	PFOS and PFHxS	<0.0002 – 0.0026	0.0014	0.0005
	PFOA	<0.0001	<0.0002	<0.0002
SS288	PFOS	<0.0002 – 0.0274	0.0012	0.0007
	PFOS and PFHxS	<0.0002 – 0.0274	0.0012	0.0007
	PFOA	<0.0001	<0.0002	<0.0002
New Maximum			New Minimum	

7.4.2.2 Central Drainage Channel

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the Central Drainage Channel sediment/surface soil sampling locations are presented in Table 7-22. Tabulated analytical data is provided in Table 2, Appendix D. There were no new maximum concentrations reported during the monitoring period.

Table 7-22 Central Drainage Channel Sediment/Surface Soil PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (mg/kg)	Nov 2022 (mg/kg)	June 2023 (mg/kg)
SS198	PFOS	<0.0002 – 0.0047	<0.0002	<0.0002
	PFOS and PFHxS	<0.0002 – 0.0047	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
SS291	PFOS	0.0004 – 0.0101	<0.0002	<0.0002
	PFOS and PFHxS	0.0004 – 0.0103	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
SS292	PFOS	<0.0002 – 0.0025	0.0005	<0.0002
	PFOS and PFHxS	<0.0002 – 0.0025	0.0005	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
SS293	PFOS	0.0005 – 0.0106	<0.0002	<0.0002
	PFOS and PFHxS	0.0005 – 0.0106	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
New Maximum			New Minimum	

7.4.2.3 Southern Drainage Channel

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the Southern Drainage Channel sediment/surface soil sampling locations are presented in Table 7-23. Tabulated analytical data is provided in Table 2, Appendix D. A new maximum concentration was reported at SS298 for PFOS and PFOS+PFHxS, with concentrations within the same order of magnitude as the historical dataset.

Table 7-23 Southern Drainage Channel Sediment/Surface Soil PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (mg/kg)	Nov 2022 (mg/kg)	Jun 2023 (mg/kg)
SD199	PFOS	<0.0002 – 0.0013	<0.0002	0.0007
	PFOS and PFHxS	<0.0002 – 0.0013	<0.0002	0.0007
	PFOA	<0.0001	<0.0002	<0.0002
SD200	PFOS	<0.0001 - 0.0004	<0.0002	<0.0002
	PFOS and PFHxS	<0.0001 - 0.0004	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
SS298	PFOS	<0.0001 – 0.0004	<0.0002	0.0005
	PFOS and PFHxS	<0.0001 – 0.0004	<0.0002	0.0005
	PFOA	<0.0001	<0.0002	<0.0002
New Maximum		New Minimum		

7.4.3 WAPET Creek Receptor Area

The WAPET Creek receptor area is divided into two areas:

- > WAPET Creek Northern Reach; and
- > WAPET Creek Southern Reach.

The results for these areas are discussed in the following sections.

7.4.3.1 WAPET Creek Northern Reach

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the WAPET Creek Northern Reach sediment sampling locations are presented in Table 7-24. Tabulated analytical data is provided in Table 2, Appendix D.

New maximum concentrations for PFOS and PFOS+PFHxS were reported during the June 2023 monitoring event at SD300 and SD301.

Table 7-24 WAPET Creek Northern Reach Sediment/Surface Soil PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (mg/kg)	Nov 2022 (mg/kg)	Jun 2023 (mg/kg)
SD209	PFOS	<0.0001 – 0.0016	<0.0002	<0.0002
	PFOS and PFHxS	<0.0001 – 0.0016	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
SD210	PFOS	<0.0002 – 0.0016	0.0006	0.0004
	PFOS and PFHxS	<0.0002 – 0.0017	0.0006	0.0004
	PFOA	<0.0001	<0.0002	<0.0002
SD211	PFOS	<0.0002 – 0.0020	<0.0002	<0.0002
	PFOS and PFHxS	<0.0002 – 0.0020	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
SD301	PFOS	<0.0002 – 0.0018	0.0003	0.0114
	PFOS and PFHxS	<0.0002 – 0.0018	0.0003	0.0114
	PFOA	<0.0002	<0.0002	<0.0002
SD302	PFOS	<0.0001 - 0.0013	<0.0002	<0.0002
	PFOS and PFHxS	<0.0001 - 0.0013	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
SD300	PFOS	<0.0001 - 0.0087	0.0008	0.0304
	PFOS and PFHxS	<0.0001 - 0.0087	0.0008	0.0304
	PFOA	<0.0001	<0.0002	<0.0002
New Maximum			New Minimum	

7.4.3.2 WAPET Creek Southern Reach

A summary of the PFOA, PFOS and PFOS+PFHxS concentrations for the monitoring period and the historical concentration ranges for the WAPET Creek Southern Reach sediment/surface soil sampling locations are presented in Table 7-25. Tabulated analytical data is provided in Table 2, Appendix D.

> SS301 reported a first-time detection of PFOS and PFOS+PFHxS in June 2023.

Table 7-25 WAPET Creek Southern Reach Sediment/Surface Soil PFOA, PFOS and PFOS+PFHxS Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (mg/kg)	Nov 2021 (mg/kg)	Jun 2022 (mg/kg)
SD205	PFOS	<0.0001	<0.0002	<0.0002
	PFOS and PFHxS	<0.0001	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
SD208	PFOS	<0.0001	<0.0002	<0.0002
	PFOS and PFHxS	<0.0001	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002
SS301	PFOS	<0.0001	<0.0002	0.0034*
	PFOS and PFHxS	<0.0001	<0.0002	0.0034*
	PFOA	<0.0001	<0.0002	<0.0002
New Maximum			New Minimum	

Note: * Duplicate result adopted as a conservative approach

8 Interpretive Analysis

This section provides a high-level interpretation of the nature and extent of PFAS within the Management Area based on the assessment of the data collected to date, supported by statistical analysis to evaluate whether changes have occurred to the understanding of the risk posed by PFAS in the Management Area.

8.1 Groundwater

Groundwater elevations and flow direction for the monitoring period were consistent with historical data. The groundwater is interpreted to be flowing towards an area of groundwater depression that lies between the site and the coast, with there being very little net flow to surface waters further to the east (Figures 5 and 6, Appendix A).

The groundwater table was observed to be deeper during the June 2023 monitoring event than the November 2022 event (refer to Table 7-2). This can be related to a lack of groundwater recharge via rainfall infiltration during the wet season (January – April) in the Exmouth area. These observations are consistent with the DSI (GHD, 2018) and previous OMP reports (Cardno, 2020-2024). The June 2023 RWLs were lower than reported in previous monitoring periods for this time of year, likely due to the lack of rainfall reported in the 2023 wet season.

A total of 49 monitoring wells were monitored for PFAS during the monitoring period. The findings are summarised in the following sections and the PFOS+PFHxS, and PFOA results are displayed in (Appendix A):

- > Figures 7 and 9 for the November 2022 event; and
- > Figures 8 and 10 for the June 2023 event.

Trends in groundwater concentrations over time have been assessed using the Mann-Kendall trend test to assess the PFAS concentrations stability. A minimum of four results per monitoring location are required to calculate a potential trend (i.e., increasing, stable or decreasing). The Mann Kendall statistical analysis relies on several statistical metrics, including:

- > The Mann Kendall '**S**' **Statistic** indicates whether concentration trend versus time is generally decreasing ($S < 0$) or increasing ($S > 0$). Where the value is zero, there is no overall trend.
- > The **Confidence Factor (CF)** value indicates the degree of confidence in the trend result as in "Decreasing" vs. "Probably Decreasing" or "Increasing" vs. "Probably Increasing". A CF between 90% and 95% indicate a "Probably" increasing or decreasing trend, when $CF > 95\%$ the data demonstrate a strong trend, either "Increasing" or "Decreasing".
- > The **Coefficient of Variation (CoV)** is used to distinguish between a 'No Trend' result and a 'Stable' result for a dataset with no significant increasing or decreasing trend.

For practicality, GSI (2012) outlines that a "No trend" result can be considered as evidence that concentrations are neither increasing or decreasing at the relevant sampling location, similar to a "Stable" trend result.

Mann Kendall statistical analysis results are presented in Appendix D and summarised in the following sections. The outcomes of the Mann-Kendall statistical analysis are to be read in conjunction with the associated confidence factors and the spatial location of the monitoring wells to assess PFAS concentrations stability.

8.1.1 On-site Source Areas

Overall, the PFAS concentrations for the on-site source area monitoring wells are consistent between each biannual monitoring event and historical recorded concentrations.

In previous monitoring periods, the greatest PFAS concentrations were generally reported at monitoring wells MW238, MW151 and MW148S within Source Area 2 – Fuel Farm and MW163, MW211 and MW233 within Source Area 1 – Maintenance Area. The lowest PFAS concentrations have been reported at up-gradient wells MW159, MW113 and MW114. The November 2022 to October 2023 monitoring period reported similar results, with the greatest PFOA, PFOS and PFOS+PFHxS concentrations reported at MW148S in November 2022 and MW233 in June 2023 and concentrations below the LOR at MW159, MW113 and MW114.

Exceedances of the adopted assessment criteria were generally consistent with previous monitoring periods. All PFOS concentrations recorded above the laboratory LOR are considered to exceed the HEPA (2020) 99% species protection level for fresh and marine water, as the criterion of 0.00023 µg/L is lower than the laboratory LOR. The FW99% was exceeded for PFOS at all monitoring wells within Source Area 1 and Source Area 2 except for the up-gradient monitoring wells, MW159, MW113 and MW114. A number of wells across both source areas have consistently reported PFOS+PFHxS concentrations above the HEPA (2020) recreational use criteria (2.0 µg/L):

- > Source Area 1 – Maintenance Area – MW162, MW163, MW164, MW211 and MW233; and
- > Source Area 2 – Fuel Farm – MW148S, MW148D, MW238 and MW151.

There were no PFOA exceedances of the recreational water or FW99% criteria in either source areas. PFOA was reported above the LOR at all wells across Source Areas 1 and 2, with the exception of MW113, MW114 (up-gradient of Source Area 1), MW165 (Source Area 1) and MW159 (up-gradient of Source Area 2). PFOA concentrations are only reported above the LOR at wells within or at proximity of the source areas confirming the CSM understanding that PFAS movement with groundwater is not a primary migration pathway.

There were no new exceedances or first-time detections reported for the November 2022 to October 2023 monitoring period. Multiple new concentration maximums were reported for PFOS, PFOS+PFHxS and PFOA over the monitoring period, with all wells reporting concentrations within the same order of magnitude as the historical maximums.

Overall, the PFAS concentrations at the source area monitoring wells appear relatively stable since the start of OMP implementation. Mann Kendall statistical analysis was undertaken to provide further evidence in regard to PFAS concentrations stability. As no seasonality is observed in the data, it is considered that the Mann-Kendall test is applicable. Mann Kendall statistical analysis outputs are presented in Appendix D. Potential trends for concentrations of PFOA, PFOS and PFOS+PFHxS in groundwater across Source Areas 1 and 2 are summarised in Table 8-1 with the associated confidence factor.

Table 8-1 Mann-Kendall Trend Analysis Summary – Source Areas 1 and 2

Monitoring Area	Location	PFOA Trend	Statistical Confidence ⁽¹⁾	PFOS Trend	Statistical Confidence ⁽¹⁾	PFOS+PFHxS Trend	Statistical Confidence ⁽¹⁾
Source Area 1 – Maintenance Area	MW018	Increasing	98%	No Trend	46%	Stable	63%
	MW021	Increasing	>99%	Increasing	>99%	Possibly Increasing	92%
	MW112	Stable	8%	Stable	31%	Stable	99%
	MW115	Increasing	99%	Increasing	<99%	Increasing	<99%
	MW162	No Trend	61%	Increasing	96%	Stable	<1%
	MW163	Stable	65%	Stable	53%	Stable	82%
	MW164	Stable	76%	No Trend	75%	Stable	8%
	MW165	No Trend	82%	No Trend	99%	No Trend	84%
	MW166	Stable	8%	No Trend	33%	Stable	8%
	MW167	Stable	<1%	No Trend	94%	No Trend	15%
	MW168	No Trend	75%	Increasing	>99%	No Trend	82%
	MW211	Decreasing	>99%	Stable	<1%	Stable	79%
	MW233	Stable	42%	Stable	42%	No Trend	46%
Source Area 2 – Fuel Farm	MW105	Stable	34%	Stable	<1%	No Trend	47%
	MW148S	No Trend	40%	No Trend	40%	No Trend	<1%
	MW148D	No Trend	15%	No Trend	15%	No Trend	15%
	MW151	Possibly Decreasing	91%	Stable	88%	Decreasing	95%
	MW159	No trend	27%	No Trend	78%	No Trend	82%
	MW238	Stable	54%	Possibly Decreasing	91%	Stable	78%

Notes:

- (1) the statistical confidence is the CF value. CF values greater than 95% indicate a strong trend, and CF values between 90% and 95% indicate a probably increasing/decreasing trend. Values below 90% indicate stable or no trend.
- (2) MW113 and MW114 were not considered in the trend analysis due to all results being below the current LOR (0.01 µg/L)

The Mann-Kendall trend analysis for the Source Area 1 and 2 wells reported stable or no statistically significant trend in most wells, with some exceptions:

- > PFOA trend analysis reported three increasing or possibly increasing trends at down-gradient wells MW018, MW021 and MW115. It is noted that PFOA concentrations recorded during the monitoring period were within the historical concentration range at MW018 and MW021. A decreasing trend was also reported for PFOA in MW211 (Source Area 1) and possibly decreasing in MW151 (Source Area 2).
- > PFOS trend analysis indicates increasing or possibly increasing trends at MW021, MW115, MW162 and MW168 and decreasing/possibly decreasing trends at MW238 (Source Area 2).
- > PFOS+PFHxS trend analysis indicates increasing/possibly increasing trends at MW115 and MW021 (Source Area 1) and decreasing/possibly decreasing trends at MW151 (Source Area 2).

A limited number of monitoring wells across Source Area 1 and 2 are displaying either increasing or decreasing trends dependent on the compound under review, which could indicate slight PFAS depletion/movement or leaching from contaminated soils at the source area. The trends identified are consistent with the previous monitoring period. Overall, the groundwater monitoring results do not suggest a change in the understanding of contamination or risk at these locations. The current management approach (ongoing monitoring) will continue to provide additional data to further evaluate the potential risk.

8.1.2 Pathways and Receptors

The 'pathways' and 'receptors' monitoring locations are the closest to the receiving environment and provide indications of potential PFAS migration and the exposure risk for the marine and other receptors.

PFAS was reported below the LOR at all offsite pathway and receptor wells, with exception of MW138 near the Central Drainage Channel, and MW137 in the offsite receptor area. Both wells are along the Central Drainage Channel and detections of PFAS at these wells could be related to surface water infiltration rather than off-site migration of PFAS with groundwater as the net groundwater flow to the east is limited (refer to Table 2-3). Multiple onsite pathway wells reported PFAS above the LOR, with the greatest PFAS concentrations in groundwater for the pathway areas reported at MW172. It is however noted that this on-site monitoring location is relatively close to the Source Area 1. PFOS was reported above the FW99% criteria (LOR adopted) at MW103 (north of Source Area 2) and MW172 (down-gradient of Source Area 1), MW138 and MW137 (near the Central Drainage Channel). PFOS+PFHxS was above the adopted recreational use criteria at MW172 (on-site, proximal to Source Area 1) and there were no PFOA exceedances of the recreational water or FW99% criteria in any of the monitoring wells.

The PFAS concentrations for the pathway and receptor monitoring wells are generally consistent between each biannual monitoring event and historical concentrations. The November 2022 – October 2023 monitoring data remained of the same order of magnitude as historical results at each monitoring well.

Mann Kendall statistical analysis has been calculated for each well that has sufficient temporal data (i.e., a minimum of four results). Groundwater monitoring data recorded between February 2018 and June 2023 was used for the assessment, with outputs presented in Appendix D. Groundwater concentration trends for PFOA, PFOS and PFOS+PFHxS across the pathway and receptor areas are summarised in Table 8-2.

Table 8-2 Mann-Kendall Trend Analysis Summary – Pathway and receptor areas

Monitoring Area	Location	PFOA Trend	Statistical Confidence ⁽¹⁾	PFOS Trend	Statistical Confidence ⁽¹⁾	PFOS+PFHxS Trend	Statistical Confidence ⁽¹⁾
On-site Pathway	MW102	NA ⁽²⁾	NA ⁽²⁾	No Trend	<1%	No Trend	<1%
	MW103	No Trend	15%	No Trend	75%	No Trend	88%
	MW104	NA ⁽²⁾	NA ⁽²⁾	No Trend	99%	No Trend	80%
	MW122	NA ⁽²⁾	NA ⁽²⁾	No Trend	82%	No Trend	72%
	MW124	No Trend	85%	No trend	84%	No Trend	88%
	MW126	NA ⁽²⁾	NA ⁽²⁾	No Trend	67%	No Trend	66%
	MW170	No Trend	56%	No Trend	75%	No Trend	90%
	MW172	Stable	89%	Stable	15%	Possibly Decreasing	92%
Northern Drainage Channel	MW134	NA ⁽²⁾	NA ⁽²⁾	No Trend	<1%	No Trend	<1%
	MW135	No Trend	84%	No Trend	78%	No Trend	56%
	MW175	No Trend	62%	No Trend	79%	No Trend	79%
Central Drainage Channel	MW138	No Trend	18%	No Trend	53%	No Trend	96%
Southern Drainage Channel	MW139	NA ⁽²⁾	NA ⁽²⁾	No Trend	<1%	No Trend	<1%
Off-site Pathway	MW180	NA ⁽²⁾	NA ⁽²⁾	No Trend	75%	No Trend	75%
	MW181	No Trend	82%	No Trend	75%	No Trend	75%
Off-site Receptor	MW137	NA ⁽²⁾	NA ⁽²⁾	No Trend	<1%	No Trend	<1%
	MW176	NA ⁽²⁾	NA ⁽²⁾	No Trend	44%	No Trend	44%
	MW177	NA ⁽²⁾	NA ⁽²⁾	No Trend	44%	No Trend	44%
	MW178	NA ⁽²⁾	NA ⁽²⁾	No Trend	82%	No Trend	82%
	MW179	NA ⁽²⁾	NA ⁽²⁾	No Trend	82%	No Trend	82%

Notes:

- (1) the statistical confidence is the CF value. CF values greater than 95% indicate a strong trend, and CF values between 90% and 95% indicate a probably increasing/decreasing trend. Values below 90% indicate stable or no trend.
- (2) Trend Not Analysed – no detection above the laboratory LOR. Can be considered “stable” for the purpose of trend analysis.
- (3) MW127, MW140, MW141, MW143, MW144, MW145, MW146 and MW147 were not considered in the trend analysis due to all results being below the current LOR (0.01 µg/L)

The results of the Mann-Kendall trend analysis for PFOA, PFOS and the PFOS+PFHxS in the receptor monitoring wells indicates that the PFAS displays a stable or no statistically significant trend.

The Mann-Kendall trend analysis for PFOA, PFOS and the PFOS+PFHxS in the pathway monitoring wells indicated no trend or stable trends in most wells, with one exception: a possibly decreasing trend for PFOS+PFHxS was reported MW172 located down-gradient to the Source Area 1 - Maintenance Area.

It is noted that the adopted laboratory LOR is different between the DSI (GHD, 2018) (0.001 µg/L) and the OMP (0.01 µg/L). All results at MW127, MW140, MW141, MW143, MW144, MW145, MW146 and MW147 are below the LOR of 0.01 µg/L. The adoption of a higher LOR doesn't impact the understanding of PFAS contamination.

Overall, the groundwater monitoring results do not suggest a change in the understanding of PFAS extent or risk at the pathway and receptor locations. This is supported by the gauging data and inferred groundwater flow direction indicating a very low hydraulic gradient and limited flow/interaction from the site to the Exmouth Gulf.

8.2 Seepage Water

The monitoring of seepage water provides data to assess the potential risk to the Exmouth Gulf environment. The seepage water results for the monitoring period are depicted in Figures 7 to 10, Appendix A. Seepage water is groundwater that is moving to the surface (with groundwater flow and tide effect mechanisms). Monitoring of seepage water is conducted to identify PFAS movement (if any) and potential impact from impacted groundwater beneath the source areas, to down-gradient receptors.

During this monitoring period, PFOA, PFOS and PFOS+PFHxS concentrations were reported below the LOR at all locations, which indicates that the exposure pathway between groundwater and the marine receptor was not complete during the monitoring period.

8.3 Surface Water

The monitoring of surface water across the Management Area assesses the PFAS extent and changes in surface water migrating from the site to WAPET Creek through the drainage channels. No surface water samples were collected within the site drains and off-site drainage channels during the monitoring period due to the lower than average rainfall. No first flush event was undertaken as the first flush trigger wasn't observed. Samples were collected from the WAPET Creek northern reach and southern reach (receptors).

PFOS+PFHxS and PFOA concentrations are displayed in (Appendix A):

- > Figures 7 and 9 for the November 2022 monitoring event;
- > Figures 8 and 10 for the June 2023 monitoring event.

8.3.1 Pathway

Surface water sampling locations were dry in all on-site and off-site pathway monitoring locations, therefore no samples were collected during the monitoring period.

8.3.2 Receptor

PFAS concentrations in surface water samples across the receptor area were predominantly below the laboratory LOR during the monitoring period, except for SW211 and SW300 (WAPET Creek Northern Reach).

No new maximum concentrations or guideline exceedances were reported, and seasonal fluctuations were not observed in the field parameters or analytical data.

8.4 Sediment/Surface Soil

PFAS concentrations in sediment are monitored within the drainage channels (pathway areas on- and off-site) and receptor areas (northern and southern reaches of WAPET Creek) to provide an indication regarding the dispersion and accumulation of PFAS and potential associated direct and indirect exposure risk to receptors.

PFOS+PFHxS concentrations are displayed in (Appendix A):

- > Figure 11 for the November 2022 monitoring event;
- > Figure 12 for the June 2023 monitoring event.

Sediment concentrations across the on-site drains were reported above the laboratory LOR, for at least one PFAS compound, at all sampling locations during the monitoring period. Three locations recorded new PFOS+PFHxS concentration minimums and ten locations recorded new maximums (Section 7.4.1). SS174 (downstream of Source Area 1), SS231 and SS234 (Source Area 2) and SS277 (Source Area 1) reported new minimums with an order of magnitude change which could be related to the lower than average rainfall during the monitoring period.

PFAS concentrations in sediment samples from within WAPET Creek (receptor) were predominantly below the laboratory LOR except for SD210, SD301 and SD300 in the northern reach and SS301 in the southern reach. The PFAS concentrations detected in WAPET Creek are likely related to PFAS that had mobilised from the source areas with surface water during previous wet seasons as limited rainfall was observed during November 2022 – October 2023.

New concentration maximums for PFOS and PFOS+PFHxS were reported during the June 2023 monitoring event at SD300 and SD301 in the northern reach and SS301 in the southern reach. No change in the order of magnitude of the results in WAPET Creek was observed. It is noted that the observed increase in sediment concentrations was not reflected in the co-located surface water samples.

It is considered that there is no significant change to the risk profile associated with sediments/surface soils within the Management Area.

9 Conceptual Site Model

The evaluation of analytical results within this report does not suggest the nature and extent of PFAS in groundwater, surface water or sediment has significantly changed compared to that inferred from previous data despite the identified fluctuations in PFAS concentrations at individual locations.

The understanding of on-site source areas presented in the investigation phase (GHD, 2018) is supported by the OMP monitoring data presented in this report and previous OMP reports. PFAS concentrations in groundwater within the source areas remained within the same order of magnitude as historical data. The data collected to date indicated no change to the understanding of the source areas.

The pathways for PFAS exposure and risks to human health and ecological receptors presented in the investigation phase (GHD, 2018) and ERA (GHD, 2019) are considered to still be relevant and data presented in this report does not suggest any significant changes to these mechanisms or risks. The predominant stability in PFAS trends in groundwater within the pathway and receptor monitoring areas suggest the risk profile of these locations do not appear to be changing significantly. The absence of detection of PFAS concentrations above the LOR in seepage water samples indicates the exposure pathway between groundwater and the marine receptor wasn't complete during the monitoring period. The limited occurrence of PFAS detections in groundwater off-site and the location of these detections being near drainage channels suggest groundwater is not the primary migration pathway. Surface water, when present, is likely to be the primary migration pathway for PFAS.

The variability in the data, and relatively low number of samples collected at some key locations to date (i.e., surface water in receptor areas), requires ongoing evaluation which will be completed through continuation of the OMP.

The data presented in this report does not significantly change the understanding of the conceptual site model (CSM) presented in the PMAP.

10 Discussion

10.1 OMP Management Response Triggers

The OMP (Defence, 2019) includes triggers and contingency actions to assess if a more active response is required to manage changes in PFAS contamination. None of the management response triggers were hit during the monitoring period:

- > PFAS was not detected at a pathway or receptor location where it hadn't been previously detected (i.e. no first-time detections were reported during the monitoring period).
- > The average and median PFAS concentrations for each Pathway/Receptor monitoring zones remained of the same order of magnitude as historical data.
- > The average and/or median PFAS concentrations in Pathway/Receptor surface water samples did not exceed assessment criteria.

Ongoing monitoring is considered to still be an appropriate management approach for the site.

10.2 Risk Profile

The outcomes of the ERA undertaken by GHD (GHD, 2019) determined that:

- > PFAS poses a low and acceptable risk to lower trophic level terrestrial and aquatic organisms across the Management Area;
- > PFAS poses a low and acceptable risk with respect to the potential for bioaccumulation and biomagnification in the food chain across the Management Area, including the on-site terrestrial environments, the adjacent saltpan, Exmouth Gulf and the southern reaches of the WAPET Creek; and
- > The PFAS concentrations estimated for fish and benthic fauna in the northern reaches of WAPET Creek marginally exceeded the NEMP avian wildlife diet guideline, designed to evaluate food chain PFAS exposure to bird species. Inherent in this guideline are a number of conservative exposure assumptions, therefore measurable and ecological relevant adverse effects to shorebird populations are considered unlikely to be associated with this exceedance. The weight of available evidence suggests that shorebirds could source a substantial portion of their diet within WAPET Creek with a low risk of chronic adverse PFOS exposures occurring.

It was concluded that the information gathered during the ERA supported the conclusion made in the DSI that PFAS poses a low risk to recreational anglers with respect to bioaccumulation in commonly caught fish species, and that PFAS was unlikely to harm prawn stocks with Exmouth Gulf or to bioaccumulate to potential harmful levels within the commercial prawn catch of the Exmouth Gulf Managed Prawn Fishery (EGMPF).

Based on the monitoring data collected as part of the OMP, there is no significant change to this risk profile and any potential future changes in groundwater, surface water and sediment PFAS concentrations will continue to be evaluated through monitoring and reporting in order to re-assess the risk as required.

10.3 Triggers for OMP Review

The OMP is to be reviewed annually considering existing trend data available to tailor the monitoring program to site-specific characteristics. A review of the OMP may be required for several reasons including (but not limited to):

- > Policy changes, regulatory requirements or regulator advices;
- > Changes or refinements to the monitoring network, frequency and parameters;
- > Feedback and information received as part of stakeholder engagement activities;
- > A change in the understanding of the risk for the site;
- > Significant changes of land use within the Management Area or at close proximity;
- > Impacts of remediation works; and
- > The requirements of a post-remediation Site Management Plan.

The November 2022 – October 2023 monitoring results did not identify a change in the risk profile for the Management Area or further management actions that would trigger the need for an OMP review.

11 Conclusions

Groundwater, surface water, seepage water and sediment sampling were completed between November 2022 and October 2023 in accordance with the PMAP OMP and SAQP (Cardno, 2023). Available historical data was also used for this assessment. The monitoring conducted during the monitoring period has met the objectives of the OMP (refer to Section 1.2) and SAQP (Appendix B).

Overall, the concentrations of PFAS across the media and locations sampled are generally consistent and of the same order of magnitude as historical data. Increasing or decreasing trends were observed at individual groundwater monitoring wells within the source areas. This indicates the source areas continue to contribute to the PFAS load in groundwater through leaching from impacted soils (increasing trends) or PFAS depletion (decreasing trends).

Mann Kendall statistical analysis outcomes for the pathways and receptor monitoring areas indicated that there were mostly stable trends or no statistically significant trends in groundwater for most locations.

The highest PFAS concentrations in groundwater were recorded at the Source Area 2 - Fuel Farm and Source Area 1 – Maintenance Area. However, there is no evidence of a change in PFAS movement towards off-site sensitive receptors. This is supported by the monitoring results and Mann Kendall statistical analysis, the groundwater levels recorded and inferred groundwater flow direction.

No detection of PFAS were recorded in seepage water samples indicating the absence of a migration pathway between groundwater and the marine water of the Exmouth Gulf during the November 2022 – October 2023 monitoring period.

Below average rainfall occurred during the November 2022 – October 2023 monitoring period, which resulted in less surface water samples collected in comparison with previous monitoring years, and no first flush monitoring event being undertaken. However, most surface water locations in the WAPET Creek receptor area were sampled in the November 2022 and June 2023 monitoring events and results were within historical range.

Sediment/surface soil concentrations recorded during the November 2022 – October 2023 monitoring period were generally of the same order of magnitude as historical data. An order of magnitude change was noted with new minimums recorded at three locations within the site drains. This could be related to the lower than average rainfall during the monitoring period.

The nature and extent of PFAS across all media sampled has not changed from the understanding presented in the DSI (GHD, 2018) and previous reports prepared during the ongoing monitoring program. Based on the current available data, there is no significant change to the risk profile of the Management Area.

The current management approach (ongoing monitoring) is considered appropriate for the level of risk (low and acceptable) of the Management Area as the understanding of the CSM remains unchanged, and none of the management response triggers presented in the OMP were met during the monitoring period.

The OMP is currently being reviewed with consideration of the OMP data collected to date to ensure that the ongoing monitoring program continues to appropriately monitor the PFAS extent within the Management Area.

12 References

General References

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2. Australian Standard AS 4482-1999 *Guide to the investigation and sampling of sites with potentially contaminated soils*, Part 2 – Volatile substances.
3. ANZECC and ARMCANZ, 2000, *Australian Water Quality Guidelines for Fresh and Marine Water Quality*.
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6. Contaminated Sites Act 2003, Western Australia.
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10. Department of Water and Environment Regulation (DWER), 2021, *Assessment and Management of Contaminated Sites*.
11. DWER, 2018, *Perth Groundwater Atlas*, (<https://maps.water.wa.gov.au/#/webmap/gwm>).
12. Environmental Protection Agency (United States EPA), November 2002, Reference: EPA/240/R-02/004, *Guidance on Environmental Data Verification and Data Validation*.
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15. National Environment Protection Council (NEPC), 1999, as amended May 2013, *National Environmental Protection (Assessment of Site Contamination) Measure*.
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20. US EPA, 2002, *Guidance on Environmental Data Verification and Data Validation* (EPA QA/G-8).

Site Specific References

21. Aurecon, May 2020, *RAAF Base Learmonth Environmental Site Assessment*.
22. Cardno, April 2020, *PFAS OMP Biannual Monitoring Event Factual Report, RAAF Base Learmonth*.
23. Cardno, May 2020, *PFAS OMP First Flush Sampling Event Factual Report, RAAF Learmonth*.
24. Cardno, December 2020, *PFAS OMP 2020 post-summer Biannual Monitoring Event, RAAF Base Learmonth*.
25. Cardno, June 2021, *2020 Annual Interpretive Report, RAAF Base Learmonth*.

26. Cardno, February 2021, *PFAS OMP 2020 post-winter Biannual Monitoring Event, RAAF Base Learmonth.*
27. Cardno, May 2021, *PFAS OMP 2021 First Flush Sampling Event Factual Report, RAAF Learmonth.*
28. Cardno, August 2021, *PFAS OMP Biannual Monitoring Event Factual Report, RAAF Base Learmonth.*
29. Cardno, April 2022, *PFAS OMP Biannual Monitoring Event Factual Report, RAAF Base Learmonth November 2021.*
30. Cardno, June 2023, *PFAS OMP Sampling and Analysis Quality Plan (SAQP) - RAAF Base Learmonth.*
31. Cardno, September 2022, *PFAS OMP 2022 First Flush Sampling Event Factual Report, RAAF Learmonth.*
32. Cardno, October 2022, *PFAS OMP Biannual Monitoring Event Factual Report, RAAF Base Learmonth June 2022.*
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APPENDIX

A

FIGURES



now



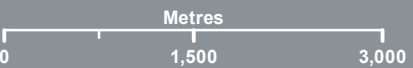


Legend

 Management Area

 RAAF Learmonth

FIGURE 1
1:60,000 Scale at A3



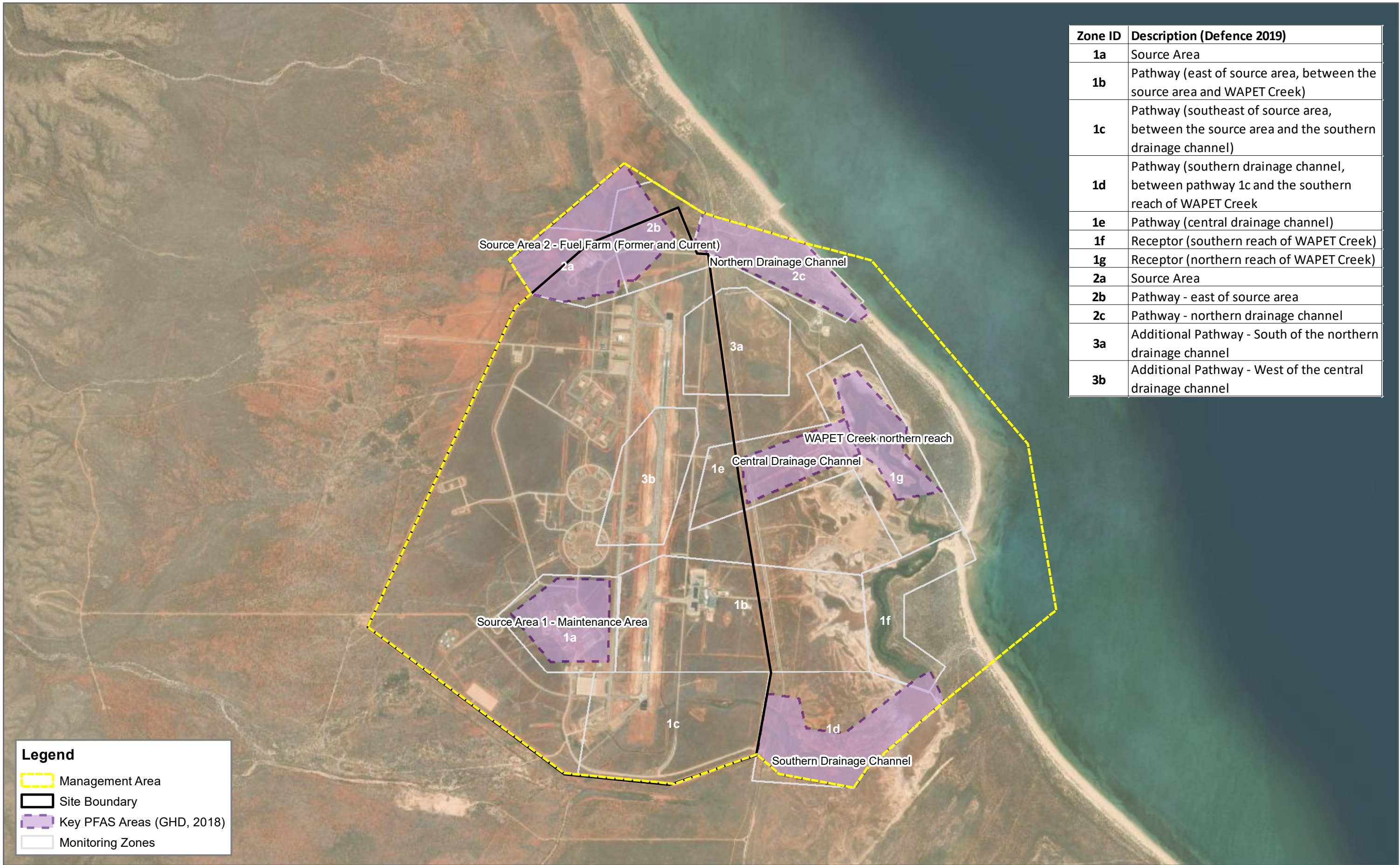
Site Location

2023 ONGOING MONITORING REPORT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



 **Cardno**

Map Produced by Cardno WA
Date: 2024-03-11 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-001_RegionalLocation 02.mxd
Aerial Imagery Supplied by Google Earth



Zone ID	Description (Defence 2019)
1a	Source Area
1b	Pathway (east of source area, between the source area and WAPET Creek)
1c	Pathway (southeast of source area, between the source area and the southern drainage channel)
1d	Pathway (southern drainage channel, between pathway 1c and the southern reach of WAPET Creek)
1e	Pathway (central drainage channel)
1f	Receptor (southern reach of WAPET Creek)
1g	Receptor (northern reach of WAPET Creek)
2a	Source Area
2b	Pathway - east of source area
2c	Pathway - northern drainage channel
3a	Additional Pathway - South of the northern drainage channel
3b	Additional Pathway - West of the central drainage channel

Legend

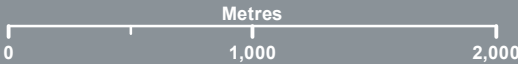
Management Area

Site Boundary

Key PFAS Areas (GHD, 2018)

Monitoring Zones

FIGURE 2
1:31,000 Scale at A3

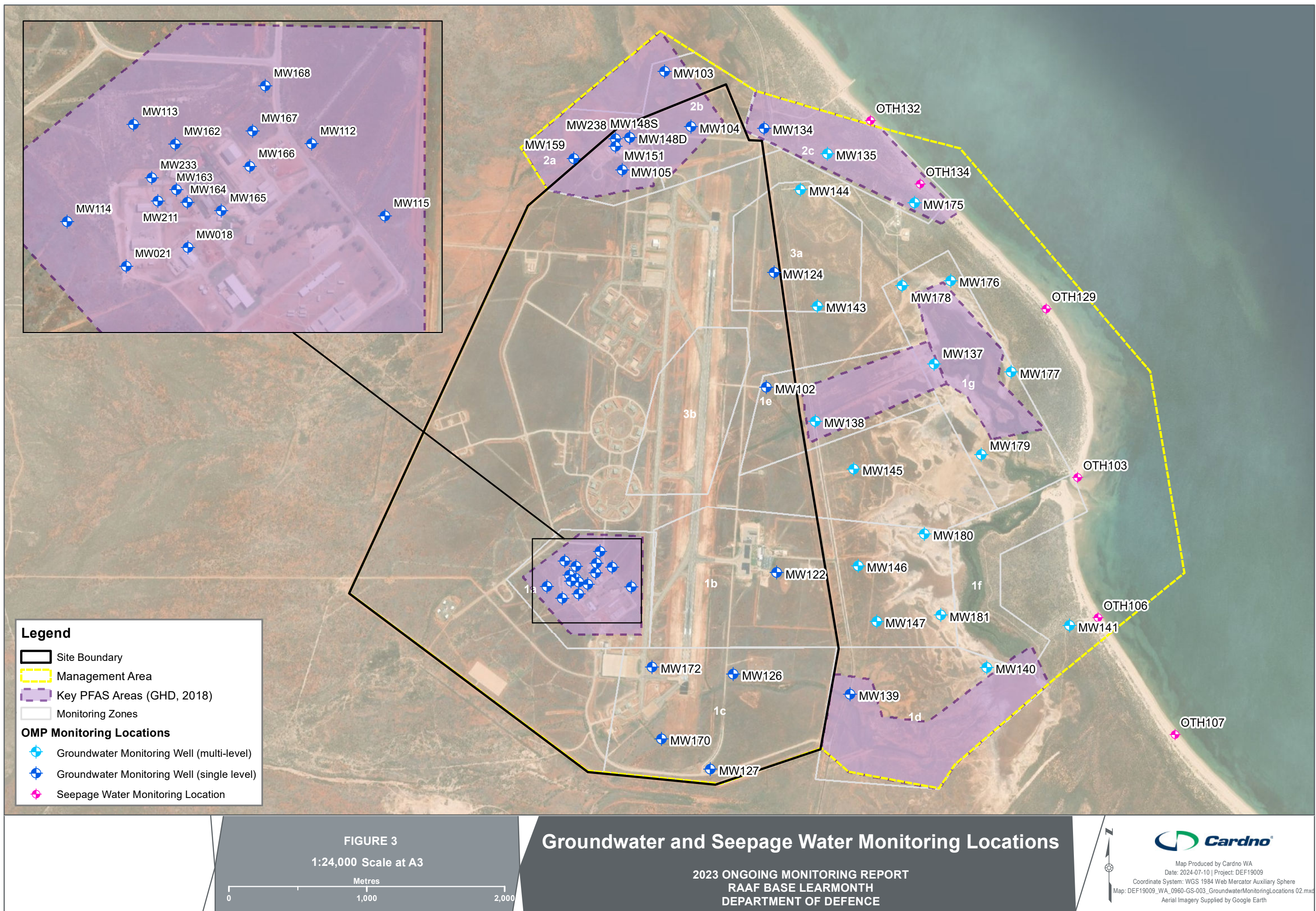


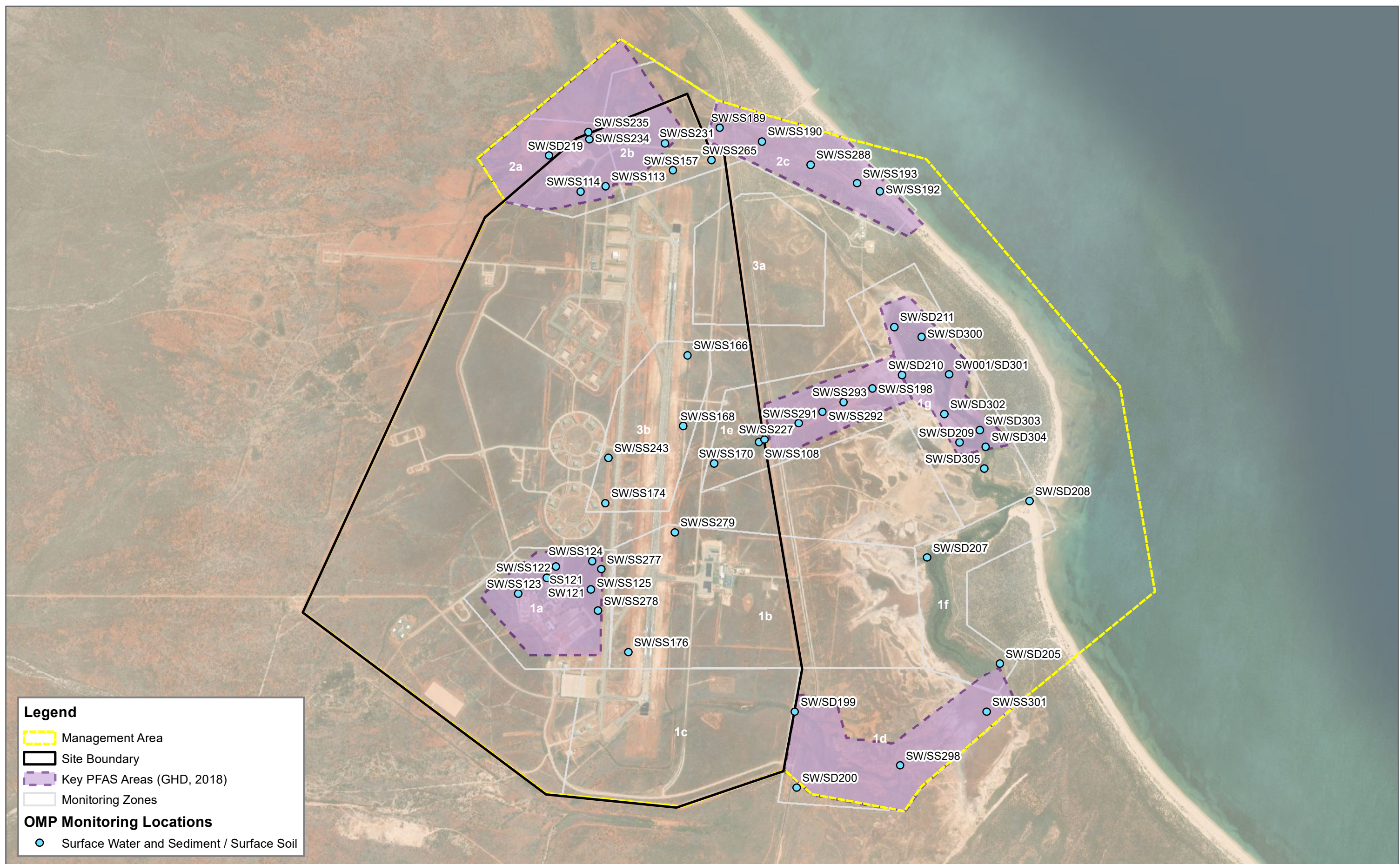
Management Areas & Monitoring Zones

2023 ONGOING MONITORING REPORT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2024-07-10 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-002_ManagementAreas 02.mxd
Aerial Imagery Supplied by Google Earth





Legend

 Management Area

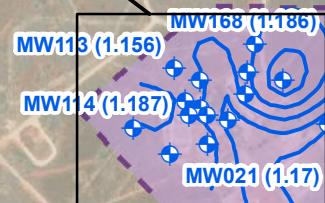
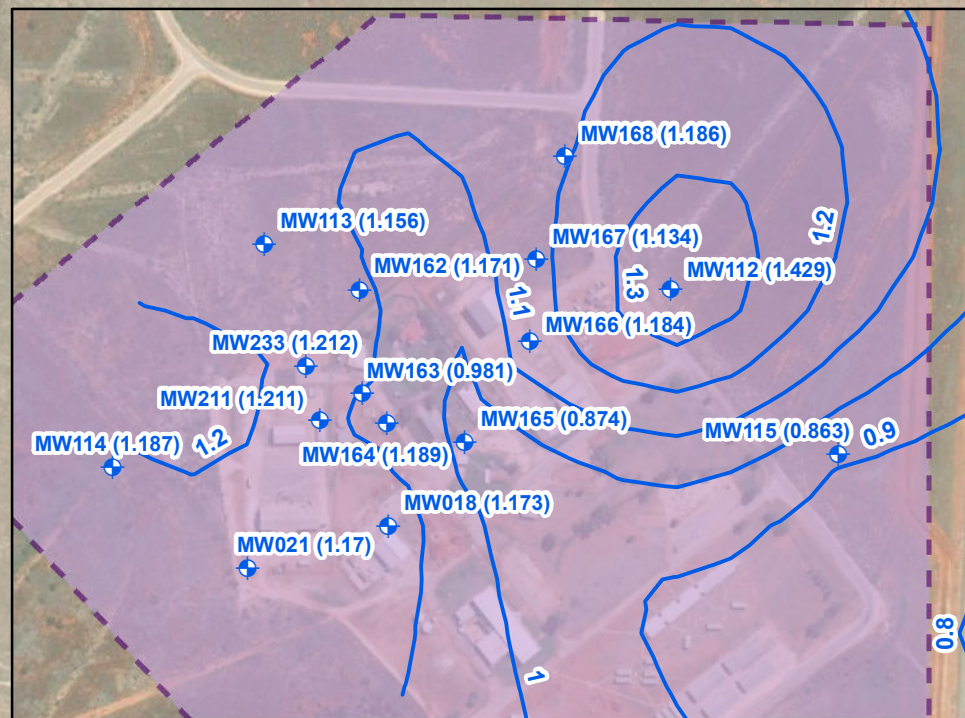
 Site Boundary

Key PFAS Areas (GHD, 2018)

Monitoring Zones

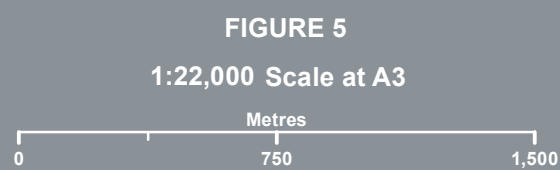
OMP Monitoring Locations

- Surface Water and Sediment / Surface Soil



Legend

- Monitoring Wells (Nov-22 RWL, mAHD)
- Management Area
- Site Boundary
- Key PFAS Areas (GHD, 2018)
- Nov22 Inferred Groundwater Contours (mAHD)
- Groundwater Flow Direction



Inferred Groundwater Contours (Nov-22)

2023 ONGOING MONITORING REPORT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



Map Produced by Cardno WA
Date: 2024-07-10 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0960-GS-005_Nov22GWContours 01.mxd
Aerial Imagery Supplied by Google Earth

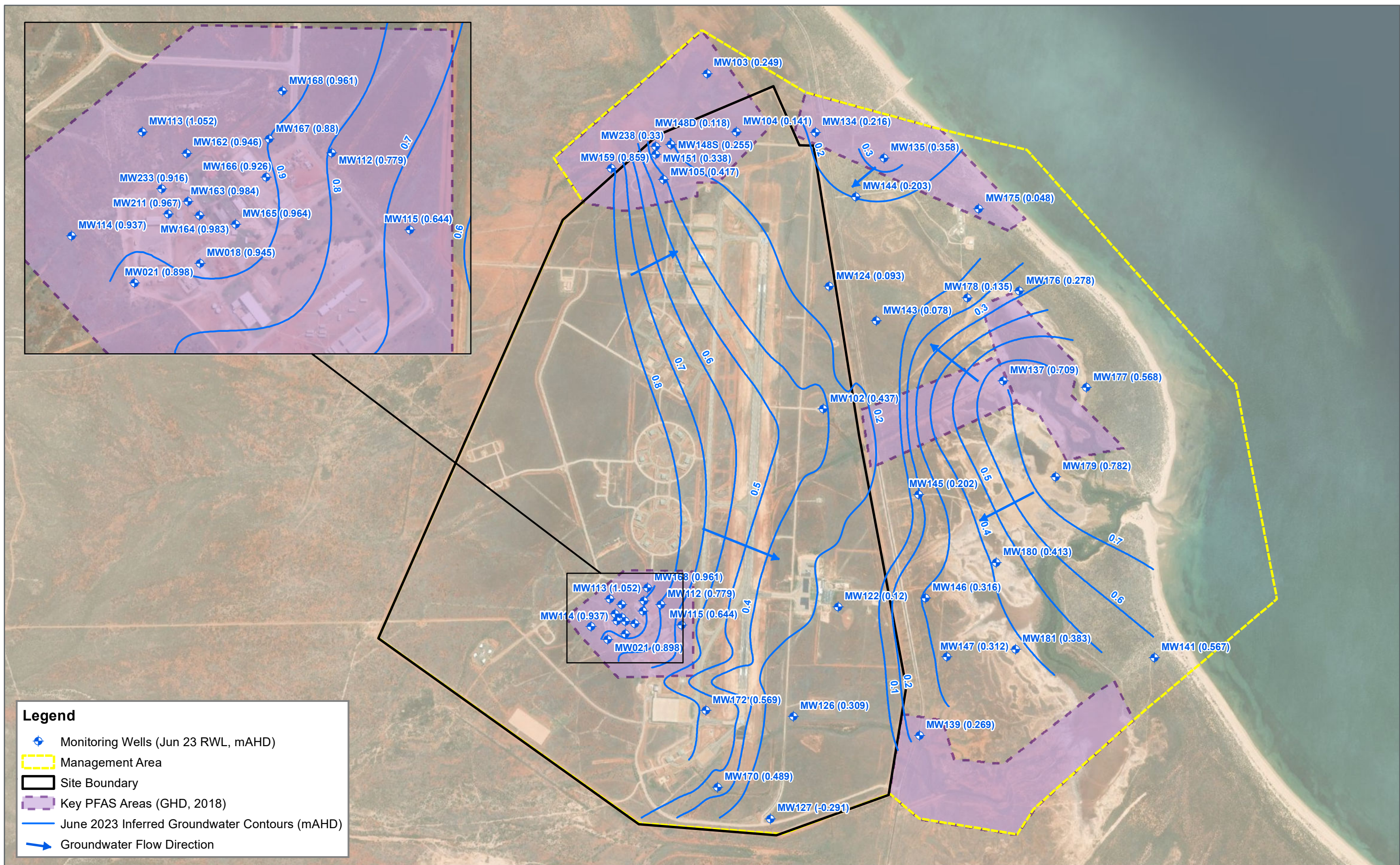


FIGURE 6
1:22,000 Scale at A3

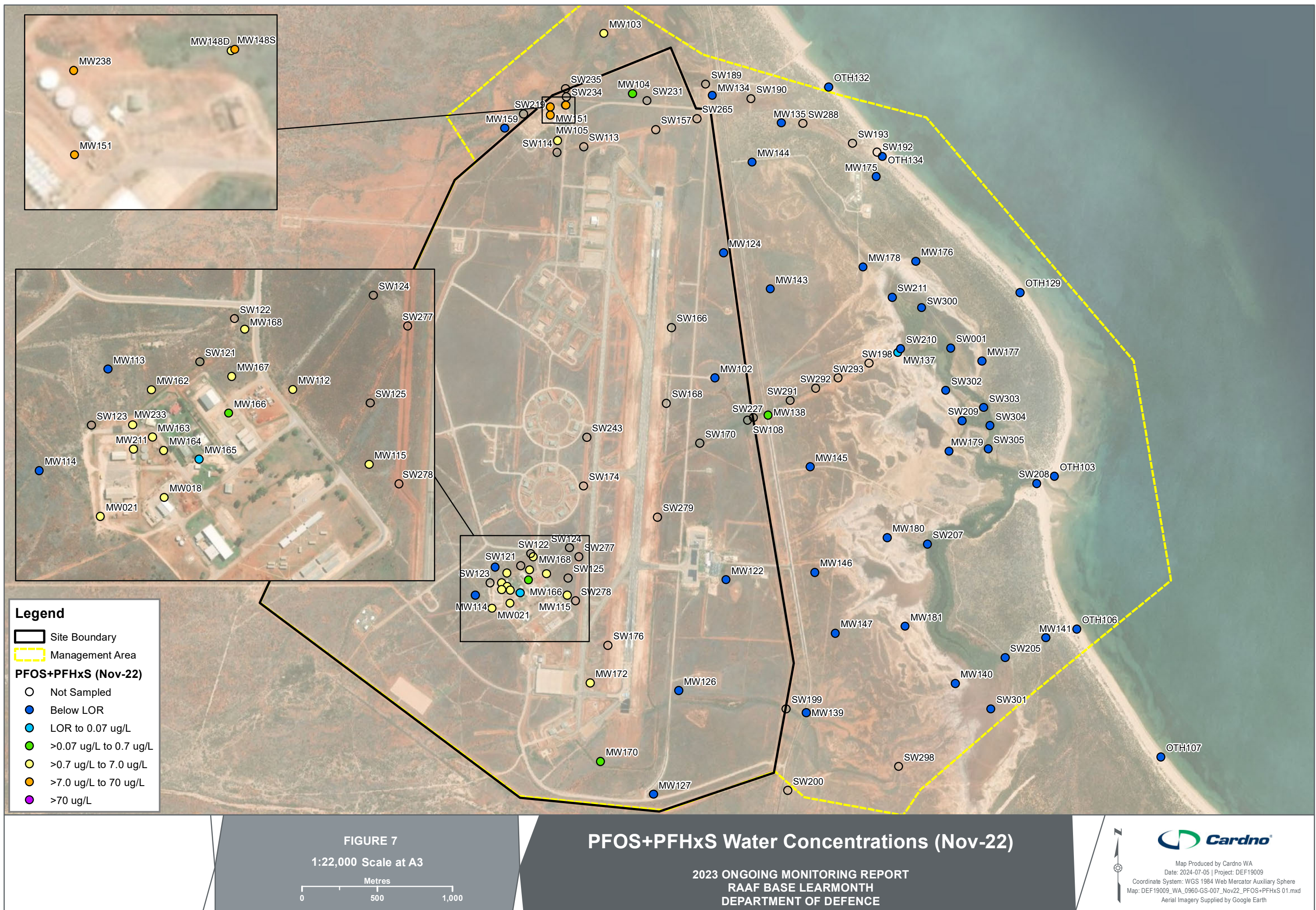
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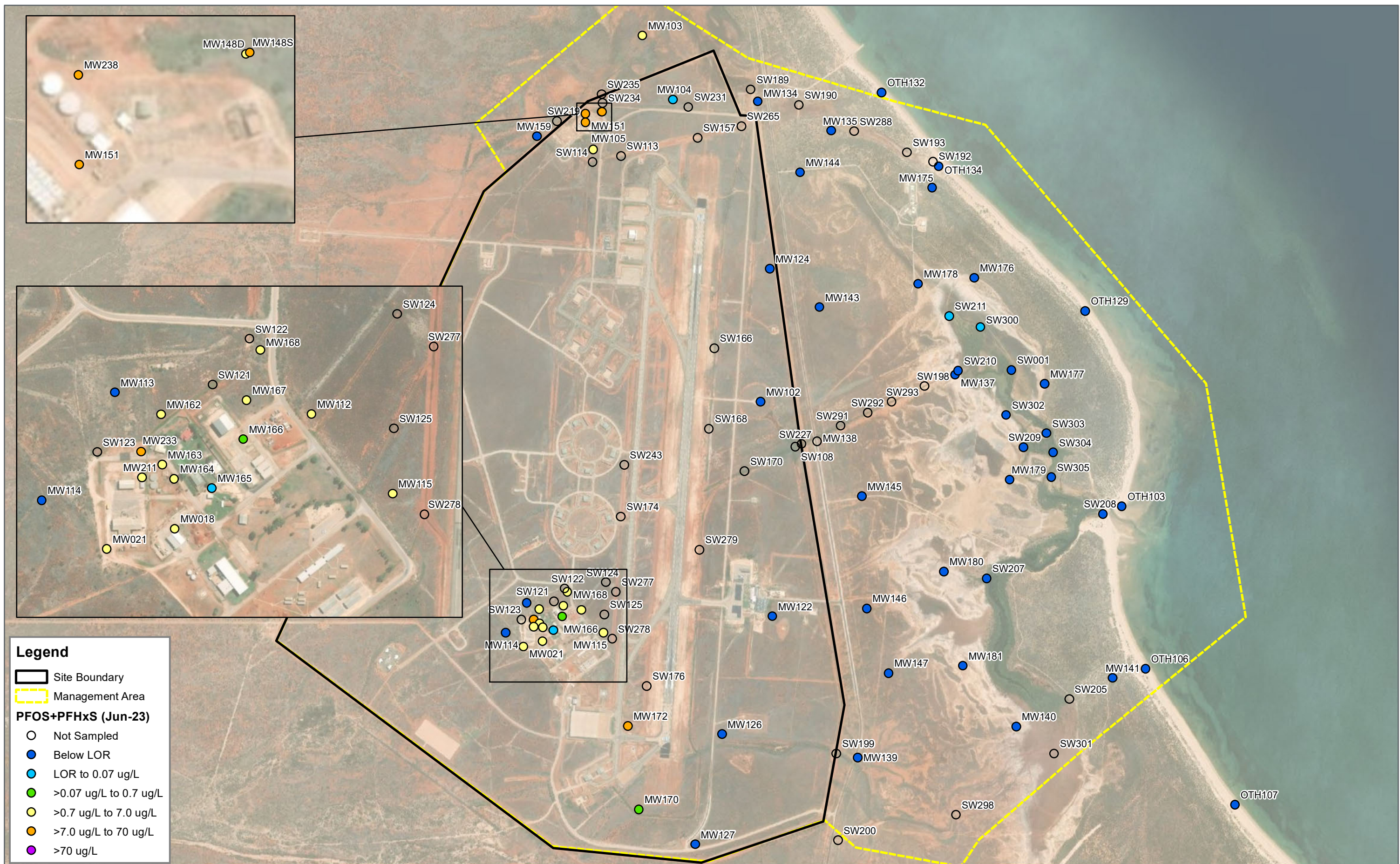
Inferred Groundwater Contours (Jun-23)

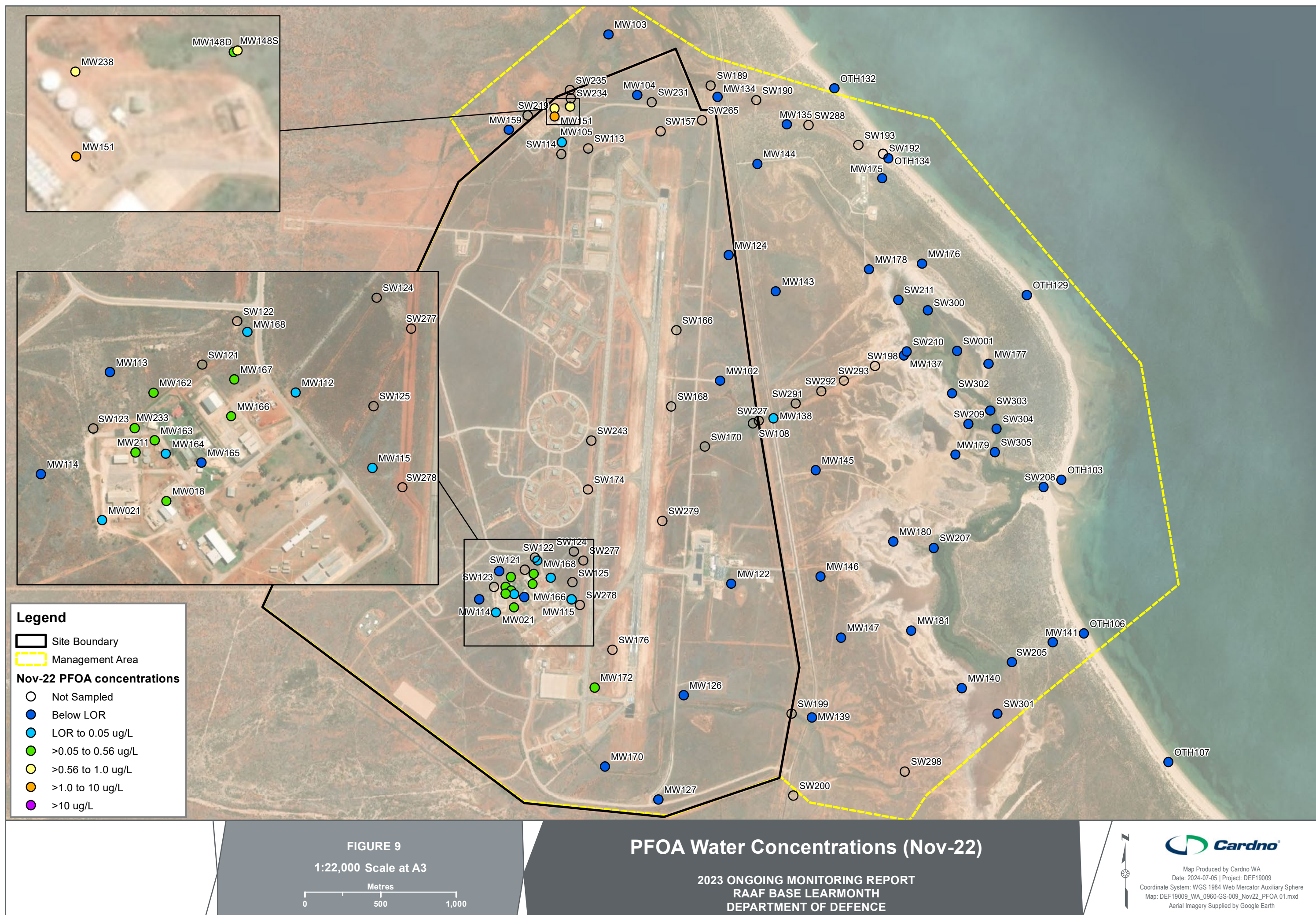
2023 ONGOING MONITORING REPORT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE

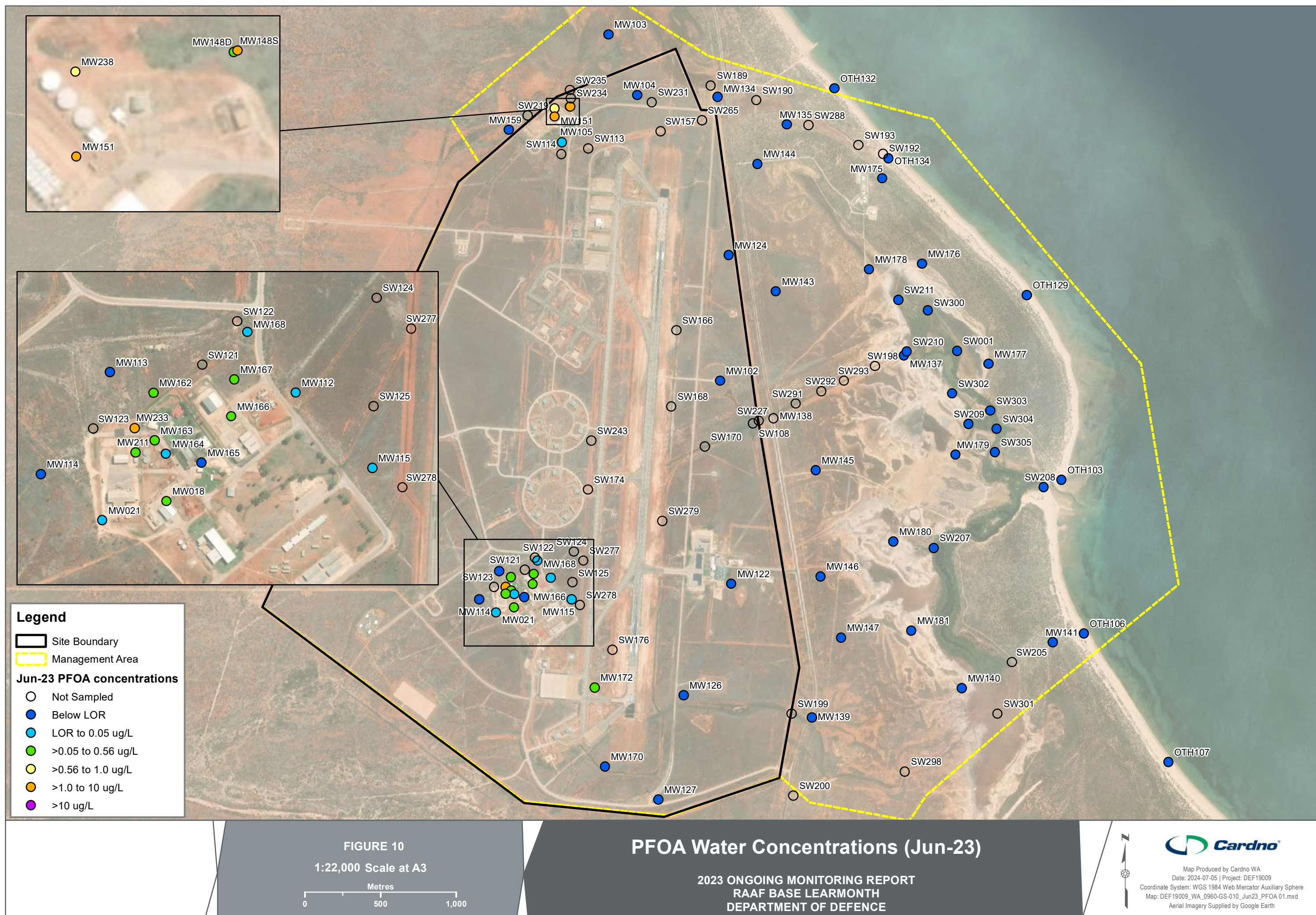


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Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0960-GS-006_Jun23GWContours 01.mxd
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Legend

Site Boundary
 Management Area

Nov22 PFOS+PFHxS concentrations

Not Sampled
 Below LOR
 LOR to 0.002 mg/kg
 >0.002 to 0.02 mg/kg
 >0.02 to 0.2 mg/kg
 >0.2 mg/kg

FIGURE 11
1:22,000 Scale at A3

Metres

0 500 1,000

Sediment PFOS+PFHxS Concentrations (Nov-22)

2023 ONGOING MONITORING REPORT
RAAF BASE LEARMONTH
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Legend

Site Boundary

Management Area

Jun23 PFOS+PFHxS concentrations

- Not Sampled
- Below LOR
- LOR to 0.002 mg/kg
- >0.002 to 0.02 mg/kg
- >0.02 to 0.2 mg/kg
- >0.2 mg/kg

FIGURE 12
1:22,000 Scale at A3

Metres

0 500 1,000

Sediment PFOS+PFHxS Concentrations (Jun-23)

2023 ONGOING MONITORING REPORT
RAAF BASE LEARMONTH
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APPENDIX

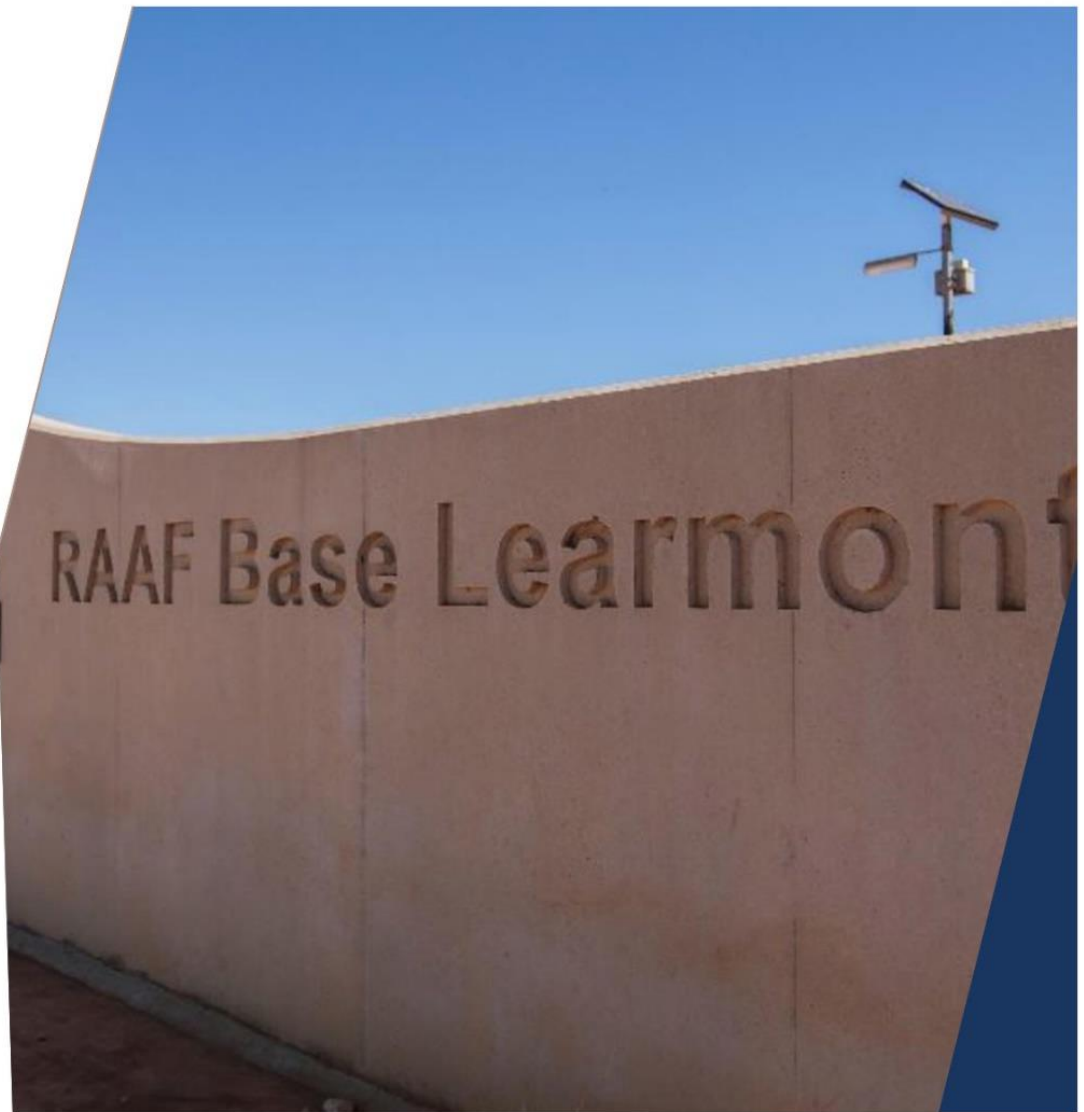
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SAQP



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PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP)

RAAF Base Learmonth

Prepared for
Department of Defence

June 23



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1 Introduction

Cardno have been engaged by the Australian Department of Defence ('Defence' or 'Client') to prepare a Sampling and Analysis Quality Plan (SAQP) as part of the Ongoing Monitoring Plan (OMP), the purpose of which to monitor trends in the extent and concentrations of per- and poly-fluoroalkyl substances (PFAS) impacts identified on and around RAAF Base Learmonth, located approximately 30km south of Exmouth, Western Australia (Figure 1, Appendix A).

The OMP SAQP applies to not only RAAF Base Learmonth, but also the surrounding areas that, together with the Base, make up the "Management Area". For the purposes of this report:

- > "the site" was defined as RAAF Base Learmonth (Figure 1, Appendix A).
- > "the Management Area" was defined as comprising the site, plus the land east of the Base, including the salt pan, drainage channels, WAPET creek and extends to Exmouth Gulf (Figure 2, Appendix A).

The site is located on Commonwealth Land and is regulated under Commonwealth environmental legislation. The OMP outlines the rationale and scope for the monitoring of the concentrations and extent of PFAS in groundwater, surface water and sediment originating from the site. The monitoring regime consists of two main sampling events in June and November, as well a 'first flush' surface water and sediment monitoring event conducted immediately (or as close as possible) following the first heavy rainfall event of the wet season.

1.1 Purpose & Objectives

The objective of the OMP SAQP is to present the specific monitoring locations, sampling methodologies and quality control / quality assurance measures for the monitoring of the concentrations and extent of PFAS in groundwater, surface water and sediment originating from the site. These findings will inform risk management decisions by Defence and the Western Australian Government to protect human health and the environment.

The specific purposes of the monitoring specified in the OMP is to:

1. Evaluate changes in the nature and extent (spatial and temporal) of PFAS impact in groundwater and surface water pathways associated with site sources of PFAS derived from legacy use of AFFF;
2. Monitor the migration of PFAS in groundwater, sediment and surface water from the site;
3. Provide confirmation of the current understanding of risk; and
4. Provide supporting data for assessment of management actions, where relevant.

1.2 Previous Reports

The following key reports prepared in relation to the RAAF Base Learmonth PFAS Investigation have been used as a basis to develop this SAQP:

- > Department of Defence, May 2019, *RAAF Base Learmonth PFAS Management Area Plan*, Revision 4.
- > Department of Defence, May 2019, *RAAF Base Learmonth PFAS Ongoing Monitoring Plan*.
- > GHD, December 2018, *RAAF Base Learmonth – PFAS Investigations – Preliminary and Detailed Site Investigation Report*.
- > GHD, April 2019, *RAAF Base Learmonth – PFAS Investigations – Ecological Risk Assessment Preliminary (ERA)*.
- > Cardno, April 2020, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Base Learmonth*
- > Cardno, May 2020, *PFAS OMP First Flush Sampling Event Factual Report RAAF Learmonth*
- > Cardno, December 2020, *PFAS OMP 2020 post-summer Biannual Monitoring Event RAAF Base Learmonth*.
- > Cardno, February 2021, *PFAS OMP 2020 post-winter Biannual Monitoring Event RAAF Base Learmonth*
- > Cardno, April 2021, *PFAS OMP First Flush Sampling Event Factual Report RAAF Learmonth*
- > Cardno, June 2021, *PFAS OMP 2020 Annual Interpretive Report – RAAF Base Learmonth*

- > Cardno, August 2021, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Learmonth*
- > Cardno, April 2022, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Learmonth*
- > Cardno, September 2022, *PFAS OMP First Flush Sampling Event Factual Report RAAF Learmonth*
- > Cardno, October 2022, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Learmonth*
- > Cardno, January 2023, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Learmonth*
- > Cardno, April 2023, *PFAS OMP DRAFT 2021 Annual Interpretive Report – RAAF Base Learmonth*

1.3 Responsible Parties

Responsible parties and responsibilities associated with the implementation of the OMP are detailed in Table 1-1.

Table 1-1 Responsible Parties

Role	Responsibilities
Department of Defence – PFAS Investigation and Management Branch	▪ Implement this OMP. ▪ Engage suitably qualified environmental consultants/contractors to carry out the works specified in the OMP
RAAF Base Learmonth – Base Support Manager/Site Manager and Environment and Sustainability Manager	▪ Review and approve all necessary permits required for implementation of the works outlined in the OMP.
Environmental Consultant	▪ Obtain necessary permits from RAAF Base Learmonth to implement the works outlined in the OMP. ▪ Liaise with State regulators (e.g. Department of Biodiversity, Conservation and Attractions) to arrange sampling of off-Site waterways, as required. ▪ Undertake the monitoring activities outlined in this SAQP. ▪ Produce a monitoring report that summarises the data and findings of each monitoring event and is consistent with the requirements of this SAQP. ▪ Produce an annual interpretive report including recommendations for any potential changes in the location and frequency of sampling which may be incorporated in the revision of the OMP. ▪ Upload analytical data from each monitoring event to the relevant Defence ESdat database.

1.4 Relevant Guidelines

This SAQP has been prepared in general accordance with the WA *Contaminated Sites Act 2003* (CS Act), applicable industry standards and guidelines relevant to an assessment of this type, and has been formulated in reference to the following:

- > National Environment Protection Council (NEPC), 1999, *National Environmental Protection (Assessment of Site Contamination) Measure (as amended 2013)* (ASC NEPM).
- > Heads of Environmental Protection Authority's Australia and New Zealand (HEPA), January 2020, *PFAS National Environmental Management Plan (NEMP) 2.0*.
- > Australian Standard AS 4482-2005 *Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 - Non-volatile and semi-volatile compounds*.
- > Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling*.
- > Australian and New Zealand Guidelines, 2018. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.
- > Department of Defence, Department of Energy, 2018, *Quality System Manual Schedule B15*.
- > Department of Defence, 2021, *Defence Contamination Management Manual (DCMM) Annex L Data Management*.
- > U.S. Environmental Protection Agency (EPA), 2000, *Guidance for the Data Quality Objectives Process (EPA QA/G-4)*.

- > USEPA, 2002, *Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)*.
- > Department of Water and Environmental and Regulation (DWER), 2021, *Assessment and Management of Contaminated Sites*¹.
- > National Health and Medical Research Council (NHMRC), August 2019, *Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water*.

1.5 Standards of Assessment and Limitations

This SAQP has been prepared in general accordance with the current industry standards for an assessment of this type for the purpose, objectives and scope identified in this report.

The scope presented in this SAQP report are derived only from available desk-based information and site inspection undertaken. This SAQP is not any of the following:

- > A Mandatory Audit Report (MAR) or Voluntary Audit Report (VAR) as defined under the *Contaminated Sites Act 2003* (CS Act).
- > A Geotechnical Assessment.
- > A Detailed Site Investigation (DSI).
- > A Detailed Hydrogeological Assessment.
- > A Remediation Action Plan (RAP) or Site Remediation & Validation (SRV) report.
- > A Site Management Plan (SMP).

2 Site Description and Management Areas

RAAF Base Learmonth is located approximately 30 km South of Exmouth and covers an area of 2,550 hectares (ha).

The buildings and associated infrastructure and support services include:

- > Runway, taxi way and aprons
- > Aircraft hangers
- > Civilian Airport terminal
- > Maintenance and workshop areas
- > General administration
- > Domestic housing
- > Fuel farm (former and current)
- > Sewage treatment ponds
- > Base water bore-field
- > There are also a number of underground storage tanks (USTs) and septic tanks across the site.

2.1 Site Definition and Planning

For the purposes of this SAQP report, “the site” was defined as comprising RAAF Base Learmonth. A detailed description of the site is provided in GHD’s DSI Report (GHD, 2018). The site location is presented on Figure 1, Appendix A.

Key site identification details are presented in Table 2-1.

¹ It is noted that Site is located on Commonwealth Land and is regulated under the Commonwealth environmental legislation, the State based DWER guidelines are relevant for the sampling of off-Site waterways.

Table 2-1 Site Identification Details

Details	Description
Site Address	Minilya-Exmouth Road, Learmonth, WA 6707
Land Description	RAAF Base Learmonth
Owner	Commonwealth of Australia
Planning Zone / Land use	Public Purposes – Commonwealth Government
Local Government Authority (LGA)	Shire of Exmouth

2.2 Surrounding Land Uses and Zoning

The surrounding land uses are outlined in Table 2-2.

Table 2-2 Surrounding Land Uses

Direction	Land Use
North	Kailis Hatchery, Potshot Memorial and pastoral land
West	Cape Range National Park and pastoral land
East	Pastoral land (Exmouth Gulf Station); Exmouth Gulf further east used for commercial prawn fishing, WAPET Creek, Solar Observatory, Bureau of Meteorology.
South	Various landfills, base supply bore-field and pastoral land

3 Environmental Setting

A summary of findings from the DSI (GHD, 2018) defining the site are presented in Table 3-1.

Table 3-1 Key Site Details

Setting	Description
Climate	The region has a hot, semi-arid climate, with a wet and dry season. The maximum temperatures range between 37.9°C (January) and 24.2°C (July) while minimum temperatures range between 11.4°C (July) and 24.7°C (February). Rainfall occurs generally between January and July with monsoonal showers between January and Late April. August to December is generally dry. The highest volume of rainfall typically occurs during the month of June with a mean monthly rainfall amount of 43.5 mm.
Topography	The site is located on a coastal plain and is generally flat. The elevation on site ranges between 0 and 20 meters relative to the Australian Height Datum (m AHD). To the west of site, the elevation at the coastal ranges are 220 m AHD.
Acid Sulfate Soil	A review of the Acid Sulfate Soils (ASS) risk mapping, available on the WA Atlas online database indicates the following: - to the north of the site is classified as having a moderate to low risk of ASS occurring within the top 3m of natural soil but high to moderate risk of ASS beyond 3m of natural soil surface - the salt pan to the east is classified as having a high to moderate risk of ASS occurring in the top 3m of natural soil.
Hydrology	The Exmouth Gulf is located approximately 600 m east of the site at its closest point. The site is also crossed west to east by three ephemeral creeks. RAAF Base Learmonth contains a number of constructed drains that direct surface water towards drainage channels that discharge into WAPET Creek (Central and Southern channels) or Exmouth gulf (northern channel). It was considered likely that the water flow in these drains are limited to high rainfall event. The northern channel was noted by GHD to inundated with seawater during high tide from the coast to the boundary of Base.

Setting	Description
	WAPET creek is located to the east of the site and is lined with mangroves. Water flows tidally in and out of the creek and low-lying areas around the creek are periodically inundated. ▪ The northern drainage channel discharges directly to the Exmouth Gulf. It is a constructed drain onsite but links to a wide natural channel offsite that cuts through the coastal dunes. ▪ The central drainage channel discharges into the northern reach of WAPET Creek. It is a straight constructed channel for its entire length. ▪ The southern drainage channel discharges into the southern reach of WAPET Creek. It is a constructed drain onsite but links to a natural channel offsite that meanders across low lying salt pan topography.
Geology	Regional Geology The site is underlain by quaternary age alluvial, aeolian and littoral sediments superimposed on the coastal plain (Geological Survey of Western Australia 1980). Further inland are Quaternary alluvium and colluvium deposits that have been derived from erosion of the Cape Ranges. The deposits include clays, silts, sands and gravels. The Cape Range forms the highlands to the west of the site and are composed of Tertiary aged Cape Range limestone units. The coastal areas are fringed by Holocene aged beach and sand dunes consisting of quartz and calcarenite sands. An older Quaternary dune unit is located to the south of RAAF Base Learmonth and dune forms are visible. Intertidal flats and mangrove swamps occur immediately west of the coastal sands and are associated with estuarine creeks. Site Specific Geology The findings of intrusive investigative works at RAAF Base Learmonth, undertaken by GHD between January and June 2018, were broadly consistent with the regional geology described above. ▪ To the west of RAAF Base Learmonth - the geology encountered comprised of colluvium, sands and sandy clay underlain by limestone rock layer ▪ On RAAF Base Learmonth – generally sands and clays were observed at the surface, underlain by colluvium/alluvium, gravels and sands and then weathered limestone rock Salt pan area to the east of the site – generally sands and clays were observed at the surface, underlain by alluvium/colluvium and then shallow limestone rock. Outcrops of limestone displaying fossilised coral were observed along the southern reach of WAPET Creek.
Hydrogeology	▪ Groundwater Occurrence – The Quaternary and Tertiary geology units are hydraulically connected and form a major, unconfined aquifer. Groundwater in the Quaternary units is considered to be perched and discontinuous. The superficial Quaternary layers (dunes, colluvium, alluvium) are considered to be no more than 20 m in thickness. Coastal dunes may also contain relatively fresh groundwater but of limited extent (lenses). This has not been assessed. The main regional aquifer occurs predominantly within the Tulki Limestone (within permeable beds and the karst system) on the flanks of the range and the Mandu Limestone (within joints and minor permeable beds) on the crest of the range. These units extend to depths of greater than 150 m. ▪ Depth to Groundwater – A total of 32 existing groundwater monitoring wells were gauged during October 2017 by GHD with depth to groundwater ranging from approximately 1.2 m below ground level (mbgl) to approximately 36 mbgl. The depth to water increased toward the west whereby the deepest groundwater SWLs were encountered at the foothills of the Cape Range in the production bore-field. Groundwater in the low-lying area near WAPET Creek was within 1.5 m of the surface and so is likely to interact with surface salt deposits. ▪ Groundwater Flow Direction – The local groundwater flow pattern (GHD, 2018) at RAAF Base Learmonth was observed to be following the regional flow regime; that is, flowing toward the east. The calculated hydraulic gradient of groundwater across the Base was low and in the order of 0.0003 to 0.0005 m/m. The groundwater flow direction and hydraulic gradients greatly restricts the flow of contaminated groundwater from the site to WAPET Creek or Exmouth Gulf. Instead, groundwater from the Base tends to flow towards an area of groundwater depression with elevated salinity that lies between the site and the coast, with there being very little net flow to surface waters further to the east.

Setting	Description
	▪ Salinity – The groundwater was generally fresh in the western wells, though groundwater near the base supply bore-field and Windmill Bore Landfill was brackish-saline. This is likely due to the abstraction of groundwater. The saltwater wedge is expected to extend 5 km inland from the east coast (Martin, 1990). The DSI identified the water was fresher in the shallow groundwater, likely due to rain infiltration. The salinity distribution in the inferred discharge area to the east is likely to have significant influence on PFAS migration and discharge. ▪ Groundwater Use – The DWER groundwater database found no registered abstraction bores were identified within a 1km radius of the site. During the GHD DSI, groundwater was being abstracted from a bore near the Windmill Bore Landfill where water was being pumped to a water storage tank and then being discharged to the surface via a hose. Flow rate was estimated to be approximately 9,000 L per day. Sheep were observed drinking this water from the surface.
Environmental Sensitive Areas	The site is located in close proximity to the Cape Range National Park and Ningaloo Reef to the east. – No Threatened Ecological Communities (TECs) with national environmental significance, were identified in the EPBC Act Protected Matters Report generated on November 2, 2017. – Five priority flora species and 36 threatened or priority fauna species are known or expected to be present within 10 km of RAAF Base Learmonth. – The mangrove wetlands are not listed on the Ramsar Convention on Wetlands of International Importance. It does however constitute a sensitive receptor.
<i>Further information can be found in the Consolidated DSI report (GHD, 2018). Information collected as part of the OMP is consistent with that presented in the DSI.</i>	

4 Source Areas and Risk

The site has been subject of previous PFAS investigations, including:

- > A combined Preliminary Site Investigation and Detailed Site Investigation (GHD, 2018)
- > An Ecological Risk Assessment (GHD 2019)

4.1 Source Areas

There are three monitoring areas, where PFAS was detected in soil or groundwater at concentrations exceeding the adopted assessment levels. These are considered to be the most impacted areas and include (refer to Figure 2, Appendix A):

- > 1A – Maintenance Area (Source Area)
- > 2A and 2B– Former and current Fuel Farm (Source Area)
- > 1D – Southern Drainage Channel (Pathway)
- > 1E – Central Drainage Channel (Pathway)
- > 2C – Northern Drainage Channel (Pathway)
- > 1G – WAPET Creek northern reach (Receptor)

The results of the DSI indicate that the two main PFAS source areas were the Fuel Farm and the Maintenance Area. PFAS were found to be present in all environmental media tested (soils, groundwater, sediments, and surface water where present) in these source areas. PFAS were also detected at lower concentrations at a number of other locations across the Base.

5 Data Quality Objectives

Development of data quality objectives (DQOs) for the OMP SAQP is based on guidance presented in the ASC NEPM (NEPC 2013) and are consistent with 'RAAF Base Learmonth PFAS Investigation PFAS Ongoing Monitoring Plan (Defence, 2019). The DQO process comprises the following seven steps:

- > Step 1: State the problem
- > Step 2: Identify the decision/principal study question(s)
- > Step 3: Identify the Inputs into the Decision
- > Step 4: Study Boundaries
- > Step 5: Decision rules
- > Step 6: Tolerable limits on decision errors
- > Step 7: Optimisation of the data collection process

The DQOs are detailed in Table 5-1.

Table 5-1 Data Quality Objectives

Data Quality Step	Description
State the Problem	The DSI (GHD, 2018) identified PFAS in groundwater, surface water and sediment within the Management Area at concentrations exceeding the relevant assessment levels. The primary mechanisms by which PFAS has migrated off-Site are considered to be via surface drains, notably the Central Drainage Channel which discharges directly into WAPET Creek. The preliminary ERA (GHD, 2019) identified one exposure risk associated with foraging seabirds from the consumption of impacted biota in the northern reach of WAPET Creek. Current data for the majority of sampling locations is limited to one or two sampling events. Whilst the findings of the Preliminary ERA (GHD, 2019) recognised that an adverse ecological impact is unlikely, a robust dataset is required to assess trends in the nature, extent and magnitude of PFAS concentrations within sediment, surface water and groundwater
	Groundwater ▪ Groundwater was found to be contaminated with PFAS, with the highest concentrations identified in the two main source areas, with relatively low concentrations elsewhere. ▪ PFAS concentrations varied both vertically within the groundwater profile and laterally across the site. Generally, the concentrations reduced with depth and distance from contamination source areas. ▪ Concentrations of PFAS in groundwater on the Base and in the vicinity of the Base exceed the guidelines for drinking water in the fuel farm, the maintenance area, MW117 (Base Landfill), STP, MW124 (Salt pan area), MW138 (Central Drainage Channel), MW172 (Former Aircraft Parking Area South), MW183 (UST at Former Powerhouse) and MW108 (UST/AST at ALER 36). In these areas the groundwater is saline and is not potable, and groundwater is not used for potable purposes. ▪ Traces of PFAS have been identified in potable wells to the west of RAAF Base Learmonth; however, the concentrations do not exceed the drinking water guideline. ▪ The groundwater flow direction and hydraulic gradients greatly restricts the flow of contaminated groundwater from the Base to WAPET Creek or Exmouth Gulf. Traces of PFAS have been detected in shallow seepage water along shorelines; this contamination is most likely to have resulted from localised infiltration of contaminated surface water rather than groundwater migrating from the Base. It was concluded that groundwater contamination present at the Base poses a low risk to the aquatic ecosystems of surface waters (WAPET Creek and the Gulf).
	Surface Water ▪ Concentrations of PFAS in surface water exceed the recreational water guideline in drains off-site at SW171 and in the Maintenance Area (SW122). ▪ Groundwater may discharge to a surface water body where recreational activities occur such as swimming. However, the groundwater flow direction and hydraulic gradients greatly restrict the rate of flow and the discharge to WAPET Creek or

Data Quality Step	Description
	Exmouth Gulf. Measured concentrations in surface water bodies are below relevant guideline. - Waters of the WAPET Creek southern reach are regularly flushed by the tides and PFAS was not detected in samples of surface water and biota. - Waters of the northern reach are irregularly flushed by the tides, and PFAS was detected in samples of surface water and crabs. The concentrations of PFAS in crabs were low and do not pose a risk to humans consuming crustaceans from the northern reach of WAPET Creek. - Trace concentrations of PFAS were detected in water seeping from the coast line and discharging to Exmouth Gulf. PFAS were not detected in fish and crabs in the Gulf waters. Soil and Sediment - PFAS contamination in the Maintenance Area exceeded the human health screening level protective of residential land-use however, the soil collected in residential backyards were below guidelines. - In several locations (the Maintenance Area, Fuel Farm, BH209 (Grid sample onsite) and BH329 (UST at Former Powerhouse) there were exceedances of the screening criterion for Interim Ecological Indirect Exposure Commercial/Industrial. - Contaminated soil and sediment can be mobilised and flow along surface drains offsite to WAPET Creek and Exmouth Gulf; however, such migration will be generally limited to larger rainfall events and flooding and will be subject to significant dilution Most of the sampling locations (groundwater, surface water, and sediment sampled as part of the DSI) have only been tested once or twice (i.e. limited time series/seasonal data). A robust dataset is required to assess trends in the nature, extent and magnitude of PFAS concentrations within sediment, surface water and groundwater to validate/improve the understanding of the CSM in relation to spatial and temporal variability of PFAS concentrations within the Management Area and associated receptors.
Identify the decision/principal study question(s)	This OMP is to provide further data to assess the following principal study questions: - What are the changes and trends in the nature, extent and magnitude of PFAS concentrations in the groundwater, surface water and sediment within the Management Area? - Has the nature, extent and magnitude of PFAS concentrations changed significantly to warrant a revision of the ERA? - Has the nature, extent and magnitude of PFAS concentrations changed significantly to warrant refinement of any existing management measures? - Has the nature, extent and magnitude of PFAS concentrations changed significantly or are they likely to change?
Identify the Inputs into the Decision	The following inputs are required to resolve the principal study questions outlined in Step 2: - PFAS concentrations in groundwater, surface water and sediment from previous and future monitoring events. - Field data (i.e. groundwater levels, physico-chemical parameters) on groundwater and surface water from previous and future monitoring events. - An appropriate statistical evaluation of the data (e.g. using Mann-Kendall or similar analysis) including short and long term trends, in particular for surface water and groundwater concentrations. - Comparison of data sets to relevant endorsed assessment levels (refer to Section 7).
Study Boundaries	Ongoing monitoring will be undertaken within the boundaries of the Management Area (Figure 2, Appendix A) at the groundwater, surface water and sediment monitoring locations outlined in Sections 6.3.1 and 6.4.1. Monitoring will be undertaken every six months, with one monitoring event in November and June. An additional surface water and sediment monitoring event will take place following the first flush immediately (or as close as possible) following the first heavy rainfall event of the wet season. Section 6.4 provides further detail on the monitoring frequency.

Data Quality Step	Description
Develop a Decision Rule	▪ The analytical and field data will be used to assess changes to the nature, extent and magnitude of PFAS in surface water, sediment and groundwater and to provide supporting data for assessment of management actions, where relevant. ▪ Trends in PFAS concentrations, including an assessment of temporal and spatial changes, will be assessed using an appropriate statistical analysis approach (e.g. using Mann- Kendall, GWSdat or similar analysis), with a specified level of confidence based upon the number of monitoring rounds completed. ▪ The analytical data will be compared to the relevant assessment levels (presented in Section 7) and/or historic concentrations (i.e. maximum concentration) recorded during prior monitoring rounds [i.e. during the DSI (GHD, 2018)] to evaluate changes in the risk profile and whether revision of the OMP, ERA or implemented management measures is warranted. Where exceedances of adopted assessment criteria levels (presented in Section 7) or new detections are reported, further interrogation of data will be undertaken to the extent relevant to assess the risk profile and location. A summary of the key decision rules as detailed below: 1. Have the analytical data collected as part of the monitoring program met the DQI (refer Table 5-2.below)? If yes, then the data can be used to answer the decision rule below and the decision statements developed in Step 2. If no, then an assessment of the need to collect additional data will be required. 2. Do PFAS concentrations exceed the investigation criteria? If no, then the contamination would be considered not to pose an unacceptable risk. Where results exceed the adopted investigation criteria, this may not necessarily indicate an unacceptable level of risk. Further risk assessment, and potentially additional investigations, will be required to determine the potential for unacceptable impacts. 3. Has PFAS been detected in any of the off-site bores previously not detected? If yes, do PFAS concentrations reported indicate an increasing trend and/or exceed historic maximum concentrations? Do results indicate a potential risk to associated receptors including associated risks that PFAS may present towards human receptors (i.e. consumers of abstracted water). Further risk assessment, and potentially additional investigations, will be required to determine the potential for unacceptable impacts. 4. Has PFAS been detected in onsite drainage channels and offsite surface water bodies within the management areas? If yes, do PFAS concentrations reported indicate an increasing trend or exceed historic maximum concentrations? Do results indicate a potential risk to receptors and changes to the risk profile? Further risk assessment, and potentially additional investigations, will be required to determine the potential for unacceptable impacts. The Annual Interpretive Report will review the results obtained against these triggers/decisions and the management response triggers and contingencies detailed in the OMP (Section 4.3).
Specify Limits on Decision Error	The potential for significant decision errors will be minimised by completing a robust QA/QC program in accordance with DWER and NEPM guideline requirements. Standard operating procedures will be closely followed in the field to ensure accurate and representative data acquisition. DQIs will be applied to assess usability of data prior to making decisions, based on precision, accuracy, representativeness, comparability and completeness. The acceptable limit on decision error is 95% compliance with the applied DQIs (see Table 5-2). If any of the DQIs are not met, further assessment will be necessary to evaluate the significance of the non- conformance and any corrective actions.
Optimise the Design for Obtaining the Data	The design of the OMP has been made in consideration of historical activities at the site, historical investigations (and findings i.e. DSI and ERA), in the context of developing responses to the principal study questions outlined in Step 2 and to meet the DQOs ensuring that a representation of the current site condition can be achieved. The OMP scope is outlined in Section 6, the available data is reviewed annually and evaluated to determine if the frequency of monitoring should increase or decrease to provide better understanding of PFAS concentration fluctuations and potential risks to receptors. As additional information is gathered during the course of this monitoring program, it may be beneficial for the proposed scope of works to be altered from the initial design.

Data Quality Step	Description
	Changes to the proposed monitoring, if considered necessary, will be made based on risk profile reviews and updated CSM and in consultation with Defence. Other factors that will optimise the design for obtaining data will include the use of laboratories that are NATA accredited for PFAS analysis and ensure laboratory LORs are suitable to meet the relevant adopted assessment levels (where possible), experienced field scientist(s), robust field and laboratory quality assurance/quality control protocols are adopted and Field and analytical data are collected in accordance with the PFAS NEMP (HEPA 2020), ASC NEPM (NEPC 2013) and the assessment of contaminated sites (DER 2014).

An assessment of the Data Quality Indicators (DQIs) relating to both field and laboratory procedures will be undertaken with appropriate documentation provided for each environmental element or media assessed. The DQIs adopted for the DSI are summarised in Table 5-2.

Table 5-2 Data Quality Indicators

Data Quality Indicator	Detail								
QA Documentation	Provision of appropriate work plans, DQI and DQO defined for the site and all QA/QC aspects documented.								
Bias	A measure of the potential distortion in an analysis which can result in errors in one direction (e.g. one laboratory consistently higher results or consistent poor spiked matrix recovery). Bias will be assessed with reference to the analysis of spiked matrix samples (NEPC 1999b).								
Representativeness	A qualitative measure of the confidence that data is representative of each medium present on the site. Use of appropriate and documented sampling methods, sampling handling, preservation and transport and holding times. A quantitative measure of data variability or reproducibility, measured by the calculation of %RPD values for duplicate samples (i.e. measure of agreement). Precision in DQI is considered an important assessment in an environmental study (USEPA, 2002, Guidance on Environmental Data Verification and Data Validation). It can be measured as follows: - Percentage of the mean of the measurement such as Relative Percent Difference (i.e. %RPD). The %RPD will be calculated for the field and secondary duplicate (i.e. inter and intra-laboratory analysis); and - Use of similar analytical method and instrument (e.g. for inter-laboratory assessment). The %RPD will be considered as acceptable if the values are: <table border="1"> <thead> <tr> <th>Magnitude of result</th><th>Acceptable RPD range</th></tr> </thead> <tbody> <tr> <td><10 x limited of reporting (LOR)</td><td>No limits</td></tr> <tr> <td>10 – 20 x LOR</td><td>0% - 50%</td></tr> <tr> <td>>20 x LOR</td><td>0% - 20%</td></tr> </tbody> </table> - Should there be a result that is greater than acceptable RPD range, then a “review should be conducted of the cause (e.g. instrument calibration, appropriateness of method used)” (NEPC, 2013). For the purpose of this OMP, field and secondary duplicates should be collected at a rate of 1 in 10 samples (HEPA 2020 and GHD, 2018).	Magnitude of result	Acceptable RPD range	<10 x limited of reporting (LOR)	No limits	10 – 20 x LOR	0% - 50%	>20 x LOR	0% - 20%
Magnitude of result	Acceptable RPD range								
<10 x limited of reporting (LOR)	No limits								
10 – 20 x LOR	0% - 50%								
>20 x LOR	0% - 20%								
Precision:									
Accuracy	A quantitative measure of the closeness of data to a ‘true value’, measured by the analysis of spike, blank and laboratory control samples (LCS). The LCS consists of a standard reference material or a matrix of known concentration. For the purpose of assessing accuracy it is required that at least one LCS for each process batch be analysed (NEPC, 2013).								
Comparability	A qualitative measure of the confidence that data may be considered to be equivalent for each sampling and analytical event. By use of standard procedures, comparable methods, qualified personnel and review of sample integrity.								
Completeness	A measure of the amount of usable data (expressed as a percentage - %) from a data collection activity, based on completeness of test program, overall QA/QC completeness and validity of data set.								

6 Ongoing Monitoring Program

6.1 OMP SAQP History

The changes made to the OMP SAQP since the Rev1 are documented in Table 6-1.

Table 6-1 OMP SAQP History

SAQP Version	Date	Report Section	Changes	Justification
Rev 2	21/11/2019	-	Formatting and figures updates, minor changes.	Defence review
Rev 3	18/06/2020	7	Update of assessment criteria and reference to HEPA (2020).	New guideline (HEPA, 2020)
Rev 4	10/03/2021	6.3	Table 'Wells construction details' added. Well ID update as per DCARM update (MWA0294 renamed MW211). MW063A (lost) replaced by MW233	DCARM update Defence review
		6	Methodology tables updates	
Rev 5	14/06/2021	6	Groundwater Methodology table updates	Defence review
Rev 6	16/06/2022	6	Lost monitoring well MW016 replaced by adjacent suitable monitoring well MW238	MW016 was found filled with soil due to no gatic lid covering the well. MW238 is also positioned down-gradient of the Fuel Farm (source area 2) and historical data is available as this location was sampled as part of the DSI.
Rev 7	02/11/2022	-	Methodologies & guidelines updates	Defence review, revised guideline documents
Rev 8	23/02/2023	-	Minor formatting updates	Defence review
Rev 9	01/06/2023	-	Minor updates	SAQP update

6.2 Management Area Description

The OMP includes sampling and analysis not only from the site, but also from a number of surrounding (off-Site) waterways. The site and these surrounding areas are collectively referred to as the "Management Area" (GHD, 2018). The Management Area boundaries are presented on Figure 2, Appendix A and encompasses:

- > RAAF Base Learmonth.
- > land east of the Base, including the salt pan, drainage channels, WAPET Creek and extends to Exmouth Gulf.

6.3 Groundwater Monitoring

6.3.1 Groundwater Monitoring Network

The monitoring network investigated during the DSI (GHD, 2018) includes 33 single level monitoring wells and 17 multilevel wells. The network of on- and off-Site groundwater monitoring locations are summarised in Table 6-2 and Table 6-3.

Table 6-2 Single Level Monitoring Wells

Location	Well Depth	Well ID	Average Screen Interval (mBGL)
On-site (31)	Shallow	MW114, MW021, MW113, MW165, MW166, MW167, MW168, MW112, MW115, MW122, MW172, MW170, MW127, MW126, MW102,	2 - 8

Location	Well Depth	Well ID	Average Screen Interval (mBGL)
		MW105, MW148S, MW151, MW159, MW103, MW104, MW124, MW238	
	Deep	MW162, MW163, MW164, MW148D	17 - 20
	Unknown	MW233, MW211, MW018, MW116	-
Off-site (2)		MW139, MW134	3 - 9

The concentrations of PFOA and sum of PFOS and PFHxS recorded in the multilevel wells during the DSI (GHD, 2018) are summarised in Table 6-3. The PFAS concentrations were generally consistent or lower in the deeper screened intervals than the shallow interval.

Table 6-3 Multilevel groundwater wells

Well ID	Screen Interval (mBGL)	Times Sampled	2018 Sum of PFHxS + PFOS (µg/L)	2018 PFOA (µg/L)
MW135	2.5 - 3	2	0.008	0.003
	4.5 - 5	2	0.011	0.001
	6.5 - 7	2	0.031	0.001
	9 - 9.5	2	0.011	ND
MW137	0.8 - 1.3	1	0.011	ND
	2.5 - 3	1	0.013	ND
	4.5 - 5	1	0.011	ND
	6.5 - 7	1	0.008	ND
MW138	3 - 3.5	1	ND	ND
	5 - 5.5	1	0.1	0.004
	7 - 7.5	2	0.006	0.002
	9 - 9.5	2	0.1	0.004
MW140	1.5 - 2	1	0.003	ND
	3.5 - 4	1	0.003	ND
	6 - 6.5	1	0.002	ND
	8.5 - 9	1	ND	ND
MW141	1.5 - 2	2	0.002	0.002
	3 - 3.5	2	0.008	ND
	5 - 5.5	2	0.007	ND
	7 - 7.5	2	0.003	ND
MW143	3 - 3.5	2	ND	ND
	5 - 5.5	2	ND	0.002
	7 - 7.5	2	0.008	0.002
	9 - 9.5	2	ND	0.003
MW144	3 - 3.5	2	0.001	0.002
	5 - 5.5	2	ND	0.002
	7 - 7.5	2	ND	0.006
	9 - 9.5	2	ND	ND
MW145	3 - 3.5	2	ND	ND

Well ID	Screen Interval (mBGL)	Times Sampled	2018 Sum of PFHxS + PFOS (µg/L)	2018 PFOA (µg/L)
	5 – 5.5	2	ND	ND
	7 – 7.5	2	ND	ND
	9 – 9.5	2	0.005	ND
MW146	2.5 – 3	2	0.028	0.001
	4.5 – 5	2	ND	0.003
	6.5 – 7	2	ND	0.001
	8.5 - 9	2	ND	0.001
MW147	3 – 3.5	2	0.007	0.002
	5 – 5.5	2	ND	ND
	7 – 7.5	2	ND	0.002
	9 – 9.5	2	ND	ND
MW175	4 – 4.5	2	0.017	0.006
	5.5 – 6	1	0.012	0.007
	7 – 7.5	1	0.007	0.003
	9 – 9.5	1	0.007	0.008
MW176	1.5 - 2	1	0.002	ND
	3.5 - 4	1	0.007	ND
	6 - 6.5	1	0.001	ND
	8.5 - 9	1	ND	ND
MW177	1.5 – 2	1	0.003	ND
	3.5 – 4	1	0.004	ND
	6 – 6.5	1	0.003	ND
	8.5 - 9	1	0.002	ND
MW178	2 – 2.5	1	0.008	ND
	4 – 4.5	1	0.013	ND
	7 – 7.5	1	0.005	ND
	9 – 9.5	1	0.003	ND
MW179	1 – 1.5	1	0.019	0.001
	3.2 – 3.7	1	0.007	0.002
	5.9 – 6.4	1	0.006	0.003
	8.5 - 9	1	0.004	0.002

Well ID	Screen Interval (mBGL)	Times Sampled	2018 Sum of PFHxS + PFOS (µg/L)	2018 PFOA (µg/L)
MW180	1 – 1.5	1	0.002	ND
	3.5 – 4	1	0.002	ND
	6 – 6.5	1	0.003	ND
	8.5 - 9	1	0.001	ND
MW181	1.5 – 2	1	0.003	0.002
	3.5 – 4	1	0.002	0.004
	5.5 – 6	1	0.001	ND
	7 – 7.5	1	0.002	0.003

The groundwater monitoring locations as part of the OMP monitoring are presented in Table 6-4, along with the rationale for the selection, and are shown on Figure 3, Appendix A. For the multilevel monitoring wells, only the shallowest-non-dry screened intervals will be sampled.

Seepage water sample locations were chosen to assess the inferred groundwater discharge zone along the coast and are shown on Figure 3. They include locations near the mouth of WAPET Creek, the Northern Drainage Channel, a low point in the dunes near the southern reach and other locations along the coast.

Table 6-4 OMP Groundwater Monitoring Locations

Area	Monitoring Well / Bore ID	Rationale
Source Areas	Source 1 – Maintenance Area - MW018, MW021, MW112, MW113, MW114, MW115, MW162, MW163, MW164, MW165, MW166, MW167, MW168, MW211, MW233.	Confirmation of overall PFAS impact identified in the DSI (GHD, 2018). Assessment of overall changes in PFAS concentration in the source areas to provide temporal data on depletion of the source zone.
	Source 2 – Fuel Farm – MW105, MW148D, MW148S, MW151, MW159, MW238.	
Pathway	MW102, MW103, MW104, MW122, MW124, MW126, MW127, MW134, MW135, MW138, MW139, MW140, MW143, MW144, MW145, MW146, MW147, MW170, MW172, MW175, MW180, MW181.	Confirmation of overall PFAS impact identified in the DSI (GHD, 2018). Assessment of changes in PFAS concentration and distribution in the main migration pathways. This will also allow for early detection of significant changes in migration so contingencies can be put in place.
Receptor	MW137, MW141, MW176, MW177, MW178, MW179.	Confirmation of overall PFAS impact identified in the DSI (GHD, 2018). Assessment of changes in PFAS concentration and distribution in the main aquatic receptors.
Seepage	OTH103, OTH106, OTH107, OTH129, OTH132, OTH134.	To assess the inferred groundwater discharge zone along the coast.

Construction details for the groundwater wells monitored as part of the OMP are provided in Table 6-5.

Table 6-5 OMP Groundwater Monitoring Wells Construction Details

Well ID	Date drilled	Easting ¹	Northing ¹	RL TOC (mAHD)	Depth (mbgl)	Screen interval (mbgl)
MW018	2006	199251.86	7537465.65	6.403	8.5	5.5-8.5
MW021	2006	199143.14	7537433.45	6.745	8.6	5.6-8.6
MW102	2018	200487.728	7538870.392	4.6266	8.5	2.5-8.5
MW103	2018	199762.727	7540965.102	2.2785	5.8	1.0-5.8
MW104	2018	199946.08	7540599.855	2.7256	6.5	1.0-6.5
MW105	2018	199491.679	7540303.158	3.7272	8.0	2.0-8.0
MW112	2018	199473.4723	7537651.252	5.1191	8.0	3.0-8.0
MW113	2018	199156.14	7537686.096	7.3165	10.0	4.0-10.0
MW114	2018	199037.9871	7537512.217	7.7467	10.0	4.0-10.0
MW115	2018	199604.327	7537522.607	4.9133	8.0	3.0-8.0
MW122	2018	200580.746	7537635.452	3.9702	7.7	1.7-7.7
MW124	2018	200525.625	7539636.566	2.9183	6.0	1.0-6.0
MW126	2018	200301.728	7536952.205	4.5088	8.0	2.0-8.0
MW127	2018	200158.599	7536314.042	5.6238	8.5	2.5-8.5
MW134	2018	200439.185	7540598.585	2.5155	5.7	1.0-5.7
MW135	2018	200867.402	7540438.161	2.7781	3.0	2.5-3.0
				2.7828	5.0	4.5-5.0
				2.7858	7.0	6.5-7.0
				2.7884	9.5	9.0-9.5
MW137	2018	201611.362	7539047.314	2.1687	1.3	0.8-1.3
				2.1691	3.0	2.5-3.0
				2.2017	5.0	4.5-5.0
				2.2034	7.0	6.5-7.0
MW138	2018	200820.406	7538649.357	3.3074	3.5	3.0-3.5
				3.3166	5.5	5.0-5.5
				3.3205	7.5	7.0-7.5
				3.3224	9.5	9.0-9.5
MW139	2018	201088.954	7536832.655	4.1386	7.0	2.0-7.0
MW140	2018	202004.879	7537028.632	2.4916	2.0	1.5-2.0
				2.5035	4.0	3.5-4.0
				2.5081	6.5	6.0-6.5
				2.5345	9.0	8.5-9.0
MW141	2018	202555.223	7537320.681	2.7999	2.0	1.5-2.0
				2.8073	3.5	3.0-3.5
				2.8141	5.5	5.0-5.5
				2.8224	7.5	7.0-7.5
MW143	2018	200819.408	7539420.558	2.8174	3.5	3.0-3.5
				2.8204	5.5	5.0-5.5
				2.8221	7.5	7.0-7.5

Well ID	Date drilled	Easting ¹	Northing ¹	RL TOC (mAHD)	Depth (mbgl)	Screen interval (mbgl)
MW144	2018	200691.327	7540195.613	2.8273	9.5	9.0-9.5
				3.0481	3.5	3.0-3.5
				3.052	5.5	5.0-5.5
				3.0545	7.5	7.0-7.5
				3.0573	9.5	9.0-9.5
MW145	2018	201084.426	7538337.599	3.1416	3.5	3.0-3.5
				3.1481	5.5	5.0-5.5
				3.1506	7.5	7.0-7.5
				3.1519	9.5	9.0-9.5
MW146	2018	201126.901	7537691.759	2.7937	3.5	3.0-3.5
				2.8009	5.5	5.0-5.5
				2.802	7.5	7.0-7.5
				2.8184	9.5	9.0-9.5
MW147	2018	201259.369	7537322.231	2.9123	3.5	3.0-3.5
				2.9152	5.5	5.0-5.5
				2.9183	7.5	7.0-7.5
				2.9209	9.5	9.0-9.5
MW148D	2018	199536.808	7540521.489	3.5778	20.0	14.0-20.0
MW148S	2018	199537.603	7540521.649	3.6851	8.0	2.0-8.0
MW151	2018	199442.761	7540459.319	4.0631	8.0	2.0-8.0
MW159	2018	199164.27	7540373.912	4.1895	9.0	3.0-9.0
MW162	2018	199230.504	7537650.674	6.856	20.0	17.0-20.0
MW163	2018	199232.4874	7537569.5756	6.7808	20.0	17.0-20.0
MW164	2018	199251.946	7537546.874	6.7893	20.0	17.0-20.0
MW165	2018	199312.5481	7537531.6778	6.1043	9.0	3.0-9.0
MW166	2018	199363.212	7537610.565	5.7441	8.5	2.5-8.5
MW167	2018	199368.445	7537673.832	6.2094	8.5	2.5-8.5
MW168	2018	199390.678	7537754.41	6.1713	8.5	2.5-8.5
MW170	2018	199828.672	7536509.856	5.639	8.5	2.5-8.5
MW172	2018	199755.067	7536989.143	5.6193	8.5	2.5-8.5
MW175	2018	201458.887	7540121.278	4.7916	4.5	4.0-4.5
				4.7982	6.0	5.5-6.0
				4.7995	7.5	7.0-7.5
				4.8316	9.5	9.0-9.5
MW176	2018	201711.745	7539606.488	2.1274	2.0	1.5-2.0
				2.1279	4.0	3.5-4.0
				2.1594	6.5	6.0-6.5
				2.1712	9.0	8.5-9.0
MW177	2018	202130.765	7539004.262	2.2299	2.0	1.5-2.0
				2.2517	4.0	3.5-4.0

Well ID	Date drilled	Easting ¹	Northing ¹	RL TOC (mAHD)	Depth (mbgl)	Screen interval (mbgl)
MW178	2018	201387.629	7539566.48	2.2531	6.5	6.0-6.5
				2.2718	9.0	8.5-9.0
				2.1612	2.5	2.0-2.5
				2.1614	4.5	4.0-4.5
				2.1726	7.5	7.0-7.5
				2.1762	9.5	9.0-9.5
MW179	2018	201939.471	7538448.239	2.222	1.5	1.0-1.5
				2.2371	3.7	3.2-3.7
				2.2653	6.4	5.9-6.4
MW180	2018	201567.932	7537913.284	2.2689	9	8.5-9.0
				1.9179	1.5	1.0-1.5
				1.9226	4	3.5-4.0
				1.9368	6.5	6.0-6.5
MW181	2018	201688.497	7537372.233	1.9458	9	8.5-9.0
				2.2333	2	1.5-2.0
				2.2773	4	3.5-4.0
				2.2789	6	5.5-6.0
MW211*		199199.771	7537549.138	2.3122	7.5	7.0-7.5
MW233	2015	199198.57	7537590.67	6.3409		
MW238	2006	199446.65	7540509.92	6.262	7	4-7
				3.98	6	3.0 – 6.0

Note: * No bore log available

6.3.2 Monitoring Frequency

All groundwater monitoring locations listed in Table 6-4 will be sampled every six months. The main sampling events will be undertaken in November and June to record the concentration and extent of PFAS and determine any seasonal fluctuations or trends. This monitoring frequency aligns with the climate of the Management Area, which features the highest volume of rainfall typically between January and July and lower rainfall between September and December.

Groundwater sampling, particularly those near WAPET Creek and Exmouth Gulf, must consider tidal periods to ensure spurious elevation data is not used to assess groundwater flow. Given the remoteness of the site, one-off opportunistic sampling is not considered feasible. Seepage water sampling will occur at low, outgoing tides which is considered the optimal condition for groundwater discharge.

6.3.3 Groundwater Sampling Methodology

Groundwater sampling methodology are detailed in the following sections.

6.3.3.1 Groundwater Monitoring Wells

Groundwater monitoring will be undertaken by no purge HydraSleeve® method for the single-level wells, while the multilevel wells will be sampled with a peristaltic pump and seepage water sampling will be conducted through methodology consistent with the 2018 DSI, as detailed in Table 6-6.

Table 6-6 Groundwater Monitoring Wells – Sampling Method

Activity	Details
Well Gauging	Standing Water Level (SWL) will be gauged using an interface probe. All wells will be measured against a specified mark at the top of the well casing.
Groundwater Field Parameters	For the single level wells, the field parameters will be recorded via a water quality meter from HydraSleeves® or hand-bailed water. For the multilevel wells, the field parameters will be recorded with a flow cell during purging. The following field parameters will be recorded: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (DO). ▪ Temperature. Once field parameters have stabilised (as indicated by at least three consecutive measurements falling within +/- 10% of each other), stabilised parameters' measurement will be recorded on field data records. All field instruments (e.g. water quality meter) will be calibrated by the equipment supplier and daily readings of reference solutions (bump tests) completed to optimise the accuracy of the measurements taken.
Peristaltic pumping (multilevel well sample collection)	The shallowest (non-dry) wells will be sampled at each location using Teflon-free dedicated and disposable high-density polyethylene (HDPE) tubing coupled to a peristaltic pump system. The groundwater will be purged at a low flow rate of 0.2L/min. Near-continuous monitoring of SWL and field parameters will be undertaken during purging and post sample collection to ensure limited drawdown effects. The groundwater will be sampled when the field parameters have stabilised, or before drawdown reaches a maximum of 30 cm.
Deployment and Retrieval of HydraSleeves® (single level well sample collection)	HydraSleeves® will be deployed with top weight sample collection to begin at the lowest point. HydraSleeve® sampling devices will be left in wells for a minimum of 24 hours to allow restabilisation of the well following the slight disturbance caused by sampler deployment. Samples will be collected via continuous pull method at a rate allowing the water to pass through the check valve into the sample sleeve. Samples will be discharged immediately (minimise changes in chemistry) via discharge tube. Following sampling, HydraSleeves® will be deployed in preparation for the next OMP monitoring event using the same string for consistency (same depth of sampling i.e. within screen depth).
Alternative sampling methodology (hand bailing)	Disposable HDPE hand bailers, attached to a polypropylene string, will be used in the event that the water column isn't sufficient to fill the HydraSleeve®. Purging of the well (i.e. removal of 3x well volume) will be undertaken prior to sampling to ensure that a sample representative of the aquifer is taken. Field parameters will be regularly recorded during the bailer purge to confirm field parameter stability is achieved.
Seepage Water Sampling	Sampling will be carried out within a two-hour period; one hour each side of the low tide. Sampling protocol will involve a shallow excavation in the beach sand; just above where inundation by wave action is occurring. In-situ water

Activity	Details
	parameters will be measured from water seeping into the excavation using a calibrated water quality meter. Water seeping into the excavation will be purged prior to measuring water quality parameters (using a dedicated syringe or jug). Once more water seeps in to the excavation, sampling containers will be lowered into the exposed seepage water and filled.
Field Records	Field records will include the following information: ▪ Sampling time, date, and name of the sampler. ▪ Weather conditions. ▪ Sample Collection method. ▪ Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised. ▪ Calibration and daily bump test records. All sample documentation including field notebooks, reporting records, COC and equipment calibration certificates and procedures will be retained within project files.
Decontamination procedure	Dedicated HydraSleeves® and single use nitrile gloves will be used at each groundwater bore thus removing the need for decontamination. All re-usable sampling equipment will be thoroughly washed using PFAS-free detergent then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample container will be pre-labelled by the laboratory with a unique barcode for identification. Samples will be collected directly in appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (CoC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times will be undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998).
Laboratory Testing	▪ Full PFAS analytical suite (see Appendix B). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance)
Laboratory Testing – Quality Control	▪ Groundwater QC samples will be collected at the following frequencies as detailed in the OMP (DoD, 2019): ▪ Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 water samples should be sent to a secondary laboratory. ▪ Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. ▪ Field blank samples at 1 per day.
Laboratory Accreditation and Limits of Reporting	All groundwater analysis will be undertaken by laboratories accredited by the NATA. ▪ Primary analysis will be undertaken by ALS Global Laboratories (Perth) ▪ Secondary analysis will be undertaken by Eurofins ARL (Perth). Laboratory LORs will be suitable to meet the relevant adopted assessment levels (0.01 µg/L).

6.4 Surface Water and Sediment Monitoring

6.4.1 Monitoring Locations

The surface water and sediment locations within the Monitoring Areas described in section 4.1, sampled as part of the DSI (GHD, 2018) are summarised in Table 6-7.

Table 6-7 Summary of Surface Water and Sediment Monitoring Locations (GHD, 2018)

Management Area	Location	Soil Monitoring Location (Sediment/Shallow Soil)	Surface Water Monitoring locations
1a	Maintenance Area (Source Area)	SS119, SS120, SS121, SS122, SS123, SS124, SS125, SS126, SS238, SS239, SS240, SS241	SW119, SW120, SW121, SW122, SW123
2a & 2b	Former and Current Fuel Farm	SD219, SS109, SS110, SS111, SS112, SS113, SS114, SS115, SS228, SS229, SS231, SS232, SS233, SS234, SS235	SW114, SW219
1d	Southern Drainage Channel (Pathway)	SD199, SD200, SS201, SD202, SD203, SD204, SD205, SS296, SS297, SS298, SS299, SS300, SS301, SS302,	SW302, SW200, SW202, SW204, SW297, SW298, SW299, SW300, SW301
1e	Central Drainage Channel (Pathway)	SS195, SS291, SS196, SS292, SS197, SS198, SS293, SS294, SS295	SW195, SW291, SW293, SW294, SW295
2c	Northern Drainage Channel (Pathway)	SS189, SS190, SS191, SS192, SS193, SS194, SS286, SS287, SS288, SS289, SS290,	SW286, SW287, SW288, SW289, SW290, SW304, SW303
1g	Northern reach of WAPET Creek (Receptor)	SD208, SD209, SD210, SD211	SW208, SW209, SW210, SW211, SW305, SW306,

The surface water locations as part of the OMP monitoring are presented in Table 6-8 along with the rationale for the selection, and are highlighted on Figure 4, Appendix A. The location shown on Figure 4 are for guidance and actual locations will depend on conditions at the time of sampling. Priority will be given to areas where surface water has pooled and to low lying areas where sediment can accumulate.

Table 6-8 OMP Surface Water and Sediment Monitoring Locations

Area	Surface water Sampling Location ID	Sediment Sampling Location ID	Rationale
Drainage channels (source and pathway)	Bi-annual and first flush events: SW108, SW113, SW114, SW121, SW122, SW123, SW124, SW125, SW157, SW166, SW168, SW170, SW174, SW176, SW189, SW190, SW192, SW193, SW198, SW199, SW200, SW219, SW227, SW231, SW234, SW235, SW243, SW265, SW277, SW278, SW279, SW288, SW291, SW292, SW293, SW298	Bi-annual and first flush events: SD199, SD200, SD219, SS108, SS113, SS114, SS121, SS122, SS123, SS124, SS125, SS157, SS166, SS168, SS170, SS174, SS176, SS189, SS190, SS192, SS193, SS227, SS231, SS234, SS235, SS243, SS265, SS277, SS278, SS279, SS288, SS291, SS292, SS293, SS298	The monitoring will assess the PFAS extent and changes in the Central Drainage Channel leading to WAPET Creek. It will also confirm the low risk posed by sediment and surface water in other drainage channels. Monitoring of these locations will provide an indication of any change in the nature or magnitude of PFAS in surface waters and sediments, and will help in determining changes attributable to seasonal fluctuations. Priority will be given to areas where surface water has pooled and to low lying areas where sediment can accumulate. This includes surface water pooling on Base at the flood gate release point, which if present during wet season monitoring will be sampled.
WAPET CREEK (Receptor)	Bi-annual and first flush events: SW001, SW205, SW207, SW208, SW209, SW210, SW211, SW300, SW301, SW302, SW303, SW304, SW305	Bi-annual and first flush events: SD205, SD207, SD208, SD209, SD210, SD211, SD300, SD301, SD302, SD303, SD304, SD305, SS301	WAPET Creek is the most important receptor with respect to identified risk. Monitoring of these locations will provide an indication of any change in the nature or magnitude of PFAS in surface waters and sediments, and will help in determining changes attributable to seasonal fluctuations

6.4.2 Surface Water and Sediment Monitoring Frequency

The surface water and sediment monitoring locations listed in Section 6.4.1 will be sampled three times per year, as follows:

- > November and June to record the concentration and extent of PFAS and determine any seasonal fluctuations or trends. This monitoring frequency aligns with the climate of the Management Area, which features the highest volume of rainfall typically between January and July and lower rainfall between September and December. This sampling should be conducted in conjunction with the groundwater monitoring described in Section 6.3.
- > An additional monitoring event will be conducted immediately (or as close as possible) following the first heavy rainfall event of the wet season in January or February. This would serve to assess the potential increase in PFAS surface water concentrations following 'first flush' rainfall and subsequent timeframe for attenuation to 'long-term average' concentrations.

6.4.3 Surface Water Sampling Methodology

The methodology for the surface water monitoring is detailed in Table 6-9.

Table 6-9 Surface Water Monitoring

Item	Details
Field parameters	Surface water physiochemical parameters (i.e. pH, electrical conductivity (EC), oxidation reduction potential (ORP), dissolved oxygen (DO), and temperature) will be recorded at the time of sampling using a pre-calibrated water quality meter. Field observations such as odours or sheen presence must also be recorded on field sampling sheets.
Sampling Method	Surface water samples will be collected directly into sample containers using a 'Grab' (manual) sample method via a long-handled sampling device. Where depth permits, the sample container should be positioned at least 10 cm below the surface water level and above the sediment bed and oriented with the capped opening facing downwards to avoid the collection of surface films. Samples will be decanted into the laboratory supplied sample containers. Samples will be collected in accordance with Australian/New Zealand Standards (AS/NZS 5667.1:1998) 'Water quality – Sampling – Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples'.
Sample Collection	Water samples will be placed directly into appropriately labelled, laboratory supplied sample bottles and packed in chilled containers for delivery to the laboratory under Chain of Custody documentation.
Decontamination	All re-usable sampling equipment will be thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection. Single-use nitrile gloves will be worn during sampling.
Sample identification, preservation, transport and holding times.	Each sample container will be pre-labelled by the laboratory with a unique barcode for identification. Samples will be contained in appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (CoC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times will be undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998). ▪ All holding times will comply with the requirements set out in Australian Standard AS/NZS 5567.1:1998.
Field Records	Field records will include the following information: ▪ Sampling time, date and name of the sampler. ▪ Weather conditions. ▪ Sample Collection method. ▪ Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised.

Item	Details
	Calibration and daily bump test records. All sample documentation including field notebooks, reporting records, COC and equipment calibration certificates and procedures will be retained within project files.
Laboratory Testing	Surface water samples will be analysed for the following: - Full PFAS analytical suite (see Appendix B). - Major anions and cations (include calcium, magnesium, sodium, potassium, chloride sulfate, alkalinity and ionic balance).
Laboratory Testing – Quality Control	Surface water QC samples will be collected at the following frequencies as detailed in the SAQP: - Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. - Field triplicate (inter-laboratory) samples at 1 per 10 water samples should be sent to a secondary laboratory. - Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)].
Laboratory Accreditation and Limits of Reporting	All surface water analysis will be undertaken by laboratories accredited by the NATA. - Primary analysis will be undertaken by ALS Global Laboratories (Perth) - Secondary analysis will be undertaken by Eurofins ARL (Perth). Laboratory LORs will be suitable to meet the relevant adopted assessment levels (0.01 µg/L).

6.4.4 Sediment Sampling Methodology

The methodology for sediment sampling is detailed in Table 6-10.

Table 6-10 Sediment Investigation Methodology

Item	Details
Sample Collection	Sediment samples will be collected at the sediment/water interface (0-0.1 mbgl) using hand tools (e.g. trowel, hand auger, PVC pipe etc.) with samples placed directly into appropriately labelled, laboratory supplied sample containers and packed in chilled containers for delivery to the laboratory under Chain of Custody documentation. At each sampling location, the sediment sample will be visually assessed and observations (including physical description) recorded on field data sheets.
Field Records	Field records will include the following information: - Sampling time, date and name of the sampler. - Sample description and condition. - Weather conditions. - Sample Collection method. - Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised. All sample documentation including field notebooks, reporting records, COC and equipment calibration certificates and procedures will be retained within project files.
Decontamination	All re-usable sampling equipment will be thoroughly washed using PFAS-free detergent, then double rinsed with clean water before the sample collection. Single-use nitrile gloves will be worn during sampling.
Laboratory Testing	Sediment samples will be analysed for the following: Full PFAS analytical suite (see Appendix B).
Laboratory Testing – Quality Control	Sediment QC samples will be collected at the following frequencies as detailed in the SAQP: Field duplicate (intra-laboratory) samples greater than 1 per 10 sediment samples or 1 per batch if the batch is less than 10 samples.

Item	Details
	Field triplicate (inter-laboratory) samples greater than 1 per 10 sediment samples should be sent to a secondary laboratory.
Laboratory Accreditation and Limits of Reporting	All sediment analysis will be undertaken by laboratories accredited by the NATA. - Primary analysis will be undertaken by ALS Global Laboratories (Perth) - Secondary analysis will be undertaken by Eurofins ARL (Perth).

7 Assessment Criteria

7.1 Groundwater and Surface Water

The assessment levels adopted for groundwater and surface water in this OMP are based upon the Heads of Environmental Protection Authorities (HEPA) Australia and New Zealand (2020) *PFAS National Environmental Management Plan 2.0* (NEMP; HEPA 2020) and finding of previous site assessment i.e. Detailed Site Investigation (DSI) (GHD, 2018). The adopted assessment criteria for groundwater and surface water are detailed in Table 7-1.

Table 7-1 Criteria for Groundwater, Seepage Water and Surface Water

Receptor	Adopted Assessment Criteria
Ecological	99% species protection level for Fresh Water and interim Marine Water: - PFOS – 0.00023* µg/L - PFOA – 19 µg/L
Human Health	Recreational Use: - PFOS + PFHxS – 2.0 µg/L - PFOA – 10 µg/L
*The criterion of 0.00023 µg/L is lower than the laboratory level of reporting (LOR) and is somewhat impractical. However, the PFAS NEMP 2020 allows for the adoption of the laboratory LOR as a screening level rather than a quantified measurement.	

7.2 Sediment

It is noted that there are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment.

8 Reporting

8.1 Factual Reporting

A factual report should be produced at the completion of each monitoring event that summarises the data and findings of each monitoring event. Each factual report will present the findings, in accordance with the *PFAS OMP Factual Report Guidance* (Defence, 2021), and contain the following information:

- > Introduction
- > Scope of work completed.
- > Description of sampling methodologies used.
- > Field observations (e.g. condition of monitoring wells, description of purged water) and water quality parameter measurements.
- > Summary of any changes to the monitoring network condition that may affect data integrity, or require rectification works, and recommendations for repair, replacement or decommissioning of a location
- > Evaluation of the applicability of adopted assessment levels.
- > Review of the suitability of the data for assessment purposes (QA/QC evaluation).
- > Summary tables presenting gauged groundwater and surface water levels.
- > Presentation of inferred groundwater contours and inferred groundwater flow direction in a figure.
- > Summary tables of analytical results in comparison to adopted assessment levels.
- > Graphs showing historical concentrations of PFOS, PFOA and PFOS plus PFHxS.
- > Laboratory reports, Chain of Custody (CoC) documentation, field sampling records, data validation and QA/QC details, equipment calibration certificates and other relevant documentation.

In the event that further investigation, management and/or remediation are required, recommendations will be presented in a separate 'technical memorandum'.

8.2 Interpretive Reporting

Upon completion of each year's monitoring period an interpretive report will be prepared in accordance with the *PFAS OMP Annual Interpretive Report Guidance* (Defence, 2022). As a minimum, each interpretive report should include the following:

- > The factual information described in Section 8.1.
- > Evidence of compliance with the requirements of the SAQP and meeting stated objectives of the OMP.
- > Relevant figures depicting sampling locations and site-specific hydrogeological features.
- > Laboratory results and analysis including comparison with relevant screening criteria as identified in each OMP.
- > Assessment and commentary on appropriate Quality Assurance/ Quality Control (QA/QC) procedures.
- > A discussion of analytical results in relation to the following:
 - Trends in PFAS concentrations, including an assessment of temporal changes and/or changes to the extent of PFAS impacts. Trends should be assessed using an appropriate statistical analysis approach (e.g. using Mann-Kendall or similar analysis), with a specified level of confidence based upon the number of monitoring rounds completed.
 - Consideration, based on data trends, as to whether any of the existing remediation / management measures should be re-assessed, with a view to potential modification, supplementation or cessation.
 - Assessment against the management response triggers and contingencies detailed in the OMP.
 - Assessment of whether changes to the CSM and/or risk assessment are required.
 - Whether recalibration or changes to the groundwater model are required to provide a better understanding of the potential future extent of PFAS impact in groundwater.

-
- > Based on the data obtained, an assessment of the OMP sampling requirements with a view to establishing whether:
 - The number of locations monitored could be reduced, such as where PFAS concentrations are stable and are considered to present a low risk to receptors.
 - Additional monitoring locations are required, including the installation of new monitoring wells or sampling of additional existing wells (and/or private bores) to provide better understanding of the nature, extent or magnitude of PFAS impacts in a particular portion of the Management Area.
 - The frequency of monitoring should increase or decrease to provide better understanding of PFAS concentration fluctuations and potential risks to receptors.
 - Monitoring of additional media should be included in the OMP. *For example, if monitoring of surface water demonstrates a trend of increasing PFAS concentrations, or if concentrations significantly greater than those recorded in previous investigations are recorded, then the requirement to conduct monitoring of aquatic biota should be considered (DoD, 2019).*
 - > An overview of remedial works or construction and maintenance activities undertaken in the management area during the reporting period, which may impact the CSM.
 - > A statement as to whether the risk profile has changed overall, or for any specific location at the Site, and a recommendation as to whether this should trigger an OMP and/or PMAP review, or other action.

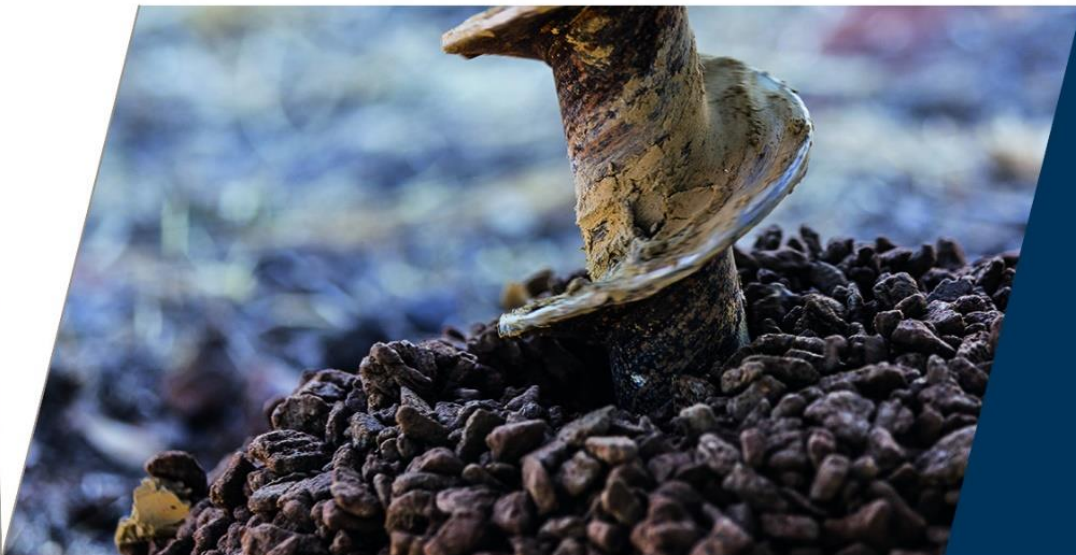
9 References

General References

1. Australian Standard AS 4482-2005 *Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 – Non-volatile and semi-volatile compounds*.
2. *Contaminated Sites Act 2003*, Western Australia.
3. Department of Defence, Department of Energy, 2018, *Quality System Manual Schedule B15*.
4. Department of Defence, 2021, *Defence Contamination Management Manual (DCMM) Annex L Data Management*.
5. Department of Defence, May 2021, *PFAS OMP Factual Report Guidance*, Version 0.2.
6. Department of Defence, October 2022, *PFAS OMP Annual Interpretive Report Guidance*, Version 0.4.
7. Department of the Environment and Energy (2017) in the *National Greenhouse and Energy Reporting Scheme Measurement Technical Guidelines for the Estimation of Emissions by Facilities in Australia*.
8. Department of Water and Environmental Regulation (DWER), 2021, *Assessment and Management of Contaminated Sites*.
9. Environmental Protection Agency (United States EPA), November 2002, Reference: EPA/240/R-02/004, *Guidance on Environmental Data Verification and Data Validation*.
10. The Heads of EPAs Australia and New Zealand (HEPA; 2020) *PFAS National Environmental Management Plan (NEMP) 2.0*, January 2020.
11. National Environment Protection Council (NEPC), 1999, *National Environmental Protection (Assessment of Site Contamination) Measure* (as amended), registered May 2013.
12. National Health and Medical Research Council (NHMRC) (2011 – updated 2022) *National Water Quality Management Strategy Australian Drinking Water Guidelines 6*, September 2022.
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14. Standards Australia/Standards New Zealand (1998) AS5667.1:1998 *Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples*.
15. U.S. Environmental Protection Agency (EPA), 2000, *Guidance for the Data Quality Objectives Process* (EPA QA/G-4).
16. USEPA, 2002, *Guidance on Environmental Data Verification and Data Validation* (EPA QA/G-8).

Site Specific References

17. Cardno, April 2020, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Base Learmonth*.
18. Cardno, May 2020, *PFAS OMP First Flush Sampling Event Factual Report RAAF Learmonth*.
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25. Cardno, September 2022, *PFAS OMP First Flush Sampling Event Factual Report RAAF Learmonth*.
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27. Cardno, January 2023, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Learmonth*.
28. Cardno, April 2023, *PFAS OMP DRAFT 2021 Annual Interpretive Report – RAAF Base Learmonth*.
29. Department of Defence, May 2019, *RAAF Base Learmonth PFAS Management Area Plan*.
30. Department of Defence, May 2019, *RAAF Base Learmonth PFAS Ongoing Monitoring Plan*.
31. GHD, December 2018, *RAAF Base Learmonth – PFAS Investigations – Preliminary and Detailed Site Investigation Report*.
32. GHD, April 2019, *RAAF Base Learmonth – PFAS Investigations – Ecological Risk Assessment Preliminary (ERA)*.



APPENDIX

A

Figures

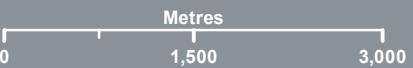


Legend

 Management Area

 RAAF Learmonth

FIGURE 1
1:60,000 Scale at A3

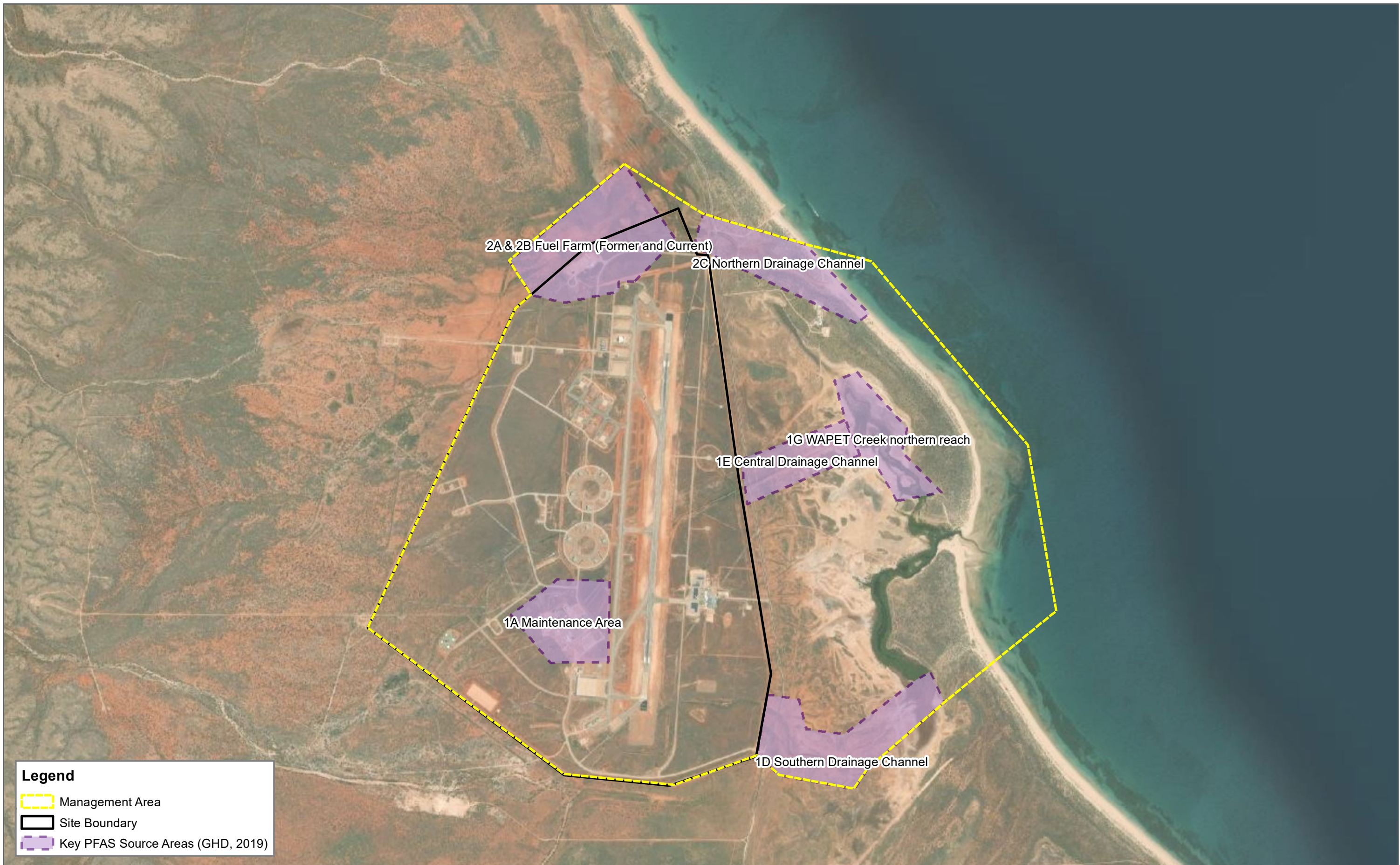


Site Location

SAMPLING AND ANALYSIS QUALITY PLAN
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



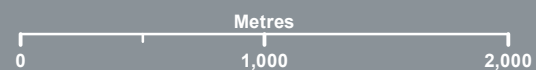
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Date: 2023-02-23 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-001_RegionalLocation 02.mxd
Aerial Imagery Supplied by Google Earth



Legend

- Management Area
- Site Boundary
- Key PFAS Source Areas (GHD, 2019)

FIGURE 2
1:31,000 Scale at A3



Management Areas

SAMPLING AND ANALYSIS QUALITY PLAN
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



Map Produced by Cardno WA
Date: 2023-02-23 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-002_ManagementAreas 02.mxd
Aerial Imagery Supplied by Google Earth

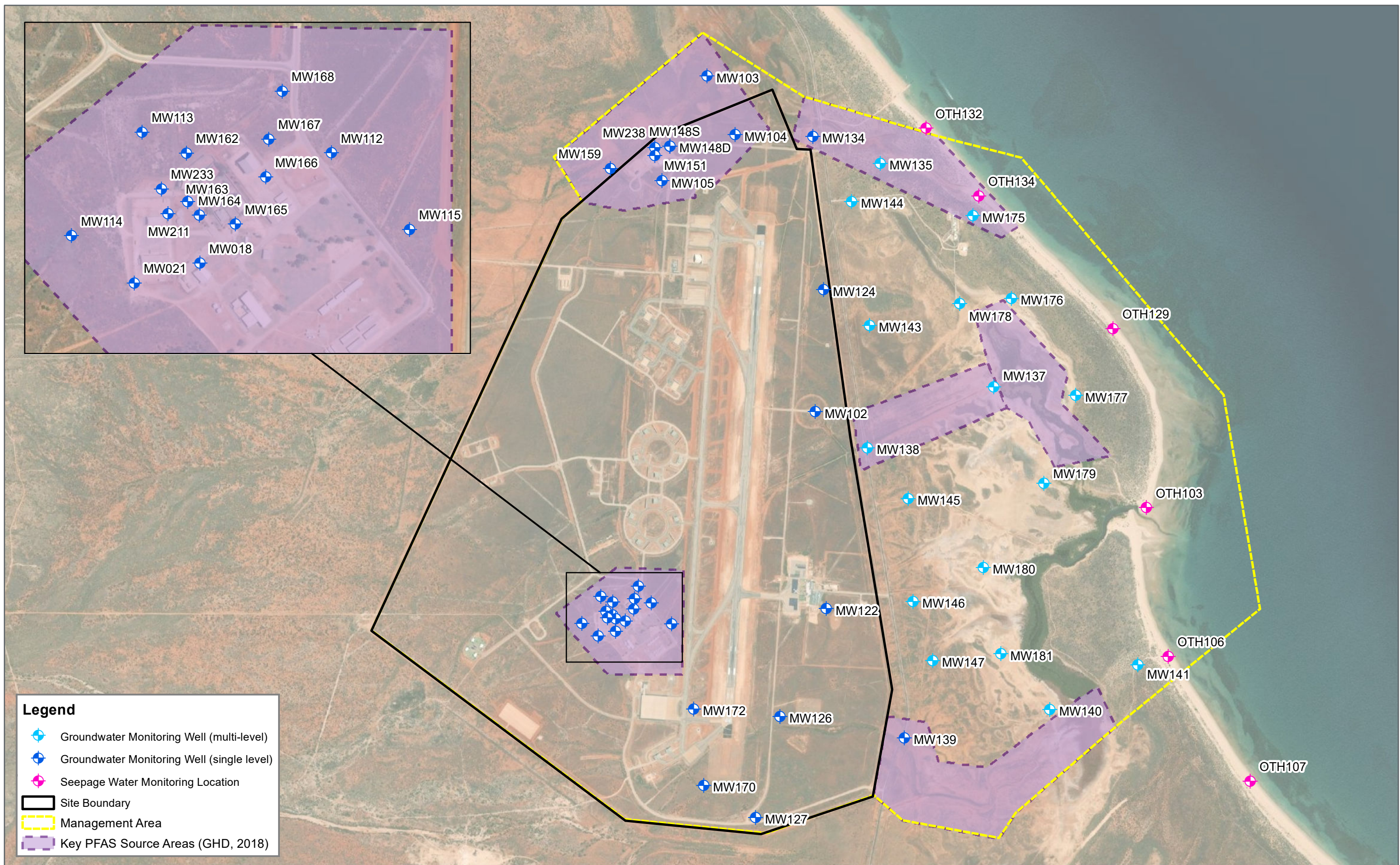


FIGURE 3
1:24,000 Scale at A3

Metres
0 1,000 2,000

Groundwater and Seepage Water Monitoring Locations

SAMPLING AND ANALYSIS QUALITY PLAN
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



Map Produced by Cardno WA
Date: 2023-02-23 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-003_GroundwaterMonitoringLocations 02.mxd
Aerial Imagery Supplied by Google Earth



APPENDIX

B

Full PFAS Analytical Suite

Full PFAS Analytical Suite

Group	Analyte	CAS No.
Perfluoroalkane Sulfonic Acids	Perfluorobutane sulfonic acid (PFBS)	375-73-5
	Perfluoropentane sulfonic acid (PFPeS)	2706-91-4
	Perfluorohexane sulfonic acid (PFHxS)	355-46-4
	Perfluoroheptane sulfonic acid (PFHpS)	375-92-8
	Perfluorooctane sulfonic acid (PFOS)	1763-23-1
	Perfluorodecane sulfonic acid (PFDS)	335-77-3
Perfluoroalkane Carboxylic Acids	Perfluorobutanoic acid (PFBA)	375-22-4
	Perfluoropentanoic acid (PFPeA)	2706-90-3
	Perfluorohexanoic acid (PFHxA)	307-24-4
	Perfluoroheptanoic acid (PFHpA)	375-85-9
	Perfluorooctanoic acid (PFOA)	335-67-1
	Perfluorononanoic acid (PFNA)	375-95-1
	Perfluorodecanoic acid (PFDA)	335-76-2
	Perfluoroundecanoic acid (PFUnDA)	2058-94-8
	Perfluorododecanoic acid (PFDoDA)	307-55-1
	Perfluorotridecanoic acid (PFTrDA)	72629-94-8
	Perfluorotetradecanoic acid (PFTeDA)	376-06-7
Perfluoroalkyl Sulfonamides	Perfluorooctane sulphonamide (FOSA)	754-91-6
	N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8
	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2
	N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	2448-09-7
	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2
	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9
	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6
(n:2) Fluorotelomer Sulfonic Acids	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4
	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2
	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4
	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0

APPENDIX

C

FACTUAL REPORTS



now



PFAS OMP Biannual Monitoring Event Factual Report

November 2022

RAAF Learmonth

304700525



Prepared for
Department of Defence

26 January 2023

 **Cardno**

now

 **Stantec**

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[REDACTED]
Senior Environmental Engineer

[REDACTED]
Principal/Regional WA Project Manager

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1	26/01/2023	Revision 1	[REDACTED]	[REDACTED]

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Chemical Names

DOC	Dissolved Organic Carbon
DO	Dissolved Oxygen
PFAS	Per- and Poly-fluoroalkyl Substances
PFHxS	Per-fluoro-hexane Sulphonate
PFOA	Per-fluoro-octanoic Acid
PFOS	Per-fluoro-octane Sulfonate
TDS	Total Dissolved Solids (salinity of water)
TOC	Total Organic Carbon
TSS	Total Suspended Solids

Technical Terms

AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
AS	Australian Standard
BGL	Below Ground Level
COC	Chain of Custody
DQI	Data Quality Indicator
DQO	Data Quality Objective
DSI	Detailed Site Investigation
EC	Electrical Conductivity
EPA	Environment Protection Authority
ERA	Ecological Risk Assessment
ESA	Environmental Site Assessment
HIL	Health Investigation Level
HSL	Health Screening Level
LOR	Limit of Reporting
N/A	Not Applicable
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
SAQP	Sampling and Analysis Quality Plan
SWL	Standing water level

Units

ha	Hectares
mAHD	Metres relative to the Australian Height Datum
mBGL	Metres Below Ground Level
mbTOC	Metres below Top of Casing
Meq/L	Milliequivalents per Litre
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
µg/L	Microgram per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

OMP	Ongoing Monitoring Plan
FTG	Fire Training Ground
RAAF	Royal Australian Airforce

1 Introduction

1.1 Background

Cardno now Stantec ("Cardno") was engaged by the Australian Department of Defence ("Defence" or "the Client") to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP) biannual monitoring event at the Royal Australian Airforce (RAAF) Learmonth ("the site"). The site is located approximately 30 km south of Exmouth, Western Australia (WA) (Figure 1, Appendix A).

The OMP was carried out in accordance with the scope and limitations presented in Cardno's Sampling and Analysis Quality Plan (SAQP):

- > Cardno, November 2022, Reference: DEF19009, 'PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) RAAF Base Learmonth'. Rev 7

The SAQP was reviewed prior to the monitoring event and the methodology and guidelines updates were made.

For the purposes of this report:

- > "the site" was defined as RAAF Base Learmonth.
- > the "Management Area" was defined as comprising the site, plus the land east of the Base, including the salt pan, drainage channels, Wapet Creek and extends to Exmouth Gulf (Figure 2, Appendix A).

1.2 Purpose & Objectives

The objective of the OMP is to assess the changes in the nature and extent of PFAS within the environment, specifically where there is an identified potentially elevated risk to a receptor or a potential future risk to a receptor associated with Defence's historical use of legacy Aqueous Film Forming Foam (AFFF).

The purpose of this PFAS OMP factual report is to provide an up-to-date status of the condition of the site as it is currently understood in relation to the most recent sampling event.

The objectives of the report are:

- > To provide a succinct summary of the November 2022 monitoring event and provision of analytical results with supporting tables and figures.
- > To provide confirmation of the current understanding of risk.
- > To provide supporting data for the assessment of management actions, where relevant.

1.3 Relevant Guidelines

This assessment has been undertaken in general accordance with applicable industry standards for a site investigation for the purpose, objectives and scope identified in this report. These standards are set out in:

- > National Environment Protection Council (NEPC), 1999, *National Environmental Protection (Assessment of Site Contamination) Measure* (as amended 2013) (ASC NEPM).
- > Heads of Environmental Protection Authority's Australia and New Zealand (HEPA), January 2020, *PFAS National Environmental Management Plan (NEMP) 2.0*.
- > Australian Standard AS 4482-2005 *Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 - Non-volatile and semi-volatile compounds*.
- > Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling*.
- > Australian and New Zealand Guidelines, 2018. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

- > Department of Water and Environmental Regulation (DWER), 2021, *Assessment and Management of Contaminated Sites*¹.
- > Department of Defence, Department of Energy, 2018, *Quality System Manual Schedule B15*.
- > U.S. Environmental Protection Agency (EPA), 2000, *Guidance for the Data Quality Objectives Process (EPA QA/G-4)*.
- > USEPA, 2002, *Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)*.
- > National Health and Medical Research Council (NHMRC), August 2019, *Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water*.

2 Scope of Work

Cardno carried out the tasks detailed in the following sections in order to satisfy the purpose and objectives of this assessment.

2.1 Groundwater Monitoring

Sampling of selected groundwater wells was generally performed in accordance with the SAQP, applying methods set out in Section 3 of this report. The groundwater wells monitored as part of the OMP are presented in Table 2-1, and are shown on Figure 4, Appendix A.

Table 2-1 Groundwater Monitoring Locations

Monitoring Area	Location ID	Number
Source Area 1 – Maintenance Area	MW018, MW021, MW112, MW113, MW114, MW115, MW162, MW163, MW164, MW165, MW166, MW167, MW168, MW211, MW233.	15
Source Area 2 – Fuel Farm	MW105, MW148D, MW148S, MW151, MW159, MW238.	6
Pathway	MW102, MW103, MW104, MW122, MW124, MW126, MW127, MW134, MW135, MW138, MW139, MW140, MW143, MW144, MW145, MW146, MW147, MW170, MW172, MW175, MW180, MW181.	22
Receptor	MW137, MW141, MW176, MW177, MW178, MW179.	6

2.2 Seepage Water Monitoring

Sampling of selected seepage water monitoring locations was performed in accordance with the SAQP, applying methods set out in section 3 of this report. The seepage water locations monitored as part of the OMP are presented in Table 2-2 and are shown on Figure 4, Appendix A.

Table 2-2 Seepage Water Monitoring Locations

Monitoring Area	Location ID	Number
Seepage	OTH103, OTH106, OTH107, OTH129, OTH132, OTH134.	6

2.3 Surface water Monitoring

Sampling of selected surface water monitoring locations was performed in accordance with the SAQP, applying methods set out in Section 3 of this report. The surface water locations monitored as part of the OMP are presented in Table 2-3 and are shown on Figure 5, Appendix A.

¹ It is noted that site is located on Commonwealth Land and is regulated under the Commonwealth environmental legislation, the State based DWER guidelines are relevant for the sampling of off-Site private properties and waterways.

Table 2-3 Surface water Monitoring Locations

Monitoring Area	Location ID	Number
Drainage channels	SW108, SW113, SW114, SW121, SW122, SW123, SW124, SW125, SW157, SW166, SW168, SW170, SW174, SW176, SW189, SW190, SW192, SW193, SW198, SW199, SW200, SW219, SW227, SW231, SW234, SW235, SW243, SW265, SW277, SW278, SW279, SW288, SW291, SW292, SW293, SW298.	36
WAPET Creek	SW001, SW205, SW207, SW208, SW209, SW210, SW211, SW300, SW301, SW302, SW303, SW304, SW305.	13

2.4 Sediment Monitoring

Sampling of selected sediment (or shallow soil if dry) monitoring locations was performed in accordance with the SAQP, applying methods set out in Section 3 of this report. The sediment locations monitored as part of the OMP are presented in Table 2-4 and are shown on Figure 6, Appendix A.

Table 2-4 Sediment Monitoring Locations

Monitoring Area	Location ID	Number
Drainage channels	SD199, SD200, SD219, SS108, SS113, SS114, SS121, SS122, SS123, SS124, SS125, SS157, SS166, SS168, SS170, SS174, SS176, SS189, SS190, SS192, SS193, SS198, SS227, SS231, SS234, SS235, SS243, SS265, SS277, SS278, SS279, SS288, SS291, SS292, SS293, SS298.	36
WAPET Creek	SD205, SD207, SD208, SD209, SD210, SD211, SD300, SD301, SD302, SD303, SD304, SD305, SS301.	13

Note: 'SS' prefix indicates a shallow soil (dry) location, 'SD' prefix a sediment (wet) location

2.5 Data Management

All the data included in the report has been collected, uploaded and reviewed according to the data management requirements of the *Defence Contamination Management Manual (DCMM)* Annex L, including:

- > The sample naming convention detailed in the DCMM Annex L was used in the field;
- > All field data collected was uploaded to the ESdat database;
- > Laboratory data was uploaded and approved; and
- > QA/QC data was reconciled.

2.6 Deviations from the OMP SAQP

Deviations from the SAQP (Cardno, November 2022) for the November 2022 monitoring event are presented in Table 2-5.

Table 2-5 Summary of deviations from the OMP SAQP

Location	Deviation	Comments
SW108, SW113, SW114, SW121, SW122, SW123, SW124, SW125, SW157, SW166, SW168, SW170, SW174, SW176, SW189, SW190, SW192, SW193, SW198, SW199, SW200, SW219, SW227, SW231, SW234, SW235, SW243, SW265, SW277, SW278, SW279, SW288, SW291, SW292, SW293, SW298.	Not sampled	These surface water monitoring locations were found dry. No impact on the OMP – These locations have never been sampled for surface water as always been dry (sediment samples were collected at these locations and analysed for PFAS).

3 Methodology

3.1 Groundwater Sampling Methodology

Groundwater monitoring was undertaken applying the methods detailed in Table 3-1.

Table 3-1 Groundwater Sampling Method

Activity	Details
Well Gauging	Standing Water Level (SWL) were gauged using an interface probe. All wells were measured against a surveyed mark at the top of the well casing.
Groundwater Field Parameters	Groundwater field parameters were recorded via a water quality meter prior to deployment of Hydrasleeves® or pre-sample collection. The following field parameters were recorded using a water quality meter: - pH. - electrical conductivity (EC). - oxidation reduction potential (ORP). - Dissolved oxygen (DO). - Temperature. Once field parameters have stabilised (as indicated by at least three consecutive measurements falling within +/- 10% of each other) measurement were recorded on field data records. All field instruments (e.g. water quality meter) were calibrated by the equipment supplier and reading of reference solutions (bump tests) undertaken daily in the field to optimise the accuracy of the measurements taken. Calibration certificates and bump tests records are provided in Appendix D.
Deployment and Retrieval of Hydrasleeves® (single level well sample collection)	Hydrasleeves® were deployed with top weight sample collection to begin at the lowest point. Hydrasleeves® sampling devices were left in wells for a minimum of 24 hours to allow restabilisation of the well following the slight disturbance caused by sampler deployment. Samples were collected via continuous pull method at a rate allowing the water to pass through the check valve into the sample sleeve. Samples were discharged immediately (minimise changes in chemistry) via discharge tube. Following sampling, Hydrasleeves® were deployed in preparation for the next OMP monitoring event using the same string for consistency between event (same depth of sampling i.e. within screen).
Peristaltic pump (multi-level wells sample collection)	The shallowest (non-dry) screen intervals were sampled at each multi-level well location, using Teflon-free dedicated and disposable high-density polyethylene (HDPE) tubing coupled to a peristaltic pump system. The groundwater was purged at a low flow rate of 0.2 mL/min. SWL and field parameters were measured during purging and post sample collection to ensure limited drawdown effects. The groundwater was sampled when the field parameters had stabilised.
Decontamination procedure	Dedicated Hydrasleeves®/tubing were used at each groundwater well thus removing the need for decontamination. All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (CoC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).

Activity	Details
Laboratory Testing	Groundwater samples were submitted for the following analysis: - Full PFAS analytical suite (refer to the SAQP for full list of analytes). - Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance). The primary laboratory was ALS Global Laboratories (Perth), and the secondary laboratory (quality control) was Eurofins ARL (Perth). Both laboratories are NATA-accredited for the parameters tested. Copies of the NATA stamped laboratory reports and CoC documentation are included in Appendix C.
Laboratory Testing – Quality Control	Groundwater QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, November 2022): - Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. - Field triplicate (inter-laboratory) samples at 1 per 10 water samples and sent to a secondary laboratory. - Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. - Field blank samples at 1 per day.

3.2 Seepage Water Sampling Methodology

Seepage water monitoring procedure is detailed in Table 3-2.

Table 3-2 Seepage water Sampling method

Activity	Details
Field parameters	The following field parameters were recorded using a water quality meter: - pH. - EC. - ORP. - DO. - Temperature. Field observations such as water flow, odours or sheen presence were also recorded on field sampling sheets.
Sampling Method	Sampling was carried out in a two-hour period; one hour each side of the low tide. Sampling protocol involved a shallow excavation in the beach sand; just above where inundation by wave action is occurring. Sampling containers were lowered into the exposed seepage water and filled.
Decontamination procedure	All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under CoC documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	Seepage water samples were submitted for the following analysis: - Full PFAS analytical suite (refer to the SAQP for full list of analytes). - Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance).
Laboratory Testing – Quality Control	Seepage water QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, November 2022): Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples.

Activity	Details
	- Field triplicate (inter-laboratory) samples at 1 per 10 water samples and sent to a secondary laboratory. - Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. - Field blank samples at 1 per day.

3.3 Surface Water Sampling Methodology

Surface water monitoring procedure is detailed in Table 3-3.

Table 3-3 Surface water Sampling Method

Activity	Details
Field parameters	The following field parameters were recorded using a water quality meter: - pH. - EC. - ORP. - DO. - Temperature. Field observations such as water flow, odours or sheen presence were also recorded on field sampling sheets.
Sampling Method	Surface water samples were collected directly into sample containers using a 'Grab' (manual) sample method via a long-handled sampling device. Where depth permits, the sample container was positioned at least 10 cm below the surface water level and above the sediment bed and oriented with the capped opening facing downwards to avoid the collection of surface films.
Decontamination procedure	All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample was labelled with the sample location, date, project identification number and sampler's initials. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under CoC documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	Surface water samples were submitted for the following analysis: - Full PFAS analytical suite (refer to the SAQP for full list of analytes). - Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance).
Laboratory Testing – Quality Control	Surface water QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, November 2022): - Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. - Field triplicate (inter-laboratory) samples at 1 per 10 water samples and sent to a secondary laboratory. - Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. - Field blank samples at 1 per day.

3.4 Sediment Sampling Methodology

Sediment sampling methodology is detailed in Table 3-4.

Table 3-4 Sediment Sampling Method

Activity	Details
Sample Collection	Sediment samples were collected at the sediment/water interface using hand tools (e.g. trowel, hand auger, PVC pipe etc.) with samples placed directly into appropriately labelled, laboratory supplied sample containers and packed in chilled containers for delivery to the laboratory under CoC documentation. At each sampling location, the sediment sample was visually assessed, and observations (including physical description) recorded on field data sheets.
Field Records	The following information was recorded on the field data sheets: - Sample description. - Sampling time and date. - Weather conditions. - Sample Collection method. - Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Laboratory Testing	Sediment samples were submitted for the following analysis: Full PFAS analytical suite (refer to the SAQP for full list of analytes).
Laboratory Testing – Quality Control	Sediment QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, November 2022): - Field duplicate (intra-laboratory) samples greater than 1 per 20 sediment samples or 1 per batch if the batch is less than 20 samples. - Field triplicate (inter-laboratory) samples greater than 1 per 20 sediment samples and sent to a secondary laboratory. - Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. trowel)]. - Field blank samples at 1 per day.

3.5 Quality Control / Quality Assurance

A critical aspect of site assessments is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process which includes a review of the following data quality indicators, as described in the SAQP:

- > QA documentation.
- > Bias.
- > Data Representativeness.
- > Data Precision & Accuracy.
- > Laboratory Performance.
- > Data Comparability.
- > Data Set Completeness.

A detailed review of these aspects has been undertaken, the results of which are presented in Appendix E.

The QA/QC review concluded that there are no significant systematic errors in the data collection process and therefore, the dataset used for the assessment is considered valid and complete.

3.6 Assessment Criteria

3.6.1 Groundwater, Seepage water and surface water

The adopted assessment criteria for groundwater are detailed in Table 3-5.

Table 3-5 Criteria for groundwater, seepage water and surface water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS µg/L	PFOA	
Human Health – Recreational Water	2 ¹	10	NHMRC 2019, HEPA 2020
Ecological – 99% species protection	0.00023 ²	19	HEPA 2020
- Sum of PFOS and PFHxS. - PFOS only; Practical screening guideline of 0.01 µg/L is based on typical current laboratory limit of reporting. Therefore, it should be noted that warning and action levels would not be relevant until the detection limits are reduced or the screening levels are increased (HEPA 2020).			

3.6.2 Sediment

The adopted assessment criteria for sediment are detailed in Table 3-6.

Table 3-6 Criteria for Sediment

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS mg/kg	PFOA	
Human Health - Commercial / industrial (on-base activities)	20 ¹	50	HEPA 2020
Ecological – Direct exposure (interim guidelines)	1 ²	10	HEPA 2020
Ecological - indirect exposure (interim guidelines)	0.01 ²	-	HEPA 2020
- Sum of PFOS and PFHxS. - PFOS only			

4 Field Observations and Results

4.1 General Site Observations

No significant weather event or site activities that could have impacted the monitoring event or results obtained were noted during the November 2022 monitoring event. No rainfall occurred leading to or during the November 2022 monitoring event and the daily maximum temperatures varied between 34.5 and 36.0°C.

No groundwater monitoring well was found dry during the November 2022 monitoring event.

4.2 Groundwater

4.2.1 Summary of Field Observations

4.2.1.1 Physicochemical parameters

Stabilised physicochemical parameters, water colour and observations recorded during the groundwater sampling program are presented in field sampling records, included in Appendix D. Groundwater was fresh to hyper saline [TDS ranging from 1,300 mg/L (MW211) to 89,585 mg/L (MW134)], and generally near neutral [pH ranging 5.6 (MW168) to 8.18 (MW238)]. Groundwater temperature was on average 28.3°C, and DO readings generally indicate aerobic groundwater condition at most monitoring wells [DO ranging from 0.01 mg/L (MW140) to 7.24 mg/L (MW238)]. Field parameters were generally consistent with the previous monitoring events.

4.2.1.2 Groundwater Elevation and Migration

Well gauging was undertaken over two days and several tide cycles which has been considered when interpreting inferred groundwater contours and flow direction.

Groundwater elevations ranged from 0.093 mAHD (MW181) to 1.429 mAHD (MW112).

Groundwater flow beneath the site was interpreted to be easterly, towards the Exmouth Gulf, consistent with the previous monitoring events. Groundwater is generally inferred to flow towards areas of groundwater depression that lie between the Base and the coast (refer to Figure 3). Groundwater elevation in wells closer to the shore might be influenced by tidal effects.

Groundwater elevation contours and flow direction are shown in Figure 3, Appendix A. Gauging records are presented in Appendix D.

4.2.2 Groundwater Laboratory Results

4.2.2.1 PFAS analytes

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results are provided within Appendix B. A summary of results exceeding the adopted criteria is presented in Table 4-1. Laboratory results have also been compared to available historical data to identify monitoring wells where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Figure 4 in Appendix A presents the groundwater monitoring locations. The laboratory reports are provided in Appendix C.

Table 4-1 Summary of Groundwater Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results ¹	No. Results Above Criteria
PFOA	-	10 ²	2.08 (MW151)	49	0
PFOS	MW018, MW021, MW103, MW105, MW112, MW115, MW137, MW138, MW148D, MW148S, MW151, MW162, MW163, MW164, MW165, MW166, MW167, MW168, MW172, MW211, MW233, MW238.	0.01 ³	26.3 (MW151)	49	22
Sum of PFOS and PFHxS	MW148D, MW148S, MW151, MW162, MW163, MW164, MW172, MW211, MW233, MW238	2 ²	59.3 (MW151)	49	10

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – Recreational Use
3. HEPA 2020 guideline value for ecological 99% species protection (LOR adopted)

Findings are summarised as follows:

- > There was no first-time detection of PFOA or the sum of PFOS and PFHxS for any of the groundwater monitoring locations in November 2022.
- > No new exceedance of a guideline value was reported for any of the groundwater monitoring locations in November 2022.

4.2.2.2 Non-PFAS analytes

Tabulated laboratory results for non-PFAS analytes are provided within Appendix B. Results were compared to historical range for each monitoring location. Total anions concentrations ranged from 20.1 (MW233) and 1,230 (MW181) meq/L. Total cations concentrations ranged from 17.3 (MW211) and 1,370 (MW181) meq/L. Non-PFAS analytes concentrations were of the same order of magnitude as previous monitoring events.

4.3 Seepage Water

4.3.1 Summary of Field Observations

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the groundwater sampling program are presented in field sampling record sheets, included in Appendix D. Seepage water temperature was on average 27.0°C, DO readings indicate aerobic conditions, pH was near neutral, and TDS indicates saline water condition. Field parameters were generally consistent with the previous monitoring events.

4.3.2 Laboratory Results

4.3.2.1 PFAS analytes

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results are provided within Appendix B. A summary of results is presented in Table 4-2. Laboratory results have also been compared to available historical data in order to identify monitoring wells where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Figure 4 in Appendix A presents the seepage water monitoring locations. The laboratory reports are provided in Appendix C.

Table 4-2 Summary of Seepage water Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results ¹	No. Results Above Criteria
PFOA	-	10 ²	<0.01	6	0
PFOS	-	0.01 ³	<0.01	6	0
Sum of PFOS and PFHxS	-	2 ²	<0.01	6	0

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – Recreational Use
3. HEPA 2020 guideline value for ecological 99% species protection (LOR adopted)

Findings are summarised as follows:

- > None of the six (6) seepage water samples reported PFAS concentrations above the LOR.
- > There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the seepage water monitoring locations during the November 2022 monitoring event.

4.3.2.2 Non-PFAS analytes

Tabulated laboratory results for non-PFAS analytes are provided within Appendix B. Results were compared to historical range for each monitoring location. Total anions concentrations ranged from 540 (OTH103) and 700 (OTH106) meq/L. Total cations concentrations ranged from 620 (OTH134) and 709 (OTH106) meq/L. Non-PFAS analytes concentrations were of the same order of magnitude as previous monitoring events.

4.4 Surface water

4.4.1 Summary of Field Observations

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the groundwater sampling program are presented in field sampling record sheets, included in Appendix D. Field parameters were generally consistent with the previous monitoring events. pH was near neutral to slightly alkaline, and water condition was aerobic and saline [TDS ranging from 31,990 (SW211) to 61,377 mg/L (SW205)].

4.4.2 Laboratory Results

4.4.2.1 PFAS analytes

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results are provided within Appendix B. A summary of results exceeding the adopted criteria is presented in Table 4-3. Laboratory results have also been compared to available historical data in order to identify monitoring wells where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Figure 5 in Appendix A presents the surface water monitoring locations. The laboratory reports are provided in Appendix C.

Table 4-3 Summary of Surface water Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results ¹	No. Results Above Criteria
PFOA	-	10 ²	<0.01	13	0
PFOS	-	0.01 ³	<0.01	13	0
Sum of PFOS and PFHxS	-	2 ²	<0.01	13	0

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – Recreational Use
3. HEPA 2020 guideline value for ecological 99% species protection (primary laboratory LOR adopted)

Findings are summarised as follows:

- > None of the 13 surface water samples reported PFAS concentrations above the LOR.
- > There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the surface water monitoring locations during the November 2022 monitoring event.

4.4.2.2 Non-PFAS analytes

Tabulated laboratory results for non-PFAS analytes are provided within Appendix B. Results were compared to historical range, where available, for each monitoring location. Total anions concentrations ranged from 599 (SW303) and 1,200 (SW300) meq/L. Total cations concentrations ranged from 658 (SW208) and 1,400 (SW300) meq/L. Non-PFAS analytes concentrations were of the same order of magnitude as previous monitoring events.

4.5 Sediment

4.5.1 Summary of Field Observations

Observations recorded during the sediment sampling program are provided in the field sampling record sheets within Appendix D.

4.5.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results are provided within Appendix B. Soil criteria are adopted in the absence of criteria for sediment for consistency with the SAQP (Cardno, November 2022), Detailed Site Investigation (DSI) (GHD, 2018) and Ecological Risk Assessment (ERA) (GHD, 2019). A summary of results exceeding the adopted criteria is presented in Table 4-4. Laboratory results have also been compared to available historical data to identify monitoring wells where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Figure 6 in Appendix A presents the sediment monitoring locations.

Table 4-4 Summary of Sediment Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (mg/kg)	Max Conc. (mg/kg)	No. Analytical Results ¹	No. Results Above Criteria
PFOA	-	10 ²	0.0003 (SS235)	49	0
PFOS	SS113, SS121, SS122, SS123, SS124, SS125, SS227, SS231, SS234, SS235, SS243	0.01 ³	0.0863 (SS122)	49	11
Sum of PFHxS and PFOS	-	20 ⁴	0.0863 (SS122)	49	0

Notes:

1. Non-inclusive of quality control samples
2. Ecosystems – all land uses – Direct exposure (HEPA, 2020)
3. Ecosystems – all land uses – Indirect exposure (HEPA, 2020)
4. Human health – Commercial/Industrial (HEPA, 2020)

Findings are summarised as follows:

- > None of the sediment samples reported a first-time detection of PFOA or Sum of PFOS and PFHxS, or a new exceedance of guideline values.

4.6 Changes to the Monitoring Network Condition

No changes to the monitoring network condition were noted during the November 2022 monitoring event.

5 Summary and Conclusions

Cardno undertook the November 2022 groundwater, seepage water, surface water and sediment monitoring event at RAAF Base Learmonth as part of the PFAS OMP. Groundwater sampling and testing was undertaken at 49 groundwater monitoring wells, 13 surface water locations, six (6) seepage water locations and 49 sediment monitoring locations. 36 surface water monitoring locations could not be sampled as these were found dry.

Groundwater levels were gauged in all wells before sampling. Groundwater is inferred to flow towards an area of groundwater depression that lies between the site and the coast.

The groundwater laboratory results reported the following:

- > Of the 49 samples that were tested, PFOS (22 samples) and Sum of PFHxS and PFOS (10 samples) reported concentrations that exceeded the HEPA (2020) ecological guideline value for 99% protection species and HEPA (2020) guideline value for recreational use respectively.
- > There was no first-time detection of PFOA or the Sum of PFOS and PFHxS for any of the groundwater monitoring locations.
- > No new exceedance of a guideline value was reported for any of the groundwater monitoring locations.

The seepage water laboratory results reported the following:

- > None of the six (6) seepage water samples reported PFAS concentrations above LOR.
- > There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the seepage water monitoring locations during the November 2022 monitoring event.

The surface water laboratory results reported the following:

- > None of the 13 surface water samples reported PFAS concentrations above the LOR.
- > There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the surface water monitoring locations during the November 2022 monitoring event.

The sediment laboratory results reported the following:

- > Of the 49 sediment samples that were tested, PFOS (11 samples) reported concentrations that exceeded the HEPA (2020) ecological indirect exposure criteria.
- > None of the sediment samples reported a first-time detection of PFOA or Sum of PFOS and PFHxS, or a new exceedance of guideline values.

PFAS concentrations were generally within the historical range for all media sampled.

The next OMP sampling event for RAAF Base Learmonth will be the 2023 first flush monitoring event. An Annual Interpretive Report will be prepared for the July 2021 – June 2022 monitoring period.

6 References

General References

1. Australian Standard AS 4482-2005 *Guide to the investigation and sampling of sites with potentially contaminated soils*, Part 1 – Non-volatile and semi-volatile compounds.
2. Australian Standard AS 4482-1999 *Guide to the investigation and sampling of sites with potentially contaminated soils*, Part 2 – Volatile substances.
3. *Contaminated Sites Act 2003*, Western Australia.
4. Department of Defence, May 2021, *PFAS OMP Factual Report Guidance* Version 0.2.
5. Department of Defence, July 2018 amended June 2021, *Contamination Management Manual*, Annex L *Guidance on Data Management*.
6. Department of the Environment and Energy (2017) in the National Greenhouse and Energy Reporting Scheme Measurement *Technical Guidelines for the Estimation of Emissions by Facilities in Australia*.
7. Department of Water and Environmental Regulation (DWER), 2021, *Assessment and Management of Contaminated Sites*.
8. Department of Water and Environment Regulation (DWER), 2018, Perth Groundwater Atlas, (<https://maps.water.wa.gov.au/#/webmap/gwm>).
9. Environmental Protection Agency (United States EPA), November 2002, Reference: EPA/240/R-02/004, 'Guidance on Environmental Data Verification and Data Validation'.
10. The Heads of EPAs Australia and New Zealand (HEPA; 2020) *PFAS National Environmental Management Plan (NEMP) 2.0*, January 2020.
11. National Environment Protection Council (NEPC), 1999, *National Environmental Protection (Assessment of Site Contamination) Measure* (as amended), registered May 2013.
12. National Health and Medical Research Council (NHMRC) (2011, as updated 2022) *National Water Quality Management Strategy Australian Drinking Water Guidelines 6*, Version 3.8, September 2022.
13. NHMRC, August 2019, *Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water*.
14. Standards Australia/Standards New Zealand (1998) AS5667.1:1998 'Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples'.
15. U.S. Environmental Protection Agency (EPA), 2000, *Guidance for the Data Quality Objectives Process* (EPA QA/G-4).
16. USEPA, 2002, *Guidance on Environmental Data Verification and Data Validation* (EPA QA/G-8).

Site Specific References

17. Cardno, November 2022, Reference: DEF19009, 'PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) RAAF Base Learmonth'. Rev 7.
18. Cardno, October 2022, draft *2021 Annual Interpretive Report RAAF Base Learmonth*.
19. Cardno, October 2022, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Base Learmonth*.
20. Cardno, August 2022, *PFAS OMP First Flush Sampling Event Factual Report RAAF Base Learmonth*.
21. Cardno, April 2021, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Base Learmonth*.
22. Cardno, August 2021, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Base Learmonth*.
23. Cardno, July 2021, *PFAS OMP 2020 Annual Interpretive Report, RAAF Base Learmonth*.
24. Cardno, May 2021, *PFAS OMP First Flush Sampling Event Factual Report RAAF Base Learmonth*.
25. Cardno, February 2021, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Base Learmonth*.
26. Cardno, July 2020, *PFAS OMP First Flush Sampling Event Factual Report RAAF Base Learmonth*.
27. Cardno, April 2020, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Base Learmonth*.
28. Department of Defence, May 2019, *RAAF Base Learmonth PFAS Ongoing Monitoring Plan*.

29. GHD, December 2018, *RAAF Base Learmonth – PFAS Investigations – Preliminary and Detailed Site Investigation Report*.
30. GHD, April 2019, *RAAF Base Learmonth – PFAS Investigations – Ecological Risk Assessment Preliminary (ERA)*.

APPENDIX

A

FIGURES



now



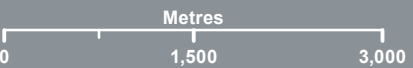


Legend

 Management Area

 RAAF Learmonth

FIGURE 1
1:60,000 Scale at A3



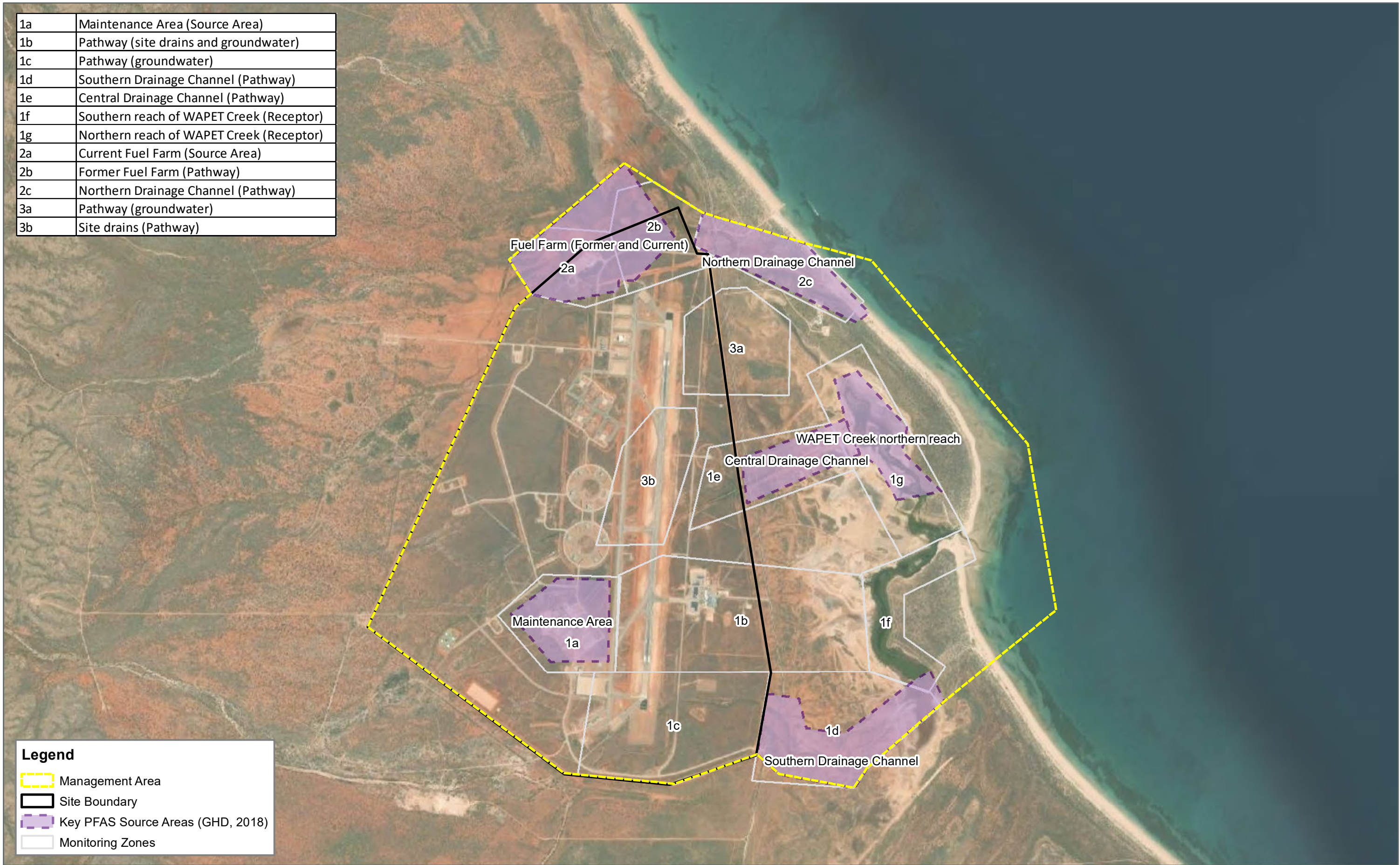
Site Location

NOVEMBER 2022 BIANNUAL MONITORING EVENT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



Map Produced by Cardno WA
Date: 2023-01-26 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-001_RegionalLocation 02.mxd
Aerial Imagery Supplied by Google Earth

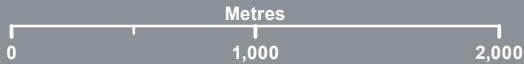
1a	Maintenance Area (Source Area)
1b	Pathway (site drains and groundwater)
1c	Pathway (groundwater)
1d	Southern Drainage Channel (Pathway)
1e	Central Drainage Channel (Pathway)
1f	Southern reach of WAPET Creek (Receptor)
1g	Northern reach of WAPET Creek (Receptor)
2a	Current Fuel Farm (Source Area)
2b	Former Fuel Farm (Pathway)
2c	Northern Drainage Channel (Pathway)
3a	Pathway (groundwater)
3b	Site drains (Pathway)



Legend

- Management Area
- Site Boundary
- Key PFAS Source Areas (GHD, 2018)
- Monitoring Zones

FIGURE 2
1:31,000 Scale at A3



Management Area

NOVEMBER 2022 BIENNIAL MONITORING EVENT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2023-01-26 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-002_ManagementAreas 02.mxd
Aerial Imagery Supplied by Google Earth

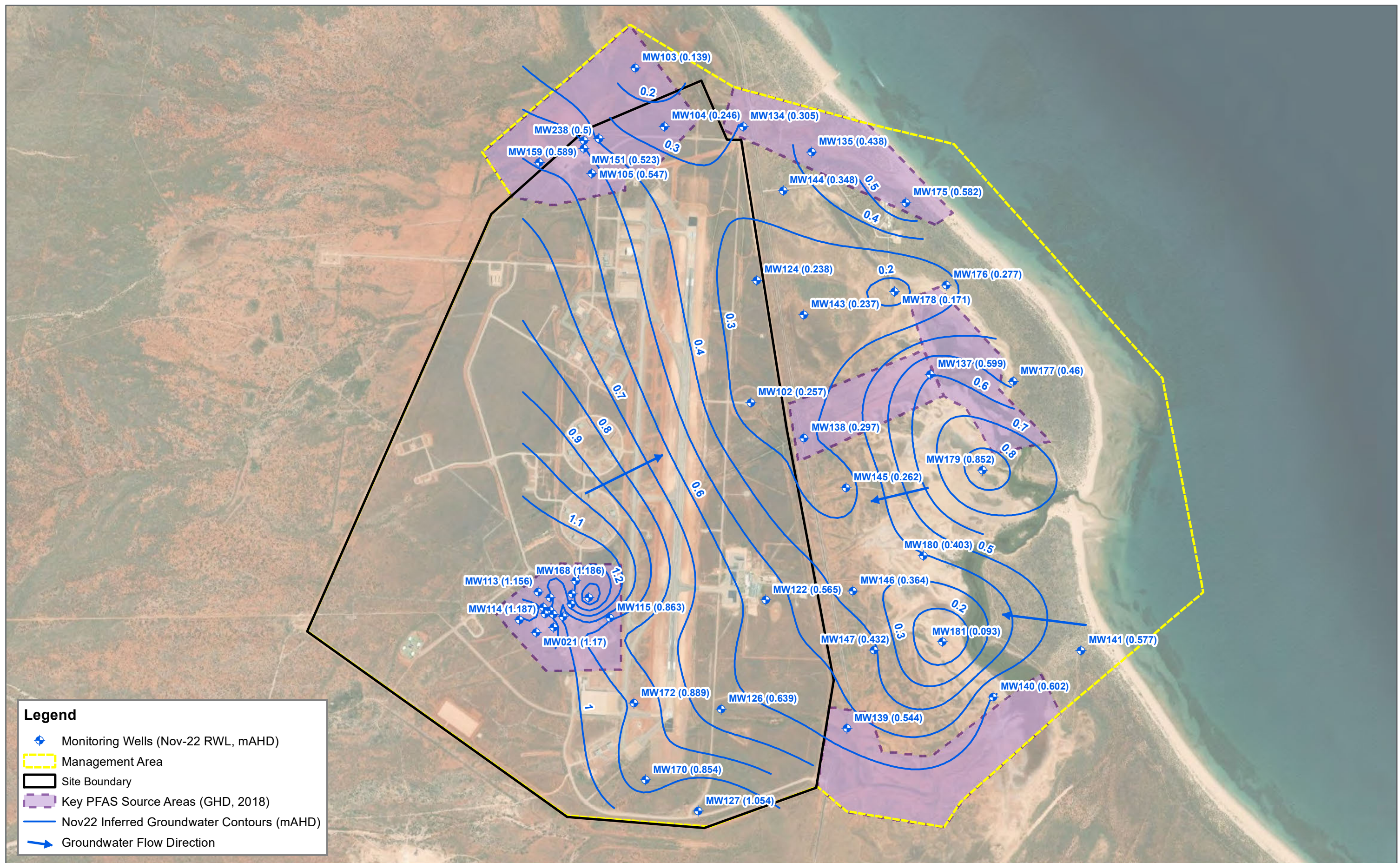


FIGURE 3
1:22,000 Scale at A3

Metres
0 750 1,500

Inferred Groundwater Contours

NOVEMBER 2022 BIANNIAL SAMPLING EVENT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



Map Produced by Cardno WA
Date: 2023-01-26 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0960-GS-003_GroundwaterElevationContours 01.mxd
Aerial Imagery Supplied by Google Earth

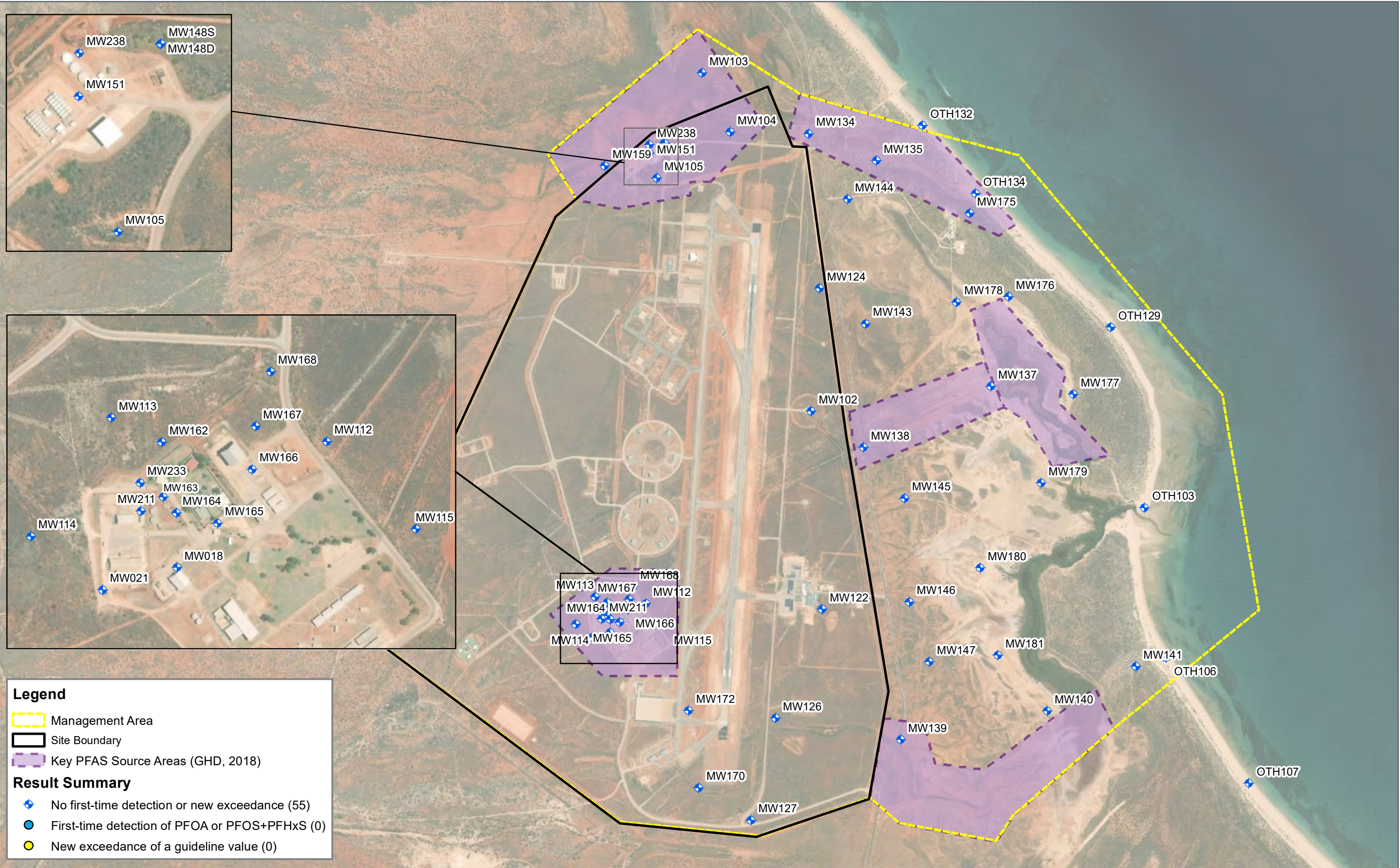


FIGURE 4
1:24,000 Scale at A3

Metres
0 1,000 2,000

Groundwater and Seepage water Monitoring Locations and Results

NOVEMBER 2022 BIENNIAL SAMPLING EVENT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



Map Produced by Cardno WA
Date: 2023-01-26 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-004_GWResults_Nov22 01.mxd
Aerial Imagery Supplied by Google Earth

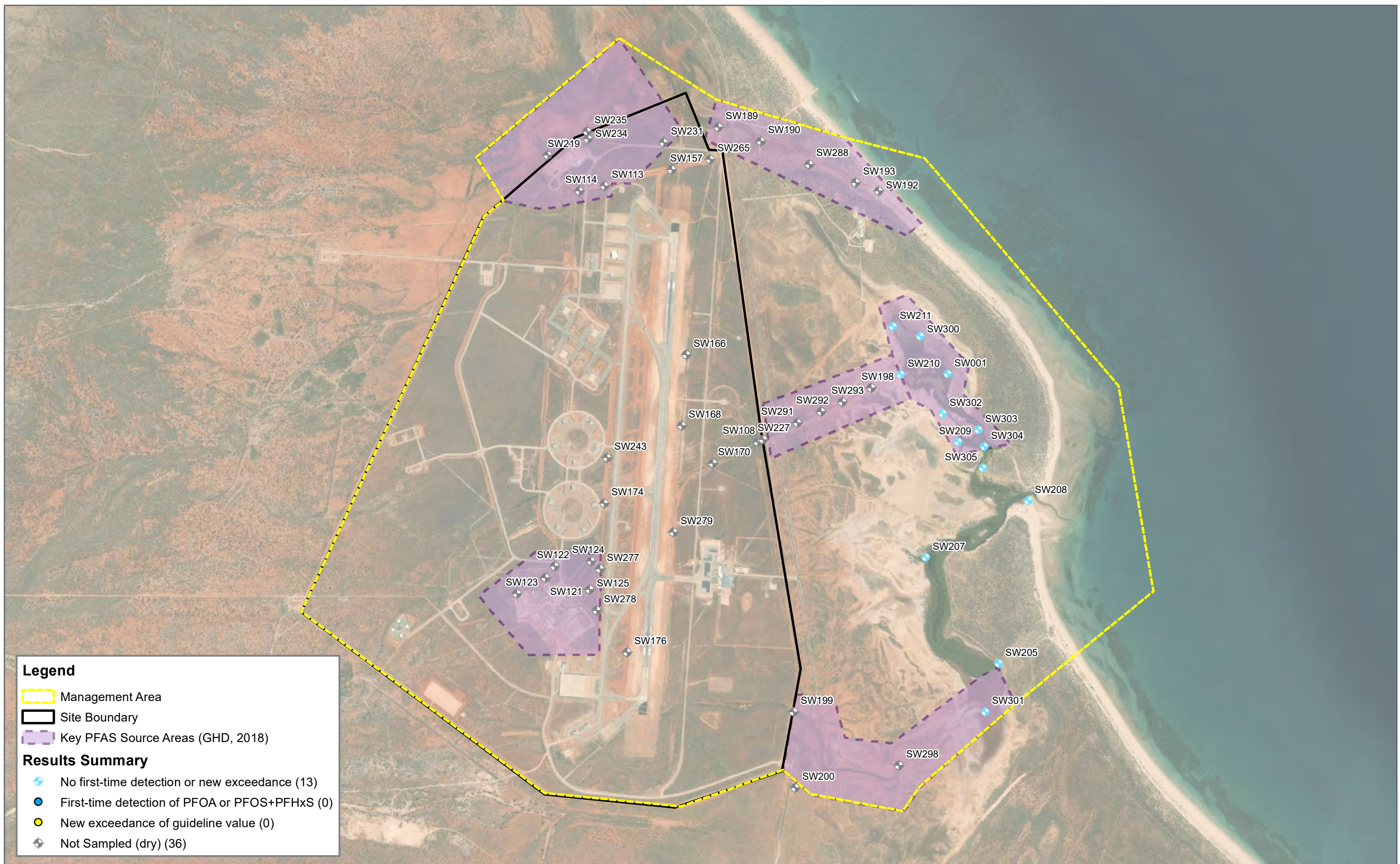


FIGURE 5
1:25,000 Scale at A3

Metres
0 1,000 2,000

Surface water Monitoring Locations and Results

NOVEMBER 2022 BIENNIAL MONITORING EVENT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



Map Produced by Cardno WA
Date: 2023-01-26 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-005_SWResults_Nov22 01.mxd

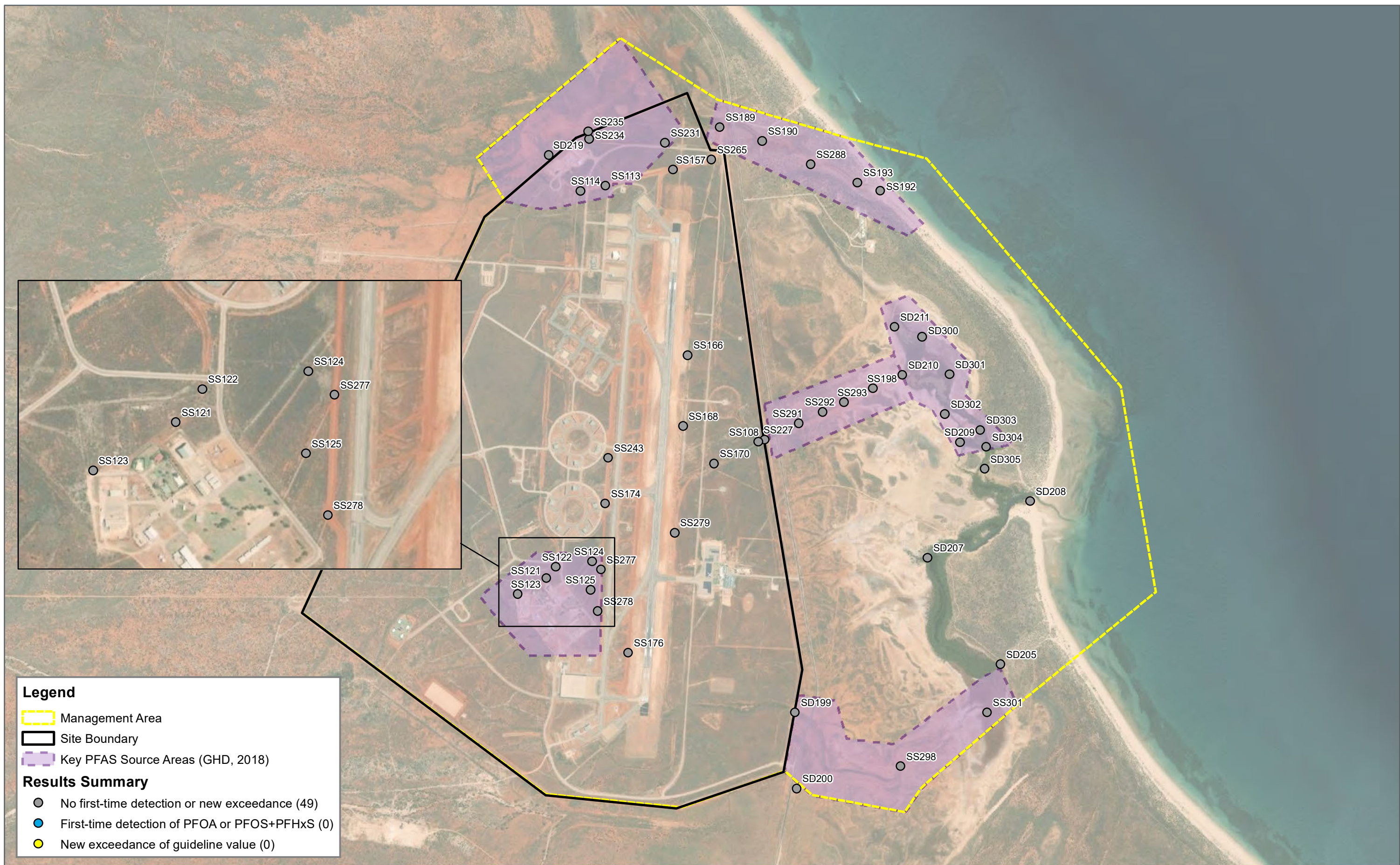


FIGURE 6
1:25,000 Scale at A3

Metres
0 1,000 2,000

Sediment Monitoring Locations and Results

NOVEMBER 2022 BIENNIAL MONITORING EVENT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



Map Produced by Cardno WA
Date: 2023-01-26 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-006_SDRResults_Nov22 01.mxd

APPENDIX

B

DATA ASSESSMENT TABLES



now



		PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids									
		Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting		0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PFAS NEMP 2020 Interim Marine 99%						0.00023*						19					
PFAS NEMP 2020 Recreational Water												10					

Location Code	Date	Field ID	Sample Type	Lab Report Number														
MW018	22/11/2022	0960_MW018_221122	Normal	EP2215711	0.03	0.05	0.77	0.06	0.40	<0.02	2.9	7.07	6.80	6.17	0.54	<0.02	<0.02	<0.02
MW021	22/11/2022	0960_MW021_221122	Normal	EP2215711	0.10	0.12	0.91	<0.02	0.45	<0.02	<0.1	0.05	0.17	0.03	0.02	<0.02	<0.02	<0.02
MW102	22/11/2022	0960_MW102_221122	Normal	EP2215722	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW102	22/11/2022	0960_QC118_221122	Field Duplicate	EP2215722	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW102	22/11/2022	0960_QC218_221122	Interlab Duplicate	945170	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MW103	23/11/2022	0960_MW103_221123	Normal	EP2215797	0.22	0.17	1.05	<0.02	0.04	<0.02	<0.1	<0.02	0.06	<0.02	<0.01	<0.02	<0.02	<0.02
MW104	22/11/2022	0960_MW104_221122	Normal	EP2215722	0.10	0.03	0.14	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW105	22/11/2022	0960_MW105_221122	Normal	EP2215722	0.13	0.17	0.89	<0.02	0.03	<0.02	<0.1	0.03	0.14	<0.02	0.01	<0.02	<0.02	<0.02
MW112	22/11/2022	0960_MW112_221122	Normal	EP2215711	0.03	0.04	0.44	<0.02	0.65	<0.02	<0.1	<0.02	0.08	<0.02	0.01	<0.02	<0.02	<0.02
MW113	22/11/2022	0960_MW113_221122	Normal	EP2215722	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW114	22/11/2022	0960_MW114_221122	Normal	EP2215711	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW115	22/11/2022	0960_MW115_221122	Normal	EP2215722	0.20	0.22	1.38	0.04	0.31	<0.02	<0.1	0.09	0.43	0.02	0.03	<0.02	<0.02	<0.02
MW122	22/11/2022	0960_MW122_221122	Normal	EP2215710	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW124	22/11/2022	0960_MW124_221122	Normal	EP2215722	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW126	22/11/2022	0960_MW126_221122	Normal	EP2215710	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW127	22/11/2022	0960_MW127_221122	Normal	EP2215710	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW134	22/11/2022	0960_MW134_221122	Normal	EP2215711	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW135	23/11/2022	0960_MW135_2.5-3.0_221123	Normal	EP2215812	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW137	22/11/2022	0960_MW137_2.5-3.0_221122	Normal	EP2215710	<0.02	<0.02	0.01	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW138	22/11/2022	0960_MW138_3.0-3.5_221122	Normal	EP2215710	<0.02	<0.02	0.11	<0.02	0.41	<0.02	<0.1	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02
MW139	22/11/2022	0960_MW139_221122	Normal	EP2215710	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW140	23/11/2022	0960_MW140_1.5-2.0_221123	Normal	EP2215815	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW141	23/11/2022	0960_MW141_3.0-3.5_221123	Normal	EP2215815	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW143	23/11/2022	0960_MW143_3.0-3.5_221123	Normal	EP2215797	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW144	22/11/2022	0960_MW144_3.0-3.5_221122	Normal	EP2215711	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	0.05	0.05	0.04	<0.01	<0.02	<0.02	<0.02
MW145	23/11/2022	0960_MW145_3.0-3.5_221123	Normal	EP2215797	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW146	23/11/2022	0960_MW146_3.0-3.5_221123	Normal	EP2215815	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW147	23/11/2022	0960_MW147_3.0-3.5_221123	Normal	EP2215815	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW148D	22/11/2022	0960_MW148D_221122	Normal	EP2215710	1.14	0.93	4.41	0.29	2.13	<0.02	0.2	0.34	1.44	0.16	0.25	<0.02	<0.02	<0.02
MW148S	22/11/2022	0960_MW148S_221122	Normal	EP2215710	4.76	4.47	20.3	1.33	13.8	<0.02	1.2	1.75	8.46	0.69	0.90	<0.02	<0.02	<0.02
MW151	22/11/2022	0960_MW151_221122	Normal	EP2215710	2.68	3.64	33.0	3.37	26.3	<0.02	1.0	1.71	9.66	0.74	2.08	<0.02	<0.02	<0.02
MW151	22/11/2022	0960_QC111_221122	Field Duplicate	EP2215710	2.80	4.03	31.1	3.58	31.9	<0.02	1.0	1.83	10.5	0.73	2.17	<0.02	<0.02	<0.02
MW151	22/11/2022	0960_QC211_221122	Interlab Duplicate	945170	2.9	4.0	21	1.7	10	<0.01	1.0	1.9	11	0.61	1.6	<0.01	<0.01	<0.01
MW159	23/11/2022	0960_MW159_221123	Normal	EP2215797	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW162	22/11/2022	0960_MW162_221122	Normal	EP2215711	0.51	0.66	4.14	0.06	0.39	<0.02	0.2	0.31	1.20	0.11	0.11	<0.02	<0.02	<0.02
MW163	22/11/2022	0960_MW163_221122	Normal	EP2215711	0.20	0.31	2.50	0.17	1.49	<0.02	<0.1	0.16	0.60	0.08	0.11	<0.02	<0.02	<0.02
MW164	22/11/2022	0960_MW164_221122	Normal	EP2215711	0.09	0.13	1.04	0.05	1.70	<0.02	<0.1	0.08	0.26	0.04	0.04	<0.02	<0.02	<0.02
MW164	22/11/2022	0960_QC112_221122	Field Duplicate	EP2215711	0.08	0.12	1.00	0.05	1.73	<0.02	<0.1	0.08	0.25	0.04	0.04	<0.02	<0.02	<0.02
MW164	22/11/2022	0960_QC212_221122	Interlab Duplicate	945170	0.06	0.09	0.61	0.02	0.44	<0.01	<0.05	0.06	0.18	0.03	0.03	<0.01	<0.01	<0.01
MW165	22/11/2022	0960_MW165_221122	Normal	EP2215711	<0.02	<0.02	0.01	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW165	22/11/2022	0960_QC110_221122	Field Duplicate	EP2215711	<0.02	<0.02	<0.01	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW165	22/11/2022	0960_QC210_221122	Interlab Duplicate	945170	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MW166	22/11/2022	0960_MW166_221122	Normal	EP2215711	0.04	0.03	0.24	<0.02	0.27	<0.02	<0.1	0.22	0.22	0.20	0.18	0.06	0.06	0.04
MW166	22/11/2022	0960_QC117_221122	Field Duplicate	EP2215711	0.04	0.03	0.27	<0.02	0.32	<0.02	<0.1	0.23	0.21	0.20	0.16	0.03	0.04	<0.02
MW166	22/11/2022	0960_QC217_221122	Interlab Duplicate	945170	0.03	0.03	0.21	<0.01	0.12	<0.01	0.10	0.18	0.18	0.14	0.09	<0.01	<0.01	<0.01
MW167	22/11/2022	0960_MW167_221122	Normal	EP2215711	0.03	0.06	0.93	0.04	0.86	<0.02	<0.1	0.10	0.20	0.09	0.14	0.02	<0.02	<0.02
MW168	22/11/2022	0960_MW168_221122	Normal	EP2215711	0.10	0.13	1.09	0.02	0.15	<0.02	<0.1	0.08	0.30	0.03	0.03	<0.02	<0.02	<0.02
MW170	22/11/2022	0960_MW170_221122	Normal	EP2215710	0.04	0.05	0.45	<0.02	<0.01	<0.02	<0.1	0.03	0.06	<0.02	<0.01	<0.02	<0.02	<0.02
MW172	22/11/2022	0960_MW172_221122	Normal	EP2215710	0.48	0.72	4.81	0.16	1.28	<0.02	0.2	0.50	1.57	0.27	0.25	<0.02	<0.02	<0.02
MW175	23/11/2022	0960_MW175_4.0-4.5_221123	Normal	EP2215812	<0.02	<0.02</												

	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids									
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTDA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PFAS NEMP 2020 Interim Marine 99%					0.00023*						19					
PFAS NEMP 2020 Recreational Water											10					

Location Code	Date	Field ID	Sample Type	Lab Report Number																
OTH103	23/11/2022	0960_OTH103_221123	Normal	EP2215791	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
OTH106	23/11/2022	0960_OTH106_221123	Normal	EP2215813	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
OTH107	23/11/2022	0960_OTH107_221123	Normal	EP2215813	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
OTH129	23/11/2022	0960_OTH129_221123	Normal	EP2215791	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
OTH132	23/11/2022	0960_OTH132_221123	Normal	EP2215791	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
OTH134	23/11/2022	0960_OTH134_221123	Normal	EP2215791	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
OTH134	23/11/2022	0960_QC123_221123	Field Duplicate	EP2215791	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
OTH134	23/11/2022	0960_QC223_221123	Interlab Duplicate	945170	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW001	23/11/2022	0960_SW001_221123	Normal	EP2215792	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
SW205	23/11/2022	0960_SW205_221123	Normal	EP2215813	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
SW207	23/11/2022	0960_SW207_221123	Normal	EP2215813	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
SW208	23/11/2022	0960_QC121_221123	Field Duplicate	EP2215813	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
SW208	23/11/2022	0960_QC221_221123	Interlab Duplicate	945170	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW208	23/11/2022	0960_SW208_221123	Normal	EP2215813	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
SW209	23/11/2022	0960_SW209_221123	Normal	EP2215792	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
SW210	23/11/2022	0960_QC122_221123	Field Duplicate	EP2215792	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
SW210	23/11/2022	0960_QC222_221123	Interlab Duplicate	945170	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.05	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW210	23/11/2022	0960_SW210_221123	Normal	EP2215792	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
SW211	23/11/2022	0960_SW211_221123	Normal	EP2215792	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
SW300	23/11/2022	0960_SW300_221123	Normal	EP2215792	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
SW301	23/11/2022	0960_SW301_221123	Normal	EP2215813	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
SW302	23/11/2022	0960_SW302_221123	Normal	EP2215792	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
SW303	23/11/2022	0960_SW303_221123	Normal	EP2215791	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
SW304	23/11/2022	0960_SW304_221123	Normal	EP2215791	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02
SW305	23/11/2022	0960_SW305_221123	Normal	EP2215792	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Note:
First-time detection of PFOA or PFHxS+PFOS
New exceedance of guideline value

Env Stds Comments
*Practical screening guideline of 0.01 µg/L adopted based on typical current laboratory limit of reporting (HEPA, 2020)

					Perfluorotetradecanoic acid (PFTeDA)	PFAS - (n:2) Fluorotelomer Sulfonic Acids					PFAS - Perfluoroalkyl Sulfonamides								PFAS		
						4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS		
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		
LOR - Limit of Reporting					0.01	0.01	0.05	0.01	0.01	0.02	0.05	0.02	0.05	0.05	0.02	0.05		0.01	0.01	0.01	
PFAS NEMP 2020 Interim Marine 99%																					
PFAS NEMP 2020 Recreational Water																	2				

Location Code	Date	Field ID	Sample Type	Lab Report Number															
MW018	22/11/2022	0960_MW018_221122	Normal	EP2215711	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.17	24.7	24.8
MW021	22/11/2022	0960_MW021_221122	Normal	EP2215711	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.36	1.73	1.85
MW102	22/11/2022	0960_MW102_221122	Normal	EP2215722	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW102	22/11/2022	0960_QC118_221122	Field Duplicate	EP2215722	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW102	22/11/2022	0960_QC218_221122	Interlab Duplicate	945170	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1
MW103	23/11/2022	0960_MW103_221123	Normal	EP2215797	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.09	1.37	1.54
MW104	22/11/2022	0960_MW104_221122	Normal	EP2215722	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.14	0.24	0.27
MW105	22/11/2022	0960_MW105_221122	Normal	EP2215722	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.92	1.23	1.40
MW112	22/11/2022	0960_MW112_221122	Normal	EP2215711	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.09	1.21	1.25
MW113	22/11/2022	0960_MW113_221122	Normal	EP2215722	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW114	22/11/2022	0960_MW114_221122	Normal	EP2215711	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW115	22/11/2022	0960_MW115_221122	Normal	EP2215722	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.69	2.46	2.72
MW122	22/11/2022	0960_MW122_221122	Normal	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW124	22/11/2022	0960_MW124_221122	Normal	EP2215722	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW126	22/11/2022	0960_MW126_221122	Normal	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW127	22/11/2022	0960_MW127_221122	Normal	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW134	22/11/2022	0960_MW134_221122	Normal	EP2215711	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW135	23/11/2022	0960_MW135_2.5-3.0_221123	Normal	EP2215812	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW137	22/11/2022	0960_MW137_2.5-3.0_221122	Normal	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03
MW138	22/11/2022	0960_MW138_3.0-3.5_221122	Normal	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.52	0.54	0.54
MW139	22/11/2022	0960_MW139_221122	Normal	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW140	23/11/2022	0960_MW140_1.5-2.0_221123	Normal	EP2215815	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW141	23/11/2022	0960_MW141_3.0-3.5_221123	Normal	EP2215815	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW143	23/11/2022	0960_MW143_3.0-3.5_221123	Normal	EP2215797	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW144	22/11/2022	0960_MW144_3.0-3.5_221122	Normal	EP2215711	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	0.14	0.14
MW145	23/11/2022	0960_MW145_3.0-3.5_221123	Normal	EP2215797	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW146	23/11/2022	0960_MW146_3.0-3.5_221123	Normal	EP2215815	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW147	23/11/2022	0960_MW147_3.0-3.5_221123	Normal	EP2215815	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW148D	22/11/2022	0960_MW148D_221122	Normal	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	6.54	10.1	11.3
MW148S	22/11/2022	0960_MW148S_221122	Normal	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	34.1	51.9	57.7
MW151	22/11/2022	0960_MW151_221122	Normal	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	59.3	77.2	84.2
MW151	22/11/2022	0960_QC111_221122	Field Duplicate	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	63.0	82.0	89.6
MW151	22/11/2022	0960_QC211_221122	Interlab Duplicate	945170	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	31	50.01	57.01
MW159	23/11/2022	0960_MW159_221123	Normal	EP2215797	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
MW162	22/11/2022	0960_MW162_221122	Normal	EP2215711	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	4.53	6.97	7.69
MW163	22/11/2022	0960_MW163_221122	Normal	EP2215711	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	3.99	5.14	5.62
MW164	22/11/2022	0960_MW164_221122	Normal	EP2215711	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02</				

	Perfluorotetradecanoic acid (PFTeDA) µg/L	PFAS - (n:2) Fluorotelomer Sulfonic Acids					PFAS - Perfluoroalkyl Sulfonamides							PFAS		
		4:2 Fluorotelomer sulfonic acid (4:2 FTS) µg/L	6:2 Fluorotelomer sulfonic acid (6:2 FTS) µg/L	8:2 Fluorotelomer sulfonic acid (8:2 FTS) µg/L	10:2 Fluorotelomer sulfonic acid (10:2 FTS) µg/L	Perfluorooctane sulfonamide (FOSA) µg/L	N-Methyl perfluorooctane sulfonamide (MeFOSA) µg/L	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA) µg/L	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE) µg/L	N-Ethyl perfluorooctane sulfonamide (EtFOSA) µg/L	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA) µg/L	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE) µg/L	Sum of PFHxS and PFOS µg/L	Sum of PFAS (WA DER List) µg/L	Sum of PFAS µg/L	
LOR - Limit of Reporting	0.01	0.01	0.05	0.01	0.01	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	0.01	
PFAS NEMP 2020 Interim Marine 99%																
PFAS NEMP 2020 Recreational Water													2			

Location Code	Date	Field ID	Sample Type	Lab Report Number															
OTH103	23/11/2022	0960_OTH103_221123	Normal	EP2215791	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
OTH106	23/11/2022	0960_OTH106_221123	Normal	EP2215813	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
OTH107	23/11/2022	0960_OTH107_221123	Normal	EP2215813	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
OTH129	23/11/2022	0960_OTH129_221123	Normal	EP2215791	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
OTH132	23/11/2022	0960_OTH132_221123	Normal	EP2215791	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
OTH134	23/11/2022	0960_OTH134_221123	Normal	EP2215791	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
OTH134	23/11/2022	0960_QC123_221123	Field Duplicate	EP2215791	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
OTH134	23/11/2022	0960_QC223_221123	Interlab Duplicate	945170	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1
SW001	23/11/2022	0960_SW001_221123	Normal	EP2215792	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
SW205	23/11/2022	0960_SW205_221123	Normal	EP2215813	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
SW207	23/11/2022	0960_SW207_221123	Normal	EP2215813	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
SW208	23/11/2022	0960_QC121_221123	Field Duplicate	EP2215813	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
SW208	23/11/2022	0960_QC221_221123	Interlab Duplicate	945170	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1
SW208	23/11/2022	0960_SW208_221123	Normal	EP2215813	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
SW209	23/11/2022	0960_SW209_221123	Normal	EP2215792	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
SW210	23/11/2022	0960_QC122_221123	Field Duplicate	EP2215792	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
SW210	23/11/2022	0960_QC222_221123	Interlab Duplicate	945170	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1
SW210	23/11/2022	0960_SW210_221123	Normal	EP2215792	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
SW211	23/11/2022	0960_SW211_221123	Normal	EP2215792	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
SW300	23/11/2022	0960_SW300_221123	Normal	EP2215792	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
SW301	23/11/2022	0960_SW301_221123	Normal	EP2215813	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
SW302	23/11/2022	0960_SW302_221123	Normal	EP2215792	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
SW303	23/11/2022	0960_SW303_221123	Normal	EP2215791	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
SW304	23/11/2022	0960_SW304_221123	Normal	EP2215791	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
SW305	23/11/2022	0960_SW305_221123	Normal	EP2215792	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Note:
First-time detection of PFOA or PFHxS+PFOS
New exceedance of guideline value

Env Stds Comments
*Practical screening guideline of 0.01 µg/L adopted based on typical current laboratory limit of reporting (HEPA, 2020)

					Inorganics									Metals			
					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting					1	1	1	1	0.01	0.01	1	0.01	1	1	1	1	1
PFAS NEMP 2020 Interim Marine 99%																	
PFAS NEMP 2020 Recreational Water																	

Location Code	Date	Field ID	Sample Type	Lab Report Number													
MW018	22/11/2022	0960_MW018_221122	Normal	EP2215711	<1	1,050	<1	1,050	27.0	23.4	130	7.21	114	4	5	18	513
MW021	22/11/2022	0960_MW021_221122	Normal	EP2215711	<1	1,210	<1	1,210	35.0	29.6	320	8.34	88	4	8	20	650
MW102	22/11/2022	0960_MW102_221122	Normal	EP2215722	<1	127	<1	127	918	1,090	29,700	8.70	3,710	1,280	2,150	647	19,200
MW102	22/11/2022	0960_QC118_221122	Field Duplicate	EP2215722	<1	127	<1	127	958	1,110	31,100	7.32	3,780	1,310	2,180	660	19,500
MW102	22/11/2022	0960_QC218_221122	Interlab Duplicate	945170													
MW103	23/11/2022	0960_MW103_221123	Normal	EP2215797	<1	164	<1	164	822	954	27,000	7.45	2,740	1,370	2,120	778	15,900
MW104	22/11/2022	0960_MW104_221122	Normal	EP2215722	<1	250	<1	250	637	720	20,200	6.11	3,010	490	1,520	725	12,700
MW105	22/11/2022	0960_MW105_221122	Normal	EP2215722	<1	382	<1	382	464	509	15,000	4.64	1,600	593	1,190	433	8,520
MW112	22/11/2022	0960_MW112_221122	Normal	EP2215711	<1	757	<1	757	117	117	2,760	0.01	1,140	96	131	95	2,270
MW113	22/11/2022	0960_MW113_221122	Normal	EP2215722	<1	394	<1	394	98.8	98.3	3,010	0.24	290	245	189	55	1,590
MW114	22/11/2022	0960_MW114_221122	Normal	EP2215711	<1	468	<1	468	78.1	83.4	2,240	3.30	268	114	108	57	1,550
MW115	22/11/2022	0960_MW115_221122	Normal	EP2215722	<1	346	<1	346	355	354	11,200	0.20	1,560	497	692	249	6,110
MW122	22/11/2022	0960_MW122_221122	Normal	EP2215710	<1	375	<1	375	433	471	13,600	4.23	2,020	317	845	486	8,590
MW124	22/11/2022	0960_MW124_221122	Normal	EP2215722	<1	169	<1	169	920	1,070	29,200	7.66	4,470	897	2,280	1,060	18,700
MW126	22/11/2022	0960_MW126_221122	Normal	EP2215710	<1	193	<1	193	710	832	23,200	7.96	2,460	1,000	1,740	671	14,300
MW127	22/11/2022	0960_MW127_221122	Normal	EP2215710	<1	154	<1	154	724	855	23,600	8.31	2,630	1,110	1,720	549	14,800
MW134	22/11/2022	0960_MW134_221122	Normal	EP2215711	<1	178	<1	178	640	711	20,100	5.25	3,340	591	1,400	712	12,600
MW135	23/11/2022	0960_MW135_2.5-3.0_221123	Normal	EP2215812	<1	242	<1	242	339	371	10,700	4.54	1,540	372	819	326	6,360
MW137	22/11/2022	0960_MW137_2.5-3.0_221122	Normal	EP2215710	<1	197	<1	197	836	974	26,400	7.63	4,190	649	2,160	955	17,000
MW138	22/11/2022	0960_MW138_3.0-3.5_221122	Normal	EP2215710	<1	313	<1	313	418	453	13,200	4.04	1,880	446	965	434	7,820
MW139	22/11/2022	0960_MW139_221122	Normal	EP2215710	<1	200	<1	200	672	791	20,800	8.13	3,920	788	1,830	727	13,400
MW140	23/11/2022	0960_MW140_1.5-2.0_221123	Normal	EP2215815	<1	153	<1	153	1,200	1,310	38,400	4.31	5,500	829	2,780	1,160	23,200
MW141	23/11/2022	0960_MW141_3.0-3.5_221123	Normal	EP2215815	<1	317	<1	317	369	430	11,500	7.55	1,860	444	975	387	7,300
MW143	23/11/2022	0960_MW143_3.0-3.5_221123	Normal	EP2215797	<1	204	<1	204	944	1,110	29,700	8.21	4,930	1,040	2,360	923	19,400
MW144	22/11/2022	0960_MW144_3.0-3.5_221122	Normal	EP2215711	<1	162	<1	162	368	412	10,700	5.70	3,010	714	867	438	6,760
MW145	23/11/2022	0960_MW145_3.0-3.5_221123	Normal	EP2215797	<1	125	<1	125	1,020	1,170	32,600	6.90	4,570	999	2,500	982	20,400
MW146	23/11/2022	0960_MW146_3.0-3.5_221123	Normal	EP2215815	<1	113	<1	113	1,070	1,170	34,100	4.41	5,120	970	2,430	984	20,600
MW147	23/11/2022	0960_MW147_3.0-3.5_221123	Normal	EP2215815	<1	135	<1	135	1,160	1,300	37,000	5.87	5,430	1,050	2,820	1,090	22,800
MW148D	22/11/2022	0960_MW148D_221122	Normal	EP2215710	<1	766	<1	766	835	948	26,400	6.37	3,600	881	1,820	770	16,900
MW148S	22/11/2022	0960_MW148S_221122	Normal	EP2215710	<1	478	<1	478	272	272	8,310	0.05	1,340	281	490	216	4,880
MW151	22/11/2022	0960_MW151_221122	Normal	EP2215710	<1	756	<1	756	141	146	4,040	1.55	595	130	238	128	2,680
MW151	22/11/2022	0960_QC111_221122	Field Duplicate	EP2215710													
MW151	22/11/2022	0960_QC211_221122	Interlab Duplicate	945170													
MW159	23/11/2022	0960_MW159_221123	Normal	EP2215797	<1	458	<1	458	272	292	8,400	3.70	1,220	418	567	236	5,030
MW162	22/11/2022	0960_MW162_221122	Normal	EP2215711	<1	514	<1	514	124	125	3,730	0.47	388	200	232	118	2,130
MW163	22/11/2022	0960_MW163_221122	Normal	EP2215711	<1	496	<1	496	122	122	3,550	0.14	570	184	210	106	2,140
MW164	22/11/2022	0960_MW164_221122	Normal	EP2215711	16	1,050	<1	1,070	60.9	56.3	1,240	3.95	220	13	38	47	1,180
MW164	22/11/2022	0960_QC112_221122	Field Duplicate	EP2215711	24	1,040	<1	1,060	60.4	56.8	1,230	3.15	220	13	38	48	1,190
MW164	22/11/2022	0960_QC212_221122	Interlab Duplicate	945170													
MW165	22/11/2022	0960_MW165_221122	Normal	EP2215711	<1	924	<1	925	31.7	26.8	421	8.26	64	3	5	23	591
MW165	22/11/2022	0960_QC110_221122	Field Duplicate	EP2215711	<1	945	<1	945	32.1	26.9	422	8.84	64	3	5	23	592
MW165	22/11/2022	0960_QC210_221122	Interlab Duplicate	945170													
MW166	22/11/2022	0960_MW166_221122	Normal	EP2215711	16	912	<1	927	28.3	25.0	285	6.24	83	3	4	22	550
MW166	22/11/2022	0960_QC117_221122	Field Duplicate	EP2215711	<1	923	<1	923	28.3	24.8	287	6.62	85	3	4	22	546
MW166	22/11/2022	0960_QC217_221122	Interlab Duplicate	945170													
MW167	22/11/2022	0960_MW167_221122	Normal	EP2215711	<1	928	<1	928	50.7	49.7	945	0.93	263	22	28	43	1,040
MW168	22/11/2022	0960_MW168_221122	Normal	EP2215711	<1	618	<1	618	117	118	3,230	0.33	648	163	182	94	2,120
MW170	22/11/2022	0960_MW170_221122	Normal	EP2215710	<1	223	<1	223	483	584	15,800	9.41	1,590	1,020	1,110	252	10,000
MW172	22/11/2022	0960_MW172_221122	Normal	EP2215710	<1	311	<1	311	354	369	10,400	2.06	2,620	440	576	203	6,770
MW175	23/11/2022	0960_MW175_4.0-4.5_221123	Normal	EP2215812	<1	421	<1	421	40.3	41.6	1,060	1.59	94	67	187	41	501
MW176	22/11/2022	0960_MW176_1.5-2.0_221122	Normal	EP2215722	<1	286	<1	286	578	626	17,900	4.02	3,240	581	1,350	653	10,800
MW177	22/11/2022	0960_MW177_1.5-2.0_221122	Normal	EP2215722	<1	193	<1	193	978	1,190	31,100	9.78	4,670	939	2,650	979	20,700
MW178	22/11/2022	0960_MW178_2.0-2.5_221122	Normal	EP2215722	<1	138	<1	138	1,050	1,240	32,800	8.32	5,780	1,140	2,680	1,020	21,500
MW179	23/11/2022	0960_MW179_1.0-1.5_221123	Normal	EP2215797	<												

	Inorganics									Metals			
	Carbonate Alkalinity (as CaCO ₃)	Alkalinity (Bicarbonate as CaCO ₃)	Alkalinity (Hydroxide) as CaCO ₃	Alkalinity (total) as CaCO ₃	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO ₄ - Turbidimetric (filtered)	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting	1	1	1	1	0.01	0.01	1	0.01	1	1	1	1	1
PFAS NEMP 2020 Interim Marine 99%													
PFAS NEMP 2020 Recreational Water													

Location Code	Date	Field ID	Sample Type	Lab Report Number													
OTH103	23/11/2022	0960_OTH103_221123	Normal	EP2215791	12	119	<1	131	540	626	17,100	7.31	2,660	446	1,390	580	10,900
OTH106	23/11/2022	0960_OTH106_221123	Normal	EP2215813	<1	133	<1	133	700	709	22,700	0.60	2,760	498	1,560	639	12,400
OTH107	23/11/2022	0960_OTH107_221123	Normal	EP2215813	12	121	<1	133	634	675	20,500	3.12	2,550	471	1,490	607	11,800
OTH129	23/11/2022	0960_OTH129_221123	Normal	EP2215791	<1	141	<1	141	556	635	17,600	6.70	2,700	446	1,400	584	11,100
OTH132	23/11/2022	0960_OTH132_221123	Normal	EP2215791	<1	134	<1	134	569	678	18,100	8.77	2,660	486	1,510	631	11,800
OTH134	23/11/2022	0960_OTH134_221123	Normal	EP2215791	<1	134	<1	134	563	620	17,900	4.82	2,660	442	1,380	572	10,800
OTH134	23/11/2022	0960_QC123_221123	Field Duplicate	EP2215791	<1	128	<1	128	550	626	17,500	6.41	2,590	444	1,390	580	10,900
OTH134	23/11/2022	0960_QC223_221123	Interlab Duplicate	945170													
SW001	23/11/2022	0960_SW001_221123	Normal	EP2215792	<1	256	<1	256	1,100	1,180	35,700	3.67	4,260	911	2,650	987	20,600
SW205	23/11/2022	0960_SW205_221123	Normal	EP2215813	<1	193	<1	193	1,150	1,230	37,500	3.24	4,440	870	2,870	989	21,300
SW207	23/11/2022	0960_SW207_221123	Normal	EP2215813	<1	191	<1	191	720	814	23,100	6.08	3,120	576	1,790	777	14,200
SW208	23/11/2022	0960_QC121_221123	Field Duplicate	EP2215813	<1	150	<1	150	701	668	22,800	2.42	2,630	469	1,460	596	11,700
SW208	23/11/2022	0960_QC221_221123	Interlab Duplicate	945170													
SW208	23/11/2022	0960_SW208_221123	Normal	EP2215813	<1	150	<1	150	690	658	22,600	2.36	2,380	471	1,450	594	11,500
SW209	23/11/2022	0960_SW209_221123	Normal	EP2215792	<1	174	<1	174	705	745	22,800	2.73	2,810	541	1,630	707	13,000
SW210	23/11/2022	0960_QC122_221123	Field Duplicate	EP2215792	<1	193	<1	193	803	806	26,000	0.17	3,170	584	1,750	764	14,100
SW210	23/11/2022	0960_QC222_221123	Interlab Duplicate	945170													
SW210	23/11/2022	0960_SW210_221123	Normal	EP2215792	<1	193	<1	193	859	801	28,200	3.47	2,870	584	1,750	755	14,000
SW211	23/11/2022	0960_SW211_221123	Normal	EP2215792	<1	256	<1	256	1,150	1,250	37,400	4.03	4,440	900	2,780	1,070	21,800
SW300	23/11/2022	0960_SW300_221123	Normal	EP2215792	3	284	<1	286	1,200	1,400	38,700	7.52	5,030	1,040	3,160	1,120	24,300
SW301	23/11/2022	0960_SW301_221123	Normal	EP2215813	23	148	<1	171	979	1,080	32,000	4.70	3,510	797	2,420	913	18,700
SW302	23/11/2022	0960_SW302_221123	Normal	EP2215792	<1	243	<1	243	958	920	31,200	2.03	3,530	676	2,040	890	16,000
SW303	23/11/2022	0960_SW303_221123	Normal	EP2215791	<1	160	<1	160	599	724	19,000	9.47	2,870	524	1,610	686	12,600
SW304	23/11/2022	0960_SW304_221123	Normal	EP2215791	3	202	<1	206	686	863	21,800	11.4	3,200	635	1,870	805	15,100
SW305	23/11/2022	0960_SW305_221123	Normal	EP2215792	<1	163	<1	163	727	765	23,600	2.53	2,790	555	1,700	733	13,300

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Note:
First-time detection of PFOA or PFHxS+PFOS
New exceedance of guideline value

Env Stds Comments
*Practical screening guideline of 0.01 µg/L adopted based on typical current laboratory limit of reporting (HEPA, 2020)

[illegible]

Note:
First-time detection of PFOA or PFHxS+PFOS
New exceedance of guideline value

	PFAS - Perfluoroalkyl Sulfonamides							PFAS		
	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamide acetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamideethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamideacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamideethanol (EtFOSE)	Sum of PFAS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting	0.0002	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0002	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure										
PFAS NEMP 2020 Ecological indirect exposure										
PFAS NEMP 2020 Industrial/ commercial (HIL D)								20		

Location Code	Date	Field ID	Sample Type	Lab Report Number										
SD199	22/11/2022	0960_SD199_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD200	22/11/2022	0960_QC120_221122	Field Duplicate	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD200	22/11/2022	0960_QC220_221122	Interlab Duplicate	945170	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.05
SD200	22/11/2022	0960_SD200_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD205	23/11/2022	0960_SD205_221123	Normal	EP2215814	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD207	23/11/2022	0960_SD207_221123	Normal	EP2215814	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD208	23/11/2022	0960_SD208_221123	Normal	EP2215814	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD209	23/11/2022	0960_SD209_221123	Normal	EP2215789	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD210	23/11/2022	0960_QC210_221123	Normal	EP2215789	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0006	0.0006	0.0006
SD211	23/11/2022	0960_SD211_221123	Normal	EP2215789	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0016	0.0016	0.0016
SD219	23/11/2022	0960_SD219_221123	Normal	EP2215789	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0031	0.0031	0.0031
SD300	23/11/2022	0960_SD300_221123	Normal	EP2215789	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0008	0.0008	0.0008
SD301	23/11/2022	0960_SD301_221123	Normal	EP2215789	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
SD302	23/11/2022	0960_SD302_221123	Normal	EP2215789	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD303	23/11/2022	0960_SD303_221123	Normal	EP2215811	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD304	23/11/2022	0960_SD304_221123	Normal	EP2215811	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD305	23/11/2022	0960_SD305_221123	Normal	EP2215789	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SS108	22/11/2022	0960_QC116_221122	Field Duplicate	EP2215723	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0045	0.0045	0.0045
SS108	22/11/2022	0960_QC216_221122	Interlab Duplicate	945170	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	0.0052	<0.01	<0.05
SS108	22/11/2022	0960_SS108_221122	Normal	EP2215723	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0040	0.0040	0.0040
SS113	22/11/2022	0960_SS113_221122	Normal	EP2215723	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0233	0.0233	0.0233
SS114	22/11/2022	0960_QC113_221122	Field Duplicate	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0004	0.0004	0.0004
SS114	22/11/2022	0960_QC213_221122	Interlab Duplicate	945170	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.05
SS114	22/11/2022	0960_SS114_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0012	0.0012	0.0012
SS121	22/11/2022	0960_SS121_221122	Normal	EP2215713	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0681	0.0681	0.0684
SS122	22/11/2022	0960_SS122_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0863	0.0863	0.0871
SS123	22/11/2022	0960_SS123_221122	Normal	EP2215713	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0279	0.0279	0.0301
SS124	22/11/2022	0960_SS124_221122	Normal	EP2215713	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0662	0.0662	0.0722
SS125	22/11/2022	0960_SS125_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0282	0.0282	0.0282
SS157	22/11/2022	0960_SS157_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0038	0.0038	0.0038
SS166	22/11/2022	0960_SS166_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
SS168	22/11/2022	0960_SS168_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0007	0.0007	0.0007
SS170	22/11/2022	0960_QC119_221122	Field Duplicate	EP2215723	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0056	0.0056	0.0056
SS170	22/11/2022	0960_QC219_221122	Interlab Duplicate	945170	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	0.0051	<0.01	<0.05
SS170	22/11/2022	0960_SS170_221122	Normal	EP2215723	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0050	0.0050	0.0053
SS174	22/11/2022	0960_SS174_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0013	0.0013	0.0013
SS176	22/11/2022	0960_SS176_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0011	0.0011	0.0011
SS189	22/11/2022	0960_SS189_221122	Normal	EP2215713	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0034	0.0034	0.0039
SS190	23/11/2022	0960_SS190_221123	Normal	EP2215811	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0078	0.0078	0.0078
SS192	23/11/2022	0960_SS192_221123	Normal	EP2215811	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SS193	23/11/2022	0960_SS193_221123	Normal	EP2215811	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0014	0.0014	0.0014
SS198	22/11/2022	0960_SS198_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SS227	22/11/2022	0960_SS227_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0105	0.0105	0.0105
SS231	22/11/2022	0960_SS231_221122	Normal	EP2215723	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0181	0.0181	0.0183
SS234	22/11/2022	0960_QC109_221122	Field Duplicate	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0696	0.0702	0.0735
SS234	22/11/2022	0960_QC209_221122	Interlab Duplicate	945170	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	0.12	0.12	0.12
SS234	22/11/2022	0960_SS234_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0593	0.0595	0.0628
SS235	23/11/2022	0960_SS235_221123	Normal	EP2215789	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0570	0.0575	0.0585
SS243	22/11/2022	0960_SS243_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0104	0.0104	0.0104
SS265	22/11/2022	0960_SS265_221122	Normal	EP2215723	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0040	0.0040	0.0040
SS277	22/11/2022	0960_SS277_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0043	0.0043	0.0043
SS278	22/11/2022	0960_SS278_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0018	0.0018	0.0018
SS279	22/11/2022	0960_SS279_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0022	0.0022	0.0022
SS288	23/11/2022	0960_SS288_221123	Normal	EP2215811	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0012	0.0012	0.0012
SS291	22/11/2022	0960_SS291_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SS292	22/11/2022	0960_SS292_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0005	0.0005	0.0005
SS293	22/11/2022	0960_SS293_221122	Normal	EP2215708	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SS298	23/11/2022	0960_SS298_221123	Normal	EP2215814	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SS301	23/11/2022	0960_SS301_221123	Normal	EP2215814	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	&

	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluorotetradecanoic acid (PFTeDA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting	0.02	0.02	0.01	0.02	0.01	0.02	0.1	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.05
PFAS NEMP 2020 Interim Marine 99%					0.00023						19						
PFAS NEMP 2020 Recreational Water											10						

Date	Field ID	Sample Type	Lab Report No.																
22/11/2022	0960_QC301_221122	Rinsate	EP2215710	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05
22/11/2022	0960_QC302_221122	Rinsate	EP2215710	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05
22/11/2022	0960_QC303_221122	Rinsate	EP2215710	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05
22/11/2022	0960_QC401_221122	Field Blank	EP2215710	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05
22/11/2022	0960_QC402_221122	Field Blank	EP2215710	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05
22/11/2022	0960_QC403_221122	Field Blank	EP2215710	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05
23/11/2022	0960_QC301_221123	Rinsate	EP2215797	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05
23/11/2022	0960_QC302_221123	Rinsate	EP2215797	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05
23/11/2022	0960_QC303_221123	Rinsate	EP2215797	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05
23/11/2022	0960_QC401_221123	Field Blank	EP2215797	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05
23/11/2022	0960_QC402_221123	Field Blank	EP2215797	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05
23/11/2022	0960_QC403_221123	Field Blank	EP2215797	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.05

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

	PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides							PFAS		
	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting	0.05	0.05	0.05	0.05	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	0.01
PFAS NEMP 2020 Interim Marine 99%														
PFAS NEMP 2020 Recreational Water												2		

Date	Field ID	Sample Type	Lab Report No.														
22/11/2022	0960_QC301_221122	Rinsate	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
22/11/2022	0960_QC302_221122	Rinsate	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
22/11/2022	0960_QC303_221122	Rinsate	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
22/11/2022	0960_QC401_221122	Field Blank	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
22/11/2022	0960_QC402_221122	Field Blank	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
22/11/2022	0960_QC403_221122	Field Blank	EP2215710	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
23/11/2022	0960_QC301_221123	Rinsate	EP2215797	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
23/11/2022	0960_QC302_221123	Rinsate	EP2215797	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
23/11/2022	0960_QC303_221123	Rinsate	EP2215797	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
23/11/2022	0960_QC401_221123	Field Blank	EP2215797	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
23/11/2022	0960_QC402_221123	Field Blank	EP2215797	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
23/11/2022	0960_QC403_221123	Field Blank	EP2215797	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%
HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Date Field ID Matrix Type Lab Report Number			22/11/2022	22/11/2022	RPD	22/11/2022	22/11/2022	RPD	22/11/2022	22/11/2022	RPD	22/11/2022	22/11/2022	RPD
			0960_MW165_221122	0960_QC110_221122		0960_MW165_221122	0960_QC210_221122		0960_MW151_221122	0960_QC111_221122		0960_MW151_221122	0960_QC211_221122	
			Water	Water		Water	Water		Water	Water				
			EP2215711	EP2215711		EP2215711	945170		EP2215710	EP2215710		EP2215710	945170	
	Unit	LOR												
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	2.68	2.80	4	2.68	2.9	8
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	3.64	4.03	10	3.64	4.0	9
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	0.01	<0.01	0	0.01	<0.01	0	33.0	31.1	6	33.0	21	44
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	3.37	3.58	6	3.37	1.7	66
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.02	0.02	0	0.02	<0.01	67	26.3	31.9	19	26.3	10	90
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.05	0	1.0	1.0	0	1.0	1.0	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	1.71	1.83	7	1.71	1.9	11
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	9.66	10.5	8	9.66	11	13
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	0.74	0.73	1	0.74	0.61	19
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	2.08	2.17	4	2.08	1.6	26
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotridecanoic acid (PFTriDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS														
Sum of PFHxS and PFOS	µg/L	0.01	0.03	0.02	40	0.03	<0.01	100	59.3	63.0	6	59.3	31	63
Sum of PFAS (WA DER List)	µg/L	0.01	0.03	0.02	40	0.03	<0.05	0	77.2	82.0	6	77.2	50.01	43
Sum of PFAS	µg/L	0.01	0.03	0.02	40	0.03	<0.1	0	84.2	89.6	6	84.2	57.01	39

*RPDs have only been considered where a concentration is greater than 1 times the LOR.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each LOR multiplier range are: No Limit (1 - 10 x LOR); 50 (10 - 20 x LOR); 20 (> 20 x LOR))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

	Unit	LOR												
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	0.09	0.08	12	0.09	0.06	40	0.11	0.11	0	0.11	0.09	20
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	0.13	0.12	8	0.13	0.09	36	0.12	0.12	0	0.12	0.09	29
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	1.04	1.00	4	1.04	0.61	52	0.96	0.93	3	0.96	0.71	30
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	0.05	0.05	0	0.05	0.02	86	0.04	0.04	0	0.04	0.03	29
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	1.70	1.73	2	1.70	0.44	118	4.63	4.49	3	4.63	4.4	5
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.05	0	0.1	0.1	0	0.1	0.10	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	0.08	0.08	0	0.08	0.06	29	0.13	0.14	7	0.13	0.11	17
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	0.26	0.25	4	0.26	0.18	36	0.31	0.31	0	0.31	0.25	21
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	0.04	0.04	0	0.04	0.03	29	0.06	0.06	0	0.06	0.05	18
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.04	0.04	0	0.04	0.03	29	0.06	0.06	0	0.06	0.05	18
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotridecanoic acid (PFTTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS														
Sum of PFHxS and PFOS	µg/L	0.01	2.74	2.73	0	2.74	1.05	89	5.59	5.42	3	5.59	5.11	9
Sum of PFAS (WA DER List)	µg/L	0.01	3.25	3.22	1	3.25	1.41	79	6.36	6.20	3	6.36	5.76	10
Sum of PFAS	µg/L	0.01	3.43	3.39	1	3.43	1.55	76	6.52	6.36	2	6.52	5.92	10

Date Field ID Matrix Type Lab Report Number			22/11/2022	22/11/2022		22/11/2022	22/11/2022		22/11/2022	22/11/2022		22/11/2022	22/11/2022	
			0960_MW233_221122	0960_QC115_221122		0960_MW233_221122	0960_QC215_221122		0960_MW166_221122	0960_QC117_221122				
			Water	Water		Water	Water		Water	Water				
			EP2215711	EP2215711		EP2215711	945170		EP2215711	945170				
RPD														
	Unit	LOR												
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	0.35	0.33	6	0.35	0.25	33	0.04	0.04	0	0.04	0.03	29
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	0.47	0.48	2	0.47	0.34	32	0.03	0.03	0	0.03	0.03	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	3.53	3.52	0	3.53	2.1	51	0.24	0.27	12	0.24	0.21	13
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	0.18	0.17	6	0.18	0.11	48	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	1.55	1.52	2	1.55	0.93	50	0.27	0.32	17	0.27	0.12	77
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.05	0.2	0.2	0	0.2	0.11	58	<0.1	<0.1	0	<0.1	0.10	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	0.26	0.25	4	0.26	0.18	36	0.22	0.23	4	0.22	0.18	20
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	0.96	0.95	1	0.96	0.75	25	0.22	0.21	5	0.22	0.18	20
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	0.10	0.10	0	0.10	0.06	50	0.20	0.20	0	0.20	0.14	35
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.17	0.17	0	0.17	0.12	34	0.18	0.16	12	0.18	0.09	67
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	0.06	0.03	67	0.06	<0.01	143
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	0.06	0.04	40	0.06	<0.01	143
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	0.04	<0.02	67	0.04	<0.01	120
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	0.04	<0.02	67	0.04	<0.01	120
Perfluorotridecanoic acid (PFTriDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	0.13	0.07	60	0.13	<0.01	171
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS														
Sum of PFHxS and PFOS	µg/L	0.01	5.08	5.04	1	5.08	3.03	51	0.51	0.59	15	0.51	0.33	43
Sum of PFAS (WA DER List)	µg/L	0.01	7.12	7.04	1	7.12	4.5	45	1.50	1.50	0	1.50	1.05	35
Sum of PFAS	µg/L	0.01	7.77	7.69	1	7.77	5.03	43	1.73	1.60	8	1.73	1.09	45

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			0960_MW102_221122	0960_QC118_221122		0960_MW102_221122	0960_QC218_221122		0960_SW208_221123	0960_QC121_221123		0960_SW208_221123	0960_QC221_221123	
			Water	Water		Water	Water		Water	Water				
			EP2215722	EP2215722		RPD	EP2215722		945170	RPD		EP2215813	EP2215813	
	Unit	LOR												
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotridecanoic acid (PFTriDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS														
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Sum of PFAS (WA DER List)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.05	0	<0.01	<0.01	0	<0.01	<0.05	0
Sum of PFAS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.1	0

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			0960_SW210_221123	0960_QC122_221123		0960_SW210_221123	0960_QC222_221123		0960_OTH134_221123	0960_QC123_221123		0960_OTH134_221123	0960_QC223_221123	
			Water	Water		Water	Water		Water	Water		Water	Water	
			EP2215792	EP2215792		EP2215792	945170		EP2215791	EP2215791		EP2215791	945170	
	Unit	LOR												
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.02	0	<0.02	0.02	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS														
Sum of PFHxS and PFOS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.01	0
Sum of PFAS (WA DER List)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.05	0
Sum of PFAS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.1	0	<0.01	<0.01	0	<0.01	<0.1	0

Date Field ID Matrix Type Lab Report Number			22/11/2022		RPD	22/11/2022		RPD	22/11/2022		RPD	22/11/2022		RPD
			0960_SS234_221122			0960_QC109_221122			0960_SS114_221122			0960_QC113_221122		
			Soil			Soil			Soil			Soil		
			EP2215708			EP2215708			EP2215708			EP2215708		
	Unit	LOR												
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluoropropanesulfonic acid (PFPrS)	mg/kg	0.005					<0.005						<0.005	
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	<0.0002	0.0003	40	<0.0002	<0.005	0	0.0009	0.0002	127	0.0009	<0.005	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	0.0593	0.0693	16	0.0593	0.12	68	0.0003	0.0002	40	0.0003	<0.005	0
Perfluorononanesulfonic acid (PFNS)	mg/kg	0.005					<0.005						<0.005	
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002	0.0012	0.0014	15	0.0012	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	mg/kg	0.001	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	0.0002	0.0006	100	0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002	0.0007	0.0011	44	0.0007	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002	0.0009	0.0008	12	0.0009	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002	0.0003	<0.0002	40	0.0003	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002	0.0002	<0.0002	0	0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS - Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS														
Sum of PFHxS and PFOS	mg/kg	0.0002	0.0593	0.0696	16	0.0593	0.12	68	0.0012	0.0004	100	0.0012	<0.005	0
Sum of PFAS (WA DER List)	mg/kg	0.0002	0.0595	0.0702	16	0.0595	0.12	67	0.0012	0.0004	100	0.0012	<0.01	0
Sum of PFAS	mg/kg	0.0002	0.0628	0.0735	16	0.0628	0.12	63	0.0012	0.0004	100	0.0012	<0.05	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	mg/kg	0.005					0.12						<0.005	

*RPDs have only been considered where a concentration is greater than 1 times the LOR.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each LOR multiplier range are: No Limit (1 - 10 x LOR); 50 (10 - 20 x LOR); 20 (> 20 x LOR))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Date Field ID Matrix Type Lab Report Number			22/11/2022	22/11/2022	RPD	22/11/2022	22/11/2022	RPD	22/11/2022	22/11/2022	RPD	22/11/2022	22/11/2022	RPD
			0960_SS108_221122	0960_QC116_221122		0960_SS170_221122	0960_QC119_221122		0960_SS170_221122	0960_QC219_221122				
			Soil	Soil		Soil	Soil		Soil	Soil				
			EP2215723	EP2215723		EP2215723	945170		EP2215723	EP2215723				
	Unit	LOR												
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluoropropanesulfonic acid (PFPrS)	mg/kg	0.005					<0.005						<0.005	
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	0.0040	0.0045	12	0.0040	0.0052	26	0.0050	0.0056	11	0.0050	0.0051	2
Perfluorononanesulfonic acid (PFNS)	mg/kg	0.005					<0.005						<0.005	
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	0.0003	<0.0002	40	0.0003	<0.005	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	mg/kg	0.001	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorotridecanoic acid (PFTTrDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS - Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
PFAS														
Sum of PFHxS and PFOS	mg/kg	0.0002	0.0040	0.0045	12	0.0040	0.0052	26	0.0050	0.0056	11	0.0050	0.0051	2
Sum of PFAS (WA DER List)	mg/kg	0.0002	0.0040	0.0045	12	0.0040	<0.01	0	0.0050	0.0056	11	0.0050	<0.01	0
Sum of PFAS	mg/kg	0.0002	0.0040	0.0045	12	0.0040	<0.05	0	0.0053	0.0056	6	0.0053	<0.05	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	mg/kg	0.005					0.0052						0.0051	

Date Field ID Matrix Type Lab Report Number			22/11/2022		22/11/2022		RPD	22/11/2022		22/11/2022		RPD
			0960_SD200_221122		0960_QC120_221122			0960_SD200_221122		0960_QC220_221122		
			Soil		Soil			Soil		Soil		
			EP2215708		EP2215708			EP2215708		945170		
	Unit	LOR										
PFAS - Perfluoroalkyl Sulfonic Acids												
Perfluoropropanesulfonic acid (PFPrS)	mg/kg	0.005								<0.005		
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Perfluorononanesulfonic acid (PFNS)	mg/kg	0.005						<0.005				
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
PFAS - Perfluoroalkyl Carboxylic Acids												
Perfluorobutanoic acid (PFBA)	mg/kg	0.001	<0.001	<0.001	0	<0.001	<0.005	<0.005	0			
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Perfluorononanoic acid (PFNA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	<0.005	0			
PFAS - (n:2) Fluorotelomer Sulfonic Acids												
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	<0.005	0			
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.01	<0.01	0			
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	<0.005	0			
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	<0.005	0			
PFAS - Perfluoroalkyl Sulfonamides												
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	<0.005	0			
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	<0.01	0			
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	<0.005	0			
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	<0.005	0			
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	<0.01	0			
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	<0.005	0			
PFAS												
Sum of PFHxS and PFOS	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	<0.005	0			
Sum of PFAS (WA DER List)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	<0.01	0			
Sum of PFAS	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.05	<0.05	0			
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	mg/kg	0.005					<0.005	<0.005				

APPENDIX

C

LABORATORY CERTIFICATES



now





Custody Document for Submissions via ALS Compass App



Environmental Division
Perth
Work Order Reference
EP2215708



Telephone : +61-8-92406 1301

Project: WA_O960_PFA30TP

Client:

STANTEC

Project Manager:

Phone:

ALS Compass COC Reference: 45226-38233

45217

Samples:

45193

45191

45205

Sampler:

Phone:

Turnaround Requirements: Standard



Urgent

Special Instructions:

Custody:

Relinquished by: <u>STANTEC</u>	Received by:	Relinquished by:	Received by:
Date / Time: <u>23-11-22 / 7.00 AM</u>	Date / Time: <u>24/11 / 1/45</u>	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC# 38233

ALS Laboratory- EP Perth

CLIENT:

MMWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFA50MP

SITE: Learnmonth SD - MB

ORDER NO: pfas-omp Learnmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
C

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE: / ES2022MMWHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_SD234		22/11/2022 08:27 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
002	0960_QC109		22/11/2022 08:27 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
003	0960_SS114		22/11/2022 09:26 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
004	0960_QC113		22/11/2022 09:26 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
005	0960_SS122		22/11/2022 09:42 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
006	0960_SS176		22/11/2022 10:44 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
007	0960_SS279		22/11/2022 10:52 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
008	0960_SS158		22/11/2022 11:01 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
009	0960_SS166		22/11/2022 11:07 AM	SOIL	ALS: 1 Non ALS: 0	No	X		

CHAIN OF CUSTODY

ALS COC#: 38233

ALS Laboratory: EP Perth

CLIENT:

MWHHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT:

WA_0960_PASOMP

SITE:

Learmonth SD - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
C

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE: / ES2022MWHHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0960_SS157		22/11/2022 11:20 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
011	0960_SS243		22/11/2022 11:33 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
012	0960_SS174		22/11/2022 11:38 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
013	0960_SS277		22/11/2022 11:42 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
014	0960_SS278		22/11/2022 12:40 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
015	0960_SS125		22/11/2022 12:50 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
016	0960_SD200		22/11/2022 01:09 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
017	0960_QC120		22/11/2022 01:10 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
018	0960_SD199		22/11/2022 01:16 PM	SOIL	ALS: 1 Non ALS: 0	No	X		

CHAIN OF CUSTODY

ALS COC# 38233

ALS Laboratory: EP Perth

CLIENT:

MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFA50MP

SITE: Learmonth SD - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
C

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE: / ES2022MMHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	0960_SS198		22/11/2022 01:36 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
020	0960_SS293		22/11/2022 02:02 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
021	0960_SS292		22/11/2022 02:17 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
022	0960_SS291		22/11/2022 02:23 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
023	0960_SS227		22/11/2022 02:44 PM	SOIL	ALS: 1 Non ALS: 0	No	X		

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD
 PROJECT: WA_0960_PFSASCOMP

SITE: Learmonth SD - MB
 ORDER NO: pfas-comp Learmonth

PROJECT MANAGER:
 PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

CONTACT PH:
 QUOTE NO: SY7139/19 B

SAMPLER MOBILE:

/ ES2022MMHAUS0002

TURNAROUND REQUIREMENTS: 5 Days
 Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A
 Free ice / frozen ice bricks present upon receipt? Yes No N/A
 Random Sample Temperature on Receipt: C
 Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_SD234	HDPE Soil Jar	200 mL	00621019043797	Grey	No	
002	0960_QC109	HDPE Soil Jar	200 mL	00620322006989	Grey	No	
003	0960_SS114	HDPE Soil Jar	200 mL	00621019038848	Grey	No	
004	0960_QC113	HDPE Soil Jar	200 mL	00620322006831	Grey	No	
005	0960_SS122	HDPE Soil Jar	200 mL	00620322041389	Grey	No	
006	0960_SS176	HDPE Soil Jar	200 mL	00621019043811	Grey	No	
007	0960_SS279	HDPE Soil Jar	200 mL	00620322041492	Grey	No	
008	0960_SS158	HDPE Soil Jar	200 mL	00620322006818	Grey	No	
009	0960_SS166	HDPE Soil Jar	200 mL	00621121002563	Grey	No	
010	0960_SS167	HDPE Soil Jar	200 mL	00621019074572	Grey	No	
011	0960_SS243	HDPE Soil Jar	200 mL	00620322006779	Grey	No	
012	0960_SS174	HDPE Soil Jar	200 mL	00620322006866	Grey	No	
013	0960_SS277	HDPE Soil Jar	200 mL	00621019043768	Grey	No	
014	0960_SS278	HDPE Soil Jar	200 mL	00620322006823	Grey	No	
015	0960_SS125	HDPE Soil Jar	200 mL	00620322012177	Grey	No	
016	0960_SD200	HDPE Soil Jar	200 mL	00621019043869	Grey	No	
017	0960_QC120	HDPE Soil Jar	200 mL	00620322041456	Grey	No	
018	0960_SD199	HDPE Soil Jar	200 mL	00620322041446	Grey	No	
019	0960_SS188	HDPE Soil Jar	200 mL	00621019065489	Grey	No	
020	0960_SS283	HDPE Soil Jar	200 mL	00621019043733	Grey	No	
021	0960_SS292	HDPE Soil Jar	200 mL	00621019074679	Grey	No	
022	0960_SS291	HDPE Soil Jar	200 mL	00620322012225	Grey	No	
023	0960_SS227	HDPE Soil Jar	200 mL	00621019025081	Grey	No	

Total Bottle Count: ALS: 23, Non ALS: 0

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EP2215708**

Client : STANTEC AUSTRALIA PTY LTD
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail : [REDACTED]
Telephone : ----
Facsimile : ----

E-mail : [REDACTED]
Telephone : [REDACTED]
Facsimile : [REDACTED]

Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 38233
Site : Learmonth SD - MB
Sampler : [REDACTED] [REDACTED]
[REDACTED]

Page : 1 of 3
Quote number : ES2022MWAUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 24-Nov-2022 13:45
Client Requested Due Date : 07-Dec-2022

Issue Date : 28-Nov-2022
Scheduled Reporting Date : **07-Dec-2022**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 3
Receipt Detail :

Security Seal : Intact.
Temperature : 18.8 - Ice present
No. of samples received / analysed : 23 / 23

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2215708-001	22-Nov-2022 08:27	0960_SS234_221122	✓	✓
EP2215708-002	22-Nov-2022 08:27	0960_QC109_221122	✓	✓
EP2215708-003	22-Nov-2022 09:26	0960_SS114_221122	✓	✓
EP2215708-004	22-Nov-2022 09:26	0960_QC113_221122	✓	✓
EP2215708-005	22-Nov-2022 09:42	0960_SS122_221122	✓	✓
EP2215708-006	22-Nov-2022 10:44	0960_SS176_221122	✓	✓
EP2215708-007	22-Nov-2022 10:52	0960_SS279_221122	✓	✓
EP2215708-008	22-Nov-2022 11:01	0960_SS168_221122	✓	✓
EP2215708-009	22-Nov-2022 11:07	0960_SS166_221122	✓	✓
EP2215708-010	22-Nov-2022 11:20	0960_SS157_221122	✓	✓
EP2215708-011	22-Nov-2022 11:33	0960_SS243_221122	✓	✓
EP2215708-012	22-Nov-2022 11:38	0960_SS174_221122	✓	✓
EP2215708-013	22-Nov-2022 11:42	0960_SS277_221122	✓	✓
EP2215708-014	22-Nov-2022 12:40	0960_SS278_221122	✓	✓
EP2215708-015	22-Nov-2022 12:50	0960_SS125_221122	✓	✓
EP2215708-016	22-Nov-2022 13:09	0960_SD200_221122	✓	✓
EP2215708-017	22-Nov-2022 13:10	0960_QC120_221122	✓	✓
EP2215708-018	22-Nov-2022 13:16	0960_SD199_221122	✓	✓
EP2215708-019	22-Nov-2022 13:58	0960_SS198_221122	✓	✓
EP2215708-020	22-Nov-2022 14:02	0960_SS293_221122	✓	✓
EP2215708-021	22-Nov-2022 14:17	0960_SS292_221122	✓	✓
EP2215708-022	22-Nov-2022 14:23	0960_SS291_221122	✓	✓
EP2215708-023	22-Nov-2022 14:44	0960_SS227_221122	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.



Requested Deliverables

██████████	- A4 - AU Tax Invoice (INV)	Email	████████████████████
DERP LAB REPORTS			
	- EDI Format - ESDAT (ESDAT)	Email	████████████████████
██████████	(STANTEC)		
	- *AU Certificate of Analysis - NATA (COA)	Email	████████████████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	████████████████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	████████████████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	████████████████████
	- Chain of Custody (CoC) (COC)	Email	████████████████████
	- EDI Format - ESDAT (ESDAT)	Email	████████████████████
	- EDI Format - XTab (XTAB)	Email	████████████████████

CERTIFICATE OF ANALYSIS

Work Order : **EP2215708**
Client : **STANTEC AUSTRALIA PTY LTD**
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE TERRACE
 PERTH 6000
Telephone : ----
Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 38233
Sampler : [REDACTED]
Site : Learmonth SD - MB
Quote number : SY/139/19 B
No. of samples received : 23
No. of samples analysed : 23

Page : 1 of 13
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : [REDACTED]
Date Samples Received : 24-Nov-2022 13:45
Date Analysis Commenced : 03-Dec-2022
Issue Date : 08-Dec-2022 12:18



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS234_221122	0960_QC109_221122	0960_SS114_221122	0960_QC113_221122	0960_SS122_221122
Sampling date / time				22-Nov-2022 08:27	22-Nov-2022 08:27	22-Nov-2022 09:26	22-Nov-2022 09:26	22-Nov-2022 09:42
Compound	CAS Number	LOR	Unit	EP2215708-001	EP2215708-002	EP2215708-003	EP2215708-004	EP2215708-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	0.9	1.0	19.0	4.1	1.0
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.0003	0.0009	0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0593	0.0693	0.0003	0.0002	0.0863
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0012	0.0014	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0002	0.0006	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0007	0.0011	<0.0002	<0.0002	0.0006
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0009	0.0008	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	0.0003	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0960_SS234_221122	0960_QC109_221122	0960_SS114_221122	0960_QC113_221122	0960_SS122_221122
Sampling date / time					22-Nov-2022 08:27	22-Nov-2022 08:27	22-Nov-2022 09:26	22-Nov-2022 09:26	22-Nov-2022 09:42
Compound	CAS Number	LOR	Unit		EP2215708-001	EP2215708-002	EP2215708-003	EP2215708-004	EP2215708-005
				Result	Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg	0.0628	0.0735	0.0012	0.0004	0.0871	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0593	0.0696	0.0012	0.0004	0.0863	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0595	0.0702	0.0012	0.0004	0.0863	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%	103	95.0	100	102	97.5	
13C8-PFOA	----	0.0002	%	104	105	95.5	100	101	



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS176_221122	0960_SS279_221122	0960_SS168_221122	0960_SS166_221122	0960_SS157_221122
Sampling date / time				22-Nov-2022 10:44	22-Nov-2022 10:52	22-Nov-2022 11:01	22-Nov-2022 11:07	22-Nov-2022 11:20
Compound	CAS Number	LOR	Unit	EP2215708-006	EP2215708-007	EP2215708-008	EP2215708-009	EP2215708-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	1.1	0.6	1.5	1.5	1.8
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0003	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0011	0.0022	0.0004	0.0003	0.0038
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS176_221122	0960_SS279_221122	0960_SS168_221122	0960_SS166_221122	0960_SS157_221122
Sampling date / time				22-Nov-2022 10:44	22-Nov-2022 10:52	22-Nov-2022 11:01	22-Nov-2022 11:07	22-Nov-2022 11:20
Compound	CAS Number	LOR	Unit	EP2215708-006	EP2215708-007	EP2215708-008	EP2215708-009	EP2215708-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0011	0.0022	0.0007	0.0003	0.0038
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0011	0.0022	0.0007	0.0003	0.0038
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0011	0.0022	0.0007	0.0003	0.0038
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	93.0	80.5	106	94.0	90.5
13C8-PFOA	----	0.0002	%	98.0	100	96.0	103	100



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS243_221122	0960_SS174_221122	0960_SS277_221122	0960_SS278_221122	0960_SS125_221122
Sampling date / time				22-Nov-2022 11:33	22-Nov-2022 11:38	22-Nov-2022 11:42	22-Nov-2022 12:40	22-Nov-2022 12:50
Compound	CAS Number	LOR	Unit	EP2215708-011	EP2215708-012	EP2215708-013	EP2215708-014	EP2215708-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	1.0	0.3	1.0	1.0	0.8
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0104	0.0013	0.0043	0.0018	0.0282
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS243_221122	0960_SS174_221122	0960_SS277_221122	0960_SS278_221122	0960_SS125_221122
Sampling date / time				22-Nov-2022 11:33	22-Nov-2022 11:38	22-Nov-2022 11:42	22-Nov-2022 12:40	22-Nov-2022 12:50
Compound	CAS Number	LOR	Unit	EP2215708-011	EP2215708-012	EP2215708-013	EP2215708-014	EP2215708-015
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0104	0.0013	0.0043	0.0018	0.0282
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0104	0.0013	0.0043	0.0018	0.0282
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0104	0.0013	0.0043	0.0018	0.0282
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	92.0	90.0	91.5	85.0	94.0
13C8-PFOA	----	0.0002	%	102	93.0	100	100	94.0



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SD200_221122	0960_QC120_221122	0960_SD199_221122	0960_SS198_221122	0960_SS293_221122
Sampling date / time				22-Nov-2022 13:09	22-Nov-2022 13:10	22-Nov-2022 13:16	22-Nov-2022 13:58	22-Nov-2022 14:02
Compound	CAS Number	LOR	Unit	EP2215708-016	EP2215708-017	EP2215708-018	EP2215708-019	EP2215708-020
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	0.8	0.8	0.4	4.2	0.8
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SD200_221122	0960_QC120_221122	0960_SD199_221122	0960_SS198_221122	0960_SS293_221122
Sampling date / time				22-Nov-2022 13:09	22-Nov-2022 13:10	22-Nov-2022 13:16	22-Nov-2022 13:58	22-Nov-2022 14:02
Compound	CAS Number	LOR	Unit	EP2215708-016	EP2215708-017	EP2215708-018	EP2215708-019	EP2215708-020
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	98.0	110	90.5	104	84.0
13C8-PFOA	----	0.0002	%	98.0	103	102	94.0	93.5



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS292_221122	0960_SS291_221122	0960_SS227_221122	----	----
Sampling date / time				22-Nov-2022 14:17	22-Nov-2022 14:23	22-Nov-2022 14:44	----	----
Compound	CAS Number	LOR	Unit	EP2215708-021	EP2215708-022	EP2215708-023	-----	-----
				Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	0.3	1.2	<0.1	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0005	<0.0002	0.0105	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	----



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS292_221122	0960_SS291_221122	0960_SS227_221122	----	----
Sampling date / time				22-Nov-2022 14:17	22-Nov-2022 14:23	22-Nov-2022 14:44	----	----
Compound	CAS Number	LOR	Unit	EP2215708-021	EP2215708-022	EP2215708-023	-----	-----
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0005	<0.0002	0.0105	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0005	<0.0002	0.0105	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0005	<0.0002	0.0105	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	103	91.0	106	----	----
13C8-PFOA	----	0.0002	%	99.0	97.0	91.5	----	----

Page : 13 of 13
Work Order : EP2215708
Client : STANTEC AUSTRALIA PTY LTD
Project : WA_0960_PFASOMP



Surrogate Control Limits

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

QUALITY CONTROL REPORT

Work Order	: EP2215708	Page	: 1 of 11
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 24-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 03-Dec-2022
C-O-C number	: 38233	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SD - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 23		
No. of samples analysed	: 23		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4749216)									
EP2215708-003	0960_SS114_221122	EA055: Moisture Content	----	0.1	%	19.0	19.4	2.5	0% - 20%
EP2215708-014	0960_SS278_221122	EA055: Moisture Content	----	0.1	%	1.0	0.5	72.7	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4749217)									
EP2215708-023	0960_SS227_221122	EA055: Moisture Content	----	0.1	%	<0.1	0.4	126	No Limit
EP2215723-007	Anonymous	EA055: Moisture Content	----	0.1	%	0.2	<0.1	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4745347)									
EP2215708-001	0960_SD234_221122	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0593	0.0566	4.6	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0012	0.0011	0.0	No Limit
ES2243540-007	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0259	0.0274	5.6	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	0.0382	0.0373	2.3	0% - 20%
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.175	0.182	4.1	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0126	0.0138	9.5	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.106	0.119	12.1	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4745831)									
EP2215708-005	0960_SS122_221122	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0002	<0.0002	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4745831) - continued									
EP2215708-005	0960_SS122_221122	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0863	0.0928	7.2	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2215708-015	0960_SS125_221122	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0282	0.0254	10.5	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4745347)									
EP2215708-001	0960_SS234_221122	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0002	0.0003	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0007	0.0008	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0009	0.0007	17.1	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	0.0003	0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
ES2243540-007	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0115	0.0120	4.4	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0477	0.0582	19.8	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0107	0.0115	7.2	0% - 20%
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0149	0.0149	0.0	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0012	<0.0012	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	0.005	0.007	27.8	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4745831)									
EP2215708-005	0960_SS122_221122	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0006	0.0007	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4745831) - continued									
EP2215708-005	0960_SS122_221122	EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2215708-015	0960_SS125_221122	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4745347)									
EP2215708-001	0960_SS234_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2243540-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0012	<0.0012	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0012	<0.0012	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0012	<0.0012	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0012	<0.0012	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4745831)									
EP2215708-005	0960_SS122_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215708-015	0960_SS125_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4745347)									
EP2215708-001	0960_SS234_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
ES2243540-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

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 Work Order : EP2215708
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4745347) - continued									
ES2243540-007	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4745831)									
EP2215708-005	0960_SS122_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215708-015	0960_SS125_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			LCS	Low
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745347)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.8	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.2	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745831)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.2	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.6	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.2	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.2	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.8	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745347)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	86.2	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.8	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.2	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.2	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.0	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.6	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.8	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.0	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.4	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745831)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	87.2	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.6	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.6	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.8	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.0	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.0	64.0	136



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745831) - continued								
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	93.1	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4745347)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	98.2	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	79.6	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	99.8	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	95.7	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.0	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.0	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4745831)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	93.8	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	82.7	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.2	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.6	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4745347)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	106	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	102	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	116	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	108	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4745831)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	84.4	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	98.4	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	79.2	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	70.4	69.2	143



Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745347)							
EP2215708-001	0960_SD234_221122	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	90.4	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	120	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	107	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	116	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# Not Determined	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	93.2	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745831)							
EP2215708-005	0960_SS122_221122	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	82.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	95.2	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	91.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	88.8	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# Not Determined	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	91.2	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745347)							
EP2215708-001	0960_SD234_221122	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	106	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	117	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	102	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	112	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	118	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	106	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	86.8	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	107	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	104	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.00125 mg/kg	96.4	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	90.5	69.0	133		
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745831)							
EP2215708-005	0960_SS122_221122	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	93.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	93.2	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	92.8	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	93.6	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	93.2	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	88.0	72.0	129



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745831) - continued							
EP2215708-005	0960_SS122_221122	EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	90.8	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	93.2	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	118	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	113	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	99.7	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4745347)							
EP2215708-001	0960_SD234_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	108	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	107	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	88.1	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	92.3	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	95.8	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	101	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	107	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4745831)							
EP2215708-005	0960_SS122_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	86.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	106	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	105	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	83.6	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	106	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	96.0	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	82.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4745347)							
EP2215708-001	0960_SD234_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	110	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	105	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	116	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	106	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4745831)							
EP2215708-005	0960_SS122_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	89.2	62.0	145



Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4745831) - continued							
EP2215708-005	0960_SS122_221122	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	76.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	77.2	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	76.0	69.2	143

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2215708	Page	: 1 of 7
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 24-Nov-2022
Site	: Learmonth SD - MB	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 23
Order number	: pfas-omp Learmonth	No. of samples analysed	: 23

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

Page : 2 of 7
 Work Order : EP2215708
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2215708--001	0960_SS234_221122	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231A: Perfluoroalkyl Sulfonic Acids	EP2215708--005	0960_SS122_221122	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055)							
0960_SS234_221122, 0960_SS114_221122, 0960_SS122_221122, 0960_SS279_221122, 0960_SS166_221122, 0960_SS243_221122, 0960_SS277_221122, 0960_SS125_221122, 0960_QC120_221122, 0960_SS198_221122, 0960_SS292_221122, 0960_SS227_221122	0960_QC109_221122, 0960_QC113_221122, 0960_SS176_221122, 0960_SS168_221122, 0960_SS157_221122, 0960_SS174_221122, 0960_SS278_221122, 0960_SD200_221122, 0960_SD199_221122, 0960_SS293_221122, 0960_SS291_221122,	22-Nov-2022	----	----	----	06-Dec-2022	06-Dec-2022
							✔



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SS234_221122, 0960_SS114_221122,	0960_QC109_221122, 0960_QC113_221122	22-Nov-2022	03-Dec-2022	21-May-2023	✔	07-Dec-2022	12-Jan-2023	✔
HDPE Soil Jar (EP231X) 0960_SS122_221122, 0960_SS279_221122, 0960_SS166_221122, 0960_SS243_221122, 0960_SS277_221122, 0960_SS125_221122, 0960_QC120_221122, 0960_SS198_221122, 0960_SS292_221122, 0960_SS227_221122	0960_SS176_221122, 0960_SS158_221122, 0960_SS157_221122, 0960_SS174_221122, 0960_SS278_221122, 0960_SD200_221122, 0960_SD199_221122, 0960_SS293_221122, 0960_SS291_221122,	22-Nov-2022	05-Dec-2022	21-May-2023	✔	08-Dec-2022	14-Jan-2023	✔
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X) 0960_SS234_221122, 0960_SS114_221122,	0960_QC109_221122, 0960_QC113_221122	22-Nov-2022	03-Dec-2022	21-May-2023	✔	07-Dec-2022	12-Jan-2023	✔
HDPE Soil Jar (EP231X) 0960_SS122_221122, 0960_SS279_221122, 0960_SS166_221122, 0960_SS243_221122, 0960_SS277_221122, 0960_SS125_221122, 0960_QC120_221122, 0960_SS198_221122, 0960_SS292_221122, 0960_SS227_221122	0960_SS176_221122, 0960_SS158_221122, 0960_SS157_221122, 0960_SS174_221122, 0960_SS278_221122, 0960_SD200_221122, 0960_SD199_221122, 0960_SS293_221122, 0960_SS291_221122,	22-Nov-2022	05-Dec-2022	21-May-2023	✔	08-Dec-2022	14-Jan-2023	✔



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X) 0960_SS234_221122, 0960_SS114_221122,	0960_QC109_221122, 0960_QC113_221122	22-Nov-2022	03-Dec-2022	21-May-2023	✔	07-Dec-2022	12-Jan-2023	✔
HDPE Soil Jar (EP231X) 0960_SS122_221122, 0960_SS279_221122, 0960_SS166_221122, 0960_SS243_221122, 0960_SS277_221122, 0960_SS125_221122, 0960_QC120_221122, 0960_SS198_221122, 0960_SS292_221122, 0960_SS227_221122	0960_SS176_221122, 0960_SS158_221122, 0960_SS157_221122, 0960_SS174_221122, 0960_SS278_221122, 0960_SD200_221122, 0960_SD199_221122, 0960_SS293_221122, 0960_SS291_221122,	22-Nov-2022	05-Dec-2022	21-May-2023	✔	08-Dec-2022	14-Jan-2023	✔
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SS234_221122, 0960_SS114_221122,	0960_QC109_221122, 0960_QC113_221122	22-Nov-2022	03-Dec-2022	21-May-2023	✔	07-Dec-2022	12-Jan-2023	✔
HDPE Soil Jar (EP231X) 0960_SS122_221122, 0960_SS279_221122, 0960_SS166_221122, 0960_SS243_221122, 0960_SS277_221122, 0960_SS125_221122, 0960_QC120_221122, 0960_SS198_221122, 0960_SS292_221122, 0960_SS227_221122	0960_SS176_221122, 0960_SS158_221122, 0960_SS157_221122, 0960_SS174_221122, 0960_SS278_221122, 0960_SD200_221122, 0960_SD199_221122, 0960_SS293_221122, 0960_SS291_221122,	22-Nov-2022	05-Dec-2022	21-May-2023	✔	08-Dec-2022	14-Jan-2023	✔



Matrix: SOIL

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X) 0960_SS234_221122, 0960_SS114_221122,	0960_QC109_221122, 0960_QC113_221122	22-Nov-2022	03-Dec-2022	21-May-2023	✔	07-Dec-2022	12-Jan-2023	✔
HDPE Soil Jar (EP231X) 0960_SS122_221122, 0960_SS279_221122, 0960_SS166_221122, 0960_SS243_221122, 0960_SS277_221122, 0960_SS125_221122, 0960_QC120_221122, 0960_SS198_221122, 0960_SS292_221122, 0960_SS227_221122	0960_SS176_221122, 0960_SS168_221122, 0960_SS157_221122, 0960_SS174_221122, 0960_SS278_221122, 0960_SD200_221122, 0960_SD199_221122, 0960_SS293_221122, 0960_SS291_221122,	22-Nov-2022	05-Dec-2022	21-May-2023	✔	08-Dec-2022	14-Jan-2023	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

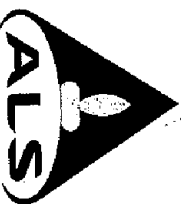
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	4	34	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
QuEChERS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.



Birth

Work Order Reference
FP2215710



Custody Document for Submissions via ALS Compass App

Project Manager
Phone:

Phone:

Sampler:
Phone:

Phone:

Urgent

Special Instructions:

Received by:

24/11 1/45

Date / Time:

alsglobal.com/als-compass

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

CLIENT: MWHHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP

SITE: Learmonth GW - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:
PRIMARY SAMPLER:

CONTACT PH: [REDACTED]
QUOTE NO: SY/139/19 B

SAMPLER MOBILE: [REDACTED]
/ ES2022MWHHAUS0002

LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free Ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comments:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinse WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_MW238		22/11/2022 08:11 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8			lab QC
002	0960_MW151		22/11/2022 08:52 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
003	0960_QC111		22/11/2022 08:52 AM	WATER	ALS: 3 Non ALS: 0	No		X		lab QC
004	0960_MW148D		22/11/2022 09:08 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
005	0960_MW148S		22/11/2022 09:10 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
006	0960_MW172		22/11/2022 10:23 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
007	0960_MW170		22/11/2022 10:38 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
008	0960_MW127		22/11/2022 12:14 PM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8			lab QC
009	0960_MW126		22/11/2022 12:27 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			

**CHAIN OF CUSTODY**

ALS) COC#: 45191

ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSASOMP

SITE: Learmonth GW - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

C

Other comments:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 B

/ ES2022MWHAUS0002

SAMPLE DETAILS**ANALYSIS REQUIRED**

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0960_MW139		22/11/2022 01:26 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
011	0960_MW137_2.5-3.0		22/11/2022 01:48 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
012	0960_MW138_3.0-3.5		22/11/2022 02:38 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
013	0960_MW122		22/11/2022 02:57 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
014	0960_QC301		22/11/2022 03:49 PM	WATER	ALS: 2 Non ALS: 0	No		X		
015	0960_QC302		22/11/2022 03:50 PM	WATER	ALS: 2 Non ALS: 0	No		X		
016	0960_QC303		22/11/2022 03:50 PM	WATER	ALS: 2 Non ALS: 0	No		X		
017	0960_QC401		22/11/2022 03:51 PM	WATER	ALS: 2 Non ALS: 0	No		X		
018	0960_QC402		22/11/2022 03:51 PM	WATER	ALS: 2 Non ALS: 0	No		X		



CHAIN OF CUSTODY

ALS) COC#: 45191

ALS Laboratory: EP Perth

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP

SITE: Learmonth GW - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

°C

CONTACT PH:

QUOTE NO: SY139/19 B

SAMPLER MOBILE:

/ ES2022MMHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	0960_QC403		22/11/2022 03:52 PM	WATER	ALS: 2 Non ALS: 0	No		X		



CHAIN OF CUSTODY

ALS COC#: 45191 ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP

SITE: Learmonth GW - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY139/19 B

/ ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)
Custody Seal intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comments:

PARTIAL ANALYSIS GROUP NAME

SELECTED ANALYSIS NAME

SAMPLE	SAMPLE NAME	MATRIX	SELECTED ANALYSIS NAME
001	0960_MW238	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0960_MW151	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0960_MW148D	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0960_MW148S	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0960_MW172	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0960_MW170	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
008	0960_MW127	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
009	0960_MW126	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
010	0960_MW139	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

**CHAIN OF CUSTODY**

ALS) COC#: 45191

ALS Laboratory: EP Perth

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP

SITE: Learmonth GW - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 B

/ ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

011	0960_MW137_2.5-3.0	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
012	0960_MW138_3.0-3.5	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
013	0960_MW122	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFA5OMP

SITE: Learmonth GW - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard Info:

CONTACT PH: [REDACTED] SAMPLER MOBILE: [REDACTED]
QUOTE NO: SY/139/19 B / ES2022MMHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_MW238	HDPE (no PTFE)	20 mL	00350821012984	Grey	No	
001	0960_MW238	Clear Plastic Bottle - Natural	500 mL	00070821039473	Green	No	
001	0960_MW238	HDPE (no PTFE)	20 mL	00350621000628	Grey	No	
001	0960_MW238	HDPE (no PTFE)	20 mL	00350621035947	Grey	No	
001	0960_MW238	HDPE (no PTFE)	20 mL	00350821012937	Grey	No	
002	0960_MW151	Clear Plastic Bottle - Natural	500 mL	00070821219907	Green	No	
002	0960_MW151	HDPE (no PTFE)	20 mL	00350821000248	Grey	No	
002	0960_MW151	HDPE (no PTFE)	20 mL	00350821000270	Grey	No	
002	0960_MW151	HDPE (no PTFE)	500 mL	00070821219791	Green	No	
003	0960_QC111	Clear Plastic Bottle - Natural	20 mL	00350821000340	Grey	No	
003	0960_QC111	HDPE (no PTFE)	20 mL	00350821030227	Grey	No	
003	0960_QC111	HDPE (no PTFE)	20 mL	00350821013079	Grey	No	
004	0960_MW148D	HDPE (no PTFE)	20 mL	00350821012986	Grey	No	
004	0960_MW148D	Clear Plastic Bottle - Natural	500 mL	00070821035585	Green	No	
004	0960_MW148D	HDPE (no PTFE)	20 mL	00350821000407	Grey	No	
005	0960_MW148S	HDPE (no PTFE)	20 mL	00350821000380	Grey	No	
005	0960_MW148S	Clear Plastic Bottle - Natural	500 mL	00070821219824	Green	No	
006	0960_MW172	HDPE (no PTFE)	20 mL	00350621000149	Grey	No	
006	0960_MW172	HDPE (no PTFE)	20 mL	00350621000232	Grey	No	
006	0960_MW172	Clear Plastic Bottle - Natural	500 mL	00070821151284	Green	No	
007	0960_MW170	Clear Plastic Bottle - Natural	500 mL	00070821219877	Green	No	
007	0960_MW170	HDPE (no PTFE)	20 mL	00350821000396	Grey	No	
007	0960_MW170	HDPE (no PTFE)	20 mL	00350821000348	Grey	No	
008	0960_MW127	Clear Plastic Bottle - Natural	500 mL	00070821026146	Green	No	
008	0960_MW127	HDPE (no PTFE)	20 mL	00352101058312	Grey	No	
008	0960_MW127	HDPE (no PTFE)	20 mL	00350821000418	Grey	No	

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PFSOMP

TURNAROUND REQUIREMENTS: 5 Days

LABORATORY USE ONLY (Circle)

SITE: Learmonth GW - MB

Biohazard Info:

Custody Seal Intact?

Yes No N/A

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

CONTACT PH:

SAMPLER MOBILE:

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

PRIMARY SAMPLER:

QUOTE NO: SY/139/19 B

/ ES2022MWHAUS0002

Random Sample Temperature on Receipt:

°C

EMAIL REPORTS TO:

EMAIL INVOICES TO:

008	0960_MW127	HDPE (no PTFE)	20 mL	00352101057866	Grey	No	
008	0960_MW127	HDPE (no PTFE)	20 mL	00350821000171	Grey	No	
009	0960_MW126	HDPE (no PTFE)	20 mL	00350621036203	Grey	No	
009	0960_MW126	Clear Plastic Bottle - Natural	500 mL	00070821151210	Green	No	
009	0960_MW126	HDPE (no PTFE)	20 mL	00350621000302	Grey	No	
010	0960_MW139	Clear Plastic Bottle - Natural	500 mL	00070821151181	Green	No	
010	0960_MW139	HDPE (no PTFE)	20 mL	00350621000257	Grey	No	
010	0960_MW139	HDPE (no PTFE)	20 mL	00350621000332	Grey	No	
011	0960_MW137	HDPE (no PTFE)	20 mL	00350821000391	Grey	No	
011	0960_MW137	Clear Plastic Bottle - Natural	500 mL	00070821219909	Green	No	
011	0960_MW137	HDPE (no PTFE)	20 mL	00350821000266	Grey	No	
012	0960_MW138	Clear Plastic Bottle - Natural	500 mL	00070821151169	Green	No	
012	0960_MW138	HDPE (no PTFE)	20 mL	00350621000441	Grey	No	
012	0960_MW138	HDPE (no PTFE)	20 mL	00350621000577	Grey	No	
013	0960_MW122	Clear Plastic Bottle - Natural	500 mL	00070821151088	Green	No	
013	0960_MW122	HDPE (no PTFE)	20 mL	00350821000251	Grey	No	
013	0960_MW122	HDPE (no PTFE)	20 mL	00350821000267	Grey	No	
014	0960_QC301	HDPE (no PTFE)	20 mL	00350019165899	Grey	No	
014	0960_QC301	HDPE (no PTFE)	20 mL	00350019165689	Grey	No	
015	0960_QC302	HDPE (no PTFE)	20 mL	003500191656788	Grey	No	
015	0960_QC302	HDPE (no PTFE)	20 mL	00350019112581	Grey	No	
016	0960_QC303	HDPE (no PTFE)	20 mL	00350019165914	Grey	No	
016	0960_QC303	HDPE (no PTFE)	20 mL	00352101071293	Grey	No	
017	0960_QC401	HDPE (no PTFE)	20 mL	00350019112539	Grey	No	
017	0960_QC401	HDPE (no PTFE)	20 mL	00350019165841	Grey	No	
018	0960_QC402	HDPE (no PTFE)	20 mL	00350019165754	Grey	No	
018	0960_QC402	HDPE (no PTFE)	20 mL	00350019165919	Grey	No	

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFEASOMP

SITE: Learmonth GW - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER: [REDACTED]

PRIMARY SAMPLER: [REDACTED]

EMAIL REPORTS TO: [REDACTED]

EMAIL INVOICES TO: [REDACTED]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

CONTACT PH: [REDACTED] SAMPLER MOBILE: [REDACTED]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

019	0960_QC403	HDPE (no PTFE)	20 mL	00350019165795	Grey	No	
019	0960_QC403	HDPE (no PTFE)	20 mL	00352101070855	Grey	No	

Total Bottle Count: ALS: 55, Non ALS: 0

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EP2215710**

Client : STANTEC AUSTRALIA PTY LTD
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail : [REDACTED]
Telephone : ----
Facsimile : ----

E-mail : [REDACTED]
Telephone : [REDACTED]
Facsimile : [REDACTED]

Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45191
Site : Learmonth GW - MB
Sampler : [REDACTED] [REDACTED]
[REDACTED]

Page : 1 of 3
Quote number : ES2022MWH AUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 24-Nov-2022 13:45
Client Requested Due Date : 07-Dec-2022

Issue Date : 28-Nov-2022
Scheduled Reporting Date : **07-Dec-2022**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 3
Receipt Detail :

Security Seal : Intact.
Temperature : 18.8 - Ice present
No. of samples received / analysed : 19 / 19

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP2215710-011 : 22-Nov-2022 13:48 : 0960_MW137_2.5-3.0_221122

EP2215710-012 : 22-Nov-2022 14:38 : 0960_MW138_3.0-3.5_221122

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215710-001	22-Nov-2022 08:11	0960_MW238_221122	✓	✓	✓
EP2215710-002	22-Nov-2022 08:52	0960_MW151_221122	✓	✓	✓
EP2215710-003	22-Nov-2022 08:52	0960_QC111_221122		✓	
EP2215710-004	22-Nov-2022 09:08	0960_MW148D_221122	✓	✓	✓
EP2215710-005	22-Nov-2022 09:10	0960_MW148S_221122	✓	✓	✓
EP2215710-006	22-Nov-2022 10:23	0960_MW172_221122	✓	✓	✓
EP2215710-007	22-Nov-2022 10:38	0960_MW170_221122	✓	✓	✓
EP2215710-008	22-Nov-2022 12:14	0960_MW127_221122	✓	✓	✓
EP2215710-009	22-Nov-2022 12:27	0960_MW126_221122	✓	✓	✓
EP2215710-010	22-Nov-2022 13:26	0960_MW139_221122	✓	✓	✓
EP2215710-011	22-Nov-2022 13:48	0960_MW137_2.5-3.0_2...	✓	✓	✓
EP2215710-012	22-Nov-2022 14:38	0960_MW138_3.0-3.5_2...	✓	✓	✓
EP2215710-013	22-Nov-2022 14:57	0960_MW122_221122	✓	✓	✓
EP2215710-014	22-Nov-2022 15:49	0960_QC301_221122		✓	
EP2215710-015	22-Nov-2022 15:50	0960_QC302_221122		✓	
EP2215710-016	22-Nov-2022 15:50	0960_QC303_221122		✓	
EP2215710-017	22-Nov-2022 15:51	0960_QC401_221122		✓	
EP2215710-018	22-Nov-2022 15:51	0960_QC402_221122		✓	
EP2215710-019	22-Nov-2022 15:52	0960_QC403_221122		✓	

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.



Requested Deliverables

██████████	- A4 - AU Tax Invoice (INV)	Email	████████████████████
DERP LAB REPORTS			
	- EDI Format - ESDAT (ESDAT)	Email	████████████████████
██████████	(STANTEC)		
	- *AU Certificate of Analysis - NATA (COA)	Email	████████████████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	████████████████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	████████████████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	████████████████████
	- Chain of Custody (CoC) (COC)	Email	████████████████████
	- EDI Format - ESDAT (ESDAT)	Email	████████████████████
	- EDI Format - XTab (XTAB)	Email	████████████████████

CERTIFICATE OF ANALYSIS

Work Order : **EP2215710**
Client : **STANTEC AUSTRALIA PTY LTD**
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE TERRACE
 PERTH 6000
Telephone : ----
Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45191
Sampler : [REDACTED]
Site : Learmonth GW - MB
Quote number : SY/139/19 B
No. of samples received : 19
No. of samples analysed : 19

Page : 1 of 16
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : [REDACTED]
Date Samples Received : 24-Nov-2022 13:45
Date Analysis Commenced : 29-Nov-2022
Issue Date : 06-Dec-2022 17:41



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW238_221122	0960_MW151_221122	0960_QC111_221122	0960_MW148D_221122 2	0960_MW148S_221122 2
Sampling date / time				22-Nov-2022 08:11	22-Nov-2022 08:52	22-Nov-2022 08:52	22-Nov-2022 09:08	22-Nov-2022 09:10
Compound	CAS Number	LOR	Unit	EP2215710-001	EP2215710-002	EP2215710-003	EP2215710-004	EP2215710-005
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	----	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	9	<1	----	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	781	756	----	766	478
Total Alkalinity as CaCO ₃	----	1	mg/L	790	756	----	766	478
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	928	595	----	3600	1340
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	930	4040	----	26400	8310
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	16	130	----	881	281
Magnesium	7439-95-4	1	mg/L	31	238	----	1820	490
Sodium	7440-23-5	1	mg/L	1270	2680	----	16900	4880
Potassium	7440-09-7	1	mg/L	70	128	----	770	216
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	61.3	141	----	835	272
∅ Total Cations	----	0.01	meq/L	60.4	146	----	948	272
∅ Ionic Balance	----	0.01	%	0.79	1.55	----	6.37	0.05
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	1.65	2.68	2.80	1.14	4.76
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	1.63	3.64	4.03	0.93	4.47
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	12.0	33.0	31.1	4.41	20.3
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	1.08	3.37	3.58	0.29	1.33
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	9.58	26.3	31.9	2.13	13.8
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.9	1.0	1.0	0.2	1.2
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	1.90	1.71	1.83	0.34	1.75
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	7.23	9.66	10.5	1.44	8.46



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW238_221122	0960_MW151_221122	0960_QC111_221122	0960_MW148D_221122 2	0960_MW148S_221122 2
Sampling date / time				22-Nov-2022 08:11	22-Nov-2022 08:52	22-Nov-2022 08:52	22-Nov-2022 09:08	22-Nov-2022 09:10
Compound	CAS Number	LOR	Unit	EP2215710-001	EP2215710-002	EP2215710-003	EP2215710-004	EP2215710-005
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.56	0.74	0.73	0.16	0.69
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.82	2.08	2.17	0.25	0.90
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW238_221122	0960_MW151_221122	0960_QC111_221122	0960_MW148D_221122 2	0960_MW148S_221122 2
Sampling date / time				22-Nov-2022 08:11	22-Nov-2022 08:52	22-Nov-2022 08:52	22-Nov-2022 09:08	22-Nov-2022 09:10
Compound	CAS Number	LOR	Unit	EP2215710-001	EP2215710-002	EP2215710-003	EP2215710-004	EP2215710-005
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	37.4	84.2	89.6	11.3	57.7
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	21.6	59.3	63.0	6.54	34.1
Sum of PFAS (WA DER List)	----	0.01	µg/L	34.6	77.2	82.0	10.1	51.9
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	102	92.1	96.4	89.1	94.4
13C8-PFOA	----	0.02	%	98.9	95.9	103	100	95.6



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW172_221122	0960_MW170_221122	0960_MW127_221122	0960_MW126_221122	0960_MW139_221122
Sampling date / time				22-Nov-2022 10:23	22-Nov-2022 10:38	22-Nov-2022 12:14	22-Nov-2022 12:27	22-Nov-2022 13:26
Compound	CAS Number	LOR	Unit	EP2215710-006	EP2215710-007	EP2215710-008	EP2215710-009	EP2215710-010
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	311	223	154	193	200
Total Alkalinity as CaCO3	----	1	mg/L	311	223	154	193	200
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2620	1590	2630	2460	3920
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	10400	15800	23600	23200	20800
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	440	1020	1110	1000	788
Magnesium	7439-95-4	1	mg/L	576	1110	1720	1740	1830
Sodium	7440-23-5	1	mg/L	6770	10000	14800	14300	13400
Potassium	7440-09-7	1	mg/L	203	252	549	671	727
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	354	483	724	710	672
∅ Total Cations	----	0.01	meq/L	369	584	855	832	791
∅ Ionic Balance	----	0.01	%	2.06	9.41	8.31	7.96	8.13
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.48	0.04	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.72	0.05	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	4.81	0.45	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.16	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1.28	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.2	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.50	0.03	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.57	0.06	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.27	<0.02	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW172_221122	0960_MW170_221122	0960_MW127_221122	0960_MW126_221122	0960_MW139_221122
Sampling date / time				22-Nov-2022 10:23	22-Nov-2022 10:38	22-Nov-2022 12:14	22-Nov-2022 12:27	22-Nov-2022 13:26
Compound	CAS Number	LOR	Unit	EP2215710-006	EP2215710-007	EP2215710-008	EP2215710-009	EP2215710-010
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.25	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW172_221122	0960_MW170_221122	0960_MW127_221122	0960_MW126_221122	0960_MW139_221122
Sampling date / time				22-Nov-2022 10:23	22-Nov-2022 10:38	22-Nov-2022 12:14	22-Nov-2022 12:27	22-Nov-2022 13:26
Compound	CAS Number	LOR	Unit	EP2215710-006	EP2215710-007	EP2215710-008	EP2215710-009	EP2215710-010
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	10.2	0.63	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	6.09	0.45	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	9.36	0.58	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	99.9	108	99.4	98.9	99.3
13C8-PFOA	----	0.02	%	100	103	101	99.6	101



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW137_2.5-3.0_221122	0960_MW138_3.0-3.5_221122	0960_MW122_221122	----	----
Sampling date / time				22-Nov-2022 13:48	22-Nov-2022 14:38	22-Nov-2022 14:57	----	----
Compound	CAS Number	LOR	Unit	EP2215710-011	EP2215710-012	EP2215710-013	-----	-----
Result				Result	Result	Result	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	197	313	375	----	----
Total Alkalinity as CaCO ₃	----	1	mg/L	197	313	375	----	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	4190	1880	2020	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	26400	13200	13600	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	649	446	317	----	----
Magnesium	7439-95-4	1	mg/L	2160	965	845	----	----
Sodium	7440-23-5	1	mg/L	17000	7820	8590	----	----
Potassium	7440-09-7	1	mg/L	955	434	486	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	836	418	433	----	----
∅ Total Cations	----	0.01	meq/L	974	453	471	----	----
∅ Ionic Balance	----	0.01	%	7.63	4.04	4.23	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.01	0.11	<0.01	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.41	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW137_2.5-3.0_221122	0960_MW138_3.0-3.5_221122	0960_MW122_221122	----	----
Sampling date / time				22-Nov-2022 13:48	22-Nov-2022 14:38	22-Nov-2022 14:57	----	----
Compound	CAS Number	LOR	Unit	EP2215710-011	EP2215710-012	EP2215710-013	-----	-----
				Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.02	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW137_2.5-3.0_221122	0960_MW138_3.0-3.5_221122	0960_MW122_221122	----	----
Sampling date / time				22-Nov-2022 13:48	22-Nov-2022 14:38	22-Nov-2022 14:57	----	----
Compound	CAS Number	LOR	Unit	EP2215710-011	EP2215710-012	EP2215710-013	-----	-----
				Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	0.03	0.54	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.03	0.52	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	0.03	0.54	<0.01	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	106	98.4	97.3	----	----
13C8-PFOA	----	0.02	%	97.4	99.2	99.0	----	----



Analytical Results

Sub-Matrix: RINSATE
 (Matrix: WATER)

Sample ID

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0960_QC301_221122	0960_QC302_221122	0960_QC303_221122	0960_QC401_221122	0960_QC402_221122
Sampling date / time				22-Nov-2022 15:49	22-Nov-2022 15:50	22-Nov-2022 15:50	22-Nov-2022 15:51	22-Nov-2022 15:51	
Compound	CAS Number	LOR	Unit	EP2215710-014	EP2215710-015	EP2215710-016	EP2215710-017	EP2215710-018	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	



Analytical Results

Sub-Matrix: RINSATE
 (Matrix: WATER)

Sample ID

				0960_QC301_221122	0960_QC302_221122	0960_QC303_221122	0960_QC401_221122	0960_QC402_221122
Sampling date / time				22-Nov-2022 15:49	22-Nov-2022 15:50	22-Nov-2022 15:50	22-Nov-2022 15:51	22-Nov-2022 15:51
Compound	CAS Number	LOR	Unit	EP2215710-014	EP2215710-015	EP2215710-016	EP2215710-017	EP2215710-018
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	100	98.3	97.0	95.1	104
13C8-PFOA	----	0.02	%	96.5	99.1	106	105	100



Analytical Results

Sub-Matrix: RINSATE
 (Matrix: WATER)

Sample ID

0960_QC403_221122

Sampling date / time				22-Nov-2022 15:52	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2215710-019	-----	-----	-----	-----
Result				----	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----



Analytical Results

Sub-Matrix: RINSATE
 (Matrix: WATER)

Sample ID

0960_QC403_221122

Sampling date / time

22-Nov-2022 15:52

Compound

CAS Number

LOR

Unit

EP2215710-019

Result

EP231C: Perfluoroalkyl Sulfonamides - Continued

N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----

EP231D: (n:2) Fluorotelomer Sulfonic Acids

4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----

EP231P: PFAS Sums

Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

EP231S: PFAS Surrogate

13C4-PFOS	----	0.02	%	98.6	----	----	----	----
13C8-PFOA	----	0.02	%	100	----	----	----	----



Surrogate Control Limits

Sub-Matrix: GROUNDWATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: RINSATE		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids
(WATER) EP231B: Perfluoroalkyl Carboxylic Acids
(WATER) EP231C: Perfluoroalkyl Sulfonamides
(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids
(WATER) EP231P: PFAS Sums
(WATER) EP231S: PFAS Surrogate

QUALITY CONTROL REPORT

Work Order	: EP2215710	Page	: 1 of 12
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 24-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 29-Nov-2022
C-O-C number	: 45191	Issue Date	: 06-Dec-2022
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth GW - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 19		
No. of samples analysed	: 19		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4741492)									
EP2215643-007	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	274	276	0.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	274	276	0.7	0% - 20%
EP2215643-019	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	276	278	0.8	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	276	278	0.8	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4747628)									
EP2215710-008	0960_MW127_221122	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	154	167	8.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	154	167	8.3	0% - 20%
EP2215722-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	127	137	7.8	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	127	137	7.8	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4731519)									
EP2215710-001	0960_MW238_221122	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	928	913	1.6	0% - 20%
EP2215710-012	0960_MW138_3.0-3.5_221122	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1880	1860	0.9	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4731518)									
EP2215710-001	0960_MW238_221122	ED045G: Chloride	16887-00-6	1	mg/L	930	927	0.4	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED045G: Chloride by Discrete Analyser (QC Lot: 4731518) - continued									
EP2215710-012	0960_MW138_3.0-3.5_221122	ED045G: Chloride	16887-00-6	1	mg/L	13200	13200	0.2	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4736102)									
EP2215710-001	0960_MW238_221122	ED093F: Calcium	7440-70-2	1	mg/L	16	16	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	31	31	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1270	1270	0.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	70	71	0.0	0% - 20%
EP2215710-012	0960_MW138_3.0-3.5_221122	ED093F: Calcium	7440-70-2	1	mg/L	446	446	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	965	977	1.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	7820	7960	1.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	434	443	2.1	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4738221)									
EP2215710-001	0960_MW238_221122	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	12.0	12.3	2.3	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	9.58	10.4	8.6	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	1.65	1.71	4.0	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	1.63	1.66	1.9	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	1.08	1.00	7.3	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215722-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.89	0.84	5.6	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	0.04	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.13	0.16	17.8	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.17	0.16	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4745870)									
EP2215711-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.77	0.81	4.5	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.40	0.38	4.5	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	0.05	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.06	0.06	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215711-009	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.91	0.84	8.4	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.45	0.42	6.8	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.10	0.09	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.12	0.12	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4738221)									
EP2215710-001	0960_MW238_221122	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.82	0.87	5.8	0% - 20%

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4738221) - continued									
EP2215710-001	0960_MW238_221122	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	1.90	1.87	1.6	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	7.23	6.93	4.2	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.56	0.55	0.0	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.9	0.9	0.0	No Limit
EP2215722-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.14	0.14	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit		
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4745870)									
EP2215711-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.54	0.50	7.4	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	7.07	7.15	1.0	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	6.80	7.02	3.2	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	6.17	6.32	2.5	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	2.9	3.0	0.0	0% - 20%
EP2215711-009	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.05	0.04	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.17	0.16	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.03	0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4745870) - continued									
EP2215711-009	Anonymous	EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4738221)									
EP2215710-001	0960_MW238_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215722-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4745870)									
EP2215711-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4745870) - continued									
EP2215711-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215711-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4738221)							
EP2215710-001	0960_MW238_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215722-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4745870)									
EP2215711-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

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 Work Order : EP2215710
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4745870) - continued									
EP2215711-001	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215711-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4738221)									
EP2215710-001	0960_MW238_221122	EP231X: Sum of PFAS	----	0.01	µg/L	37.4	38.2	2.2	0% - 20%
EP2215722-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.40	1.37	2.2	0% - 20%
EP231P: PFAS Sums (QC Lot: 4745870)									
EP2215711-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	24.8	25.3	2.1	0% - 20%
EP2215711-009	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.85	1.71	7.9	0% - 20%



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED037P: Alkalinity by PC Titrator (QCLot: 4741492)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	110	87.8	118
				<1	200 mg/L	97.7	87.8	118
ED037P: Alkalinity by PC Titrator (QCLot: 4747628)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	110	87.8	118
				<1	200 mg/L	94.2	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4731519)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.7	89.9	112
				<1	500 mg/L	97.6	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4731518)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	89.1	88.6	113
				<1	1000 mg/L	93.7	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4736102)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.1	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.6	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4738221)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	74.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	78.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	77.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	82.2	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	79.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	67.6	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745870)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	87.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	127



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745870) - continued								
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	97.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	102	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	101	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4738221)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	82.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	86.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	88.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	87.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	86.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	97.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	84.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	83.4	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	94.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	85.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	86.3	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745870)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	98.9	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	99.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	96.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	109	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	98.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	110	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	91.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	112	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4738221)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	90.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	75.2	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	76.9	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	86.6	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	89.1	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	89.8	65.0	136

Sub-Matrix: WATER

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4738221) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	73.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4745870)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	106	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	102	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	92.2	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.1	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	108	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	113	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	98.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4738221)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	78.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	103	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	85.0	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	81.4	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4745870)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	89.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	91.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	97.6	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	86.6	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4731519)							
EP2215710-001	0960_MW238_221122	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4731518)							
EP2215710-001	0960_MW238_221122	ED045G: Chloride	16887-00-6	1000 mg/L	95.1	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4738221)							



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4738221) - continued							
EP2215710-008	0960_MW127_221122	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	86.8	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	94.0	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	100	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	88.6	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	84.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	84.2	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745870)							
EP2215711-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	90.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	71.4	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	# Not Determined	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	93.6	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	# Not Determined	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	93.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4738221)							
EP2215710-008	0960_MW127_221122	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	94.5	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	100	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	99.6	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	99.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	97.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	104	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	96.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	99.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	112	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	101	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	97.2	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745870)							
EP2215711-006	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	91.7	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	85.8	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	86.0	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	86.2	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	81.4	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	101	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	88.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	98.4	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	97.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	90.0	65.0	144



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745870) - continued							
EP2215711-006	Anonymous	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	119	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4738221)							
EP2215710-008	0960_MW127_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	87.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	97.2	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	95.0	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	93.0	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	95.7	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	112	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	91.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4745870)							
EP2215711-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	94.6	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	105	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	98.9	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	102	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	103	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	99.2	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	95.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4738221)							
EP2215710-008	0960_MW127_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	125	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	105	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	86.0	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	86.4	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4745870)							
EP2215711-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	88.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	81.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	97.8	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	86.4	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2215710	Page	: 1 of 6
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 24-Nov-2022
Site	: Learmonth GW - MB	Issue Date	: 06-Dec-2022
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 19
Order number	: pfas-omp Learmonth	No. of samples analysed	: 19

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	EP2215710--001	0960_MW238_221122	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231A: Perfluoroalkyl Sulfonic Acids	EP2215711--006	Anonymous	Perfluorohexane sulfonic acid (PFHxS)	355-46-4	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231A: Perfluoroalkyl Sulfonic Acids	EP2215711--006	Anonymous	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for **VOC in soils** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0960_MW238_221122, 0960_MW148D_221122, 0960_MW172_221122	0960_MW151_221122, 0960_MW148S_221122,	22-Nov-2022	----	----	----	01-Dec-2022	06-Dec-2022	✔
Clear Plastic Bottle - Natural (ED037-P)								
0960_MW170_221122, 0960_MW126_221122, 0960_MW137_2.5-3.0_221122, 0960_MW122_221122	0960_MW127_221122, 0960_MW139_221122, 0960_MW138_3.0-3.5_221122,	22-Nov-2022	----	----	----	06-Dec-2022	06-Dec-2022	✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0960_MW238_221122, 0960_MW148D_221122, 0960_MW172_221122, 0960_MW127_221122, 0960_MW139_221122, 0960_MW138_3.0-3.5_221122,	0960_MW151_221122, 0960_MW148S_221122, 0960_MW170_221122, 0960_MW126_221122, 0960_MW137_2.5-3.0_221122, 0960_MW122_221122	22-Nov-2022	----	----	----	06-Dec-2022	20-Dec-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 0960_MW238_221122, 0960_MW148D_221122, 0960_MW172_221122, 0960_MW127_221122, 0960_MW139_221122, 0960_MW138_3.0-3.5_221122,	0960_MW151_221122, 0960_MW148S_221122, 0960_MW170_221122, 0960_MW126_221122, 0960_MW137_2.5-3.0_221122, 0960_MW122_221122	22-Nov-2022	----	----	----	06-Dec-2022	20-Dec-2022	✔
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) 0960_MW238_221122, 0960_MW148D_221122, 0960_MW172_221122, 0960_MW127_221122, 0960_MW139_221122, 0960_MW138_3.0-3.5_221122,	0960_MW151_221122, 0960_MW148S_221122, 0960_MW170_221122, 0960_MW126_221122, 0960_MW137_2.5-3.0_221122, 0960_MW122_221122	22-Nov-2022	----	----	----	29-Nov-2022	29-Nov-2022	✔
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_QC303_221122, 0960_QC402_221122,	0960_QC401_221122, 0960_QC403_221122	22-Nov-2022	05-Dec-2022	21-May-2023	✔	06-Dec-2022	21-May-2023	✔
HDPE (no PTFE) (EP231X) 0960_MW238_221122, 0960_QC111_221122, 0960_MW148S_221122, 0960_MW170_221122, 0960_MW126_221122, 0960_MW137_2.5-3.0_221122, 0960_MW122_221122, 0960_QC302_221122	0960_MW151_221122, 0960_MW148D_221122, 0960_MW172_221122, 0960_MW127_221122, 0960_MW139_221122, 0960_MW138_3.0-3.5_221122, 0960_QC301_221122,	22-Nov-2022	30-Nov-2022	21-May-2023	✔	06-Dec-2022	21-May-2023	✔
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) 0960_QC303_221122, 0960_QC402_221122,	0960_QC401_221122, 0960_QC403_221122	22-Nov-2022	05-Dec-2022	21-May-2023	✔	06-Dec-2022	21-May-2023	✔
HDPE (no PTFE) (EP231X) 0960_MW238_221122, 0960_QC111_221122, 0960_MW148S_221122, 0960_MW170_221122, 0960_MW126_221122, 0960_MW137_2.5-3.0_221122, 0960_MW122_221122, 0960_QC302_221122	0960_MW151_221122, 0960_MW148D_221122, 0960_MW172_221122, 0960_MW127_221122, 0960_MW139_221122, 0960_MW138_3.0-3.5_221122, 0960_QC301_221122,	22-Nov-2022	30-Nov-2022	21-May-2023	✔	06-Dec-2022	21-May-2023	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) 0960_QC303_221122, 0960_QC402_221122,	0960_QC401_221122, 0960_QC403_221122	22-Nov-2022	05-Dec-2022	21-May-2023	✓	06-Dec-2022	21-May-2023	✓
HDPE (no PTFE) (EP231X) 0960_MW238_221122, 0960_QC111_221122, 0960_MW148S_221122, 0960_MW170_221122, 0960_MW126_221122, 0960_MW137_2.5-3.0_221122, 0960_MW122_221122, 0960_QC302_221122	0960_MW151_221122, 0960_MW148D_221122, 0960_MW172_221122, 0960_MW127_221122, 0960_MW139_221122, 0960_MW138_3.0-3.5_221122, 0960_QC301_221122,	22-Nov-2022	30-Nov-2022	21-May-2023	✓	06-Dec-2022	21-May-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_QC303_221122, 0960_QC402_221122,	0960_QC401_221122, 0960_QC403_221122	22-Nov-2022	05-Dec-2022	21-May-2023	✓	06-Dec-2022	21-May-2023	✓
HDPE (no PTFE) (EP231X) 0960_MW238_221122, 0960_QC111_221122, 0960_MW148S_221122, 0960_MW170_221122, 0960_MW126_221122, 0960_MW137_2.5-3.0_221122, 0960_MW122_221122, 0960_QC302_221122	0960_MW151_221122, 0960_MW148D_221122, 0960_MW172_221122, 0960_MW127_221122, 0960_MW139_221122, 0960_MW138_3.0-3.5_221122, 0960_QC301_221122,	22-Nov-2022	30-Nov-2022	21-May-2023	✓	06-Dec-2022	21-May-2023	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0960_QC303_221122, 0960_QC402_221122,	0960_QC401_221122, 0960_QC403_221122	22-Nov-2022	05-Dec-2022	21-May-2023	✓	06-Dec-2022	21-May-2023	✓
HDPE (no PTFE) (EP231X) 0960_MW238_221122, 0960_QC111_221122, 0960_MW148S_221122, 0960_MW170_221122, 0960_MW126_221122, 0960_MW137_2.5-3.0_221122, 0960_MW122_221122, 0960_QC302_221122	0960_MW151_221122, 0960_MW148D_221122, 0960_MW172_221122, 0960_MW127_221122, 0960_MW139_221122, 0960_MW138_3.0-3.5_221122, 0960_QC301_221122,	22-Nov-2022	30-Nov-2022	21-May-2023	✓	06-Dec-2022	21-May-2023	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

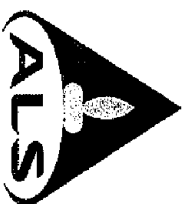
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	4	40	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	38	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	4	40	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



Environmental Division
Perth
Work Order Reference
EP2215711



Telephone : +61-8-9400 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0960_PFA30TP Client: STANTEC

Project Manager:

Phone:

ALS Compass COC Reference: 45226 38233 45195 45191 45205

Samples:

Sampler:

Phone:

Turnaround Requirements: Standard ☒ Urgent ☐

Special Instructions:

--

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
STANTEC			
Date / Time: 23-11-22 / 7.00 AM	Date / Time: 24/11 1/45	Date / Time:	Date / Time:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSASCOMP

SITE: Learmonth GW - JS

ORDER NO: pfs-comp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free Ice / frozen Ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH:

QUOTE NO: SY139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

SAMPLE DETAILS					ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	
001	0960_MM018		22/11/2022 08:06 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8
002	0960_MM165		22/11/2022 08:25 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8
003	0960_QC110		22/11/2022 08:27 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8
004	0960_MM164		22/11/2022 08:56 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8
005	0960_QC112		22/11/2022 08:57 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8
006	0960_MM163		22/11/2022 09:16 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8
007	0960_MM211		22/11/2022 09:48 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8
008	0960_QC114		22/11/2022 09:49 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8
009	0960_MM021		22/11/2022 10:10 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PASOMP

SITE: Learmonth GW - JS

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER: [REDACTED]

PRIMARY SAMPLER: [REDACTED]

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH: [REDACTED]

QUOTE NO: SY139/19 B

SAMPLER MOBILE: [REDACTED]

/ ES2022MWHAUS0002

Yes No N/A
Yes No N/A
C

SAMPLE DETAILS

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0960_MMW233		22/11/2022 10:29 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
011	0960_QC115		22/11/2022 10:35 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
012	0960_MMW162		22/11/2022 11:02 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
013	0960_MMW114		22/11/2022 11:26 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
014	0960_MMW166		22/11/2022 11:53 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
015	0960_QC117		22/11/2022 11:59 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
016	0960_MMW167		22/11/2022 12:34 PM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
017	0960_MMW168		22/11/2022 12:53 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
018	0960_MMW112		22/11/2022 01:22 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MW/HAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP

SITE: Learmonth GW - JS

ORDER NO: pfas-omp Learmonth

TURNAROUND REQUIREMENTS: 5 Days
Biohazard Info:

LABORATORY USE ONLY (Circle)

PROJECT MANAGER:	CONTACT PH:	SAMPLER MOBILE:	Custody Seal Intact?	Yes	No	N/A
PRIMARY SAMPLER:	QUOTE NO: SY139/19 B	/ ES2022MWHAUS0002	Free Ice / frozen ice bricks present upon receipt?	Yes	No	N/A
EMAIL REPORTS TO:			Random Sample Temperature on Receipt:		°C	
EMAIL INVOICES TO:			Other comments:			

SAMPLE DETAILS					ANALYSIS REQUIRED				
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	0960_MW144_3.0-3.5		22/11/2022 02:21 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
020	0960_MW134		22/11/2022 02:39 PM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	0960_MW144_3.0-3.5		22/11/2022 02:21 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
020	0960_MW134		22/11/2022 02:39 PM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

CLIENT: MW/HAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PFA50MP

SITE: Learmonth GW - JS

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 B

/ ES2022MW/HAUS002

LABORATORY USE ONLY (Circle)
Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comments:

PARTIAL ANALYSIS GROUP NAME

SELECTED ANALYSIS NAME

SAMPLE	SAMPLE NAME	MATRIX	SELECTED ANALYSIS NAME
001	0960_MW018	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED083F -EP231X PFAS - Full Suite (28 analytes)
002	0960_MW165	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED083F -EP231X PFAS - Full Suite (28 analytes)
003	0960_QC110	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED083F -EP231X PFAS - Full Suite (28 analytes)
004	0960_MW164	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED083F -EP231X PFAS - Full Suite (28 analytes)
005	0960_QC112	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED083F -EP231X PFAS - Full Suite (28 analytes)
006	0960_MW163	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED083F -EP231X PFAS - Full Suite (28 analytes)
007	0960_MW211	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED083F -EP231X PFAS - Full Suite (28 analytes)
008	0960_QC114	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED083F -EP231X PFAS - Full Suite (28 analytes)
009	0960_MW021	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED083F -EP231X PFAS - Full Suite (28 analytes)

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSASOMP

SITE: Learmonth GW - JS

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 B

/ ES2022MMHAUS0002

010	0960_MM233	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG, Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
011	0960_QC115	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG, Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
012	0960_MM162	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG, Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
013	0960_MM114	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG, Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
014	0960_MM166	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG, Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
015	0960_QC117	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG, Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
016	0960_MM167	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG, Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
017	0960_MM168	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG, Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
018	0960_MM112	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG, Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
019	0960_MM144_3.0-3.5	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG, Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PFASOMP
SITE: Learmonth GW - JS
ORDER NO: pfas-omp Learmonth
PROJECT MANAGER:
PRIMARY SAMPLER:
EMAIL REPORTS TO:
EMAIL INVOICES TO:

CONTACT PH:
QUOTE NO: SY1139/19 B / ES2022MWHAUS0002
SAMPLER MOBILE:

020	0960_MW134	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED063F - EP231X PFAS - Full Suite (28 analytes)
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RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C
Other comments:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_FFASOMP

SITE: Leamonth GW - JS

ORDER NO: pfas-omp Leamonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

Yes No N/A

Yes No N/A

C

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_MW018	Clear Plastic Bottle - Natural	500 mL	00070522144942	Green	No	
001	0960_MW018	HDPE (no PTFE)	20 mL	00350522042796	Grey	No	
001	0960_MW018	HDPE (no PTFE)	20 mL	00350522042947	Grey	No	
001	0960_MW018	HDPE (no PTFE)	20 mL	00352005019472	Grey	No	
001	0960_MW018	HDPE (no PTFE)	20 mL	00352005019678	Grey	No	
002	0960_MW165	Clear Plastic Bottle - Natural	500 mL	00070522144936	Green	No	
002	0960_MW165	HDPE (no PTFE)	20 mL	00350522042897	Grey	No	
002	0960_MW165	HDPE (no PTFE)	20 mL	00350522043010	Grey	No	
003	0960_QC110	Clear Plastic Bottle - Natural	500 mL	00070522144982	Green	No	
003	0960_QC110	HDPE (no PTFE)	20 mL	00350522042891	Grey	No	
003	0960_QC110	HDPE (no PTFE)	20 mL	00350522042732	Grey	No	
004	0960_MW164	Clear Plastic Bottle - Natural	500 mL	00070522145104	Green	No	
004	0960_MW164	HDPE (no PTFE)	20 mL	00350522042944	Grey	No	
004	0960_MW164	HDPE (no PTFE)	20 mL	00350522042851	Grey	No	
005	0960_QC112	Clear Plastic Bottle - Natural	500 mL	00070522144966	Green	No	
005	0960_QC112	HDPE (no PTFE)	20 mL	00350522042806	Grey	No	
005	0960_QC112	HDPE (no PTFE)	20 mL	00350522042778	Grey	No	
006	0960_MW163	HDPE (no PTFE)	20 mL	00352005007530	Grey	No	
006	0960_MW163	HDPE (no PTFE)	20 mL	00352005007478	Grey	No	
006	0960_MW163	Clear Plastic Bottle - Natural	500 mL	00070522145018	Green	No	
006	0960_MW163	HDPE (no PTFE)	20 mL	00350821001943	Grey	No	
006	0960_MW163	HDPE (no PTFE)	20 mL	00350821001966	Grey	No	
007	0960_MW211	Clear Plastic Bottle - Natural	500 mL	00070522162815	Green	No	
007	0960_MW211	HDPE (no PTFE)	20 mL	00350821001972	Grey	No	
007	0960_MW211	HDPE (no PTFE)	20 mL	00350821001753	Grey	No	
008	0960_QC114	Clear Plastic Bottle - Natural	500 mL	00070522144888	Green	No	

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSASOMP

SITE: Learmonth GW - JS

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

Yes No N/A
Yes No N/A
C

008	0960_QC114	HDPE (no PTFE)	20 mL	00350821001799	Grey	No	
008	0960_QC114	HDPE (no PTFE)	20 mL	00350821001785	Grey	No	
009	0960_MW021	HDPE (no PTFE)	20 mL	00352005006769	Grey	No	
009	0960_MW021	HDPE (no PTFE)	20 mL	00352005007560	Grey	No	
009	0960_MW021	HDPE (no PTFE)	20 mL	00350821001745	Grey	No	
009	0960_MW021	HDPE (no PTFE)	20 mL	00350821001858	Grey	No	
009	0960_MW021	Clear Plastic Bottle - Natural	500 mL	00070522145044	Green	No	
010	0960_MW233	Clear Plastic Bottle - Natural	500 mL	00070522162833	Green	No	
010	0960_MW233	HDPE (no PTFE)	20 mL	00350821001690	Grey	No	
010	0960_MW233	HDPE (no PTFE)	20 mL	00350821001932	Grey	No	
011	0960_QC115	Clear Plastic Bottle - Natural	500 mL	00070522145063	Green	No	
011	0960_QC115	HDPE (no PTFE)	20 mL	00350522042794	Grey	No	
011	0960_QC115	HDPE (no PTFE)	20 mL	00350522042899	Grey	No	
012	0960_MW162	HDPE (no PTFE)	20 mL	00352005007549	Grey	No	
012	0960_MW162	HDPE (no PTFE)	20 mL	00352005007462	Grey	No	
012	0960_MW162	Clear Plastic Bottle - Natural	500 mL	00070522145122	Green	No	
012	0960_MW162	HDPE (no PTFE)	20 mL	00350821001957	Grey	No	
012	0960_MW162	HDPE (no PTFE)	20 mL	00350821001976	Grey	No	
013	0960_MW114	Clear Plastic Bottle - Natural	500 mL	00070522162804	Green	No	
013	0960_MW114	HDPE (no PTFE)	20 mL	00350821001727	Grey	No	
013	0960_MW114	HDPE (no PTFE)	20 mL	00350821001977	Grey	No	
014	0960_MW166	Clear Plastic Bottle - Natural	500 mL	00070522145043	Green	No	
014	0960_MW166	HDPE (no PTFE)	20 mL	00350821001873	Grey	No	
014	0960_MW166	HDPE (no PTFE)	20 mL	00350821001925	Grey	No	
015	0960_QC117	Clear Plastic Bottle - Natural	500 mL	00070522145166	Green	No	
015	0960_QC117	HDPE (no PTFE)	20 mL	00350522042914	Grey	No	
015	0960_QC117	HDPE (no PTFE)	20 mL	00350522062456	Grey	No	

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSASOMP

SITE: Learmonth GW - JS

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard Info:

LABORATORY USE ONLY (circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
C

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MMHAUS0002

016	0960_MMV167	HDPE (no PTFE)	20 mL	00350821001826	Grey	No	
016	0960_MMV167	HDPE (no PTFE)	20 mL	00350821001754	Grey	No	
016	0960_MMV167	Clear Plastic Bottle - Natural	500 mL	00070522162824	Green	No	
016	0960_MMV167	HDPE (no PTFE)	20 mL	00352005020617	Grey	No	
016	0960_MMV167	HDPE (no PTFE)	20 mL	00352005020565	Grey	No	
017	0960_MMV168	HDPE (no PTFE)	20 mL	00350821001751	Grey	No	
017	0960_MMV168	HDPE (no PTFE)	20 mL	00350821001704	Grey	No	
017	0960_MMV168	Clear Plastic Bottle - Natural	500 mL	00070522145177	Green	No	
018	0960_MMV112	HDPE (no PTFE)	20 mL	00350821001890	Grey	No	
018	0960_MMV112	Clear Plastic Bottle - Natural	500 mL	00070522145049	Green	No	
018	0960_MMV112	HDPE (no PTFE)	20 mL	00350821001742	Grey	No	
019	0960_MMV144_3.0-3.5	Clear Plastic Bottle - Natural	500 mL	00070522145048	Green	No	
019	0960_MMV144_3.0-3.5	HDPE (no PTFE)	20 mL	00350821001700	Grey	No	
019	0960_MMV144_3.0-3.5	HDPE (no PTFE)	20 mL	00350821001947	Grey	No	
020	0960_MMV134	HDPE (no PTFE)	20 mL	00352005006737	Grey	No	
020	0960_MMV134	HDPE (no PTFE)	20 mL	00352005006735	Grey	No	
020	0960_MMV134	Clear Plastic Bottle - Natural	500 mL	00070522145137	Green	No	
020	0960_MMV134	HDPE (no PTFE)	20 mL	00350821001892	Grey	No	
020	0960_MMV134	HDPE (no PTFE)	20 mL	00350821001807	Grey	No	

Total Bottle Count: ALS: 72, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2215711

Client : STANTEC AUSTRALIA PTY LTD Contact : [REDACTED] (STANTEC) Address : GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000 E-mail : [REDACTED] Telephone : ---- Facsimile : ---- Project : WA_0960_PFASOMP Order number : pfas-omp Learmonth C-O-C number : 45193 Site : Learmonth GW - JS Sampler : [REDACTED]	Laboratory : Environmental Division Perth Contact : [REDACTED] Address : 26 Rigali Way Wangara WA Australia 6065 E-mail : [REDACTED] Telephone : [REDACTED] Facsimile : [REDACTED] Page : 1 of 3 Quote number : ES2022MWH AUS0002 (SY/139/19 B) QC Level : NEPM 2013 B3 & ALS QC Standard
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Dates

Date Samples Received : 24-Nov-2022 13:45 Client Requested Due Date : 07-Dec-2022	Issue Date : 28-Nov-2022 Scheduled Reporting Date : 07-Dec-2022
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Delivery Details

Mode of Delivery : Carrier No. of coolers/boxes : 3 Receipt Detail :	Security Seal : Intact. Temperature : 18.8 - Ice present No. of samples received / analysed : 20 / 20
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General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP2215711-019 : 22-Nov-2022 14:21 : 0960_MW144_3.0-3.5_221122

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215711-001	22-Nov-2022 08:06	0960_MW018_221122	✓	✓	✓
EP2215711-002	22-Nov-2022 08:25	0960_MW165_221122	✓	✓	✓
EP2215711-003	22-Nov-2022 08:27	0960_QC110_221122	✓	✓	✓
EP2215711-004	22-Nov-2022 08:56	0960_MW164_221122	✓	✓	✓
EP2215711-005	22-Nov-2022 08:57	0960_QC112_221122	✓	✓	✓
EP2215711-006	22-Nov-2022 09:16	0960_MW163_221122	✓	✓	✓
EP2215711-007	22-Nov-2022 09:48	0960_MW211_221122	✓	✓	✓
EP2215711-008	22-Nov-2022 09:49	0960_QC114_221122	✓	✓	✓
EP2215711-009	22-Nov-2022 10:10	0960_MW021_221122	✓	✓	✓
EP2215711-010	22-Nov-2022 10:29	0960_MW233_221122	✓	✓	✓
EP2215711-011	22-Nov-2022 10:35	0960_QC115_221122	✓	✓	✓
EP2215711-012	22-Nov-2022 11:02	0960_MW162_221122	✓	✓	✓
EP2215711-013	22-Nov-2022 11:26	0960_MW114_221122	✓	✓	✓
EP2215711-014	22-Nov-2022 11:53	0960_MW166_221122	✓	✓	✓
EP2215711-015	22-Nov-2022 11:59	0960_QC117_221122	✓	✓	✓
EP2215711-016	22-Nov-2022 12:34	0960_MW167_221122	✓	✓	✓
EP2215711-017	22-Nov-2022 12:53	0960_MW168_221122	✓	✓	✓
EP2215711-018	22-Nov-2022 13:22	0960_MW112_221122	✓	✓	✓
EP2215711-019	22-Nov-2022 14:21	0960_MW144_3.0-3.5_2...	✓	✓	✓
EP2215711-020	22-Nov-2022 14:39	0960_MW134_221122	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.



Requested Deliverables

██████████	- A4 - AU Tax Invoice (INV)	Email	████████████████████
DERP LAB REPORTS			
██████████	- EDI Format - ESDAT (ESDAT)	Email	████████████████████
██████████	(STANTEC)		
	- *AU Certificate of Analysis - NATA (COA)	Email	████████████████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	████████████████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	████████████████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	████████████████████
	- Chain of Custody (CoC) (COC)	Email	████████████████████
	- EDI Format - ESDAT (ESDAT)	Email	████████████████████
	- EDI Format - XTab (XTAB)	Email	████████████████████

CERTIFICATE OF ANALYSIS

Work Order : EP2215711
Client : STANTEC AUSTRALIA PTY LTD
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE TERRACE
 PERTH 6000
Telephone : ----
Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45193
Sampler : [REDACTED]
Site : Learmonth GW - JS
Quote number : SY/139/19 B
No. of samples received : 20
No. of samples analysed : 20

Page : 1 of 15
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : [REDACTED]
Date Samples Received : 24-Nov-2022 13:45
Date Analysis Commenced : 29-Nov-2022
Issue Date : 08-Dec-2022 12:54



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Ionic Balance out of acceptable limits for sample #7 due to analytes not quantified in this report. Major cations (ED093F) and major anions (ED041G/ED045G) have been confirmed by re-analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW018_221122	0960_MW165_221122	0960_QC110_221122	0960_MW164_221122	0960_QC112_221122
Sampling date / time				22-Nov-2022 08:06	22-Nov-2022 08:25	22-Nov-2022 08:27	22-Nov-2022 08:56	22-Nov-2022 08:57
Compound	CAS Number	LOR	Unit	EP2215711-001	EP2215711-002	EP2215711-003	EP2215711-004	EP2215711-005
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	16	24
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1050	924	945	1050	1040
Total Alkalinity as CaCO3	----	1	mg/L	1050	925	945	1070	1060
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	114	64	64	220	220
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	130	421	422	1240	1230
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	4	3	3	13	13
Magnesium	7439-95-4	1	mg/L	5	5	5	38	38
Sodium	7440-23-5	1	mg/L	513	591	592	1180	1190
Potassium	7440-09-7	1	mg/L	18	23	23	47	48
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	27.0	31.7	32.1	60.9	60.4
∅ Total Cations	----	0.01	meq/L	23.4	26.8	26.9	56.3	56.8
∅ Ionic Balance	----	0.01	%	7.21	8.26	8.84	3.95	3.15
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	<0.02	<0.02	0.09	0.08
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	<0.02	<0.02	0.13	0.12
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.77	0.01	<0.01	1.04	1.00
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.06	<0.02	<0.02	0.05	0.05
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.40	0.02	0.02	1.70	1.73
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	2.9	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	7.07	<0.02	<0.02	0.08	0.08
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	6.80	<0.02	<0.02	0.26	0.25
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	6.17	<0.02	<0.02	0.04	0.04



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW018_221122	0960_MW165_221122	0960_QC110_221122	0960_MW164_221122	0960_QC112_221122
Sampling date / time				22-Nov-2022 08:06	22-Nov-2022 08:25	22-Nov-2022 08:27	22-Nov-2022 08:56	22-Nov-2022 08:57
Compound	CAS Number	LOR	Unit	EP2215711-001	EP2215711-002	EP2215711-003	EP2215711-004	EP2215711-005
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.54	<0.01	<0.01	0.04	0.04
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW018_221122	0960_MW165_221122	0960_QC110_221122	0960_MW164_221122	0960_QC112_221122
Sampling date / time				22-Nov-2022 08:06	22-Nov-2022 08:25	22-Nov-2022 08:27	22-Nov-2022 08:56	22-Nov-2022 08:57
Compound	CAS Number	LOR	Unit	EP2215711-001	EP2215711-002	EP2215711-003	EP2215711-004	EP2215711-005
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	24.8	0.03	0.02	3.43	3.39
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	1.17	0.03	0.02	2.74	2.73
Sum of PFAS (WA DER List)	----	0.01	µg/L	24.7	0.03	0.02	3.25	3.22
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	103	98.5	97.2	98.6	95.4
13C8-PFOA	----	0.02	%	106	103	101	101	101



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW163_221122	0960_MW211_221122	0960_QC114_221122	0960_MW021_221122	0960_MW233_221122
Sampling date / time				22-Nov-2022 09:16	22-Nov-2022 09:48	22-Nov-2022 09:49	22-Nov-2022 10:10	22-Nov-2022 10:29
Compound	CAS Number	LOR	Unit	EP2215711-006	EP2215711-007	EP2215711-008	EP2215711-009	EP2215711-010
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	22	21	<1	16
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	496	766	754	1210	580
Total Alkalinity as CaCO3	----	1	mg/L	496	788	775	1210	596
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	570	71	73	88	48
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	3550	139	140	320	254
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	184	<1	2	4	2
Magnesium	7439-95-4	1	mg/L	210	2	3	8	2
Sodium	7440-23-5	1	mg/L	2140	385	390	650	400
Potassium	7440-09-7	1	mg/L	106	14	15	20	14
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	122	21.1	21.0	35.0	20.1
∅ Total Cations	----	0.01	meq/L	122	17.3	17.7	29.6	18.0
∅ Ionic Balance	----	0.01	%	0.14	10.1	8.43	8.34	5.38
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.20	0.11	0.11	0.10	0.35
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.31	0.12	0.12	0.12	0.47
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	2.50	0.96	0.93	0.91	3.53
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.17	0.04	0.04	<0.02	0.18
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1.49	4.63	4.49	0.45	1.55
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	0.1	0.1	<0.1	0.2
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.16	0.13	0.14	0.05	0.26
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.60	0.31	0.31	0.17	0.96
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.08	0.06	0.06	0.03	0.10



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW163_221122	0960_MW211_221122	0960_QC114_221122	0960_MW021_221122	0960_MW233_221122
Sampling date / time				22-Nov-2022 09:16	22-Nov-2022 09:48	22-Nov-2022 09:49	22-Nov-2022 10:10	22-Nov-2022 10:29
Compound	CAS Number	LOR	Unit	EP2215711-006	EP2215711-007	EP2215711-008	EP2215711-009	EP2215711-010
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.11	0.06	0.06	0.02	0.17
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW163_221122	0960_MW211_221122	0960_QC114_221122	0960_MW021_221122	0960_MW233_221122
Sampling date / time				22-Nov-2022 09:16	22-Nov-2022 09:48	22-Nov-2022 09:49	22-Nov-2022 10:10	22-Nov-2022 10:29
Compound	CAS Number	LOR	Unit	EP2215711-006	EP2215711-007	EP2215711-008	EP2215711-009	EP2215711-010
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	5.62	6.52	6.36	1.85	7.77
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	3.99	5.59	5.42	1.36	5.08
Sum of PFAS (WA DER List)	----	0.01	µg/L	5.14	6.36	6.20	1.73	7.12
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	95.8	100	99.4	103	97.2
13C8-PFOA	----	0.02	%	96.2	106	101	102	97.5



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_QC115_221122	0960_MW162_221122	0960_MW114_221122	0960_MW166_221122	0960_QC117_221122
Sampling date / time				22-Nov-2022 10:35	22-Nov-2022 11:02	22-Nov-2022 11:26	22-Nov-2022 11:53	22-Nov-2022 11:59
Compound	CAS Number	LOR	Unit	EP2215711-011	EP2215711-012	EP2215711-013	EP2215711-014	EP2215711-015
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	18	<1	<1	16	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	586	514	468	912	923
Total Alkalinity as CaCO3	----	1	mg/L	604	514	468	927	923
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	48	388	268	83	85
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	253	3730	2240	285	287
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	1	200	114	3	3
Magnesium	7439-95-4	1	mg/L	2	232	108	4	4
Sodium	7440-23-5	1	mg/L	393	2130	1550	550	546
Potassium	7440-09-7	1	mg/L	14	118	57	22	22
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	20.2	124	78.1	28.3	28.3
∅ Total Cations	----	0.01	meq/L	17.7	125	83.4	25.0	24.8
∅ Ionic Balance	----	0.01	%	6.70	0.47	3.30	6.24	6.62
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.33	0.51	<0.02	0.04	0.04
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.48	0.66	<0.02	0.03	0.03
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	3.52	4.14	<0.01	0.24	0.27
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.17	0.06	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1.52	0.39	<0.01	0.27	0.32
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.2	0.2	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.25	0.31	<0.02	0.22	0.23
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.95	1.20	<0.02	0.22	0.21
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.10	0.11	<0.02	0.20	0.20



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_QC115_221122	0960_MW162_221122	0960_MW114_221122	0960_MW166_221122	0960_QC117_221122
Sampling date / time				22-Nov-2022 10:35	22-Nov-2022 11:02	22-Nov-2022 11:26	22-Nov-2022 11:53	22-Nov-2022 11:59
Compound	CAS Number	LOR	Unit	EP2215711-011	EP2215711-012	EP2215711-013	EP2215711-014	EP2215711-015
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.17	0.11	<0.01	0.18	0.16
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	0.06	0.03
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	0.06	0.04
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	0.04	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	0.04	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	0.13	0.07



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_QC115_221122	0960_MW162_221122	0960_MW114_221122	0960_MW166_221122	0960_QC117_221122
Sampling date / time				22-Nov-2022 10:35	22-Nov-2022 11:02	22-Nov-2022 11:26	22-Nov-2022 11:53	22-Nov-2022 11:59
Compound	CAS Number	LOR	Unit	EP2215711-011	EP2215711-012	EP2215711-013	EP2215711-014	EP2215711-015
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	7.69	7.69	<0.01	1.73	1.60
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	5.04	4.53	<0.01	0.51	0.59
Sum of PFAS (WA DER List)	----	0.01	µg/L	7.04	6.97	<0.01	1.50	1.50
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	106	98.5	102	91.7	106
13C8-PFOA	----	0.02	%	102	102	106	95.9	98.3



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW167_221122	0960_MW168_221122	0960_MW112_221122	0960_MW144_3.0-3.5_221122	0960_MW134_221122
Sampling date / time				22-Nov-2022 12:34	22-Nov-2022 12:53	22-Nov-2022 13:22	22-Nov-2022 14:21	22-Nov-2022 14:39
Compound	CAS Number	LOR	Unit	EP2215711-016	EP2215711-017	EP2215711-018	EP2215711-019	EP2215711-020
Result				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	928	618	757	162	178
Total Alkalinity as CaCO3	----	1	mg/L	928	618	757	162	178
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	263	648	1140	3010	3340
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	945	3230	2760	10700	20100
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	22	163	96	714	591
Magnesium	7439-95-4	1	mg/L	28	182	131	867	1400
Sodium	7440-23-5	1	mg/L	1040	2120	2270	6760	12600
Potassium	7440-09-7	1	mg/L	43	94	95	438	712
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	50.7	117	117	368	640
∅ Total Cations	----	0.01	meq/L	49.7	118	117	412	711
∅ Ionic Balance	----	0.01	%	0.93	0.33	0.01	5.70	5.25
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	0.10	0.03	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.06	0.13	0.04	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.93	1.09	0.44	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.04	0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.86	0.15	0.65	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.10	0.08	<0.02	0.05	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.20	0.30	0.08	0.05	<0.02



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW167_221122	0960_MW168_221122	0960_MW112_221122	0960_MW144_3.0-3.5_221122	0960_MW134_221122
Sampling date / time				22-Nov-2022 12:34	22-Nov-2022 12:53	22-Nov-2022 13:22	22-Nov-2022 14:21	22-Nov-2022 14:39
Compound	CAS Number	LOR	Unit	EP2215711-016	EP2215711-017	EP2215711-018	EP2215711-019	EP2215711-020
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.09	0.03	<0.02	0.04	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.14	0.03	0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW167_221122	0960_MW168_221122	0960_MW112_221122	0960_MW144_3.0-3.5_221122	0960_MW134_221122
Sampling date / time				22-Nov-2022 12:34	22-Nov-2022 12:53	22-Nov-2022 13:22	22-Nov-2022 14:21	22-Nov-2022 14:39
Compound	CAS Number	LOR	Unit	EP2215711-016	EP2215711-017	EP2215711-018	EP2215711-019	EP2215711-020
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	2.47	1.93	1.25	0.14	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	1.79	1.24	1.09	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	2.35	1.78	1.21	0.14	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	97.6	99.7	107	90.5	96.1
13C8-PFOA	----	0.02	%	103	99.7	98.8	98.4	102

Page : 15 of 15
Work Order : EP2215711
Client : STANTEC AUSTRALIA PTY LTD
Project : WA_0960_PFASOMP



Surrogate Control Limits

Sub-Matrix: GROUNDWATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

QUALITY CONTROL REPORT

Work Order	: EP2215711	Page	: 1 of 11
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 24-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 29-Nov-2022
C-O-C number	: 45193	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth GW - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 20		
No. of samples analysed	: 20		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4746654)									
EP2215711-002	0960_MW165_221122	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	8	154	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	924	811	13.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	925	819	12.1	0% - 20%
EP2215711-012	0960_MW162_221122	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	514	534	3.8	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	514	534	3.8	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4731517)									
EP2215711-001	0960_MW018_221122	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	114	115	1.0	0% - 20%
EP2215711-011	0960_QC115_221122	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	48	49	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4731516)									
EP2215711-001	0960_MW018_221122	ED045G: Chloride	16887-00-6	1	mg/L	130	129	1.0	0% - 20%
EP2215711-011	0960_QC115_221122	ED045G: Chloride	16887-00-6	1	mg/L	253	257	1.6	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4736102)									
EP2215710-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	16	16	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	31	31	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1270	1270	0.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	70	71	0.0	0% - 20%
EP2215710-012	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	446	446	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	965	977	1.2	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	7820	7960	1.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	434	443	2.1	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 4736103)									
EP2215711-009	0960_MW021_221122	ED093F: Calcium	7440-70-2	1	mg/L	4	4	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	8	7	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	650	644	1.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	20	20	0.0	0% - 50%
EP2215711-019	0960_MW144_3.0-3.5_221122	ED093F: Calcium	7440-70-2	1	mg/L	714	709	0.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	867	863	0.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	6760	6740	0.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	438	434	0.9	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4745870)									
EP2215711-001	0960_MW018_221122	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.77	0.81	4.5	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.40	0.38	4.5	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	0.05	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.06	0.06	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215711-009	0960_MW021_221122	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.91	0.84	8.4	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.45	0.42	6.8	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.10	0.09	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.12	0.12	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4745877)									
EP2215711-016	0960_MW167_221122	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.93	0.83	10.8	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.86	0.91	6.1	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	0.04	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.06	0.05	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4745870)									
EP2215711-001	0960_MW018_221122	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.54	0.50	7.4	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	7.07	7.15	1.0	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	6.80	7.02	3.2	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	6.17	6.32	2.5	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4745870) - continued									
EP2215711-001	0960_MW018_221122	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	2.9	3.0	0.0	0% - 20%
EP2215711-009	0960_MW021_221122	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.05	0.04	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.17	0.16	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.03	0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4745877)									
EP2215711-016	0960_MW167_221122	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.14	0.14	0.0	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.10	0.10	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.20	0.21	0.0	0% - 50%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.09	0.10	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4745870)									
EP2215711-001	0960_MW018_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215711-009	0960_MW021_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4745870) - continued									
EP2215711-009	0960_MW021_221122	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4745877)									
EP2215711-016	0960_MW167_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4745870)									
EP2215711-001	0960_MW018_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215711-009	0960_MW021_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Page : 6 of 11
 Work Order : EP2215711
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4745870) - continued									
EP2215711-009	0960_MW021_221122	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4745877)									
EP2215711-016	0960_MW167_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4745870)									
EP2215711-001	0960_MW018_221122	EP231X: Sum of PFAS	----	0.01	µg/L	24.8	25.3	2.1	0% - 20%
EP2215711-009	0960_MW021_221122	EP231X: Sum of PFAS	----	0.01	µg/L	1.85	1.71	7.9	0% - 20%
EP231P: PFAS Sums (QC Lot: 4745877)									
EP2215711-016	0960_MW167_221122	EP231X: Sum of PFAS	----	0.01	µg/L	2.47	2.44	1.2	0% - 20%



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED037P: Alkalinity by PC Titrator (QCLot: 4746654)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	118	87.8	118
				<1	200 mg/L	103	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4731517)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	106	89.9	112
				<1	500 mg/L	102	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4731516)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	92.8	88.6	113
				<1	1000 mg/L	99.4	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4736102)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.1	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.6	84.6	108
ED093F: Dissolved Major Cations (QCLot: 4736103)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.9	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.8	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745870)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	87.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	97.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	102	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	101	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745877)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	75.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	84.2	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	83.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	84.0	69.0	134



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745877) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	79.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	79.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745870)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	98.9	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	99.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	96.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	109	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	98.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	110	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	134
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	91.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	112	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745877)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	79.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	88.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	86.2	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	83.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	82.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	92.0	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	84.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	76.8	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	97.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	97.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	92.1	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4745870)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	106	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	102	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	92.2	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.1	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	108	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	113	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	98.2	61.0	135



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit	Result					
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4745877)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	86.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	85.0	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	75.0	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	88.5	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	88.0	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	93.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	81.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4745870)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	89.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	91.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	97.6	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	86.6	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4745877)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	64.2	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	84.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	100	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Laboratory sample ID				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%)	Acceptable Limits (%)	
					MS	Low	High
Sample ID	Method: Compound	CAS Number					
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4731517)							
EP2215711-001	0960_MW018_221122	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	130	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4731516)							
EP2215711-001	0960_MW018_221122	ED045G: Chloride	16887-00-6	1000 mg/L	92.2	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745870)							
EP2215711-006	0960_MW163_221122	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	90.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	71.4	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	# Not Determined	68.0	131



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745870) - continued							
EP2215711-006	0960_MW163_221122	EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	93.6	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	# Not Determined	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	93.4	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745877)							
EP2215711-020	0960_MW134_221122	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	78.2	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	82.2	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	83.4	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	80.6	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	76.8	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	70.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745870)							
EP2215711-006	0960_MW163_221122	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	91.7	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	85.8	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	86.0	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	86.2	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	81.4	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	101	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	88.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	98.4	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	97.6	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	90.0	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	119	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745877)							
EP2215711-020	0960_MW134_221122	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	80.6	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	87.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	87.8	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	84.2	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	88.2	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	90.8	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	88.8	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	75.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	95.2	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	92.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	87.3	71.0	132
		EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4745870)					
EP2215711-006	0960_MW163_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	94.6	67.0	137



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4745870) - continued							
EP2215711-006	0960_MW163_221122	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	105	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	98.9	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	102	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	103	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	99.2	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	95.6	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4745877)							
EP2215711-020	0960_MW134_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	82.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	93.3	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	75.6	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	89.5	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	85.8	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	87.4	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	79.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4745870)							
EP2215711-006	0960_MW163_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	88.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	81.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	97.8	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	86.4	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4745877)							
EP2215711-020	0960_MW134_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	82.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	86.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	77.4	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	98.4	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2215711	Page	: 1 of 7
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 24-Nov-2022
Site	: Learmonth GW - JS	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 20
Order number	: pfas-omp Learmonth	No. of samples analysed	: 20

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2215711--006	0960_MW163_221122	Perfluorohexane sulfonic acid (PFHxS)	355-46-4	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231A: Perfluoroalkyl Sulfonic Acids	EP2215711--006	0960_MW163_221122	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results. This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein. Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters. Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)		22-Nov-2022	----	----	----	05-Dec-2022	06-Dec-2022	✔
0960_MW018_221122,	0960_MW165_221122,							
0960_QC110_221122,	0960_MW164_221122,							
0960_QC112_221122,	0960_MW163_221122,							
0960_MW211_221122,	0960_QC114_221122,							
0960_MW021_221122,	0960_MW233_221122,							
0960_QC115_221122,	0960_MW162_221122,							
0960_MW114_221122,	0960_MW166_221122,							
0960_QC117_221122,	0960_MW167_221122,							
0960_MW168_221122,	0960_MW112_221122,							
0960_MW144_3.0-3.5_221122,	0960_MW134_221122							



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) 0960_MW018_221122, 0960_QC110_221122, 0960_QC112_221122, 0960_MW211_221122, 0960_MW021_221122, 0960_QC115_221122, 0960_MW114_221122, 0960_QC117_221122, 0960_MW168_221122, 0960_MW144_3.0-3.5_221122,	0960_MW165_221122, 0960_MW164_221122, 0960_MW163_221122, 0960_QC114_221122, 0960_MW233_221122, 0960_MW162_221122, 0960_MW166_221122, 0960_MW167_221122, 0960_MW112_221122, 0960_MW134_221122	22-Nov-2022	----	----	----	07-Dec-2022	20-Dec-2022	✔
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 0960_MW018_221122, 0960_QC110_221122, 0960_QC112_221122, 0960_MW211_221122, 0960_MW021_221122, 0960_QC115_221122, 0960_MW114_221122, 0960_QC117_221122, 0960_MW168_221122, 0960_MW144_3.0-3.5_221122,	0960_MW165_221122, 0960_MW164_221122, 0960_MW163_221122, 0960_QC114_221122, 0960_MW233_221122, 0960_MW162_221122, 0960_MW166_221122, 0960_MW167_221122, 0960_MW112_221122, 0960_MW134_221122	22-Nov-2022	----	----	----	07-Dec-2022	20-Dec-2022	✔
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) 0960_MW018_221122, 0960_QC110_221122, 0960_QC112_221122, 0960_MW211_221122, 0960_MW021_221122, 0960_QC115_221122, 0960_MW114_221122, 0960_QC117_221122, 0960_MW168_221122, 0960_MW144_3.0-3.5_221122,	0960_MW165_221122, 0960_MW164_221122, 0960_MW163_221122, 0960_QC114_221122, 0960_MW233_221122, 0960_MW162_221122, 0960_MW166_221122, 0960_MW167_221122, 0960_MW112_221122, 0960_MW134_221122	22-Nov-2022	----	----	----	29-Nov-2022	29-Nov-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)		22-Nov-2022	05-Dec-2022	21-May-2023	✔	06-Dec-2022	21-May-2023	✔
0960_MW018_221122,	0960_MW165_221122,							
0960_QC110_221122,	0960_MW164_221122,							
0960_QC112_221122,	0960_MW163_221122,							
0960_MW211_221122,	0960_QC114_221122,							
0960_MW021_221122,	0960_MW233_221122,							
0960_QC115_221122,	0960_MW162_221122,							
0960_MW114_221122,	0960_MW166_221122,							
0960_QC117_221122,	0960_MW167_221122,							
0960_MW168_221122,	0960_MW112_221122,							
0960_MW144_3.0-3.5_221122,	0960_MW134_221122							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)		22-Nov-2022	05-Dec-2022	21-May-2023	✔	06-Dec-2022	21-May-2023	✔
0960_MW018_221122,	0960_MW165_221122,							
0960_QC110_221122,	0960_MW164_221122,							
0960_QC112_221122,	0960_MW163_221122,							
0960_MW211_221122,	0960_QC114_221122,							
0960_MW021_221122,	0960_MW233_221122,							
0960_QC115_221122,	0960_MW162_221122,							
0960_MW114_221122,	0960_MW166_221122,							
0960_QC117_221122,	0960_MW167_221122,							
0960_MW168_221122,	0960_MW112_221122,							
0960_MW144_3.0-3.5_221122,	0960_MW134_221122							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)		22-Nov-2022	05-Dec-2022	21-May-2023	✔	06-Dec-2022	21-May-2023	✔
0960_MW018_221122,	0960_MW165_221122,							
0960_QC110_221122,	0960_MW164_221122,							
0960_QC112_221122,	0960_MW163_221122,							
0960_MW211_221122,	0960_QC114_221122,							
0960_MW021_221122,	0960_MW233_221122,							
0960_QC115_221122,	0960_MW162_221122,							
0960_MW114_221122,	0960_MW166_221122,							
0960_QC117_221122,	0960_MW167_221122,							
0960_MW168_221122,	0960_MW112_221122,							
0960_MW144_3.0-3.5_221122,	0960_MW134_221122							

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	29	10.34	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



ALSCompass

SAMPLING *Intelligence*



Environmental Division
Perth

Work Order Reference
EP2215713



Telephone : -- 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0960_PFA30TIP Client: STANTEC
ALS Compass COC Reference: 45226 38233 45193 45191 45205
Samples: 45217

Project Manager:

Phone:

Sampler:

Phone:

Turnaround Requirements: Standard ☒ Urgent ☐

Special Instructions:

Custody:

Relinquished by: <u>STANTEC</u>	Received by: 	Relinquished by:	Received by:
Date / Time: <u>23-11-22 / 7.00 AM</u>	Date / Time: <u>24/11 / 4.5</u>	Date / Time:	Date / Time:

CLIENT: MMWHAUS - STANTEC AUSTRALIA PTY LTD		RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
PROJECT: WA_0960_PFSASOMP		DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:
SITE: Learmonth SD - JS		TURNAROUND REQUIREMENTS: 5 Days		LABORATORY USE ONLY (Circle)	
ORDER NO: pfas-omp Learmonth		Biohazard info:		Custody Seal intact? Yes No N/A	
PROJECT MANAGER:		CONTACT PH: SAMPLER MOBILE:		Free ice / frozen ice bricks present upon receipt? Yes No N/A	
PRIMARY SAMPLER:		QUOTE NO: SY/139/19 B / ES2022MMWHAUS0002		Random Sample Temperature on Receipt: °C	
EMAIL REPORTS TO:		Other comments:			
EMAIL INVOICES TO:					

SAMPLE DETAILS					ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	ADDITIONAL INFORMATION
001	0960_SS123		22/11/2022 09:41 AM	SOIL	ALS: 1 Non ALS: 0	No	PAS Sediments SEDIMENT
002	0960_SD121		22/11/2022 01:06 PM	SOIL	ALS: 1 Non ALS: 0	No	
003	0960_SS124		22/11/2022 01:38 PM	SOIL	ALS: 1 Non ALS: 0	No	
004	0960_SS189		22/11/2022 02:43 PM	SOIL	ALS: 1 Non ALS: 0	No	

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSASOMP

SITE: Learmonth SD - JS

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

CONTACT PH:

QUOTE NO: SY139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

°C

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_SS123	HDPE Soil Jar	200 mL	00620322054860	Grey	No	
002	0960_SD121	HDPE Soil Jar	200 mL	00620322054907	Grey	No	
003	0960_SS124	HDPE Soil Jar	200 mL	00620322054865	Grey	No	
004	0960_SS189	HDPE Soil Jar	200 mL	00620322054903	Grey	No	

Total Bottle Count: ALS: 4, Non ALS: 0

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EP2215713****Amendment : 1**

Client : STANTEC AUSTRALIA PTY LTD
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail : [REDACTED]
Telephone : ----
Facsimile : ----

E-mail : [REDACTED]
Telephone : [REDACTED]
Facsimile : [REDACTED]

Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45205
Site : Learmonth SD - JS
Sampler : [REDACTED] [REDACTED]
[REDACTED]

Page : 1 of 2
Quote number : ES2022MWHAUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 24-Nov-2022 13:45
Client Requested Due Date : 07-Dec-2022

Issue Date : 09-Dec-2022
Scheduled Reporting Date : **07-Dec-2022**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 3
Receipt Detail :

Security Seal : Intact.
Temperature : 18.8 - Ice present
No. of samples received / analysed : 4 / 4

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2215713-001	22-Nov-2022 09:41	0960_SS123_221122	✓	✓
EP2215713-002	22-Nov-2022 13:06	0960_SS121_221122	✓	✓
EP2215713-003	22-Nov-2022 13:38	0960_SS124_221122	✓	✓
EP2215713-004	22-Nov-2022 14:43	0960_SS189_221122	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

██████████	- A4 - AU Tax Invoice (INV)	Email	██████████
DERP LAB REPORTS			
██████████	- EDI Format - ESDAT (ESDAT)	Email	██████████
██████████	(STANTEC)		
	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
	- EDI Format - ESDAT (ESDAT)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████

CERTIFICATE OF ANALYSIS

Work Order : EP2215713 Amendment : 1 Client : STANTEC AUSTRALIA PTY LTD Contact : [REDACTED] (STANTEC) Address : GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000 Telephone : ---- Project : WA_0960_PFASOMP Order number : pfas-omp Learmonth C-O-C number : 45205 Sampler : [REDACTED] Site : Learmonth SD - JS Quote number : SY/139/19 B No. of samples received : 4 No. of samples analysed : 4	Page : 1 of 5 Laboratory : Environmental Division Perth Contact : [REDACTED] Address : 26 Rigali Way Wangara WA Australia 6065 Telephone : [REDACTED] Date Samples Received : 24-Nov-2022 13:45 Date Analysis Commenced : 05-Dec-2022 Issue Date : 09-Dec-2022 08:09
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Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Amendment (09/12/2022): This report has been amended as a result of a request to change sample identification numbers (IDs) received from [REDACTED] on 08/12/22, for sample 2. All analysis results are as per the previous report.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS123_221122	0960_SS121_221122	0960_SS124_221122	0960_SS189_221122	----
Sampling date / time				22-Nov-2022 09:41	22-Nov-2022 13:06	22-Nov-2022 13:38	22-Nov-2022 14:43	----
Compound	CAS Number	LOR	Unit	EP2215713-001	EP2215713-002	EP2215713-003	EP2215713-004	-----
				Result	Result	Result	Result	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	0.7	6.5	5.0	29.6	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0005	<0.0002	<0.0002	<0.0002	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0274	0.0681	0.0662	0.0034	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0022	<0.0002	0.0029	0.0005	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.0003	0.0006	<0.0002	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0017	<0.0002	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0005	<0.0002	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0003	<0.0002	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0960_SS123_221122	0960_SS121_221122	0960_SS124_221122	0960_SS189_221122	----
Sampling date / time					22-Nov-2022 09:41	22-Nov-2022 13:06	22-Nov-2022 13:38	22-Nov-2022 14:43	----
Compound	CAS Number	LOR	Unit		EP2215713-001	EP2215713-002	EP2215713-003	EP2215713-004	-----
				Result	Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg	0.0301	0.0684	0.0722	0.0039	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0279	0.0681	0.0662	0.0034	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0279	0.0681	0.0662	0.0034	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%	108	83.5	81.5	85.0	----	----
13C8-PFOA	----	0.0002	%	99.0	97.5	88.0	102	----	----



Surrogate Control Limits

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

QUALITY CONTROL REPORT

Work Order	: EP2215713	Page	: 1 of 11
Amendment	: 1		
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 24-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 05-Dec-2022
C-O-C number	: 45205	Issue Date	: 09-Dec-2022
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SD - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 4		
No. of samples analysed	: 4		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4749217)									
EP2215708-023	Anonymous	EA055: Moisture Content	----	0.1	%	<0.1	0.4	126	No Limit
EP2215723-007	Anonymous	EA055: Moisture Content	----	0.1	%	0.2	<0.1	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4745831)									
EP2215708-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0863	0.0928	7.2	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2215708-015	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0282	0.0254	10.5	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746034)									
EP2215713-002	0960_SS121_221122	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0681	0.0668	1.9	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2216138-007	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746034) - continued									
EP2216138-007	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4745831)									
EP2215708-005	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0006	0.0007	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2215708-015	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746034)									
EP2215713-002	0960_SS121_221122	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0003	0.0003	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
		EP2216138-007	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746034) - continued									
EP2216138-007	Anonymous	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0003	0.0003	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit		
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4745831)									
EP2215708-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215708-015	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746034)									
EP2215713-002	0960_SS121_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746034) - continued									
EP2215713-002	0960_SS121_221122	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2216138-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4745831)							
EP2215708-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215708-015	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746034)									

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 Work Order : EP2215713 Amendment 1
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746034) - continued									
EP2215713-002	0960_SS121_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2216138-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	0.0008	0.0009	14.6	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745831)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.2	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.6	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.2	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.2	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.8	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	77.2	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746034)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.4	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.4	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.6	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	73.6	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745831)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	87.2	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.6	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.6	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.8	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.0	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.0	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	93.1	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746034)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	80.4	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.4	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.4	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.2	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.4	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.0	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.0	64.0	136



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746034) - continued								
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.4	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4745831)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	93.8	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	82.7	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.2	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.6	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.4	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746034)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	99.5	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	83.6	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	83.3	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	82.0	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4745831)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	84.4	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	98.4	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	79.2	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	70.4	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746034)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	77.6	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	68.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	94.8	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	105	69.2	143



Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4745831)							
EP2215708-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	82.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	95.2	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	91.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	88.8	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# Not Determined	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	91.2	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746034)							
EP2215713-002	0960_SS121_221122	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	85.6	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	82.8	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	78.0	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	96.0	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# Not Determined	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	106	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4745831)							
EP2215708-005	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	93.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	93.2	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	92.8	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	93.6	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	93.2	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	88.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	90.8	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	93.2	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	118	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.00125 mg/kg	113	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	99.7	69.0	133		
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746034)							
EP2215713-002	0960_SS121_221122	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	76.1	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	94.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	92.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	88.0	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	96.8	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	95.2	72.0	129



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746034) - continued							
EP2215713-002	0960_SS121_221122	EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	89.2	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	85.6	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	107	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	106	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	90.9	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4745831)							
EP2215708-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	86.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	106	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	105	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	83.6	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	106	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	96.0	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	82.4	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746034)							
EP2215713-002	0960_SS121_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	89.6	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	95.5	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	83.2	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	91.2	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	96.6	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	94.8	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	73.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4745831)							
EP2215708-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	89.2	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	76.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	77.2	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	76.0	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746034)							
EP2215713-002	0960_SS121_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	94.8	62.0	145



Sub-Matrix: SOIL

Laboratory sample ID Sample ID Method: Compound CAS Number				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746034) - continued							
EP2215713-002	0960_SS121_221122	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	74.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	99.6	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	102	69.2	143

QA/QC Compliance Assessment to assist with Quality Review

Work Order : EP2215713

Page : 1 of 5

Amendment : 1

Client : STANTEC AUSTRALIA PTY LTD

Laboratory : Environmental Division Perth

Contact : [REDACTED] (STANTEC)

Telephone : [REDACTED]

Project : WA_0960_PFASOMP

Date Samples Received : 24-Nov-2022

Site : Learmonth SD - JS

Issue Date : 09-Dec-2022

Sampler : [REDACTED]

No. of samples received : 4

Order number : pfas-omp Learmonth

No. of samples analysed : 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2215708--005	Anonymous	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231A: Perfluoroalkyl Sulfonic Acids	EP2215713--002	0960_SS121_221122	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055) 0960_SS123_221122, 0960_SS124_221122,	0960_SS121_221122, 0960_SS189_221122	22-Nov-2022	----	----	----	06-Dec-2022	06-Dec-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SS121_221122, 0960_SS189_221122	0960_SS124_221122,	22-Nov-2022	05-Dec-2022	21-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
HDPE Soil Jar (EP231X) 0960_SS123_221122		22-Nov-2022	05-Dec-2022	21-May-2023	✓	08-Dec-2022	14-Jan-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X) 0960_SS121_221122, 0960_SS189_221122	0960_SS124_221122,	22-Nov-2022	05-Dec-2022	21-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
HDPE Soil Jar (EP231X) 0960_SS123_221122		22-Nov-2022	05-Dec-2022	21-May-2023	✓	08-Dec-2022	14-Jan-2023	✓

Page : 3 of 5
 Work Order : EP2215713 Amendment 1
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X) 0960_SS121_221122, 0960_SS189_221122	0960_SS124_221122,	22-Nov-2022	05-Dec-2022	21-May-2023	✔	07-Dec-2022	14-Jan-2023	✔
HDPE Soil Jar (EP231X) 0960_SS123_221122		22-Nov-2022	05-Dec-2022	21-May-2023	✔	08-Dec-2022	14-Jan-2023	✔
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SS121_221122, 0960_SS189_221122	0960_SS124_221122,	22-Nov-2022	05-Dec-2022	21-May-2023	✔	07-Dec-2022	14-Jan-2023	✔
HDPE Soil Jar (EP231X) 0960_SS123_221122		22-Nov-2022	05-Dec-2022	21-May-2023	✔	08-Dec-2022	14-Jan-2023	✔
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X) 0960_SS121_221122, 0960_SS189_221122	0960_SS124_221122,	22-Nov-2022	05-Dec-2022	21-May-2023	✔	07-Dec-2022	14-Jan-2023	✔
HDPE Soil Jar (EP231X) 0960_SS123_221122		22-Nov-2022	05-Dec-2022	21-May-2023	✔	08-Dec-2022	14-Jan-2023	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
QuEChERS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.



CHAIN OF CUSTODY

ALS) COC#: 45217 ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFA50MP

SITE: Learmonth GW - SC

ORDER NO: plas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

CONTACT PH: [REDACTED]
QUOTE NO: SY/139/19 B

SAMPLER MOBILE: [REDACTED]
/ ES2022MWHAUS0002

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
C

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_MW105	2 x lab QC	22/11/2022 10:43 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
002	0960_MW104		22/11/2022 11:04 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
003	0960_MW124		22/11/2022 11:31 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0960_MW102		22/11/2022 12:23 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0960_QC118		22/11/2022 12:24 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0960_MW113		22/11/2022 01:36 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
007	0960_MW115	2 x lab QC	22/11/2022 01:53 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
008	0960_MW178_2.0-2.5		22/11/2022 02:38 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
009	0960_MW177_1.5-2.0	2 x lab QC	22/11/2022 02:42 PM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		

Telephone : +61 8 9408 1301



Environmental Division
Perth
Work Order Reference
EP2215722



CHAIN OF CUSTODY

ALS) COC#: 45217 ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP

SITE: Learmonth GW - SC

ORDER NO.: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 B

/ ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
°C

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0960_MM176_1.5-2.0		22/11/2022 03:20 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		



CHAIN OF CUSTODY

ALS) COC#: 45217 ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASCOMP

SITE: Learmonth GW - SC

ORDER NO: pfas-comp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

CONTACT PH: [REDACTED]
QUOTE NO: SY/139/19 B
SAMPLER MOBILE: [REDACTED] / ES2022MWHAUS0002

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

°C

PARTIAL ANALYSIS GROUP NAME

MATRIX

SELECTED ANALYSIS NAME

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0960_MW105	Ground Waters WATER	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F -EP231X PFAS - Full Suite (28 analytes)
002	0960_MW104	Ground Waters WATER	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F -EP231X PFAS - Full Suite (28 analytes)
003	0960_MW124	Ground Waters WATER	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F -EP231X PFAS - Full Suite (28 analytes)
004	0960_MW102	Ground Waters WATER	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F -EP231X PFAS - Full Suite (28 analytes)
005	0960_QC118	Ground Waters WATER	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F -EP231X PFAS - Full Suite (28 analytes)
006	0960_MW113	Ground Waters WATER	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F -EP231X PFAS - Full Suite (28 analytes)
007	0960_MW115	Ground Waters WATER	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F -EP231X PFAS - Full Suite (28 analytes)
008	0960_MW178_2.0-2.5	Ground Waters WATER	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F -EP231X PFAS - Full Suite (28 analytes)
009	0960_MW177_1.5-2.0	Ground Waters WATER	WATER	-NT-02 Major Anions (Chloride, Sulphate, Alkalinity) -NT-01 Major Cations (Ca, Mg, Na, K) -EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F -EP231X PFAS - Full Suite (28 analytes)

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP

SITE: Learmonth GW - SC

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER: [REDACTED]

PRIMARY SAMPLER: [REDACTED]

EMAIL REPORTS TO: [REDACTED]

EMAIL INVOICES TO: [REDACTED]

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

CONTACT PH: [REDACTED]

SAMPLER MOBILE: [REDACTED]

QUOTE NO: SY139/19 B

/ ES2022MMHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

Ground Waters WATER

WATER

- NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
- NT-01 Major Cations (Ca, Mg, Na, K)
- EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED083F
- EP231X PFAS - Full Suite (25 analytes)

010 0960_MM176_1.5-2.0



CHAIN OF CUSTODY

ALS Laboratory: EP Perth

COC#: 45217

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSASOMP

SITE: Learmonth GW - SC

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

°C

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_MW105	Clear Plastic Bottle - Natural	500 mL	00070522145046	Green	No	
001	0960_MW105	HDPE (no PTFE)	20 mL	00350821001876	Grey	No	
001	0960_MW105	HDPE (no PTFE)	20 mL	00350621067247	Grey	No	
001	0960_MW105	HDPE (no PTFE)	20 mL	00350621067320	Grey	No	
001	0960_MW105	HDPE (no PTFE)	20 mL	00350821001820	Grey	No	
001	0960_MW105	HDPE (no PTFE)	20 mL	00350522042823	Grey	No	
002	0960_MW104	HDPE (no PTFE)	20 mL	00350522042838	Grey	No	
002	0960_MW104	HDPE (no PTFE)	20 mL	00070522145039	Green	No	
002	0960_MW104	Clear Plastic Bottle - Natural	500 mL	00070522145162	Green	No	
002	0960_MW104	Clear Plastic Bottle - Natural	500 mL	00070522145162	Green	No	
003	0960_MW124	HDPE (no PTFE)	20 mL	00350821001920	Grey	No	
003	0960_MW124	HDPE (no PTFE)	20 mL	00350821001774	Grey	No	
003	0960_MW124	HDPE (no PTFE)	20 mL	00070522144950	Green	No	
004	0960_MW102	HDPE (no PTFE)	20 mL	00350821001851	Grey	No	
004	0960_MW102	HDPE (no PTFE)	20 mL	00350821001814	Grey	No	
004	0960_MW102	HDPE (no PTFE)	20 mL	00350821001687	Grey	No	
005	0960_QC118	Clear Plastic Bottle - Natural	500 mL	00070522145038	Green	No	
005	0960_QC118	HDPE (no PTFE)	20 mL	00350821001694	Grey	No	
005	0960_QC118	HDPE (no PTFE)	500 mL	00070522145026	Green	No	
006	0960_MW113	Clear Plastic Bottle - Natural	20 mL	00350821001797	Grey	No	
006	0960_MW113	HDPE (no PTFE)	20 mL	00350821001874	Grey	No	
006	0960_MW113	HDPE (no PTFE)	500 mL	00070522144947	Green	No	
007	0960_MW115	Clear Plastic Bottle - Natural	20 mL	00350621066973	Grey	No	
007	0960_MW115	HDPE (no PTFE)	20 mL	00350621067271	Grey	No	
007	0960_MW115	HDPE (no PTFE)	20 mL	00350622062469	Grey	No	
007	0960_MW115	HDPE (no PTFE)	20 mL	00350622042785	Grey	No	
008	0960_MW115	HDPE (no PTFE)	20 mL	00350522042729	Grey	No	



CHAIN OF CUSTODY

ALS COC#: 45217 ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP

SITE: Learmonth GW - SC

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

008	0960_MM178_2.0-2.5	HDPE (no PTFE)	20 mL	00360622042936	Grey	No	
008	0960_MM178_2.0-2.5	Clear Plastic Bottle - Natural	500 mL	00070522144964	Green	No	
009	0960_MM177_1.5-2.0	HDPE (no PTFE)	20 mL	00350522042870	Grey	No	
009	0960_MM177_1.5-2.0	HDPE (no PTFE)	20 mL	00350621067149	Grey	No	
009	0960_MM177_1.5-2.0	Clear Plastic Bottle - Natural	500 mL	00070522144984	Green	No	
009	0960_MM177_1.5-2.0	HDPE (no PTFE)	20 mL	00350621067425	Grey	No	
009	0960_MM177_1.5-2.0	HDPE (no PTFE)	20 mL	00350522062468	Grey	No	
009	0960_MM177_1.5-2.0	Clear Plastic Bottle - Natural	500 mL	00070522145120	Green	No	
010	0960_MM176_1.5-2.0	HDPE (no PTFE)	20 mL	00360622043156	Grey	No	
010	0960_MM176_1.5-2.0	HDPE (no PTFE)	20 mL	00350622042697	Grey	No	

Total Bottle Count: ALS: 36, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2215722

Client : STANTEC AUSTRALIA PTY LTD Contact : [REDACTED] (STANTEC) Address : GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000 E-mail : [REDACTED] Telephone : ---- Facsimile : ---- Project : WA_0960_PFASOMP Order number : pfas-omp Learmonth C-O-C number : 45217 Site : Learmonth GW - SC Sampler : [REDACTED] [REDACTED]	Laboratory : Environmental Division Perth Contact : [REDACTED] Address : 26 Rigali Way Wangara WA Australia 6065 E-mail : [REDACTED] Telephone : [REDACTED] Facsimile : [REDACTED] Page : 1 of 2 Quote number : ES2022MWAUS0002 (SY/139/19 B) QC Level : NEPM 2013 B3 & ALS QC Standard
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Dates

Date Samples Received : 24-Nov-2022 13:45 Client Requested Due Date : 07-Dec-2022	Issue Date : 28-Nov-2022 Scheduled Reporting Date : 07-Dec-2022
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Delivery Details

Mode of Delivery : Carrier No. of coolers/boxes : 3 Receipt Detail :	Security Seal : Intact. Temperature : 18.8 - Ice present No. of samples received / analysed : 10 / 10
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General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- **No sample container / preservation non-compliance exists.**

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP2215722-008 : 22-Nov-2022 14:38 : 0960_MW178_2.0-2.5_221122
EP2215722-009 : 22-Nov-2022 14:42 : 0960_MW177_1.5-2.0_221122
EP2215722-010 : 22-Nov-2022 15:20 : 0960_MW176_1.5-2.0_221122

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215722-001	22-Nov-2022 10:43	0960_MW105_221122	✓	✓	✓
EP2215722-002	22-Nov-2022 11:04	0960_MW104_221122	✓	✓	✓
EP2215722-003	22-Nov-2022 11:31	0960_MW124_221122	✓	✓	✓
EP2215722-004	22-Nov-2022 12:23	0960_MW102_221122	✓	✓	✓
EP2215722-005	22-Nov-2022 12:24	0960_QC118_221122	✓	✓	✓
EP2215722-006	22-Nov-2022 13:36	0960_MW113_221122	✓	✓	✓
EP2215722-007	22-Nov-2022 13:53	0960_MW115_221122	✓	✓	✓
EP2215722-008	22-Nov-2022 14:38	0960_MW178_2.0-2.5_2...	✓	✓	✓
EP2215722-009	22-Nov-2022 14:42	0960_MW177_1.5-2.0_2...	✓	✓	✓
EP2215722-010	22-Nov-2022 15:20	0960_MW176_1.5-2.0_2...	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

- A4 - AU Tax Invoice (INV)	Email	
DERP LAB REPORTS		
- EDI Format - ESDAT (ESDAT)	Email	
(STANTEC)		
*AU Certificate of Analysis - NATA (COA)	Email	
*AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	
*AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	
A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	
Chain of Custody (CoC) (COC)	Email	
EDI Format - ESDAT (ESDAT)	Email	
EDI Format - XTab (XTAB)	Email	

CERTIFICATE OF ANALYSIS

Work Order : **EP2215722**
Client : **STANTEC AUSTRALIA PTY LTD**
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE TERRACE
 PERTH 6000
Telephone : ----
Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45217
Sampler : [REDACTED]
Site : Learmonth GW - SC
Quote number : SY/139/19 B
No. of samples received : 10
No. of samples analysed : 10

Page : 1 of 9
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : [REDACTED]
Date Samples Received : 24-Nov-2022 13:45
Date Analysis Commenced : 28-Nov-2022
Issue Date : 06-Dec-2022 17:44



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW105_221122	0960_MW104_221122	0960_MW124_221122	0960_MW102_221122	0960_QC118_221122
Sampling date / time				22-Nov-2022 10:43	22-Nov-2022 11:04	22-Nov-2022 11:31	22-Nov-2022 12:23	22-Nov-2022 12:24
Compound	CAS Number	LOR	Unit	EP2215722-001	EP2215722-002	EP2215722-003	EP2215722-004	EP2215722-005
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	382	250	169	127	127
Total Alkalinity as CaCO3	----	1	mg/L	382	250	169	127	127
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1600	3010	4470	3710	3780
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	15000	20200	29200	29700	31100
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	593	490	897	1280	1310
Magnesium	7439-95-4	1	mg/L	1190	1520	2280	2150	2180
Sodium	7440-23-5	1	mg/L	8520	12700	18700	19200	19500
Potassium	7440-09-7	1	mg/L	433	725	1060	647	660
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	464	637	920	918	958
∅ Total Cations	----	0.01	meq/L	509	720	1070	1090	1110
∅ Ionic Balance	----	0.01	%	4.64	6.11	7.66	8.70	7.32
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.13	0.10	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.17	0.03	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.89	0.14	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.03	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.14	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW105_221122	0960_MW104_221122	0960_MW124_221122	0960_MW102_221122	0960_QC118_221122
Sampling date / time				22-Nov-2022 10:43	22-Nov-2022 11:04	22-Nov-2022 11:31	22-Nov-2022 12:23	22-Nov-2022 12:24
Compound	CAS Number	LOR	Unit	EP2215722-001	EP2215722-002	EP2215722-003	EP2215722-004	EP2215722-005
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW105_221122	0960_MW104_221122	0960_MW124_221122	0960_MW102_221122	0960_QC118_221122
Sampling date / time				22-Nov-2022 10:43	22-Nov-2022 11:04	22-Nov-2022 11:31	22-Nov-2022 12:23	22-Nov-2022 12:24
Compound	CAS Number	LOR	Unit	EP2215722-001	EP2215722-002	EP2215722-003	EP2215722-004	EP2215722-005
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	1.40	0.27	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.92	0.14	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	1.23	0.24	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	93.4	104	94.7	101	95.4
13C8-PFOA	----	0.02	%	101	99.0	101	102	91.9



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW113_221122	0960_MW115_221122	0960_MW178_2.0-2.5_221122	0960_MW177_1.5-2.0_221122	0960_MW176_1.5-2.0_221122
Sampling date / time				22-Nov-2022 13:36	22-Nov-2022 13:53	22-Nov-2022 14:38	22-Nov-2022 14:42	22-Nov-2022 15:20
Compound	CAS Number	LOR	Unit	EP2215722-006	EP2215722-007	EP2215722-008	EP2215722-009	EP2215722-010
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	394	346	138	193	286
Total Alkalinity as CaCO3	----	1	mg/L	394	346	138	193	286
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	290	1560	5780	4670	3240
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	3010	11200	32800	31100	17900
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	245	497	1140	939	581
Magnesium	7439-95-4	1	mg/L	189	692	2680	2650	1350
Sodium	7440-23-5	1	mg/L	1590	6110	21500	20700	10800
Potassium	7440-09-7	1	mg/L	55	249	1020	979	653
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	98.8	355	1050	978	578
∅ Total Cations	----	0.01	meq/L	98.3	354	1240	1190	626
∅ Ionic Balance	----	0.01	%	0.24	0.20	8.32	9.78	4.02
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.20	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.22	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	1.38	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.04	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.31	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.09	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.43	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0960_MW113_221122	0960_MW115_221122	0960_MW178_2.0-2.5_221122	0960_MW177_1.5-2.0_221122	0960_MW176_1.5-2.0_221122
Sampling date / time					22-Nov-2022 13:36	22-Nov-2022 13:53	22-Nov-2022 14:38	22-Nov-2022 14:42	22-Nov-2022 15:20
Compound	CAS Number	LOR	Unit	EP2215722-006	EP2215722-007	EP2215722-008	EP2215722-009	EP2215722-010	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.02	<0.02	<0.02	<0.02	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.03	<0.01	<0.01	<0.01	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW113_221122	0960_MW115_221122	0960_MW178_2.0-2.5_221122	0960_MW177_1.5-2.0_221122	0960_MW176_1.5-2.0_221122
Sampling date / time				22-Nov-2022 13:36	22-Nov-2022 13:53	22-Nov-2022 14:38	22-Nov-2022 14:42	22-Nov-2022 15:20
Compound	CAS Number	LOR	Unit	EP2215722-006	EP2215722-007	EP2215722-008	EP2215722-009	EP2215722-010
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	2.72	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	1.69	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	2.46	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	90.5	95.1	91.3	93.0	99.1
13C8-PFOA	----	0.02	%	90.6	93.3	89.9	91.0	91.2

Page : 9 of 9
Work Order : EP2215722
Client : STANTEC AUSTRALIA PTY LTD
Project : WA_0960_PFASOMP



Surrogate Control Limits

Sub-Matrix: GROUNDWATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

QUALITY CONTROL REPORT

Work Order	: EP2215722	Page	: 1 of 12
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 24-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 28-Nov-2022
C-O-C number	: 45217	Issue Date	: 06-Dec-2022
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth GW - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 10		
No. of samples analysed	: 10		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4747628)									
EP2215710-008	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	154	167	8.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	154	167	8.3	0% - 20%
EP2215722-004	0960_MW102_221122	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	127	137	7.8	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	127	137	7.8	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4731328)									
EP2215915-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	2	0.0	No Limit
EP2215722-001	0960_MW105_221122	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1600	1560	2.9	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4731327)									
EP2215722-001	0960_MW105_221122	ED045G: Chloride	16887-00-6	1	mg/L	15000	15000	0.3	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4731255)									
EP2215715-015	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	495	490	1.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1080	1070	0.8	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	8830	8770	0.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	466	460	1.4	0% - 20%
EP2215722-010	0960_MW176_1.5-2.0_221122	ED093F: Calcium	7440-70-2	1	mg/L	581	593	2.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1350	1380	2.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10800	10900	1.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	653	668	2.1	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4738221)									
EP2215710-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	12.0	12.3	2.3	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	9.58	10.4	8.6	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	1.65	1.71	4.0	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	1.63	1.66	1.9	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	1.08	1.00	7.3	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215722-001	0960_MW105_221122	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.89	0.84	5.6	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.03	0.04	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.13	0.16	17.8	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.17	0.16	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4739533)									
EP2215715-011	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.18	0.16	11.1	0% - 50%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.34	0.31	9.1	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215722-009	0960_MW177_1.5-2.0_221122	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4738221)									
EP2215710-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.82	0.87	5.8	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	1.90	1.87	1.6	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	7.23	6.93	4.2	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.56	0.55	0.0	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.9	0.9	0.0	No Limit
		EP2215722-001	0960_MW105_221122	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.01	<0.01
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02		µg/L	0.03	0.03	0.0	No Limit	



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4738221) - continued									
EP2215722-001	0960_MW105_221122	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.14	0.14	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4739533)									
EP2215715-011	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.08	0.08	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.90	0.82	9.5	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.82	0.77	6.1	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.23	0.21	9.0	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
				EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.3	0.3
EP2215722-009	0960_MW177_1.5-2.0_221122	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4738221)									
EP2215710-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4738221) - continued									
EP2215710-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215722-001	0960_MW105_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4739533)									
EP2215715-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215722-009	0960_MW177_1.5-2.0_221122	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4739533) - continued									
EP2215722-009	0960_MW177_1.5-2.0_221122	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4738221)									
EP2215710-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215722-001	0960_MW105_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4739533)									
EP2215715-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215722-009	0960_MW177_1.5-2.0_221122	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

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 Work Order : EP2215722
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4739533) - continued									
EP2215722-009	0960_MW177_1.5-2.0_221 122	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4738221)									
EP2215710-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	37.4	38.2	2.2	0% - 20%
EP2215722-001	0960_MW105_221122	EP231X: Sum of PFAS	----	0.01	µg/L	1.40	1.37	2.2	0% - 20%
EP231P: PFAS Sums (QC Lot: 4739533)									
EP2215715-011	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	2.87	2.67	7.2	0% - 20%
EP2215722-009	0960_MW177_1.5-2.0_221 122	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED037P: Alkalinity by PC Titrator (QCLot: 4747628)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	110	87.8	118
				<1	200 mg/L	94.2	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4731328)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	89.9	112
				<1	500 mg/L	101	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4731327)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	90.5	88.6	113
				<1	1000 mg/L	95.6	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4731255)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.1	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.1	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.5	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4738221)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	74.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	78.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	77.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	82.2	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	79.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	67.6	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4739533)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	77.4	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	95.6	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	84.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	89.6	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	81.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	78.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4738221)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	82.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	86.6	72.0	129



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4738221) - continued								
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	88.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	87.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	86.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	97.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	84.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	83.4	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	94.4	72.0	134
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	85.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	86.3	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4739533)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	91.8	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	94.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	86.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	90.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	84.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	75.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	78.2	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	85.0	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	134
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	81.6	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	95.8	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4738221)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	90.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	75.2	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	76.9	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	86.6	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	89.1	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	89.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	73.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4739533)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	106	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	92.7	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	87.9	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	91.4	66.0	145

Sub-Matrix: WATER

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4739533) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	108	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	105	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	101	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4738221)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	78.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	103	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	85.0	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	81.4	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4739533)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	80.8	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	85.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	96.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	88.8	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4731328)							
EP2215722-001	0960_MW105_221122	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4731327)							
EP2215722-001	0960_MW105_221122	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4738221)							
EP2215710-008	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	86.8	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	94.0	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	100	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	88.6	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	84.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	84.2	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4739533)							



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4739533) - continued							
EP2215715-012	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	88.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	109	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	125	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	104	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	# Not Determined	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	101	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4738221)							
EP2215710-008	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	94.5	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	100	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	99.6	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	99.0	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	97.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	104	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	96.4	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	99.6	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	112	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.25 µg/L	101	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	97.2	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4739533)							
EP2215715-012	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	115	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	123	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	122	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	118	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	103	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	97.6	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	91.8	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	109	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	124	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.25 µg/L	89.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	119	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4738221)							
EP2215710-008	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	87.0	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	97.2	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	95.0	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	93.0	66.0	145



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4738221) - continued							
EP2215710-008	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	95.7	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	112	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	91.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4739533)							
EP2215715-012	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	127	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	120	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	122	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	136	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	126	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	124	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	113	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4738221)							
EP2215710-008	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	125	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	105	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	86.0	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	86.4	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4739533)							
EP2215715-012	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	103	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	106	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	122	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	106	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2215722	Page	: 1 of 6
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 24-Nov-2022
Site	: Learmonth GW - SC	Issue Date	: 06-Dec-2022
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 10
Order number	: pfas-omp Learmonth	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2215722--001	0960_MW105_221122	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EP2215722--001	0960_MW105_221122	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231A: Perfluoroalkyl Sulfonic Acids	EP2215715--012	Anonymous	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results. This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein. Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)		22-Nov-2022	----	----	----	06-Dec-2022	06-Dec-2022	✓
0960_MW105_221122,	0960_MW104_221122,							
0960_MW124_221122,	0960_MW102_221122,							
0960_QC118_221122,	0960_MW113_221122,							
0960_MW115_221122,	0960_MW178_2.0-2.5_221122,							
0960_MW177_1.5-2.0_221122,	0960_MW176_1.5-2.0_221122							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)		22-Nov-2022	----	----	----	06-Dec-2022	20-Dec-2022	✓
0960_MW105_221122,	0960_MW104_221122,							
0960_MW124_221122,	0960_MW102_221122,							
0960_QC118_221122,	0960_MW113_221122,							
0960_MW115_221122,	0960_MW178_2.0-2.5_221122,							
0960_MW177_1.5-2.0_221122,	0960_MW176_1.5-2.0_221122							



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)		22-Nov-2022	----	----	----	06-Dec-2022	20-Dec-2022	✓
0960_MW105_221122,	0960_MW104_221122,							
0960_MW124_221122,	0960_MW102_221122,							
0960_QC118_221122,	0960_MW113_221122,							
0960_MW115_221122,	0960_MW178_2.0-2.5_221122,							
0960_MW177_1.5-2.0_221122,	0960_MW176_1.5-2.0_221122							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)		22-Nov-2022	----	----	----	28-Nov-2022	29-Nov-2022	✓
0960_MW105_221122,	0960_MW104_221122,							
0960_MW124_221122,	0960_MW102_221122,							
0960_QC118_221122,	0960_MW113_221122,							
0960_MW115_221122,	0960_MW178_2.0-2.5_221122,							
0960_MW177_1.5-2.0_221122,	0960_MW176_1.5-2.0_221122							
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)		22-Nov-2022	01-Dec-2022	21-May-2023	✓	05-Dec-2022	21-May-2023	✓
0960_QC118_221122,	0960_MW113_221122,							
0960_MW115_221122,	0960_MW178_2.0-2.5_221122,							
0960_MW177_1.5-2.0_221122,	0960_MW176_1.5-2.0_221122							
HDPE (no PTFE) (EP231X)		22-Nov-2022	30-Nov-2022	21-May-2023	✓	06-Dec-2022	21-May-2023	✓
0960_MW105_221122,	0960_MW104_221122,							
0960_MW124_221122,	0960_MW102_221122							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)		22-Nov-2022	01-Dec-2022	21-May-2023	✓	05-Dec-2022	21-May-2023	✓
0960_QC118_221122,	0960_MW113_221122,							
0960_MW115_221122,	0960_MW178_2.0-2.5_221122,							
0960_MW177_1.5-2.0_221122,	0960_MW176_1.5-2.0_221122							
HDPE (no PTFE) (EP231X)		22-Nov-2022	30-Nov-2022	21-May-2023	✓	06-Dec-2022	21-May-2023	✓
0960_MW105_221122,	0960_MW104_221122,							
0960_MW124_221122,	0960_MW102_221122							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)		22-Nov-2022	01-Dec-2022	21-May-2023	✓	05-Dec-2022	21-May-2023	✓
0960_QC118_221122,	0960_MW113_221122,							
0960_MW115_221122,	0960_MW178_2.0-2.5_221122,							
0960_MW177_1.5-2.0_221122,	0960_MW176_1.5-2.0_221122							
HDPE (no PTFE) (EP231X)		22-Nov-2022	30-Nov-2022	21-May-2023	✓	06-Dec-2022	21-May-2023	✓
0960_MW105_221122,	0960_MW104_221122,							
0960_MW124_221122,	0960_MW102_221122							

Page : 4 of 6
 Work Order : EP2215722
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_QC118_221122, 0960_MW115_221122, 0960_MW177_1.5-2.0_221122,	0960_MW113_221122, 0960_MW178_2.0-2.5_221122, 0960_MW176_1.5-2.0_221122	22-Nov-2022	01-Dec-2022	21-May-2023	✔	05-Dec-2022	21-May-2023	✔
HDPE (no PTFE) (EP231X) 0960_MW105_221122, 0960_MW124_221122,	0960_MW104_221122, 0960_MW102_221122	22-Nov-2022	30-Nov-2022	21-May-2023	✔	06-Dec-2022	21-May-2023	✔
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0960_QC118_221122, 0960_MW115_221122, 0960_MW177_1.5-2.0_221122,	0960_MW113_221122, 0960_MW178_2.0-2.5_221122, 0960_MW176_1.5-2.0_221122	22-Nov-2022	01-Dec-2022	21-May-2023	✔	05-Dec-2022	21-May-2023	✔
HDPE (no PTFE) (EP231X) 0960_MW105_221122, 0960_MW124_221122,	0960_MW104_221122, 0960_MW102_221122	22-Nov-2022	30-Nov-2022	21-May-2023	✔	06-Dec-2022	21-May-2023	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	38	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	38	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



Environmental Division
Perth

Work Order Reference
EP2215723



Telephone : - 61 8 9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0960_PFA30TIP Client: STANTEC

Project Manager:

Phone:

Sampler:

Phone:

ALS Compass COC Reference: 45225 38233 45193 45191 45205

Samples:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

Custody:		Received by:		Relinquished by:		Received by:	
Relinquished by: <u>STANTEC</u>							
Date / Time: <u>23-11-22 / 7:00 AM</u>		Date / Time: <u>24/11</u>		Date / Time: <u>1/145</u>		Date / Time:	



CHAIN OF CUSTODY

ALS COC# 45226 ALS Laboratory: EP Perth

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFA5OMP

SITE: Leamonth SD - SC

ORDER NO: pfas-omp Leamonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

LABORATORY USE ONLY (circle)

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY139/19 B

/ ES2022MMHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFA5 Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_SS231		22/11/2022 11:10 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
002	0960_SS108		22/11/2022 11:44 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
003	0960_QC116		22/11/2022 11:53 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
004	0960_SS170		22/11/2022 12:35 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
005	0960_QC119		22/11/2022 12:36 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
006	0960_SS265		22/11/2022 01:01 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
007	0960_SS113		22/11/2022 01:11 PM	SOIL	ALS: 1 Non ALS: 0	No	X		

**CHAIN OF CUSTODY**

COC#: 45226

ALS Laboratory: EP Perth

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

DATE TIME:

PROJECT: WA_0960_PFSASOMP

DATE TIME:

SITE: Learmonth SD - SC

DATE TIME:

ORDER NO: pfas-omp Learmonth

DATE TIME:

PROJECT MANAGER: [REDACTED]

DATE TIME:

PRIMARY SAMPLER: [REDACTED]

DATE TIME:

EMAIL REPORTS TO: [REDACTED]

DATE TIME:

EMAIL INVOICES TO: [REDACTED]

DATE TIME:

CONTACT PH: [REDACTED]

SAMPLER MOBILE: [REDACTED]

QUOTE NO: SY/139/19 B

/ ES2022MWHAUS0002

TURNAROUND REQUIREMENTS : 5 Days

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_SS231	HDPE Soil Jar	200 mL	00620322029635	Grey	No	
002	0960_SS108	HDPE Soil Jar	200 mL	00620322029643	Grey	No	
003	0960_QC116	HDPE Soil Jar	200 mL	00620322029595	Grey	No	
004	0960_SS170	HDPE Soil Jar	200 mL	00620322036309	Grey	No	
005	0960_QC119	HDPE Soil Jar	200 mL	00620322029647	Grey	No	
006	0960_SS265	HDPE Soil Jar	200 mL	00620322029632	Grey	No	
007	0960_SS113	HDPE Soil Jar	200 mL	00620322036430	Grey	No	

Total Bottle Count: ALS: 7, Non ALS: 0

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EP2215723**

Client : STANTEC AUSTRALIA PTY LTD
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail : [REDACTED]
Telephone : ----
Facsimile : ----

E-mail : [REDACTED]
Telephone : [REDACTED]
Facsimile : [REDACTED]

Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45226
Site : Learmonth SD - SC
Sampler : [REDACTED] [REDACTED]

Page : 1 of 2
Quote number : ES2022MWAUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 24-Nov-2022 13:45
Client Requested Due Date : 07-Dec-2022

Issue Date : 28-Nov-2022
Scheduled Reporting Date : **07-Dec-2022**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 3
Receipt Detail :

Security Seal : Intact.
Temperature : 18.8 - Ice present
No. of samples received / analysed : 7 / 7

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- ### Summary of Sample(s) and Requested Analysis

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - E Moisture	SOIL - E PFAS -
EP2215723-001	22-Nov-2022 11:10	0960_SS231_221122	✓	✓
EP2215723-002	22-Nov-2022 11:44	0960_SS108_221122	✓	✓
EP2215723-003	22-Nov-2022 11:53	0960_QC116_221122	✓	✓
EP2215723-004	22-Nov-2022 12:35	0960_SS170_221122	✓	✓
EP2215723-005	22-Nov-2022 12:36	0960_QC119_221122	✓	✓
EP2215723-006	22-Nov-2022 13:01	0960_SS265_221122	✓	✓
EP2215723-007	22-Nov-2022 13:11	0960_SS113_221122	✓	✓

- A4 - AU Tax Invoice (INV)	Email	
DERP LAB REPORTS		
- EDI Format - ESDAT (ESDAT)	Email	
(STANTEC)		
- *AU Certificate of Analysis - NATA (COA)	Email	
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	
- Chain of Custody (CoC) (COC)	Email	
- EDI Format - ESDAT (ESDAT)	Email	
- EDI Format - XTab (XTAB)	Email	

CERTIFICATE OF ANALYSIS

Work Order : **EP2215723**
Client : **STANTEC AUSTRALIA PTY LTD**
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE TERRACE
 PERTH 6000
Telephone : ----
Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45226
Sampler : [REDACTED]
Site : Learmonth SD - SC
Quote number : SY/139/19 B
No. of samples received : 7
No. of samples analysed : 7

Page : 1 of 7
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : [REDACTED]
Date Samples Received : 24-Nov-2022 13:45
Date Analysis Commenced : 05-Dec-2022
Issue Date : 07-Dec-2022 16:42



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS231_221122	0960_SS108_221122	0960_QC116_221122	0960_SS170_221122	0960_QC119_221122
Sampling date / time				22-Nov-2022 11:10	22-Nov-2022 11:44	22-Nov-2022 11:53	22-Nov-2022 12:35	22-Nov-2022 12:36
Compound	CAS Number	LOR	Unit	EP2215723-001	EP2215723-002	EP2215723-003	EP2215723-004	EP2215723-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	1.3	1.5	0.4	1.3	0.6
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0181	0.0040	0.0045	0.0050	0.0056
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	0.0003	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS231_221122	0960_SS108_221122	0960_QC116_221122	0960_SS170_221122	0960_QC119_221122
Sampling date / time				22-Nov-2022 11:10	22-Nov-2022 11:44	22-Nov-2022 11:53	22-Nov-2022 12:35	22-Nov-2022 12:36
Compound	CAS Number	LOR	Unit	EP2215723-001	EP2215723-002	EP2215723-003	EP2215723-004	EP2215723-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0183	0.0040	0.0045	0.0053	0.0056
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0181	0.0040	0.0045	0.0050	0.0056
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0181	0.0040	0.0045	0.0050	0.0056
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	88.0	89.0	99.5	82.5	84.0
13C8-PFOA	----	0.0002	%	99.5	94.5	106	99.5	98.5



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS265_221122	0960_SS113_221122	----	----	----
Sampling date / time				22-Nov-2022 13:01	22-Nov-2022 13:11	----	----	----
Compound	CAS Number	LOR	Unit	EP2215723-006	EP2215723-007	-----	-----	-----
Result				Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	18.6	0.2	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0040	0.0233	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	----	----	----



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS265_221122	0960_SS113_221122	----	----	----
Sampling date / time				22-Nov-2022 13:01	22-Nov-2022 13:11	----	----	----
Compound	CAS Number	LOR	Unit	EP2215723-006	EP2215723-007	-----	-----	-----
				Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0040	0.0233	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0040	0.0233	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0040	0.0233	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	66.5	106	----	----	----
13C8-PFOA	----	0.0002	%	101	102	----	----	----

Page : 7 of 7
Work Order : EP2215723
Client : STANTEC AUSTRALIA PTY LTD
Project : WA_0960_PFASOMP



Surrogate Control Limits

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

QUALITY CONTROL REPORT

Work Order	: EP2215723	Page	: 1 of 7
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 24-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 05-Dec-2022
C-O-C number	: 45226	Issue Date	: 07-Dec-2022
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SD - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 7		
No. of samples analysed	: 7		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4749217)									
EP2215708-023	Anonymous	EA055: Moisture Content	----	0.1	%	<0.1	0.4	126	No Limit
EP2215723-007	0960_SS113_221122	EA055: Moisture Content	----	0.1	%	0.2	<0.1	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746034)									
EP2215713-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0681	0.0668	1.9	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2216138-007	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746034)									
EP2215713-002	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0003	0.0003	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746034) - continued									
EP2215713-002	Anonymous	EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2216138-007	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0003	0.0003	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746034)									
EP2215713-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2216138-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

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 Work Order : EP2215723
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746034)									
EP2215713-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2216138-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	0.0008	0.0009	14.6	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746034)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.4	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.4	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.6	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	73.6	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746034)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	80.4	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.4	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.4	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.2	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.4	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.0	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.0	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.4	69.0	135
EP231X: Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.4	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746034)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	99.5	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	83.6	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	83.3	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	82.0	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746034)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	77.6	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	68.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	94.8	65.0	137



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit		Spike	Spike Recovery (%)	Acceptable Limits (%)	
					Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746034) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	105	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746034)							
EP2215713-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	85.6	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	82.8	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	78.0	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	96.0	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# Not Determined	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	106	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746034)							
EP2215713-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	76.1	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	94.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	92.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	88.0	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	96.8	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	95.2	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	89.2	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	85.6	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	107	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	106	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	90.9	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746034)							
EP2215713-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	89.6	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	95.5	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	83.2	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	91.2	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	96.6	65.1	134

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 Work Order : EP2215723
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746034) - continued							
EP2215713-002	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	94.8	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	73.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746034)							
EP2215713-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	94.8	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	74.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	99.6	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	102	69.2	143

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2215723	Page	: 1 of 5
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 24-Nov-2022
Site	: Learmonth SD - SC	Issue Date	: 07-Dec-2022
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 7
Order number	: pfas-omp Learmonth	No. of samples analysed	: 7

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2215713--002	Anonymous	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055) 0960_SS231_221122, 0960_QC116_221122, 0960_QC119_221122, 0960_SS113_221122	0960_SS108_221122, 0960_SS170_221122, 0960_SS265_221122,	22-Nov-2022	----	----	----	06-Dec-2022	06-Dec-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SS231_221122, 0960_QC116_221122, 0960_QC119_221122, 0960_SS113_221122	0960_SS108_221122, 0960_SS170_221122, 0960_SS265_221122,	22-Nov-2022	05-Dec-2022	21-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X) 0960_SS231_221122, 0960_QC116_221122, 0960_QC119_221122, 0960_SS113_221122	0960_SS108_221122, 0960_SS170_221122, 0960_SS265_221122,	22-Nov-2022	05-Dec-2022	21-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X) 0960_SS231_221122, 0960_QC116_221122, 0960_QC119_221122, 0960_SS113_221122	0960_SS108_221122, 0960_SS170_221122, 0960_SS265_221122,	22-Nov-2022	05-Dec-2022	21-May-2023	✓	07-Dec-2022	14-Jan-2023	✓

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X)		22-Nov-2022	05-Dec-2022	21-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
0960_SS231_221122,	0960_SS108_221122,							
0960_QC116_221122,	0960_SS170_221122,							
0960_QC119_221122,	0960_SS265_221122,							
0960_SS113_221122								
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X)		22-Nov-2022	05-Dec-2022	21-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
0960_SS231_221122,	0960_SS108_221122,							
0960_QC116_221122,	0960_SS170_221122,							
0960_QC119_221122,	0960_SS265_221122,							
0960_SS113_221122								



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

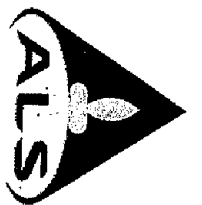
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
QuEChERS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.



Environmental Division
Perth

Work Order Reference
EP2215789



Telephone : -- 61-6-9416 1301

Custody Document for Submissions via ALS Compass App

Project: WA - O960 - PFAS ONP Client: STANTEC

Project Manager:

Phone:

Sampler:

Phone:

ALS Compass COC Reference: 45291 45298 45307 45310 45300 45293 # Samples: 45302 45295 45290

Turnaround Requirements: Standard ☒ Urgent ☐

Special Instructions:

Custody:

Relinquished by: <u>STANTEC</u>	Received by: 	Relinquished by:	Received by:
Date / Time: <u>24/11/22</u> <u>7AM</u>	Date / Time: <u>25/11</u> <u>12pm</u>	Date / Time:	Date / Time:

Right Solutions - Right Partner

alsglobal.com/als-compass

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFA5OMP

SITE: Learnmonth SD - MIB

ORDER NO: pfas-omp Learnmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

CONTACT PH:

QUOTE NO: SY139/19 B

SAMPLER MOBILE

/ ES2022MMWHAUS0002

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

C

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFA5 Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_SS235		23/11/2022 07:59 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
002	0960_SD219		23/11/2022 08:42 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
003	0960_SD210		23/11/2022 09:41 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
004	0960_SD302		23/11/2022 09:57 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
005	0960_SD209		23/11/2022 10:13 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
006	0960_SD305		23/11/2022 10:47 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
007	0960_SD211		23/11/2022 11:05 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
008	0960_SD300		23/11/2022 11:18 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
009	0960_SD301		23/11/2022 11:32 AM	SOIL	ALS: 1 Non ALS: 0	No	X		

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP

SITE: Learmonth SD - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

CONTACT PH: / SAMPLER MOBILE: QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_SS235	HDPE Soil Jar	200 mL	00620322012277	Grey	No	
002	0960_SD219	HDPE Soil Jar	200 mL	00620322054861	Grey	No	
003	0960_SD210	HDPE Soil Jar	200 mL	00620322054877	Grey	No	
004	0960_SD302	HDPE Soil Jar	200 mL	00621019025028	Grey	No	
005	0960_SD209	HDPE Soil Jar	200 mL	00620322054864	Grey	No	
006	0960_SD305	HDPE Soil Jar	200 mL	00620322054870	Grey	No	
007	0960_SD211	HDPE Soil Jar	200 mL	00620322054873	Grey	No	
008	0960_SD300	HDPE Soil Jar	200 mL	00620322054899	Grey	No	
009	0960_SD301	HDPE Soil Jar	200 mL	00621018043814	Grey	No	

Total Bottle Count: ALS: 9, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2215789

Client : STANTEC AUSTRALIA PTY LTD Contact : [REDACTED] (STANTEC) Address : GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000 E-mail : [REDACTED] Telephone : ---- Facsimile : ---- Project : WA_0960_PFASOMP Order number : pfas-omp Learmonth C-O-C number : 45300 Site : Learmonth SD - MB Sampler : [REDACTED] [REDACTED]	Laboratory : Environmental Division Perth Contact : [REDACTED] Address : 26 Rigali Way Wangara WA Australia 6065 E-mail : [REDACTED] Telephone : [REDACTED] Facsimile : [REDACTED] Page : 1 of 2 Quote number : ES2022MWH AUS0002 (SY/139/19 B) QC Level : NEPM 2013 B3 & ALS QC Standard
--	--

Dates

Date Samples Received : 25-Nov-2022 12:00 Client Requested Due Date : 08-Dec-2022	Issue Date : 29-Nov-2022 Scheduled Reporting Date : 08-Dec-2022
---	--

Delivery Details

Mode of Delivery : Carrier No. of coolers/boxes : 3 Receipt Detail :	Security Seal : Intact. Temperature : ---- No. of samples received / analysed : 9 / 9
---	--

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2215789-001	23-Nov-2022 07:59	0960_SS235_221123	✓	✓
EP2215789-002	23-Nov-2022 08:42	0960_SD219_221123	✓	✓
EP2215789-003	23-Nov-2022 09:41	0960_SD210_221123	✓	✓
EP2215789-004	23-Nov-2022 09:57	0960_SD302_221123	✓	✓
EP2215789-005	23-Nov-2022 10:13	0960_SD209_221123	✓	✓
EP2215789-006	23-Nov-2022 10:47	0960_SD305_221123	✓	✓
EP2215789-007	23-Nov-2022 11:05	0960_SD211_221123	✓	✓
EP2215789-008	23-Nov-2022 11:18	0960_SD300_221123	✓	✓
EP2215789-009	23-Nov-2022 11:32	0960_SD301_221123	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

- A4 - AU Tax Invoice (INV)	Email	
DERP LAB REPORTS		
- EDI Format - ESDAT (ESDAT)	Email	
(STANTEC)		
- *AU Certificate of Analysis - NATA (COA)	Email	
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	
- Chain of Custody (CoC) (COC)	Email	
- EDI Format - ESDAT (ESDAT)	Email	
- EDI Format - XTab (XTAB)	Email	

CERTIFICATE OF ANALYSIS

Work Order : **EP2215789**
Client : **STANTEC AUSTRALIA PTY LTD**
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE TERRACE
 PERTH 6000
Telephone : ----
Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45300
Sampler : [REDACTED]
Site : Learmonth SD - MB
Quote number : SY/139/19 B
No. of samples received : 9
No. of samples analysed : 9

Page : 1 of 7
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : [REDACTED]
Date Samples Received : 25-Nov-2022 12:00
Date Analysis Commenced : 05-Dec-2022
Issue Date : 08-Dec-2022 12:18



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X: High MS results deemed acceptable as all associated analyte results are less than LOR.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS235_221123	0960_SD219_221123	0960_SD210_221123	0960_SD302_221123	0960_SD209_221123
Sampling date / time				23-Nov-2022 07:59	23-Nov-2022 08:42	23-Nov-2022 09:41	23-Nov-2022 09:57	23-Nov-2022 10:13
Compound	CAS Number	LOR	Unit	EP2215789-001	EP2215789-002	EP2215789-003	EP2215789-004	EP2215789-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	0.6	1.2	26.0	25.2	21.6
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0016	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	0.0006	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0554	0.0031	0.0006	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0004	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0003	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS235_221123	0960_SD219_221123	0960_SD210_221123	0960_SD302_221123	0960_SD209_221123
Sampling date / time				23-Nov-2022 07:59	23-Nov-2022 08:42	23-Nov-2022 09:41	23-Nov-2022 09:57	23-Nov-2022 10:13
Compound	CAS Number	LOR	Unit	EP2215789-001	EP2215789-002	EP2215789-003	EP2215789-004	EP2215789-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0585	0.0031	0.0006	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0570	0.0031	0.0006	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0575	0.0031	0.0006	<0.0002	<0.0002
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	95.5	109	112	102	106
13C8-PFOA	----	0.0002	%	108	106	112	103	105



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SD305_221123	0960_SD211_221123	0960_SD300_221123	0960_SD301_221123	----
Sampling date / time				23-Nov-2022 10:47	23-Nov-2022 11:05	23-Nov-2022 11:18	23-Nov-2022 11:32	----
Compound	CAS Number	LOR	Unit	EP2215789-006	EP2215789-007	EP2215789-008	EP2215789-009	-----
				Result	Result	Result	Result	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	21.3	28.1	20.2	28.0	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.0016	0.0008	0.0003	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SD305_221123	0960_SD211_221123	0960_SD300_221123	0960_SD301_221123	----
Sampling date / time				23-Nov-2022 10:47	23-Nov-2022 11:05	23-Nov-2022 11:18	23-Nov-2022 11:32	----
Compound	CAS Number	LOR	Unit	EP2215789-006	EP2215789-007	EP2215789-008	EP2215789-009	-----
				Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	0.0016	0.0008	0.0003	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	0.0016	0.0008	0.0003	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	0.0016	0.0008	0.0003	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	104	102	97.5	106	----
13C8-PFOA	----	0.0002	%	100	96.5	98.0	103	----

Page : 7 of 7
Work Order : EP2215789
Client : STANTEC AUSTRALIA PTY LTD
Project : WA_0960_PFASOMP



Surrogate Control Limits

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

QUALITY CONTROL REPORT

Work Order	: EP2215789	Page	: 1 of 11
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 05-Dec-2022
C-O-C number	: 45300	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SD - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 9		
No. of samples analysed	: 9		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4749328)									
EB2235224-025	Anonymous	EA055: Moisture Content	----	0.1	%	15.6	17.9	14.3	0% - 20%
EP2215789-003	0960_SD210_221123	EA055: Moisture Content	----	0.1	%	26.0	25.5	1.9	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746039)									
EB2235224-017	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EB2235224-081	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0008	0.0007	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0027	0.0025	10.3	0% - 50%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0004	0.0003	47.1	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746045)									
EP2215789-009	0960_SD301_221123	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0003	0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746045) - continued									
EP2215814-003	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746039)									
EB2235224-017	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EB2235224-081	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	0.0007	0.0007	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746045)									
EP2215789-009	0960_SD301_221123	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746045) - continued									
EP2215814-003	Anonymous	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit		
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746039)									
EB2235224-017	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EB2235224-081	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746045)									
EP2215789-009	0960_SD301_221123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746045) - continued									
EP2215789-009	0960_SD301_221123	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746039)									
EB2235224-017	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EB2235224-081	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746045)									

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 Work Order : EP2215789
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746045) - continued									
EP2215789-009	0960_SD301_221123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215814-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			LCS	Low
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746039)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.2	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.0	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746045)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.4	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	62.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746039)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	92.0	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.6	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.2	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.0	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.2	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.8	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746045)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	79.9	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.2	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.6	64.0	136



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746045) - continued								
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.4	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746039)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	109	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.8	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	110	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	98.2	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.8	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.4	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.4	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.9	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	63.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746039)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	93.2	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	92.4	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	107	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	102	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	68.8	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.4	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	72.4	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.6	69.2	143



Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746039)							
EB2235224-017	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	95.2	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	104	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	96.4	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	117	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	92.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	116	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746045)							
EP2215789-009	0960_SD301_221123	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	86.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	94.8	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	89.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	93.6	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	82.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	66.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746039)							
EB2235224-017	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	92.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	114	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	105	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	104	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	108	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	104	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	98.0	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	116	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	108	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	80.8	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	# 245	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746045)							
EP2215789-009	0960_SD301_221123	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	91.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	96.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	88.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	90.4	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	102	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	105	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	89.6	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	106	64.0	136



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746045) - continued							
EP2215789-009	0960_SD301_221123	EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	119	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	112	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	104	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746039)							
EB2235224-017	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	108	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	104	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	85.7	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	71.0	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	66.5	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	104	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	# 161	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045)							
EP2215789-009	0960_SD301_221123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	86.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	99.0	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	88.8	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	105	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	86.5	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	93.2	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	72.0	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746039)							
EB2235224-017	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	99.6	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	101	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	117	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	98.0	69.2	143
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045)							
EP2215789-009	0960_SD301_221123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	82.4	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	97.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	69.6	65.0	137



Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045) - continued							
EP2215789-009	0960_SD301_221123	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	79.2	69.2	143

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2215789	Page	: 1 of 5
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: Learmonth SD - MB	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 9
Order number	: pfas-omp Learmonth	No. of samples analysed	: 9

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231B: Perfluoroalkyl Carboxylic Acids	EB2235224--017	Anonymous	Perfluorotetradecanoic acid (PFTeDA)	376-06-7	245 %	69.0-133%	Recovery greater than upper data quality objective
EP231C: Perfluoroalkyl Sulfonamides	EB2235224--017	Anonymous	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	161 %	61.0-139%	Recovery greater than upper data quality objective

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results. This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein. Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters. Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055) 0960_SS235_221123, 0960_SD210_221123, 0960_SD209_221123, 0960_SD211_221123, 0960_SD301_221123	0960_SD219_221123, 0960_SD302_221123, 0960_SD305_221123, 0960_SD300_221123,	23-Nov-2022	----	----	----	06-Dec-2022	07-Dec-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SD301_221123		23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
HDPE Soil Jar (EP231X) 0960_SS235_221123, 0960_SD210_221123, 0960_SD209_221123, 0960_SD211_221123,	0960_SD219_221123, 0960_SD302_221123, 0960_SD305_221123, 0960_SD300_221123	23-Nov-2022	06-Dec-2022	22-May-2023	✓	08-Dec-2022	15-Jan-2023	✓



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) 0960_SD301_221123	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
HDPE Soil Jar (EP231X) 0960_SS235_221123, 0960_SD210_221123, 0960_SD209_221123, 0960_SD211_221123, 0960_SD219_221123, 0960_SD302_221123, 0960_SD305_221123, 0960_SD300_221123	23-Nov-2022	06-Dec-2022	22-May-2023	✓	08-Dec-2022	15-Jan-2023	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) 0960_SD301_221123	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
HDPE Soil Jar (EP231X) 0960_SS235_221123, 0960_SD210_221123, 0960_SD209_221123, 0960_SD211_221123, 0960_SD219_221123, 0960_SD302_221123, 0960_SD305_221123, 0960_SD300_221123	23-Nov-2022	06-Dec-2022	22-May-2023	✓	08-Dec-2022	15-Jan-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) 0960_SD301_221123	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
HDPE Soil Jar (EP231X) 0960_SS235_221123, 0960_SD210_221123, 0960_SD209_221123, 0960_SD211_221123, 0960_SD219_221123, 0960_SD302_221123, 0960_SD305_221123, 0960_SD300_221123	23-Nov-2022	06-Dec-2022	22-May-2023	✓	08-Dec-2022	15-Jan-2023	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) 0960_SD301_221123	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
HDPE Soil Jar (EP231X) 0960_SS235_221123, 0960_SD210_221123, 0960_SD209_221123, 0960_SD211_221123, 0960_SD219_221123, 0960_SD302_221123, 0960_SD305_221123, 0960_SD300_221123	23-Nov-2022	06-Dec-2022	22-May-2023	✓	08-Dec-2022	15-Jan-2023	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

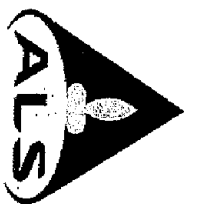
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



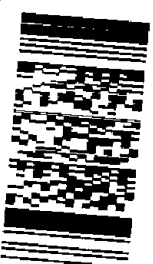
Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
QuEChERS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.



Environmental Division
Perth
Work Order Reference
EP2215791



Telephone : - 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA-0960-PFAS07P Client: STANTEC

Project Manager:

Phone:

Sampler:

Phone:

ALS Compass COC Reference: 45291 45298 45307 45310 45300
Samples: 45293 45302 45295 45290

Turnaround Requirements: Standard ☒ Urgent

Special Instructions:

Custody:

Relinquished by: STANTEC	Received by:	Relinquished by:	Received by:
Date / Time: 24/11/22 7AM	Date / Time: 25/11 12pm	Date / Time:	Date / Time:



CHAIN OF CUSTODY

ALS COC#: 45307

ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFIASCOMP

SITE: Learmonth SW/OTH - JS

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH

QUOTE NO: SY139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_OTH132		23/11/2022 09:02 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
002	0960_OTH134		23/11/2022 09:50 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
003	0960_QC123		23/11/2022 09:52 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0960_OTH129		23/11/2022 10:57 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
005	0960_OTH103		23/11/2022 11:24 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0960_SW304		23/11/2022 11:40 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
007	0960_SW303		23/11/2022 03:08 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		

CLIENT: MM/HAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP

SITE: Leamonth SW/OTH - JS

ORDER NO: pfas-omp Leamonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard Info:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 B

/ ES2022MM/HAUS0002

Other comments:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

C

PARTIAL ANALYSIS GROUP NAME

SELECTED ANALYSIS NAME

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0960_OTH132	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
002	0960_OTH134	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
003	0960_QC123	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
004	0960_OTH129	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
005	0960_OTH103	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
006	0960_SW304	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)
007	0960_SW303	Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analyses)

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP

SITE: Learmonth SW/OTH - JS

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

Yes No N/A
Yes No N/A
C

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_OTH132	HDPE (no PTFE)	20 mL	00352005020576	Grey	No	
001	0960_OTH132	HDPE (no PTFE)	20 mL	00352005020639	Grey	No	
001	0960_OTH132	HDPE (no PTFE)	20 mL	00350821001861	Grey	No	
001	0960_OTH132	Clear Plastic Bottle - Natural	500 mL	00070522162817	Green	No	
001	0960_OTH132	HDPE (no PTFE)	20 mL	00350821001934	Grey	No	
002	0960_OTH134	Clear Plastic Bottle - Natural	500 mL	00070522162827	Green	No	
002	0960_OTH134	HDPE (no PTFE)	20 mL	00350821001687	Grey	No	
002	0960_OTH134	HDPE (no PTFE)	20 mL	00350821001740	Grey	No	
003	0960_QC123	Clear Plastic Bottle - Natural	500 mL	00070522145171	Green	No	
003	0960_QC123	HDPE (no PTFE)	20 mL	00350821001747	Grey	No	
003	0960_QC123	HDPE (no PTFE)	20 mL	00350821001875	Grey	No	
004	0960_OTH129	HDPE (no PTFE)	20 mL	00352005007541	Grey	No	
004	0960_OTH129	HDPE (no PTFE)	20 mL	00352005007534	Grey	No	
004	0960_OTH129	Clear Plastic Bottle - Natural	500 mL	00070522144961	Green	No	
004	0960_OTH129	HDPE (no PTFE)	20 mL	00350821001914	Grey	No	
004	0960_OTH129	HDPE (no PTFE)	20 mL	00350821001951	Grey	No	
005	0960_OTH103	HDPE (no PTFE)	20 mL	00350522043099	Grey	No	
005	0960_OTH103	Clear Plastic Bottle - Natural	500 mL	00070522145069	Green	No	
005	0960_OTH103	HDPE (no PTFE)	20 mL	00350522042689	Grey	No	
006	0960_SW304	HDPE (no PTFE)	20 mL	00350821001713	Grey	No	
006	0960_SW304	HDPE (no PTFE)	20 mL	00350821001899	Grey	No	
006	0960_SW304	Clear Plastic Bottle - Natural	500 mL	00070522145167	Green	No	
007	0960_SW303	HDPE (no PTFE)	20 mL	00350821001959	Grey	No	
007	0960_SW303	HDPE (no PTFE)	20 mL	00350821001906	Grey	No	
007	0960_SW303	Clear Plastic Bottle - Natural	500 mL	00070522144992	Green	No	

CLIENT: MWHHAUS - STANTEC AUSTRALIA PTY LTD		RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
PROJECT: WA_0960_PFSOMP		DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:
SITE: Learmonth SW/OTH - JS		TURNAROUND REQUIREMENTS: 5 Days		LABORATORY USE ONLY (Circle)	
ORDER NO: pfas-omp Learmonth		Biohazard info:		Custody Seal intact? Yes No N/A	
PROJECT MANAGER: [REDACTED]		CONTACT PH: [REDACTED] SAMPLER MOBILE: [REDACTED]		Free ice / frozen ice bricks present upon receipt? Yes No N/A	
PRIMARY SAMPLER: [REDACTED]		QUOTE NO: SY/139/19 B / ES2022MWHHAUS0002		Random Sample Temperature on Receipt: °C	
EMAIL REPORTS TO: [REDACTED]		Other comments:			
EMAIL INVOICES TO: [REDACTED]					

Total Bottle Count: ALS: 25, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2215791

Client : STANTEC AUSTRALIA PTY LTD Contact : [REDACTED] (STANTEC) Address : GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000 E-mail : [REDACTED] Telephone : ---- Facsimile : ---- Project : WA_0960_PFASOMP Order number : pfas-omp Learmonth C-O-C number : 45307 Site : Learmonth SW/OTH - JS Sampler : [REDACTED]	Laboratory : Environmental Division Perth Contact : [REDACTED] Address : 26 Rigali Way Wangara WA Australia 6065 E-mail : [REDACTED] Telephone : [REDACTED] Facsimile : [REDACTED] Page : 1 of 2 Quote number : ES2022MWAUS0002 (SY/139/19 B) QC Level : NEPM 2013 B3 & ALS QC Standard
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Dates

Date Samples Received : 25-Nov-2022 12:00 Client Requested Due Date : 08-Dec-2022	Issue Date : 29-Nov-2022 Scheduled Reporting Date : 08-Dec-2022
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Delivery Details

Mode of Delivery : Carrier No. of coolers/boxes : 3 Receipt Detail :	Security Seal : Intact. Temperature : 21.2 - Ice present No. of samples received / analysed : 7 / 7
--	---

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215791-001	23-Nov-2022 09:02	0960_OTH132_221123	✓	✓	✓
EP2215791-002	23-Nov-2022 09:50	0960_OTH134_221123	✓	✓	✓
EP2215791-003	23-Nov-2022 09:52	0960_QC123_221123	✓	✓	✓
EP2215791-004	23-Nov-2022 10:57	0960_OTH129_221123	✓	✓	✓
EP2215791-005	23-Nov-2022 11:24	0960_OTH103_221123	✓	✓	✓
EP2215791-006	23-Nov-2022 11:40	0960_SW304_221123	✓	✓	✓
EP2215791-007	23-Nov-2022 15:08	0960_SW303_221123	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

- A4 - AU Tax Invoice (INV)	Email	
DERP LAB REPORTS		
- EDI Format - ESDAT (ESDAT)	Email	
(STANTEC)		
- *AU Certificate of Analysis - NATA (COA)	Email	
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	
- Chain of Custody (CoC) (COC)	Email	
- EDI Format - ESDAT (ESDAT)	Email	
- EDI Format - XTab (XTAB)	Email	

CERTIFICATE OF ANALYSIS

Work Order : **EP2215791**
Client : **STANTEC AUSTRALIA PTY LTD**
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE TERRACE
 PERTH 6000
Telephone : ----
Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45307
Sampler : [REDACTED]
Site : Learmonth SW/OTH - JS
Quote number : SY/139/19 B
No. of samples received : 7
No. of samples analysed : 7

Page : 1 of 9
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : [REDACTED]
Date Samples Received : 25-Nov-2022 12:00
Date Analysis Commenced : 29-Nov-2022
Issue Date : 08-Dec-2022 17:47



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Ionic Balance out of acceptable limits for sample #6 due to analytes not quantified in this report. Major cations (ED093F) and major anions (ED041G/ED045G) have been confirmed by re-analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_OTH132_22112 3	0960_OTH134_22112 3	0960_QC123_221123	0960_OTH129_22112 3	0960_OTH103_22112 3
Sampling date / time				23-Nov-2022 09:02	23-Nov-2022 09:50	23-Nov-2022 09:52	23-Nov-2022 10:57	23-Nov-2022 11:24
Compound	CAS Number	LOR	Unit	EP2215791-001	EP2215791-002	EP2215791-003	EP2215791-004	EP2215791-005
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	12
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	134	134	128	141	119
Total Alkalinity as CaCO ₃	----	1	mg/L	134	134	128	141	131
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	2660	2660	2590	2700	2660
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18100	17900	17500	17600	17100
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	486	442	444	446	446
Magnesium	7439-95-4	1	mg/L	1510	1380	1390	1400	1390
Sodium	7440-23-5	1	mg/L	11800	10800	10900	11100	10900
Potassium	7440-09-7	1	mg/L	631	572	580	584	580
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	569	563	550	556	540
∅ Total Cations	----	0.01	meq/L	678	620	626	635	626
∅ Ionic Balance	----	0.01	%	8.77	4.82	6.41	6.70	7.31
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_OTH132_22112 3	0960_OTH134_22112 3	0960_QC123_221123	0960_OTH129_22112 3	0960_OTH103_22112 3
Sampling date / time				23-Nov-2022 09:02	23-Nov-2022 09:50	23-Nov-2022 09:52	23-Nov-2022 10:57	23-Nov-2022 11:24
Compound	CAS Number	LOR	Unit	EP2215791-001	EP2215791-002	EP2215791-003	EP2215791-004	EP2215791-005
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_OTH132_22112 3	0960_OTH134_22112 3	0960_QC123_221123	0960_OTH129_22112 3	0960_OTH103_22112 3
Sampling date / time				23-Nov-2022 09:02	23-Nov-2022 09:50	23-Nov-2022 09:52	23-Nov-2022 10:57	23-Nov-2022 11:24
Compound	CAS Number	LOR	Unit	EP2215791-001	EP2215791-002	EP2215791-003	EP2215791-004	EP2215791-005
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	89.3	91.1	91.5	89.0	89.7
13C8-PFOA	----	0.02	%	102	98.4	97.9	98.6	97.5



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW304_221123	0960_SW303_221123	----	----	----
Sampling date / time				23-Nov-2022 11:40	23-Nov-2022 15:08	----	----	----
Compound	CAS Number	LOR	Unit	EP2215791-006	EP2215791-007	-----	-----	-----
Result				Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	3	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	202	160	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	206	160	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3200	2870	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	21800	19000	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	635	524	----	----	----
Magnesium	7439-95-4	1	mg/L	1870	1610	----	----	----
Sodium	7440-23-5	1	mg/L	15100	12600	----	----	----
Potassium	7440-09-7	1	mg/L	805	686	----	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	686	599	----	----	----
∅ Total Cations	----	0.01	meq/L	863	724	----	----	----
∅ Ionic Balance	----	0.01	%	11.4	9.47	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	----	----	----



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW304_221123	0960_SW303_221123	----	----	----
Sampling date / time				23-Nov-2022 11:40	23-Nov-2022 15:08	----	----	----
Compound	CAS Number	LOR	Unit	EP2215791-006	EP2215791-007	-----	-----	-----
Result				Result	Result	----	----	----

EP231B: Perfluoroalkyl Carboxylic Acids - Continued

Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	----	----	----

EP231C: Perfluoroalkyl Sulfonamides

Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	----	----	----

EP231D: (n:2) Fluorotelomer Sulfonic Acids

4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	----	----	----



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW304_221123	0960_SW303_221123			
Sampling date / time				23-Nov-2022 11:40	23-Nov-2022 15:08	----	----	----
Compound	CAS Number	LOR	Unit	EP2215791-006	EP2215791-007	-----	-----	-----
Result				Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	94.3	86.9	----	----	----
13C8-PFOA	----	0.02	%	93.4	94.9	----	----	----

Page : 9 of 9
Work Order : EP2215791
Client : STANTEC AUSTRALIA PTY LTD
Project : WA_0960_PFASOMP



Surrogate Control Limits

Sub-Matrix: SURFACE WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

QUALITY CONTROL REPORT

Work Order	: EP2215791	Page	: 1 of 8
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 29-Nov-2022
C-O-C number	: 45307	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED]		
Site	: Learmonth SW/OTH - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 7		
No. of samples analysed	: 7		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4752742)									
EP2215791-002	0960_OTH134_221123	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	134	129	4.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	134	129	4.1	0% - 20%
EP2215792-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	163	162	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	163	162	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4736343)									
EP2215715-009	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	20	19	0.0	0% - 50%
EP2215791-005	0960_OTH103_221123	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2660	2640	0.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4736342)									
EP2215715-009	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	58	59	2.0	0% - 20%
EP2215791-005	0960_OTH103_221123	ED045G: Chloride	16887-00-6	1	mg/L	17100	17400	1.7	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4736103)									
EP2215711-009	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	4	4	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	8	7	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	650	644	1.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	20	20	0.0	0% - 50%
EP2215711-019	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	714	709	0.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	867	863	0.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	6760	6740	0.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	438	434	0.9	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746956)									
EP2215791-001	0960_OTH132_221123	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215812-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746956)									
EP2215791-001	0960_OTH132_221123	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP2215812-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorononanoic acid (PFNA)	375-95-1			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7			0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4			0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746956)									
EP2215791-001	0960_OTH132_221123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746956) - continued									
EP2215791-001	0960_OTH132_221123	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215812-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746956)									
EP2215791-001	0960_OTH132_221123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215812-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4746956)									



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231P: PFAS Sums (QC Lot: 4746956) - continued									
EP2215791-001	0960_OTH132_221123	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2215812-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			LCS	Low
ED037P: Alkalinity by PC Titrator (QCLot: 4752742)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	112	87.8	118
				<1	200 mg/L	100	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736343)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	107	89.9	112
				<1	500 mg/L	106	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4736342)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	93.3	88.6	113
				<1	1000 mg/L	98.2	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4736103)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.9	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.8	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746956)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	77.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	109	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	110	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	76.2	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	81.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	93.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746956)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	93.2	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	97.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	98.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	98.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	114	72.0	134



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746956) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	114	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	104	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746956)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	95.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	93.1	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	87.5	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	101	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	93.4	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	97.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	83.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746956)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	109	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	78.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	89.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	123	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736343)							
EP2215715-009	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	116	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4736342)							
EP2215715-009	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	90.7	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746956)							
EP2215791-004	0960_OTH129_221123	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	96.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	103	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	98.4	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	97.2	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	97.8	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	95.4	53.0	142



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746956)							
EP2215791-004	0960_OTH129_221123	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	101	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	108	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	112	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	112	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	113	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	110	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	108	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	105	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	117	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	122	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	111	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746956)							
EP2215791-004	0960_OTH129_221123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	101	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	112	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	114	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	111	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	102	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	114	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	87.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746956)							
EP2215791-004	0960_OTH129_221123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	100	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	95.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	111	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	125	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2215791	Page	: 1 of 5
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: Learmonth SW/OTH - JS	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 7
Order number	: pfas-omp Learmonth	No. of samples analysed	: 7

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0960_OTH132_221123,	0960_OTH134_221123,	23-Nov-2022	----	----	----	07-Dec-2022	07-Dec-2022	✔
0960_QC123_221123,	0960_OTH129_221123,							
0960_OTH103_221123,	0960_SW304_221123,							
0960_SW303_221123								
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0960_OTH132_221123,	0960_OTH134_221123,	23-Nov-2022	----	----	----	06-Dec-2022	21-Dec-2022	✔
0960_QC123_221123,	0960_OTH129_221123,							
0960_OTH103_221123,	0960_SW304_221123,							
0960_SW303_221123								
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0960_OTH132_221123,	0960_OTH134_221123,	23-Nov-2022	----	----	----	06-Dec-2022	21-Dec-2022	✔
0960_QC123_221123,	0960_OTH129_221123,							
0960_OTH103_221123,	0960_SW304_221123,							
0960_SW303_221123								
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0960_OTH132_221123,	0960_OTH134_221123,	23-Nov-2022	----	----	----	29-Nov-2022	30-Nov-2022	✔
0960_QC123_221123,	0960_OTH129_221123,							
0960_OTH103_221123,	0960_SW304_221123,							
0960_SW303_221123								
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0960_OTH132_221123,	0960_OTH134_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✔	07-Dec-2022	22-May-2023	✔
0960_QC123_221123,	0960_OTH129_221123,							
0960_OTH103_221123,	0960_SW304_221123,							
0960_SW303_221123								

Page : 3 of 5
 Work Order : EP2215791
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0960_OTH132_221123,	0960_OTH134_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✔	07-Dec-2022	22-May-2023	✔
0960_QC123_221123,	0960_OTH129_221123,							
0960_OTH103_221123,	0960_SW304_221123,							
0960_SW303_221123								
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0960_OTH132_221123,	0960_OTH134_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✔	07-Dec-2022	22-May-2023	✔
0960_QC123_221123,	0960_OTH129_221123,							
0960_OTH103_221123,	0960_SW304_221123,							
0960_SW303_221123								
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0960_OTH132_221123,	0960_OTH134_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✔	07-Dec-2022	22-May-2023	✔
0960_QC123_221123,	0960_OTH129_221123,							
0960_OTH103_221123,	0960_SW304_221123,							
0960_SW303_221123								
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0960_OTH132_221123,	0960_OTH134_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✔	07-Dec-2022	22-May-2023	✔
0960_QC123_221123,	0960_OTH129_221123,							
0960_OTH103_221123,	0960_SW304_221123,							
0960_SW303_221123								



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard



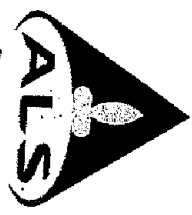
Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



Custody Document for Submissions via ALS Compass App



Environmental Division
Perth
Work Order Reference
EP2215792



Telephone : -- 61-8-9406 1301

Project: WA-0960-PEASOTP Client: STANTEC

ALS Compass COC Reference: 45291 45298 45307 45310 45300
Samples: 45293 45302 45295 45290

Turnaround Requirements: Standard ✓ Urgent _____

Special Instructions: _____

Custody: _____

Relinquished by: <u>STANTEC</u>	Received by:	Relinquished by:	Received by:
Date / Time: <u>24/11/22</u> <u>7AM</u>	Date / Time:	Date / Time:	Date / Time:
	<u>25/11</u> <u>12pm</u>		

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP

SITE: Learmonth SW/OTH - NB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER: [REDACTED]
 PRIMARY SAMPLER: [REDACTED]

EMAIL REPORTS TO: [REDACTED]

EMAIL INVOICES TO: [REDACTED]

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH: [REDACTED]

SAMPLER MOBILE: [REDACTED]

QUOTE NO: SY/139/19 B

/ ES2022MWHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_SW210		23/11/2022 09:40 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0960_QC122		23/11/2022 09:51 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
003	0960_SW302		23/11/2022 09:56 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		lab QC
004	0960_SW209		23/11/2022 10:14 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0960_SW305		23/11/2022 10:48 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0960_SW211		23/11/2022 11:04 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
007	0960_SW300		23/11/2022 11:18 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		lab QC
008	0960_SW001		23/11/2022 11:31 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		

CUSTODY

ALS Laboratory: EP Perth

STANTEC AUSTRALIA PTY LTD

FASOMP

W/OTH - MB

armorth

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

CONTACT PH: [REDACTED] / QUOTE NO: SY/139/19 B

SAMPLER MOBILE: [REDACTED]

/ ES2022MWHHAUS0002

Other comments:

Yes No N/A

Yes No N/A

C

NAME

BOTTLE NAME

VOLUME

BARCODE

TYPE

FILTERED

REASON

210 HDPE (no PTFE)

20 mL

00350821000232

Grey

No

210 HDPE (no PTFE)

20 mL

00350821000289

Grey

No

210 Clear Plastic Bottle - Natural

500 mL

00070821151137

Green

No

122 Clear Plastic Bottle - Natural

500 mL

00070821219854

Green

No

122 HDPE (no PTFE)

20 mL

00350821000347

Grey

No

122 HDPE (no PTFE)

20 mL

00350821000371

Grey

No

302 HDPE (no PTFE)

20 mL

00350821036929

Grey

No

302 HDPE (no PTFE)

20 mL

00350821036665

Grey

No

302 HDPE (no PTFE)

20 mL

00350821000296

Grey

No

302 HDPE (no PTFE)

20 mL

00350821000335

Grey

No

302 Clear Plastic Bottle - Natural

500 mL

00070821026275

Green

No

209 HDPE (no PTFE)

20 mL

00350821000464

Grey

No

209 HDPE (no PTFE)

20 mL

00350821000225

Grey

No

209 Clear Plastic Bottle - Natural

500 mL

00070821026152

Green

No

305 Clear Plastic Bottle - Natural

500 mL

00070821219862

Green

No

305 HDPE (no PTFE)

20 mL

00350821000399

Grey

No

305 HDPE (no PTFE)

20 mL

00350821000370

Grey

No

211 Clear Plastic Bottle - Natural

500 mL

00070821219976

Green

No

211 HDPE (no PTFE)

20 mL

00350821000315

Grey

No

211 HDPE (no PTFE)

20 mL

00350821000218

Grey

No

300 HDPE (no PTFE)

20 mL

00350821000439

Grey

No

300 Clear Plastic Bottle - Natural

500 mL

00070821026268

Green

No

300 HDPE (no PTFE)

20 mL

00350821000170

Grey

No

300 HDPE (no PTFE)

20 mL

00350821036659

Grey

No

300 HDPE (no PTFE)

20 mL

00350821036742

Grey

No

301 HDPE (no PTFE)

20 mL

00350821000404

Grey

No

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFA5COMP

SITE: Learmonth SW/OTH - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Yes No N/A

Free Ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 B

/ ES2022MMHAUS0002

HDPE (no PTFE)

Clear Plastic Bottle - Natural

20 mL

00350821000427

Grey

No

500 mL

00070821219830

Green

No

Total Bottle Count: ALS: 28, Non ALS: 0

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EP2215792**

Client : STANTEC AUSTRALIA PTY LTD
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail : [REDACTED]
Telephone : ----
Facsimile : ----

E-mail : [REDACTED]
Telephone : [REDACTED]
Facsimile : [REDACTED]

Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45310
Site : Learmonth SW/OTH - MB
Sampler : [REDACTED] [REDACTED]
[REDACTED]

Page : 1 of 2
Quote number : ES2022MWAUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 25-Nov-2022 12:00
Client Requested Due Date : 08-Dec-2022

Issue Date : 29-Nov-2022
Scheduled Reporting Date : **08-Dec-2022**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 3
Receipt Detail :

Security Seal : Intact.
Temperature : 21.2 - Ice present
No. of samples received / analysed : 8 / 8

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215792-001	23-Nov-2022 09:40	0960_SW210_221123	✓	✓	✓
EP2215792-002	23-Nov-2022 09:51	0960_QC122_221123	✓	✓	✓
EP2215792-003	23-Nov-2022 09:56	0960_SW302_221123	✓	✓	✓
EP2215792-004	23-Nov-2022 10:14	0960_SW209_221123	✓	✓	✓
EP2215792-005	23-Nov-2022 10:48	0960_SW305_221123	✓	✓	✓
EP2215792-006	23-Nov-2022 11:04	0960_SW211_221123	✓	✓	✓
EP2215792-007	23-Nov-2022 11:18	0960_SW300_221123	✓	✓	✓
EP2215792-008	23-Nov-2022 11:31	0960_SW001_221123	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

- A4 - AU Tax Invoice (INV)

Email

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)

Email

(STANTEC)

- *AU Certificate of Analysis - NATA (COA)

Email

- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)

Email

- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)

Email

- A4 - AU Sample Receipt Notification - Environmental HT (SRN)

Email

- Chain of Custody (CoC) (COC)

Email

- EDI Format - ESDAT (ESDAT)

Email

- EDI Format - XTab (XTAB)

Email

CERTIFICATE OF ANALYSIS

Work Order : **EP2215792**
Client : **STANTEC AUSTRALIA PTY LTD**
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE TERRACE
 PERTH 6000
Telephone : ----
Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45310
Sampler : [REDACTED]
Site : Learmonth SW/OTH - MB
Quote number : SY/139/19 B
No. of samples received : 8
No. of samples analysed : 8

Page : 1 of 9
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : [REDACTED]
Date Samples Received : 25-Nov-2022 12:00
Date Analysis Commenced : 30-Nov-2022
Issue Date : 08-Dec-2022 21:36



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW210_221123	0960_QC122_221123	0960_SW302_221123	0960_SW209_221123	0960_SW305_221123
Sampling date / time				23-Nov-2022 09:40	23-Nov-2022 09:51	23-Nov-2022 09:56	23-Nov-2022 10:14	23-Nov-2022 10:48
Compound	CAS Number	LOR	Unit	EP2215792-001	EP2215792-002	EP2215792-003	EP2215792-004	EP2215792-005
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	193	193	243	174	163
Total Alkalinity as CaCO ₃	----	1	mg/L	193	193	243	174	163
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	2870	3170	3530	2810	2790
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	28200	26000	31200	22800	23600
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	584	584	676	541	555
Magnesium	7439-95-4	1	mg/L	1750	1750	2040	1630	1700
Sodium	7440-23-5	1	mg/L	14000	14100	16000	13000	13300
Potassium	7440-09-7	1	mg/L	755	764	890	707	733
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	859	803	958	705	727
∅ Total Cations	----	0.01	meq/L	801	806	920	745	765
∅ Ionic Balance	----	0.01	%	3.47	0.17	2.03	2.73	2.53
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW210_221123	0960_QC122_221123	0960_SW302_221123	0960_SW209_221123	0960_SW305_221123
Sampling date / time				23-Nov-2022 09:40	23-Nov-2022 09:51	23-Nov-2022 09:56	23-Nov-2022 10:14	23-Nov-2022 10:48
Compound	CAS Number	LOR	Unit	EP2215792-001	EP2215792-002	EP2215792-003	EP2215792-004	EP2215792-005
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW210_221123	0960_QC122_221123	0960_SW302_221123	0960_SW209_221123	0960_SW305_221123
Sampling date / time				23-Nov-2022 09:40	23-Nov-2022 09:51	23-Nov-2022 09:56	23-Nov-2022 10:14	23-Nov-2022 10:48
Compound	CAS Number	LOR	Unit	EP2215792-001	EP2215792-002	EP2215792-003	EP2215792-004	EP2215792-005
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	95.6	85.6	94.1	101	93.1
13C8-PFOA	----	0.02	%	94.1	93.7	92.1	91.2	95.5



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW211_221123	0960_SW300_221123	0960_SW001_221123	----	----
Sampling date / time				23-Nov-2022 11:04	23-Nov-2022 11:18	23-Nov-2022 11:31	----	----
Compound	CAS Number	LOR	Unit	EP2215792-006	EP2215792-007	EP2215792-008	-----	-----
				Result	Result	Result	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	3	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	256	284	256	----	----
Total Alkalinity as CaCO3	----	1	mg/L	256	286	256	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4440	5030	4260	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	37400	38700	35700	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	900	1040	911	----	----
Magnesium	7439-95-4	1	mg/L	2780	3160	2650	----	----
Sodium	7440-23-5	1	mg/L	21800	24300	20600	----	----
Potassium	7440-09-7	1	mg/L	1070	1120	987	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	1150	1200	1100	----	----
∅ Total Cations	----	0.01	meq/L	1250	1400	1180	----	----
∅ Ionic Balance	----	0.01	%	4.03	7.52	3.67	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW211_221123	0960_SW300_221123	0960_SW001_221123	----	----
Sampling date / time				23-Nov-2022 11:04	23-Nov-2022 11:18	23-Nov-2022 11:31	----	----
Compound	CAS Number	LOR	Unit	EP2215792-006	EP2215792-007	EP2215792-008	-----	-----
				Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW211_221123	0960_SW300_221123	0960_SW001_221123	----	----
Sampling date / time				23-Nov-2022 11:04	23-Nov-2022 11:18	23-Nov-2022 11:31	----	----
Compound	CAS Number	LOR	Unit	EP2215792-006	EP2215792-007	EP2215792-008	-----	-----
				Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	97.0	87.5	89.1	----	----
13C8-PFOA	----	0.02	%	94.4	89.5	92.8	----	----

Page : 9 of 9
Work Order : EP2215792
Client : STANTEC AUSTRALIA PTY LTD
Project : WA_0960_PFASOMP



Surrogate Control Limits

Sub-Matrix: SURFACE WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

QUALITY CONTROL REPORT

Work Order	: EP2215792	Page	: 1 of 8
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45310	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED]		
Site	: Learmonth SW/OTH - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 8		
No. of samples analysed	: 8		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4752742)									
EP2215791-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	134	129	4.1	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	134	129	4.1	0% - 20%
EP2215792-005	0960_SW305_221123	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	163	162	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	163	162	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4736349)									
EP2215792-001	0960_SW210_221123	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2870	3080	7.0	0% - 20%
EP2215793-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	191	196	2.2	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4736348)									
EP2215792-001	0960_SW210_221123	ED045G: Chloride	16887-00-6	1	mg/L	28200	26700	5.5	0% - 20%
EP2215793-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	464	495	6.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4736104)									
EP2215792-001	0960_SW210_221123	ED093F: Calcium	7440-70-2	1	mg/L	584	575	1.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1750	1750	0.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	14000	14100	0.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	755	756	0.2	0% - 20%
EP2215793-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	97	97	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	63	63	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	257	257	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	20	20	0.0	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4743869)									
EP2215792-003	0960_SW302_221123	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215793-002	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.15	0.18	21.8	0% - 50%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.08	0.07	16.3	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4743869)									
EP2215792-003	0960_SW302_221123	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP2215793-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3			0.02	µg/L	0.05	<0.02	90.4	No Limit
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4			0.02	µg/L	0.04	0.03	0.0	No Limit
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9			0.02	µg/L	0.02	0.02	0.0	No Limit
EP231X: Perfluorononanoic acid (PFNA)	375-95-1			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7			0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4			0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743869)									
EP2215792-003	0960_SW302_221123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743869) - continued									
EP2215792-003	0960_SW302_221123	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215793-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4743869)									
EP2215792-003	0960_SW302_221123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215793-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4743869)									



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231P: PFAS Sums (QC Lot: 4743869) - continued									
EP2215792-003	0960_SW302_221123	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2215793-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.34	0.30	12.5	0% - 20%



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result				
ED037P: Alkalinity by PC Titrator (QCLot: 4752742)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	112	87.8	118
				<1	200 mg/L	100	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736349)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	94.9	89.9	112
				<1	500 mg/L	92.0	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4736348)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	88.6	113
				<1	1000 mg/L	98.6	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4736104)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.3	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.9	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743869)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	84.2	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	107	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	103	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	89.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	86.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	81.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743869)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	96.9	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.8	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	103	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	95.6	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	96.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	101	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	123	72.0	134



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743869) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	111	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	108	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743869)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	94.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	107	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	98.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	101	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	104	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	86.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743869)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	101	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	91.4	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	88.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	84.8	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736349)							
EP2215792-001	0960_SW210_221123	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4736348)							
EP2215792-001	0960_SW210_221123	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743869)							
EP2215792-007	0960_SW300_221123	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	91.8	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	107	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	104	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	98.6	69.0	134

Page : 8 of 8
 Work Order : EP2215792
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743869) - continued							
EP2215792-007	0960_SW300_221123	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	91.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	88.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743869)							
EP2215792-007	0960_SW300_221123	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	94.8	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	105	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	108	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	103	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	99.8	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	103	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	96.0	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	94.4	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	128	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	118	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	117	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743869)							
EP2215792-007	0960_SW300_221123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	110	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	104	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	93.5	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	94.2	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	109	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	108	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	91.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743869)							
EP2215792-007	0960_SW300_221123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	93.6	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	97.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	90.2	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	72.8	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order : EP2215792

Page : 1 of 5

Client : STANTEC AUSTRALIA PTY LTD

Laboratory : Environmental Division Perth

Contact : [REDACTED] (STANTEC)

Telephone : [REDACTED]

Project : WA_0960_PFASOMP

Date Samples Received : 25-Nov-2022

Site : Learmonth SW/OTH - MB

Issue Date : 08-Dec-2022

Sampler : [REDACTED]

No. of samples received : 8

Order number : pfas-omp Learmonth

No. of samples analysed : 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2215792--001	0960_SW210_221123	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EP2215792--001	0960_SW210_221123	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results. This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein. Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters. Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)	23-Nov-2022	----	----	----	07-Dec-2022	07-Dec-2022	✓	
0960_SW210_221123,								0960_QC122_221123,
0960_SW302_221123,								0960_SW209_221123,
0960_SW305_221123,								0960_SW211_221123,
0960_SW300_221123,								0960_SW001_221123
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)	23-Nov-2022	----	----	----	08-Dec-2022	21-Dec-2022	✓	
0960_SW210_221123,								0960_QC122_221123,
0960_SW302_221123,								0960_SW209_221123,
0960_SW305_221123,								0960_SW211_221123,
0960_SW300_221123,								0960_SW001_221123
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)	23-Nov-2022	----	----	----	08-Dec-2022	21-Dec-2022	✓	
0960_SW210_221123,								0960_QC122_221123,
0960_SW302_221123,								0960_SW209_221123,
0960_SW305_221123,								0960_SW211_221123,
0960_SW300_221123,								0960_SW001_221123



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) 0960_SW210_221123, 0960_SW302_221123, 0960_SW305_221123, 0960_SW300_221123,	0960_QC122_221123, 0960_SW209_221123, 0960_SW211_221123, 0960_SW001_221123	23-Nov-2022	----	----	----	30-Nov-2022	30-Nov-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_SW210_221123, 0960_SW302_221123, 0960_SW305_221123, 0960_SW300_221123,	0960_QC122_221123, 0960_SW209_221123, 0960_SW211_221123, 0960_SW001_221123	23-Nov-2022	02-Dec-2022	22-May-2023	✓	08-Dec-2022	22-May-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) 0960_SW210_221123, 0960_SW302_221123, 0960_SW305_221123, 0960_SW300_221123,	0960_QC122_221123, 0960_SW209_221123, 0960_SW211_221123, 0960_SW001_221123	23-Nov-2022	02-Dec-2022	22-May-2023	✓	08-Dec-2022	22-May-2023	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) 0960_SW210_221123, 0960_SW302_221123, 0960_SW305_221123, 0960_SW300_221123,	0960_QC122_221123, 0960_SW209_221123, 0960_SW211_221123, 0960_SW001_221123	23-Nov-2022	02-Dec-2022	22-May-2023	✓	08-Dec-2022	22-May-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_SW210_221123, 0960_SW302_221123, 0960_SW305_221123, 0960_SW300_221123,	0960_QC122_221123, 0960_SW209_221123, 0960_SW211_221123, 0960_SW001_221123	23-Nov-2022	02-Dec-2022	22-May-2023	✓	08-Dec-2022	22-May-2023	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0960_SW210_221123, 0960_SW302_221123, 0960_SW305_221123, 0960_SW300_221123,	0960_QC122_221123, 0960_SW209_221123, 0960_SW211_221123, 0960_SW001_221123	23-Nov-2022	02-Dec-2022	22-May-2023	✓	08-Dec-2022	22-May-2023	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

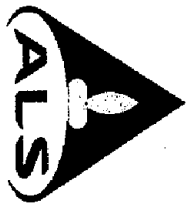
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



Environmental Division
Perth
Work Order Reference
EP2215797

Custody Document for Submissions via ALS Compass App

Telephone : + 61-8-9406 1301

Project: WA - 0960 - PFAS ONP Client: STANTEC Project Manager: [Redacted]

Phone:

ALS Compass COC Reference: 45291 45298 45307 45310 45300 Sampler: [Redacted]

Phone:

Turnaround Requirements: Standard ✓ Urgent

Special Instructions:

--	--	--	--

Custody:

Relinquished by: <u>STANTEC</u>	Received by: <u>[Redacted]</u>	Relinquished by:	Received by:
Date / Time: <u>24/11/22 7AM</u>	Date / Time: <u>25/11 12pm</u>	Date / Time:	Date / Time:

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSASOMP

SITE: Learmonth GW - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER: [REDACTED]
PRIMARY SAMPLER: [REDACTED]

CONTACT PH: [REDACTED]
QUOTE NO: SY/139/19 B

SAMPLER MOBILE: [REDACTED]
/ ES2022MMHAUS0002

EMAIL REPORTS TO: [REDACTED]
EMAIL INVOICES TO: [REDACTED]

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days
Biohazard Info:

LABORATORY USE ONLY (Circle)
Custody Seal intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comments:

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinse WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_MMV143_3.0-3.5		23/11/2022 07:17 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8			lab QC
002	0960_MMV145_3.0-3.5		23/11/2022 07:32 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
003	0960_MMV103		23/11/2022 08:32 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
004	0960_MMV159		23/11/2022 08:57 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
005	0960_MMV179_1.0-1.5		23/11/2022 10:34 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8			
006	0960_QC301		23/11/2022 03:50 PM	WATER	ALS: 2 Non ALS: 0	No		X		
007	0960_QC302		23/11/2022 03:50 PM	WATER	ALS: 2 Non ALS: 0	No		X		
008	0960_QC303		23/11/2022 03:51 PM	WATER	ALS: 2 Non ALS: 0	No		X		
009	0960_QC401		23/11/2022 03:51 PM	WATER	ALS: 6 Non ALS: 0	No		X		

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP

SITE: Learnmonth GW - MB

ORDER NO: pfas-omp Learnmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 B

/ ES2022MMWHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0960_QC402		23/11/2022 03:53 PM	WATER	ALS: 0 Non ALS: 0	No		X		bottles labelled QC402, scan not working
011	0960_QC403		23/11/2022 03:54 PM	WATER	ALS: 0 Non ALS: 0	No		X		bottles labelled QC403, scan not working

CHAIN OF CUSTODY



COC# 45291

ALS Laboratory EP Perth

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASCOMP

SITE: Learmonth GW - MB

ORDER NO: pfas-comp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

°C

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY139/19 B

/ ES2022MMHAUS0002

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0960_MM143_3.0-3.5	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0960_MM145_3.0-3.5	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0960_MM103	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0960_MM159	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0960_MM179_1.0-1.5	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CLIENT: MMWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP

SITE: Learmonth GW - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
C

CONTACT PH: QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MMWHAUS0002

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_MMV143_3.0-3.5	Clear Plastic Bottle - Natural	500 mL	00070821151143	Green	No	
001	0960_MMV143_3.0-3.5	HDPE (no PTFE)	20 mL	00350621035915	Grey	No	
001	0960_MMV143_3.0-3.5	HDPE (no PTFE)	20 mL	00350821000299	Grey	No	
001	0960_MMV143_3.0-3.5	HDPE (no PTFE)	20 mL	00350019165868	Grey	No	
001	0960_MMV143_3.0-3.5	HDPE (no PTFE)	20 mL	00350821000389	Grey	No	
002	0960_MMV145_3.0-3.5	HDPE (no PTFE)	20 mL	00350621000357	Grey	No	
002	0960_MMV145_3.0-3.5	Clear Plastic Bottle - Natural	500 mL	00070821151333	Green	No	
002	0960_MMV145_3.0-3.5	HDPE (no PTFE)	20 mL	00350621000527	Grey	No	
003	0960_MMV103	Clear Plastic Bottle - Natural	500 mL	00070821151154	Green	No	
003	0960_MMV103	HDPE (no PTFE)	20 mL	00350621000342	Grey	No	
003	0960_MMV103	HDPE (no PTFE)	20 mL	00350621000261	Grey	No	
004	0960_MMV159	Clear Plastic Bottle - Natural	500 mL	00070821219891	Green	No	
004	0960_MMV159	HDPE (no PTFE)	20 mL	00350821000424	Grey	No	
004	0960_MMV159	HDPE (no PTFE)	20 mL	00350821000303	Grey	No	
005	0960_MMV179_1.0-1.5	HDPE (no PTFE)	20 mL	00350821000415	Grey	No	
005	0960_MMV179_1.0-1.5	HDPE (no PTFE)	20 mL	00350821000283	Grey	No	
005	0960_MMV179_1.0-1.5	Clear Plastic Bottle - Natural	500 mL	00070821219887	Green	No	
006	0960_QC301	HDPE (no PTFE)	20 mL	00350621035912	Grey	No	
006	0960_QC301	HDPE (no PTFE)	20 mL	00350621035942	Grey	No	
007	0960_QC302	HDPE (no PTFE)	20 mL	00350821035762	Grey	No	
007	0960_QC302	HDPE (no PTFE)	20 mL	00350821035763	Grey	No	
008	0960_QC303	HDPE (no PTFE)	20 mL	00350621036004	Grey	No	
008	0960_QC303	HDPE (no PTFE)	20 mL	00350821036684	Grey	No	
009	0960_QC401	HDPE (no PTFE)	20 mL	00350621035886	Grey	No	
009	0960_QC401	HDPE (no PTFE)	20 mL	00350621035952	Grey	No	
009	0960_QC401	HDPE (no PTFE)	20 mL	00350621035955	Grey	No	

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PFA5OMP
SITE: Learmonth GW - MB
ORDER NO: pfas-omp Learmonth
PROJECT MANAGER: [REDACTED]
PRIMARY SAMPLER: [REDACTED]
EMAIL REPORTS TO: [REDACTED]
EMAIL INVOICES TO: [REDACTED]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days
Biohazard info:

CONTACT PH: [REDACTED] SAMPLER MOBILE: [REDACTED]
QUOTE NO: SY/139/19 B / ES2022MMHAUSD002

LABORATORY USE ONLY (Circle)
Custody Seal intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comments:

009	0960_QC401	HDPE (no PTFE)	20 mL	00350621036021	Grey	No	
009	0960_QC401	HDPE (no PTFE)	20 mL	00350621035954	Grey	No	
009	0960_QC401	HDPE (no PTFE)	20 mL	00350621035958	Grey	No	

Total Bottle Count: ALS: 29, Non ALS: 0

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EP2215797**

Client : STANTEC AUSTRALIA PTY LTD
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail : [REDACTED]
Telephone : ----
Facsimile : ----

E-mail : [REDACTED]
Telephone : [REDACTED]
Facsimile : [REDACTED]

Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45291
Site : Learmonth GW - MB
Sampler : [REDACTED] [REDACTED]

Page : 1 of 2
Quote number : ES2022MWAUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 25-Nov-2022 12:00
Client Requested Due Date : 08-Dec-2022

Issue Date : 29-Nov-2022
Scheduled Reporting Date : **08-Dec-2022**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 3
Receipt Detail :

Security Seal : Intact.
Temperature : 21.2 - Ice present
No. of samples received / analysed : 11 / 11

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP2215797-001 : 23-Nov-2022 07:17 : 0960_MW143_3.0-3.5_221123
EP2215797-002 : 23-Nov-2022 07:32 : 0960_MW145_3.0-3.5_221123
EP2215797-005 : 23-Nov-2022 10:34 : 0960_MW179_1.0-1.5_221123

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215797-001	23-Nov-2022 07:17	0960_MW143_3.0-3.5_2...	✓	✓	✓
EP2215797-002	23-Nov-2022 07:32	0960_MW145_3.0-3.5_2...	✓	✓	✓
EP2215797-003	23-Nov-2022 08:32	0960_MW103_221123	✓	✓	✓
EP2215797-004	23-Nov-2022 08:57	0960_MW159_221123	✓	✓	✓
EP2215797-005	23-Nov-2022 10:34	0960_MW179_1.0-1.5_2...	✓	✓	✓
EP2215797-006	23-Nov-2022 15:50	0960_QC301_221123		✓	
EP2215797-007	23-Nov-2022 15:50	0960_QC302_221123		✓	
EP2215797-008	23-Nov-2022 15:51	0960_QC303_221123		✓	
EP2215797-009	23-Nov-2022 15:51	0960_QC401_221123		✓	
EP2215797-010	23-Nov-2022 15:53	0960_QC402_221123		✓	
EP2215797-011	23-Nov-2022 15:54	0960_QC403_221123		✓	

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

██████████	- A4 - AU Tax Invoice (INV)	Email	██████████
DERP LAB REPORTS			
██████████	- EDI Format - ESDAT (ESDAT)	Email	██████████
██████████ (STANTEC)			
██████████	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
██████████	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
██████████	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
██████████	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
██████████	- Chain of Custody (CoC) (COC)	Email	██████████
██████████	- EDI Format - ESDAT (ESDAT)	Email	██████████
██████████	- EDI Format - XTab (XTAB)	Email	██████████

CERTIFICATE OF ANALYSIS

Work Order : **EP2215797**
Client : **STANTEC AUSTRALIA PTY LTD**
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE TERRACE
 PERTH 6000
Telephone : ----
Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45291
Sampler : [REDACTED]
Site : Learmonth GW - MB
Quote number : SY/139/19 B
No. of samples received : 11
No. of samples analysed : 11

Page : 1 of 10
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : [REDACTED]
Date Samples Received : 25-Nov-2022 12:00
Date Analysis Commenced : 30-Nov-2022
Issue Date : 08-Dec-2022 21:05



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW143_3.0-3.5_221123	0960_MW145_3.0-3.5_221123	0960_MW103_221123	0960_MW159_221123	0960_MW179_1.0-1.5_221123
Sampling date / time				23-Nov-2022 07:17	23-Nov-2022 07:32	23-Nov-2022 08:32	23-Nov-2022 08:57	23-Nov-2022 10:34
Compound	CAS Number	LOR	Unit	EP2215797-001	EP2215797-002	EP2215797-003	EP2215797-004	EP2215797-005
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	204	125	164	458	173
Total Alkalinity as CaCO ₃	----	1	mg/L	204	125	164	458	173
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	4930	4570	2740	1220	3960
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	29700	32600	27000	8400	26700
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	1040	999	1370	418	641
Magnesium	7439-95-4	1	mg/L	2360	2500	2120	567	2130
Sodium	7440-23-5	1	mg/L	19400	20400	15900	5030	16800
Potassium	7440-09-7	1	mg/L	923	982	778	236	926
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	944	1020	822	272	839
∅ Total Cations	----	0.01	meq/L	1110	1170	954	292	962
∅ Ionic Balance	----	0.01	%	8.21	6.90	7.45	3.70	6.81
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.22	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.17	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	1.05	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.04	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.06	<0.02	<0.02



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW143_3.0-3.5 _221123	0960_MW145_3.0-3.5 _221123	0960_MW103_221123	0960_MW159_221123	0960_MW179_1.0-1.5 _221123
Sampling date / time				23-Nov-2022 07:17	23-Nov-2022 07:32	23-Nov-2022 08:32	23-Nov-2022 08:57	23-Nov-2022 10:34
Compound	CAS Number	LOR	Unit	EP2215797-001	EP2215797-002	EP2215797-003	EP2215797-004	EP2215797-005
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW143_3.0-3.5 _221123	0960_MW145_3.0-3.5 _221123	0960_MW103_221123	0960_MW159_221123	0960_MW179_1.0-1.5 _221123
Sampling date / time				23-Nov-2022 07:17	23-Nov-2022 07:32	23-Nov-2022 08:32	23-Nov-2022 08:57	23-Nov-2022 10:34
Compound	CAS Number	LOR	Unit	EP2215797-001	EP2215797-002	EP2215797-003	EP2215797-004	EP2215797-005
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	1.54	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	1.09	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	1.37	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	96.6	93.4	92.3	99.1	93.0
13C8-PFOA	----	0.02	%	96.0	94.2	96.4	92.3	99.4



Analytical Results

Sub-Matrix: RINSATE
 (Matrix: WATER)

Sample ID

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0960_QC301_221123	0960_QC302_221123	0960_QC303_221123	0960_QC401_221123	0960_QC402_221123
Sampling date / time				23-Nov-2022 15:50	23-Nov-2022 15:50	23-Nov-2022 15:51	23-Nov-2022 15:51	23-Nov-2022 15:53	
Compound	CAS Number	LOR	Unit	EP2215797-006	EP2215797-007	EP2215797-008	EP2215797-009	EP2215797-010	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	



Analytical Results

Sub-Matrix: RINSATE
 (Matrix: WATER)

Sample ID

				0960_QC301_221123	0960_QC302_221123	0960_QC303_221123	0960_QC401_221123	0960_QC402_221123
Sampling date / time				23-Nov-2022 15:50	23-Nov-2022 15:50	23-Nov-2022 15:51	23-Nov-2022 15:51	23-Nov-2022 15:53
Compound	CAS Number	LOR	Unit	EP2215797-006	EP2215797-007	EP2215797-008	EP2215797-009	EP2215797-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	85.7	99.4	99.3	94.3	94.2
13C8-PFOA	----	0.02	%	93.1	96.1	97.5	98.7	92.7



Analytical Results

Sub-Matrix: RINSATE
 (Matrix: WATER)

Sample ID

0960_QC403_221123

Sampling date / time				23-Nov-2022 15:54	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2215797-011	-----	-----	-----	-----
Result				----	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----



Analytical Results

Sub-Matrix: RINSATE
 (Matrix: WATER)

Sample ID

0960_QC403_221123

Sampling date / time				23-Nov-2022 15:54	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2215797-011	-----	-----	-----	-----
Result				----	----	----	----	----

EP231C: Perfluoroalkyl Sulfonamides - Continued

N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----

EP231D: (n:2) Fluorotelomer Sulfonic Acids

4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----

EP231P: PFAS Sums

Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

EP231S: PFAS Surrogate

13C4-PFOS	----	0.02	%	82.9	----	----	----	----
13C8-PFOA	----	0.02	%	89.9	----	----	----	----



Surrogate Control Limits

Sub-Matrix: GROUNDWATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: RINSATE		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids
(WATER) EP231B: Perfluoroalkyl Carboxylic Acids
(WATER) EP231C: Perfluoroalkyl Sulfonamides
(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids
(WATER) EP231P: PFAS Sums
(WATER) EP231S: PFAS Surrogate

QUALITY CONTROL REPORT

Work Order	: EP2215797	Page	: 1 of 8
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45291	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth GW - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 11		
No. of samples analysed	: 11		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4752743)									
EP2215797-002	0960_MW145_3.0-3.5_221 123	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	125	124	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	125	124	0.0	0% - 20%
EP2215813-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	133	144	7.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	133	144	7.6	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4736352)									
EP2215797-001	0960_MW143_3.0-3.5_221 123	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4930	4740	3.7	0% - 20%
EP2215815-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5120	5280	3.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4736351)									
EP2215797-001	0960_MW143_3.0-3.5_221 123	ED045G: Chloride	16887-00-6	1	mg/L	29700	29600	0.4	0% - 20%
EP2215815-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	34100	34400	0.9	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4736104)									
EP2215792-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	584	575	1.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1750	1750	0.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	14000	14100	0.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	755	756	0.2	0% - 20%
EP2215793-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	97	97	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	63	63	0.0	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 4736104) - continued									
EP2215793-004	Anonymous	ED093F: Sodium	7440-23-5	1	mg/L	257	257	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	20	20	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4743877)									
EP2215797-001	0960_MW143_3.0-3.5_221 123	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215813-007	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4743877)									
EP2215797-001	0960_MW143_3.0-3.5_221 123	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2215813-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743877)									
EP2215797-001	0960_MW143_3.0-3.5_221 123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215813-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4743877)									
EP2215797-001	0960_MW143_3.0-3.5_221 123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215813-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit

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 Work Order : EP2215797
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4743877) - continued									
EP2215813-007	Anonymous	EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4743877)									
EP2215797-001	0960_MW143_3.0-3.5_221 123	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2215813-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED037P: Alkalinity by PC Titrator (QCLot: 4752743)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	110	87.8	118
				<1	200 mg/L	102	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736352)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	89.9	112
				<1	500 mg/L	99.1	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4736351)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.0	88.6	113
				<1	1000 mg/L	98.1	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4736104)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.3	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.9	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743877)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	83.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	88.0	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	84.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	97.6	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	90.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	91.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743877)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	100	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	97.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	98.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	105	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	106	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.6	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	124	72.0	134



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743877) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	115	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	116	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743877)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	90.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	101	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	93.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.5	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	106	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	119	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	89.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743877)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	103	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	99.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	99.0	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	84.2	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736352)							
EP2215797-001	0960_MW143_3.0-3.5_221123	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4736351)							
EP2215797-001	0960_MW143_3.0-3.5_221123	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743877)							
EP2215813-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	85.0	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	108	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	100	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	93.0	69.0	134



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743877) - continued							
EP2215813-002	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	85.2	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	87.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743877)							
EP2215813-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	99.2	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	103	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	100	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	98.4	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	96.8	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	100	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	98.2	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	102	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	128	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTeDA)	72629-94-8	0.25 µg/L	114	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	109	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743877)							
EP2215813-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	92.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	109	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	100	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	102	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	100	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	104	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	93.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743877)							
EP2215813-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	100	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	86.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	84.0	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	71.8	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2215797	Page	: 1 of 5
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: Learmonth GW - MB	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 11
Order number	: pfas-omp Learmonth	No. of samples analysed	: 11

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

Page : 2 of 5
 Work Order : EP2215797
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	EP2215797--001	0960_MW143_3.0-3.5_221123	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EP2215797--001	0960_MW143_3.0-3.5_221123	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) 0960_MW143_3.0-3.5_221123, 0960_MW103_221123, 0960_MW179_1.0-1.5_221123	0960_MW145_3.0-3.5_221123, 0960_MW159_221123,	23-Nov-2022	----	----	----	07-Dec-2022	07-Dec-2022	✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) 0960_MW143_3.0-3.5_221123, 0960_MW103_221123, 0960_MW179_1.0-1.5_221123	0960_MW145_3.0-3.5_221123, 0960_MW159_221123,	23-Nov-2022	----	----	----	08-Dec-2022	21-Dec-2022	✔
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 0960_MW143_3.0-3.5_221123, 0960_MW103_221123, 0960_MW179_1.0-1.5_221123	0960_MW145_3.0-3.5_221123, 0960_MW159_221123,	23-Nov-2022	----	----	----	08-Dec-2022	21-Dec-2022	✔
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) 0960_MW143_3.0-3.5_221123, 0960_MW103_221123, 0960_MW179_1.0-1.5_221123	0960_MW145_3.0-3.5_221123, 0960_MW159_221123,	23-Nov-2022	----	----	----	30-Nov-2022	30-Nov-2022	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_MW143_3.0-3.5_221123, 0960_MW103_221123, 0960_MW179_1.0-1.5_221123, 0960_QC302_221123, 0960_QC401_221123, 0960_QC403_221123	0960_MW145_3.0-3.5_221123, 0960_MW159_221123, 0960_QC301_221123, 0960_QC303_221123, 0960_QC402_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✔	08-Dec-2022	22-May-2023	✔
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) 0960_MW143_3.0-3.5_221123, 0960_MW103_221123, 0960_MW179_1.0-1.5_221123, 0960_QC302_221123, 0960_QC401_221123, 0960_QC403_221123	0960_MW145_3.0-3.5_221123, 0960_MW159_221123, 0960_QC301_221123, 0960_QC303_221123, 0960_QC402_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✔	08-Dec-2022	22-May-2023	✔
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) 0960_MW143_3.0-3.5_221123, 0960_MW103_221123, 0960_MW179_1.0-1.5_221123, 0960_QC302_221123, 0960_QC401_221123, 0960_QC403_221123	0960_MW145_3.0-3.5_221123, 0960_MW159_221123, 0960_QC301_221123, 0960_QC303_221123, 0960_QC402_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✔	08-Dec-2022	22-May-2023	✔
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_MW143_3.0-3.5_221123, 0960_MW103_221123, 0960_MW179_1.0-1.5_221123, 0960_QC302_221123, 0960_QC401_221123, 0960_QC403_221123	0960_MW145_3.0-3.5_221123, 0960_MW159_221123, 0960_QC301_221123, 0960_QC303_221123, 0960_QC402_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✔	08-Dec-2022	22-May-2023	✔
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0960_MW143_3.0-3.5_221123, 0960_MW103_221123, 0960_MW179_1.0-1.5_221123, 0960_QC302_221123, 0960_QC401_221123, 0960_QC403_221123	0960_MW145_3.0-3.5_221123, 0960_MW159_221123, 0960_QC301_221123, 0960_QC303_221123, 0960_QC402_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✔	08-Dec-2022	22-May-2023	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



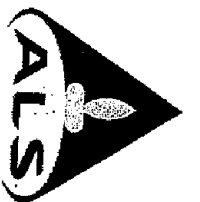
Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



Custody Document for Submissions via ALS Compass App



Environmental Division
Perth

Work Order Reference
EP2215811



Telephone : - 01-894061397

Project: WA - 0960 - PEAS ONP

Client:

STANTEC

Project Manager:

Phone:

ALS Compass COC Reference:

45294 45298 45307 45310 45300 45293

Samples:

45302 45295 45290

Sampler:

Phone:

Turnaround Requirements: Standard



Urgent

Special Instructions:

Custody:

Relinquished by:

STANTEC

Received by:



Date / Time: 24/11/22 7AM

Date / Time:

25/11 12pm

Relinquished by:

Date / Time:

Received by:

Date / Time:

Right Solutions - Right Partner

alsglobal.com/als-compass

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD	RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
PROJECT: WA_0960_PFA50MP	DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:
SITE: Learmonth SD - JS	TURNAROUND REQUIREMENTS: 5 Days	LABORATORY USE ONLY (Circle)		
ORDER NO: pfas-omp Learmonth	Biohazard info:	Custody Seal Intact? Yes No N/A		
PROJECT MANAGER:	CONTACT PH:	Free Ice / frozen ice bricks present upon receipt? Yes No N/A		
PRIMARY SAMPLER:	SAMPLER MOBILE:	Random Sample Temperature on Receipt: °C		
EMAIL REPORTS TO:	QUOTE NO: SY139/19 B / ES2022MWH-AUS0002	Other comments:		
EMAIL INVOICES TO:				

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFA5 Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_SS190		23/11/2022 07:52 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
002	0960_SS288		23/11/2022 07:53 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
003	0960_SS192		23/11/2022 09:25 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
004	0960_SS193		23/11/2022 09:26 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
005	0960_SD303		23/11/2022 11:28 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
006	0960_SD304		23/11/2022 11:28 AM	SOIL	ALS: 1 Non ALS: 0	No	X		

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP

SITE: Learmonth SD - JS

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MMHAUS0002

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_SS190	HDPE Soil Jar	200 mL	00620322054857	Grey	No	
002	0960_SS288	HDPE Soil Jar	200 mL	00620322054862	Grey	No	
003	0960_SS192	HDPE Soil Jar	200 mL	00620322054879	Grey	No	
004	0960_SS193	HDPE Soil Jar	200 mL	00620322054915	Grey	No	
005	0960_SD303	HDPE Soil Jar	200 mL	00620322054880	Grey	No	
006	0960_SD304	HDPE Soil Jar	200 mL	00620322054911	Grey	No	

Total Bottle Count: ALS: 6, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2215811

Client : STANTEC AUSTRALIA PTY LTD Contact : [REDACTED] (STANTEC) Address : GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000 E-mail : [REDACTED] Telephone : ---- Facsimile : ---- Project : WA_0960_PFASOMP Order number : pfas-omp Learmonth C-O-C number : 45293 Site : Learmonth SD - JS Sampler : [REDACTED] [REDACTED]	Laboratory : Environmental Division Perth Contact : [REDACTED] Address : 26 Rigali Way Wangara WA Australia 6065 E-mail : [REDACTED] Telephone : [REDACTED] Facsimile : [REDACTED] Page : 1 of 2 Quote number : ES2022MWH AUS0002 (SY/139/19 B) QC Level : NEPM 2013 B3 & ALS QC Standard
--	--

Dates

Date Samples Received : 25-Nov-2022 12:00 Client Requested Due Date : 08-Dec-2022	Issue Date : 29-Nov-2022 Scheduled Reporting Date : 08-Dec-2022
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Delivery Details

Mode of Delivery : Carrier No. of coolers/boxes : 3 Receipt Detail :	Security Seal : Intact. Temperature : 21.2 - Ice present No. of samples received / analysed : 6 / 6
---	--

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2215811-001	23-Nov-2022 07:52	0960_SS190_221123	✓	✓
EP2215811-002	23-Nov-2022 07:53	0960_SS288_221123	✓	✓
EP2215811-003	23-Nov-2022 09:25	0960_SS192_221123	✓	✓
EP2215811-004	23-Nov-2022 09:26	0960_SS193_221123	✓	✓
EP2215811-005	23-Nov-2022 11:28	0960_SD303_221123	✓	✓
EP2215811-006	23-Nov-2022 11:28	0960_SD304_221123	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

██████████	- A4 - AU Tax Invoice (INV)	Email	██████████cardno.com.au
DERP LAB REPORTS			
██████████	- EDI Format - ESDAT (ESDAT)	Email	██████████
██████████	(STANTEC)		
	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
	- EDI Format - ESDAT (ESDAT)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████

CERTIFICATE OF ANALYSIS

Work Order : **EP2215811**
Client : **STANTEC AUSTRALIA PTY LTD**
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE TERRACE
 PERTH 6000
Telephone : ----
Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45293
Sampler : [REDACTED]
Site : Learmonth SD - JS
Quote number : SY/139/19 B
No. of samples received : 6
No. of samples analysed : 6

Page : 1 of 7
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : [REDACTED]
Date Samples Received : 25-Nov-2022 12:00
Date Analysis Commenced : 05-Dec-2022
Issue Date : 07-Dec-2022 11:45



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS190_221123	0960_SS288_221123	0960_SS192_221123	0960_SS193_221123	0960_SD303_221123
Sampling date / time				23-Nov-2022 07:52	23-Nov-2022 07:53	23-Nov-2022 09:25	23-Nov-2022 09:26	23-Nov-2022 11:28
Compound	CAS Number	LOR	Unit	EP2215811-001	EP2215811-002	EP2215811-003	EP2215811-004	EP2215811-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	1.7	14.9	0.3	28.2	28.1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0078	0.0012	<0.0002	0.0014	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS190_221123	0960_SS288_221123	0960_SS192_221123	0960_SS193_221123	0960_SD303_221123
Sampling date / time				23-Nov-2022 07:52	23-Nov-2022 07:53	23-Nov-2022 09:25	23-Nov-2022 09:26	23-Nov-2022 11:28
Compound	CAS Number	LOR	Unit	EP2215811-001	EP2215811-002	EP2215811-003	EP2215811-004	EP2215811-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0078	0.0012	<0.0002	0.0014	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0078	0.0012	<0.0002	0.0014	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0078	0.0012	<0.0002	0.0014	<0.0002
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	97.0	87.5	103	98.5	90.5
13C8-PFOA	----	0.0002	%	106	104	95.5	104	99.5



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

0960_SD304_221123

Sampling date / time			23-Nov-2022 11:28	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2215811-006	-----	-----	-----
Result				----	----	----	----

EA055: Moisture Content (Dried @ 105-110°C)

Moisture Content	----	0.1	%	20.8	----	----	----	----
------------------	------	-----	---	------	------	------	------	------

EP231A: Perfluoroalkyl Sulfonic Acids

Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----

EP231B: Perfluoroalkyl Carboxylic Acids

Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	----	----	----	----

EP231C: Perfluoroalkyl Sulfonamides

Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	----	----	----	----



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

0960_SD304_221123

Sampling date / time

23-Nov-2022 11:28

Compound

CAS Number

LOR

Unit

EP2215811-006

Result

EP231C: Perfluoroalkyl Sulfonamides - Continued

N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	----	----	----	----

EP231D: (n:2) Fluorotelomer Sulfonic Acids

4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	----	----	----	----

EP231P: PFAS Sums

Sum of PFAS	----	0.0002	mg/kg	<0.0002	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	----	----	----	----

EP231S: PFAS Surrogate

13C4-PFOS	----	0.0002	%	89.5	----	----	----	----
13C8-PFOA	----	0.0002	%	97.0	----	----	----	----

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Work Order : EP2215811
Client : STANTEC AUSTRALIA PTY LTD
Project : WA_0960_PFASOMP



Surrogate Control Limits

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

QUALITY CONTROL REPORT

Work Order	: EP2215811	Page	: 1 of 7
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 05-Dec-2022
C-O-C number	: 45293	Issue Date	: 07-Dec-2022
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SD - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 6		
No. of samples analysed	: 6		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4749329)									
EP2215811-002	0960_SS288_221123	EA055: Moisture Content	----	0.1	%	14.9	15.0	0.8	0% - 20%
EP2215817-002	Anonymous	EA055: Moisture Content	----	0.1	%	12.2	12.3	0.9	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0003	0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746045) - continued									
EP2215789-009	Anonymous	EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215814-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Page : 4 of 7
 Work Order : EP2215811
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215814-003	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746045)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.4	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	62.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746045)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	79.9	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.2	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.6	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.4	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.4	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.4	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.9	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	63.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	68.8	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.4	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	72.4	65.0	137



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
Method: Compound	CAS Number	LOR	Unit		Result	Spike	Spike Recovery (%)	Acceptable Limits (%)	
						Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045) - continued									
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.6	69.2	143	

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	86.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	94.8	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	89.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	93.6	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	82.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	66.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	91.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	96.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	88.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	90.4	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	102	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	105	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	89.6	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	106	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	119	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.00125 mg/kg	112	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	104	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	86.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	99.0	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	88.8	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	105	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	86.5	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	93.2	63.0	144



Sub-Matrix: SOIL

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045) - continued							
EP2215789-009	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	72.0	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	82.4	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	97.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	69.6	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	79.2	69.2	143

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2215811	Page	: 1 of 4
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: Learmonth SD - JS	Issue Date	: 07-Dec-2022
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 6
Order number	: pfas-omp Learmonth	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055) 0960_SS190_221123, 0960_SS192_221123, 0960_SD303_221123,	0960_SS288_221123, 0960_SS193_221123, 0960_SD304_221123	23-Nov-2022	----	----	----	06-Dec-2022	07-Dec-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SS190_221123, 0960_SS192_221123, 0960_SD303_221123,	0960_SS288_221123, 0960_SS193_221123, 0960_SD304_221123	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X) 0960_SS190_221123, 0960_SS192_221123, 0960_SD303_221123,	0960_SS288_221123, 0960_SS193_221123, 0960_SD304_221123	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X) 0960_SS190_221123, 0960_SS192_221123, 0960_SD303_221123,	0960_SS288_221123, 0960_SS193_221123, 0960_SD304_221123	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SS190_221123, 0960_SS192_221123, 0960_SD303_221123,	0960_SS288_221123, 0960_SS193_221123, 0960_SD304_221123	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X) 0960_SS190_221123, 0960_SS192_221123, 0960_SD303_221123,	0960_SS288_221123, 0960_SS193_221123, 0960_SD304_221123	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

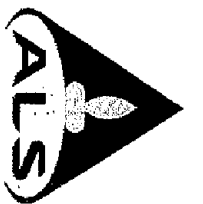
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
QuEChERS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.



Environmental Division
Perth
Work Order Reference
EP2215812



Telephone : -- 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA - 0960 - PEAS ONP Client: STANTEC

ALS Compass COC Reference: 45291 45292 45307 45310 45300

Project Manager: [Redacted]
Phone: [Redacted]
Sampler: [Redacted]
Phone: [Redacted]

Turnaround Requirements: Standard ☒ Urgent ☐

Special Instructions:

Custody:

Relinquished by: <u>STANTEC</u>	Received by: <u>[Redacted]</u>	Relinquished by:	Received by:
Date / Time: <u>24/11/22</u> <u>7AM</u>	Date / Time: <u>[Redacted]</u>	Date / Time:	Date / Time:
	<u>25/11</u> <u>12pm</u>		



CHAIN OF CUSTODY

ALS) COC# 45298

ALS Laboratory: EP Perth

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP

SITE: Learmonth GW - JS

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MMHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_MM/135_2.5-3.0		23/11/2022 07:51 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
002	0960_MM/175_4.0-4.5		23/11/2022 10:14 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		

CLIENT: MW/HAUS - STANTEC AUSTRALIA PTY LTD		RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
PROJECT: WA_0960_PFASOMP		DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:
SITE: Learmonth GW - JS	TURNAROUND REQUIREMENTS: 5 Days	LABORATORY USE ONLY (Circle)			
ORDER NO: pfas-omp Learmonth	Biohazard Info:	Custody Seal Intact? Yes No N/A			
PROJECT MANAGER: [REDACTED]	CONTACT PH: [REDACTED] SAMPLER MOBILE: [REDACTED]	Free ice / frozen ice bricks present upon receipt? Yes No N/A			
PRIMARY SAMPLER: [REDACTED]	QUOTE NO: SY139/19 B / ES2022MW/HAUS0002	Random Sample Temperature on Receipt: °C			
EMAIL REPORTS TO: [REDACTED]	Other comments:				
EMAIL INVOICES TO: [REDACTED]					

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0960_MW135_2-5-3.0	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0960_MW175_4-0-4.5	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PPASCOMP

SITE: Learmonth GW - JS
ORDER NO: pfas-comp Learmonth

PROJECT MANAGER: [REDACTED]
PRIMARY SAMPLER: [REDACTED]

EMAIL REPORTS TO: [REDACTED]
EMAIL INVOICES TO: [REDACTED]

CONTACT PH: [REDACTED] SAMPLER MOBILE: [REDACTED]
QUOTE NO: SY/139/19 B / ES2022MMHAUS0002

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days	LABORATORY USE ONLY (Circle)
Biohazard info:	Custody Seal Intact? Yes No N/A
	Free ice / frozen ice bricks present upon receipt? Yes No N/A
	Random Sample Temperature on Receipt: C
	Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_MMV135_2.5-3.0	HDPE (no PTFE)	20 mL	00352005019685	Grey	No	
001	0960_MMV135_2.5-3.0	HDPE (no PTFE)	20 mL	00352005002624	Grey	No	
001	0960_MMV135_2.5-3.0	Clear Plastic Bottle - Natural	500 mL	00070522145126	Green	No	
001	0960_MMV135_2.5-3.0	HDPE (no PTFE)	20 mL	00350821001788	Grey	No	
001	0960_MMV135_2.5-3.0	HDPE (no PTFE)	20 mL	00350821001872	Grey	No	
002	0960_MMV175_4.0-4.5	HDPE (no PTFE)	20 mL	00350821001907	Grey	No	
002	0960_MMV175_4.0-4.5	HDPE (no PTFE)	20 mL	00350821001941	Grey	No	
002	0960_MMV175_4.0-4.5	Clear Plastic Bottle - Natural	500 mL	00070522145127	Green	No	

Total Bottle Count: ALS: 8, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2215812

Client : STANTEC AUSTRALIA PTY LTD Contact : [REDACTED] (STANTEC) Address : GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000 E-mail : [REDACTED] Telephone : ---- Facsimile : ---- Project : WA_0960_PFASOMP Order number : pfas-omp Learmonth C-O-C number : 45298 Site : Learmonth GW - JS Sampler : [REDACTED] [REDACTED]	Laboratory : Environmental Division Perth Contact : [REDACTED] Address : 26 Rigali Way Wangara WA Australia 6065 E-mail : [REDACTED] Telephone : [REDACTED] Facsimile : [REDACTED] Page : 1 of 2 Quote number : ES2022MWH AUS0002 (SY/139/19 B) QC Level : NEPM 2013 B3 & ALS QC Standard
--	---

Dates

Date Samples Received : 25-Nov-2022 12:00 Client Requested Due Date : 08-Dec-2022	Issue Date : 29-Nov-2022 Scheduled Reporting Date : 08-Dec-2022
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Delivery Details

Mode of Delivery : Carrier No. of coolers/boxes : 3 Receipt Detail :	Security Seal : Intact. Temperature : 21.2 - Ice present No. of samples received / analysed : 2 / 2
--	---

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP2215812-001 : 23-Nov-2022 07:51 : 0960_MW135_2.5-3.0_221123

EP2215812-002 : 23-Nov-2022 10:14 : 0960_MW175_4.0-4.5_221123

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215812-001	23-Nov-2022 07:51	0960_MW135_2.5-3.0_2...	✓	✓	✓
EP2215812-002	23-Nov-2022 10:14	0960_MW175_4.0-4.5_2...	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

██████████	- A4 - AU Tax Invoice (INV)	Email	██████████
DERP LAB REPORTS			
██████████	- EDI Format - ESDAT (ESDAT)	Email	██████████
██████████	(STANTEC)		
	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
	- EDI Format - ESDAT (ESDAT)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████

CERTIFICATE OF ANALYSIS

Work Order : **EP2215812**
Client : **STANTEC AUSTRALIA PTY LTD**
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE TERRACE
 PERTH 6000
Telephone : ----
Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45298
Sampler : [REDACTED]
Site : Learmonth GW - JS
Quote number : SY/139/19 B
No. of samples received : 2
No. of samples analysed : 2

Page : 1 of 6
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : [REDACTED]
Date Samples Received : 25-Nov-2022 12:00
Date Analysis Commenced : 30-Nov-2022
Issue Date : 08-Dec-2022 16:32



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW135_2.5-3.0 _221123	0960_MW175_4.0-4.5 _221123	----	----	----
Sampling date / time				23-Nov-2022 07:51	23-Nov-2022 10:14	----	----	----
Compound	CAS Number	LOR	Unit	EP2215812-001	EP2215812-002	-----	-----	-----
Result				Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	242	421	----	----	----
Total Alkalinity as CaCO ₃	----	1	mg/L	242	421	----	----	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	1540	94	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	10700	1060	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	372	67	----	----	----
Magnesium	7439-95-4	1	mg/L	819	187	----	----	----
Sodium	7440-23-5	1	mg/L	6360	501	----	----	----
Potassium	7440-09-7	1	mg/L	326	41	----	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	339	40.3	----	----	----
∅ Total Cations	----	0.01	meq/L	371	41.6	----	----	----
∅ Ionic Balance	----	0.01	%	4.54	1.59	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	----	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW135_2.5-3.0 _221123	0960_MW175_4.0-4.5 _221123	----	----	----
Sampling date / time				23-Nov-2022 07:51	23-Nov-2022 10:14	----	----	----
Compound	CAS Number	LOR	Unit	EP2215812-001	EP2215812-002	-----	-----	-----
				Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	----	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW135_2.5-3.0 _221123	0960_MW175_4.0-4.5 _221123	----	----	----
Sampling date / time				23-Nov-2022 07:51	23-Nov-2022 10:14	----	----	----
Compound	CAS Number	LOR	Unit	EP2215812-001	EP2215812-002	-----	-----	-----
Result				Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	96.4	86.9	----	----	----
13C8-PFOA	----	0.02	%	96.4	93.7	----	----	----

Page : 6 of 6
Work Order : EP2215812
Client : STANTEC AUSTRALIA PTY LTD
Project : WA_0960_PFASOMP



Surrogate Control Limits

Sub-Matrix: GROUNDWATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

QUALITY CONTROL REPORT

Work Order	: EP2215812	Page	: 1 of 8
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45298	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth GW - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 2		
No. of samples analysed	: 2		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4752743)									
EP2215797-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	125	124	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	125	124	0.0	0% - 20%
EP2215813-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	133	144	7.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	133	144	7.6	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4736343)									
EP2215715-009	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	20	19	0.0	0% - 50%
EP2215791-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2660	2640	0.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4736342)									
EP2215715-009	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	58	59	2.0	0% - 20%
EP2215791-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	17100	17400	1.7	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4738821)									
EP2215715-016	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	16	15	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	26	26	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	800	788	1.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	55	54	2.1	0% - 20%
EP2215848-008	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	246	246	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	412	413	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	3010	3000	0.1	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	155	155	0.0	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746956)									
EP2215791-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215812-001	0960_MW135_2.5-3.0_221 123	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746956)									
EP2215791-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2215812-001	0960_MW135_2.5-3.0_221 123	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746956)									
EP2215791-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746956) - continued									
EP2215791-001	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215812-001	0960_MW135_2.5-3.0_221 123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746956)									
EP2215791-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215812-001	0960_MW135_2.5-3.0_221 123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746956) - continued									
EP2215812-001	0960_MW135_2.5-3.0_221 123	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4746956)									
EP2215791-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2215812-001	0960_MW135_2.5-3.0_221 123	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			LCS	Low
ED037P: Alkalinity by PC Titrator (QCLot: 4752743)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	110	87.8	118
				<1	200 mg/L	102	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736343)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	107	89.9	112
				<1	500 mg/L	106	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4736342)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	93.3	88.6	113
				<1	1000 mg/L	98.2	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4738821)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.6	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.5	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	102	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.8	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746956)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	77.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	109	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	110	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	76.2	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	81.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	93.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746956)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	93.2	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	97.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	98.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	98.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	114	72.0	134



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746956) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	114	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	104	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746956)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	95.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	93.1	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	87.5	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	101	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	93.4	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	97.4	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	83.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746956)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	109	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	78.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	89.8	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	123	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736343)							
EP2215715-009	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	116	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4736342)							
EP2215715-009	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	90.7	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746956)							
EP2215791-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	96.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	103	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	98.4	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	97.2	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	97.8	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	95.4	53.0	142



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746956)							
EP2215791-004	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	101	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	108	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	112	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	112	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	113	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	110	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	108	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	105	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	117	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	122	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	111	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746956)							
EP2215791-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	101	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	112	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	114	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	111	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	102	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	114	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	87.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746956)							
EP2215791-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	100	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	95.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	111	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	125	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2215812	Page	: 1 of 4
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: Learmonth GW - JS	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 2
Order number	: pfas-omp Learmonth	No. of samples analysed	: 2

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) 0960_MW135_2.5-3.0_221123,	0960_MW175_4.0-4.5_221123	23-Nov-2022	----	----	----	07-Dec-2022	07-Dec-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) 0960_MW135_2.5-3.0_221123,	0960_MW175_4.0-4.5_221123	23-Nov-2022	----	----	----	06-Dec-2022	21-Dec-2022	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 0960_MW135_2.5-3.0_221123,	0960_MW175_4.0-4.5_221123	23-Nov-2022	----	----	----	06-Dec-2022	21-Dec-2022	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) 0960_MW135_2.5-3.0_221123,	0960_MW175_4.0-4.5_221123	23-Nov-2022	----	----	----	30-Nov-2022	30-Nov-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_MW135_2.5-3.0_221123,	0960_MW175_4.0-4.5_221123	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	22-May-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) 0960_MW135_2.5-3.0_221123,	0960_MW175_4.0-4.5_221123	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	22-May-2023	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) 0960_MW135_2.5-3.0_221123,	0960_MW175_4.0-4.5_221123	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	22-May-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_MW135_2.5-3.0_221123,	0960_MW175_4.0-4.5_221123	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	22-May-2023	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0960_MW135_2.5-3.0_221123,	0960_MW175_4.0-4.5_221123	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	22-May-2023	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

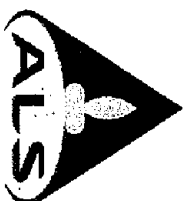
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



Environmental Division
Perth

Work Order Reference
EP2215813



Telephone : -- 61-89406 1301

Custody Document for Submissions via ALS Compass App

Project:

WA - 0960 - PEAS OGP

Client:

STANTEC

Project Manager:

Phone:

ALS Compass COC Reference: 45291

45298

45307

45310

45300

45290

Sampler:

Phone:

Turnaround Requirements: Standard



Urgent

Special Instructions:

--	--	--	--

Custody:

Relinquished by: <u>STANTEC</u>	Received by: 	Relinquished by:	Received by:
Date / Time: <u>24/11/22</u> <u>7AM</u>	Date / Time: <u>25/11</u> <u>12pm</u>	Date / Time:	Date / Time:



CHAIN OF CUSTODY

ALS) COC#: 45290

ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSASOMP

SITE: Learmonth SW/OTH - SC

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_OTH107		23/11/2022 07:10 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0960_SW208	2 x extra lab QC	23/11/2022 07:41 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
003	0960_QC121		23/11/2022 07:41 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0960_OTH106		23/11/2022 07:53 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0960_SW205		23/11/2022 08:33 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0960_SW301		23/11/2022 09:12 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
007	0960_SW207	2 x lab QC added	23/11/2022 10:56 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		



CHAIN OF CUSTODY

ALS) COC#: 45290

ALS Laboratory: EP Perth

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSASOMP

SITE: Learmonth SW/OTH - SC

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

CONTACT PH: [REDACTED]
QUOTE NO: SY/139/19 B

SAMPLER MOBILE: [REDACTED] / ES2022MMHAUS0002

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

PARTIAL ANALYSIS GROUP NAME

SELECTED ANALYSIS NAME

SAMPLE	SAMPLE NAME	MATRIX	SELECTED ANALYSIS NAME
001	0960_OTH107 Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0960_SW208 Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0960_QC121 Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0960_OTH106 Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0960_SW205 Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0960_SW301 Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0960_SW207 Surface Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)



CHAIN OF CUSTODY

ALS COC#: 45290 ALS Laboratory: EP Perth

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFIASCOMP

SITE: Learmonth SW/OTI - SC

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

Yes No N/A

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_OTI107	Clear Plastic Bottle - Natural	500 mL	00070622145041	Green	No	
001	0960_OTI107	HDPE (no PTFE)	20 mL	00350522043183	Grey	No	
001	0960_OTI107	HDPE (no PTFE)	20 mL	00350522042907	Grey	No	
002	0960_SW208	Clear Plastic Bottle - Natural	500 mL	00070621089901	Green	No	
002	0960_SW208	HDPE (no PTFE)	20 mL	00350821023815	Grey	No	
002	0960_SW208	HDPE (no PTFE)	20 mL	00350821023771	Grey	No	
002	0960_SW208	HDPE (no PTFE)	20 mL	00350621067028	Grey	No	
002	0960_SW208	HDPE (no PTFE)	500 mL	00070621089886	Green	No	
003	0960_QC121	Clear Plastic Bottle - Natural	20 mL	00350821023842	Grey	No	
003	0960_QC121	HDPE (no PTFE)	20 mL	00350821023953	Grey	No	
003	0960_QC121	HDPE (no PTFE)	20 mL	00350821023772	Grey	No	
004	0960_OTI106	HDPE (no PTFE)	20 mL	00350821043204	Grey	No	
004	0960_OTI106	HDPE (no PTFE)	500 mL	00070621089947	Green	No	
004	0960_OTI106	Clear Plastic Bottle - Natural	20 mL	00350821023849	Grey	No	
005	0960_SW205	HDPE (no PTFE)	20 mL	00350821023872	Grey	No	
005	0960_SW205	HDPE (no PTFE)	500 mL	00070621089861	Green	No	
005	0960_SW205	Clear Plastic Bottle - Natural	20 mL	00350821023768	Grey	No	
006	0960_SW301	HDPE (no PTFE)	20 mL	00350821023893	Grey	No	
006	0960_SW301	HDPE (no PTFE)	500 mL	00070621089862	Green	No	
007	0960_SW207	Clear Plastic Bottle - Natural	20 mL	00070621191224	Green	No	
007	0960_SW207	HDPE (no PTFE)	20 mL	00350621067163	Grey	No	
007	0960_SW207	HDPE (no PTFE)	20 mL	00350621067239	Grey	No	
007	0960_SW207	HDPE (no PTFE)	20 mL	00352101071495	Grey	No	
007	0960_SW207	HDPE (no PTFE)	20 mL	00352101071653	Grey	No	



CHAIN OF CUSTODY

ALS) COC#: 45290

ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP

SITE: Learmonth SW/OTI - SC

ORDER NO: pfes-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE

/ ES2022MWHAUS0002

Total Bottle Count: ALS: 25, Non ALS: 0



CHAIN OF CUSTODY

ALIS) COC#: 45290

ALS Laboratory: EP Perth

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSASOMP

SITE: Learmonth SW/OTH - SC

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH:

QUOTE NO: SY139/19 B

SAMPLER MOBILE:

/ ES2022MMHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_OTH107		23/11/2022 07:10 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0960_SW208	2 x extra lab QC	23/11/2022 07:41 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
003	0960_QC121		23/11/2022 07:41 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0960_OTH106		23/11/2022 07:53 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0960_SW205		23/11/2022 08:33 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0960_SW301		23/11/2022 08:12 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
007	0960_SW207	2 x lab QC added	23/11/2022 10:58 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		



CHAIN OF CUSTODY

COC#: 45290

ALS Laboratory: EP Perth

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP

SITE: Learmonth SW/OTH - SC

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard Info:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 B

/ ES2022MMHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

PARTIAL ANALYSIS GROUP NAME

SELECTED ANALYSIS NAME

SAMPLE	SAMPLE NAME	MATRIX	
001	0960_OTH107	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0960_SW208	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0960_QC121	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0960_OTH106	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0960_SW205	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0960_SW301	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
007	0960_SW207	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)



CHAIN OF CUSTODY

ALS COC#: 45290

ALS Laboratory: EP Perth

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFIASOMP

SITE: Leammonth SW/OTI - SC

ORDER NO.: pfas-omp Leammonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

°C

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

BOTTLE NAME

VOLUME

BARCODE

TYPE

FILTERED

REASON

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_OTI107	Clear Plastic Bottle - Natural	500 mL	00070522145041	Green	No	
001	0960_OTI107	HDPE (no PTFE)	20 mL	00350522043183	Grey	No	
001	0960_OTI107	HDPE (no PTFE)	20 mL	00350522042907	Grey	No	
002	0960_SW208	Clear Plastic Bottle - Natural	500 mL	00070621089901	Green	No	
002	0960_SW208	HDPE (no PTFE)	20 mL	00350621057010	Grey	No	
002	0960_SW208	HDPE (no PTFE)	20 mL	00350821023815	Grey	No	
002	0960_SW208	HDPE (no PTFE)	20 mL	00350821023771	Grey	No	
002	0960_SW208	HDPE (no PTFE)	20 mL	00350621067028	Grey	No	
002	0960_SW208	HDPE (no PTFE)	20 mL	00070621089886	Green	No	
003	0960_QC121	Clear Plastic Bottle - Natural	500 mL	00070621089886	Green	No	
003	0960_QC121	HDPE (no PTFE)	20 mL	00350821023842	Grey	No	
003	0960_QC121	HDPE (no PTFE)	20 mL	00350821023953	Grey	No	
004	0960_OTI106	HDPE (no PTFE)	20 mL	00350821023772	Grey	No	
004	0960_OTI106	HDPE (no PTFE)	20 mL	00350821043204	Grey	No	
004	0960_OTI106	Clear Plastic Bottle - Natural	500 mL	00070621089947	Green	No	
005	0960_SW205	HDPE (no PTFE)	20 mL	00350821023849	Grey	No	
005	0960_SW205	HDPE (no PTFE)	20 mL	00350821023872	Grey	No	
005	0960_SW205	Clear Plastic Bottle - Natural	500 mL	00070621089851	Green	No	
006	0960_SW301	HDPE (no PTFE)	20 mL	00350821023768	Grey	No	
006	0960_SW301	HDPE (no PTFE)	20 mL	00350821023893	Grey	No	
006	0960_SW301	Clear Plastic Bottle - Natural	500 mL	00070621089982	Green	No	
007	0960_SW207	Clear Plastic Bottle - Natural	500 mL	00070621191224	Green	No	
007	0960_SW207	HDPE (no PTFE)	20 mL	00350621067163	Grey	No	
007	0960_SW207	HDPE (no PTFE)	20 mL	00350621067239	Grey	No	
007	0960_SW207	HDPE (no PTFE)	20 mL	00350621071496	Grey	No	
007	0960_SW207	HDPE (no PTFE)	20 mL	00350621071653	Grey	No	



CHAIN OF CUSTODY

ALS) COC#: 45290 ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PFIASOMP
SITE: Learmonth SW/OTI - SC
ORDER NO: pfas-omp Learmonth
PROJECT MANAGER: [REDACTED]
PRIMARY SAMPLER: [REDACTED]
EMAIL REPORTS TO: [REDACTED]
EMAIL INVOICES TO: [REDACTED]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard Info:

CONTACT PH: [REDACTED] SAMPLER MOBILE: [REDACTED]
QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal Intact?	Yes	No	N/A
Free Ice / frozen ice bricks present upon receipt?	Yes	No	N/A
Random Sample Temperature on Receipt:			C
Other comments:			

Total Bottle Count: ALS: 25, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2215813

Client : STANTEC AUSTRALIA PTY LTD Contact : [REDACTED] (STANTEC) Address : GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000 E-mail : [REDACTED] Telephone : ---- Facsimile : ---- Project : WA_0960_PFASOMP Order number : pfas-omp Learmonth C-O-C number : 45290 Site : Learmonth SW/OTH - SC Sampler : [REDACTED]	Laboratory : Environmental Division Perth Contact : [REDACTED] Address : 26 Rigali Way Wangara WA Australia 6065 E-mail : [REDACTED] Telephone : [REDACTED] Facsimile : [REDACTED] Page : 1 of 2 Quote number : ES2022MWH AUS0002 (SY/139/19 B) QC Level : NEPM 2013 B3 & ALS QC Standard
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Dates

Date Samples Received : 25-Nov-2022 12:00	Issue Date : 29-Nov-2022
Client Requested Due Date : 08-Dec-2022	Scheduled Reporting Date : 08-Dec-2022

Delivery Details

Mode of Delivery : Carrier	Security Seal : Intact.
No. of coolers/boxes : 3	Temperature : 21.2 - Ice present
Receipt Detail :	No. of samples received / analysed : 7 / 7

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215813-001	23-Nov-2022 07:10	0960_OTH107_221123	✓	✓	✓
EP2215813-002	23-Nov-2022 07:41	0960_SW208_221123	✓	✓	✓
EP2215813-003	23-Nov-2022 07:41	0960_QC121_221123	✓	✓	✓
EP2215813-004	23-Nov-2022 07:53	0960_OTH106_221123	✓	✓	✓
EP2215813-005	23-Nov-2022 08:33	0960_SW205_221123	✓	✓	✓
EP2215813-006	23-Nov-2022 09:12	0960_SW301_221123	✓	✓	✓
EP2215813-007	23-Nov-2022 10:58	0960_SW207_221123	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

- A4 - AU Tax Invoice (INV)	Email	
DERP LAB REPORTS		
- EDI Format - ESDAT (ESDAT)	Email	
(STANTEC) - *AU Certificate of Analysis - NATA (COA) - *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) - *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) - A4 - AU Sample Receipt Notification - Environmental HT (SRN) - Chain of Custody (CoC) (COC) - EDI Format - ESDAT (ESDAT) - EDI Format - XTab (XTAB)	Email	

CERTIFICATE OF ANALYSIS

Work Order : **EP2215813**
Client : **STANTEC AUSTRALIA PTY LTD**
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE TERRACE
 PERTH 6000
Telephone : ----
Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45290
Sampler : [REDACTED]
Site : Learmonth SW/OTH - SC
Quote number : SY/139/19 B
No. of samples received : 7
No. of samples analysed : 7

Page : 1 of 9
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : [REDACTED]
Date Samples Received : 25-Nov-2022 12:00
Date Analysis Commenced : 30-Nov-2022
Issue Date : 08-Dec-2022 21:39



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_OTH107_22112 3	0960_OTH106_22112 3	----	----	----
Sampling date / time				23-Nov-2022 07:10	23-Nov-2022 07:53	----	----	----
Compound	CAS Number	LOR	Unit	EP2215813-001	EP2215813-004	-----	-----	-----
Result				Result	Result	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	12	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	121	133	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	133	133	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2550	2760	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	20500	22700	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	471	498	----	----	----
Magnesium	7439-95-4	1	mg/L	1490	1560	----	----	----
Sodium	7440-23-5	1	mg/L	11800	12400	----	----	----
Potassium	7440-09-7	1	mg/L	607	639	----	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	634	700	----	----	----
∅ Total Cations	----	0.01	meq/L	675	709	----	----	----
∅ Ionic Balance	----	0.01	%	3.12	0.60	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	----	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_OTH107_22112 3	0960_OTH106_22112 3	----	----	----
Sampling date / time				23-Nov-2022 07:10	23-Nov-2022 07:53	----	----	----
Compound	CAS Number	LOR	Unit	EP2215813-001	EP2215813-004	-----	-----	-----
				Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	----	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_OTH107_22112 3	0960_OTH106_22112 3	----	----	----
Sampling date / time				23-Nov-2022 07:10	23-Nov-2022 07:53	----	----	----
Compound	CAS Number	LOR	Unit	EP2215813-001	EP2215813-004	-----	-----	-----
Result				Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	----	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	----	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	84.6	93.4	----	----	----
13C8-PFOA	----	0.02	%	90.5	95.0	----	----	----



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW208_221123	0960_QC121_221123	0960_SW205_221123	0960_SW301_221123	0960_SW207_221123
Sampling date / time				23-Nov-2022 07:41	23-Nov-2022 07:41	23-Nov-2022 08:33	23-Nov-2022 09:12	23-Nov-2022 10:58
Compound	CAS Number	LOR	Unit	EP2215813-002	EP2215813-003	EP2215813-005	EP2215813-006	EP2215813-007
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	23	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	150	150	193	148	191
Total Alkalinity as CaCO3	----	1	mg/L	150	150	193	171	191
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2380	2630	4440	3510	3120
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	22600	22800	37500	32000	23100
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	471	469	870	797	576
Magnesium	7439-95-4	1	mg/L	1450	1460	2870	2420	1790
Sodium	7440-23-5	1	mg/L	11500	11700	21300	18700	14200
Potassium	7440-09-7	1	mg/L	594	596	989	913	777
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	690	701	1150	979	720
∅ Total Cations	----	0.01	meq/L	658	668	1230	1080	814
∅ Ionic Balance	----	0.01	%	2.36	2.42	3.24	4.70	6.08
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW208_221123	0960_QC121_221123	0960_SW205_221123	0960_SW301_221123	0960_SW207_221123
Sampling date / time				23-Nov-2022 07:41	23-Nov-2022 07:41	23-Nov-2022 08:33	23-Nov-2022 09:12	23-Nov-2022 10:58
Compound	CAS Number	LOR	Unit	EP2215813-002	EP2215813-003	EP2215813-005	EP2215813-006	EP2215813-007
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW208_221123	0960_QC121_221123	0960_SW205_221123	0960_SW301_221123	0960_SW207_221123
Sampling date / time				23-Nov-2022 07:41	23-Nov-2022 07:41	23-Nov-2022 08:33	23-Nov-2022 09:12	23-Nov-2022 10:58
Compound	CAS Number	LOR	Unit	EP2215813-002	EP2215813-003	EP2215813-005	EP2215813-006	EP2215813-007
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	98.7	95.1	93.3	99.1	82.6
13C8-PFOA	----	0.02	%	93.7	94.1	91.3	92.3	92.4



Surrogate Control Limits

Sub-Matrix: GROUNDWATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: SURFACE WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

- (WATER) EP231A: Perfluoroalkyl Sulfonic Acids
- (WATER) EP231B: Perfluoroalkyl Carboxylic Acids
- (WATER) EP231C: Perfluoroalkyl Sulfonamides
- (WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids
- (WATER) EP231P: PFAS Sums
- (WATER) EP231S: PFAS Surrogate

QUALITY CONTROL REPORT

Work Order	: EP2215813	Page	: 1 of 8
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45290	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SW/OTH - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 7		
No. of samples analysed	: 7		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4752743)									
EP2215797-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	125	124	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	125	124	0.0	0% - 20%
EP2215813-004	0960_OTH106_221123	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	133	144	7.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	133	144	7.6	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4736349)									
EP2215792-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2870	3080	7.0	0% - 20%
EP2215793-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	191	196	2.2	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4736348)									
EP2215792-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	28200	26700	5.5	0% - 20%
EP2215793-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	464	495	6.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4736104)									
EP2215792-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	584	575	1.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1750	1750	0.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	14000	14100	0.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	755	756	0.2	0% - 20%
EP2215793-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	97	97	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	63	63	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	257	257	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	20	20	0.0	0% - 20%



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 4736105)									
EP2215813-003	0960_QC121_221123	ED093F: Calcium	7440-70-2	1	mg/L	469	493	5.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1460	1530	4.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11700	12200	4.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	596	628	5.2	0% - 20%
EP2215815-006	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	970	1020	5.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	2430	2440	0.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	20600	20300	1.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	984	983	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4743877)									
EP2215797-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215813-007	0960_SW207_221123	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4743877)									
EP2215797-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTeDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2215813-007	0960_SW207_221123	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4743877) - continued									
EP2215813-007	0960_SW207_221123	EP231X: Perfluorododecanoic acid (PFDODA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743877)									
EP2215797-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215813-007	0960_SW207_221123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4743877)									
EP2215797-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Page : 5 of 8
 Work Order : EP2215813
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4743877) - continued									
EP2215813-007	0960_SW207_221123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4743877)									
EP2215797-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2215813-007	0960_SW207_221123	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED037P: Alkalinity by PC Titrator (QCLot: 4752743)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	110	87.8	118
				<1	200 mg/L	102	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736349)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	94.9	89.9	112
				<1	500 mg/L	92.0	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4736348)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	88.6	113
				<1	1000 mg/L	98.6	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4736104)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.3	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.9	84.6	108
ED093F: Dissolved Major Cations (QCLot: 4736105)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	100	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.4	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.3	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743877)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	83.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	88.0	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	84.2	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	97.6	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	90.0	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	91.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743877)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	100	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	97.4	72.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743877) - continued								
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	98.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	105	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	106	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	84.6	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	124	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	115	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	116	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743877)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	90.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	101	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	93.6	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.5	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	106	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	119	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	89.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743877)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	103	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	99.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	99.0	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	84.2	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736349)							
EP2215792-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4736348)							
EP2215792-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743877)							
EP2215813-002	0960_SW208_221123	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	85.0	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	108	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	100	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	93.0	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	85.2	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	87.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743877)							
EP2215813-002	0960_SW208_221123	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	99.2	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	103	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	100	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	98.4	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	96.8	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	100	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	98.2	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	102	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	128	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	114	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	109	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743877)							
EP2215813-002	0960_SW208_221123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	92.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	109	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	100	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	102	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	100	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	104	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	93.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743877)							
EP2215813-002	0960_SW208_221123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	100	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	86.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	84.0	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	71.8	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2215813	Page	: 1 of 5
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: Learmonth SW/OTH - SC	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 7
Order number	: pfas-omp Learmonth	No. of samples analysed	: 7

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2215792--001	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EP2215792--001	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results. This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein. Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters. Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) 0960_OTH107_221123, 0960_QC121_221123, 0960_SW205_221123, 0960_SW207_221123	0960_SW208_221123, 0960_OTH106_221123, 0960_SW301_221123,	23-Nov-2022	----	----	----	07-Dec-2022	07-Dec-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) 0960_OTH107_221123, 0960_QC121_221123, 0960_SW205_221123, 0960_SW207_221123	0960_SW208_221123, 0960_OTH106_221123, 0960_SW301_221123,	23-Nov-2022	----	----	----	08-Dec-2022	21-Dec-2022	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 0960_OTH107_221123, 0960_QC121_221123, 0960_SW205_221123, 0960_SW207_221123	0960_SW208_221123, 0960_OTH106_221123, 0960_SW301_221123,	23-Nov-2022	----	----	----	08-Dec-2022	21-Dec-2022	✓



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)		23-Nov-2022	----	----	----	30-Nov-2022	30-Nov-2022	✓
0960_OTH107_221123,	0960_SW208_221123,							
0960_QC121_221123,	0960_OTH106_221123,							
0960_SW205_221123,	0960_SW301_221123,							
0960_SW207_221123								
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)		23-Nov-2022	05-Dec-2022	22-May-2023	✓	08-Dec-2022	22-May-2023	✓
0960_OTH107_221123,	0960_SW208_221123,							
0960_QC121_221123,	0960_OTH106_221123,							
0960_SW205_221123,	0960_SW301_221123,							
0960_SW207_221123								
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)		23-Nov-2022	05-Dec-2022	22-May-2023	✓	08-Dec-2022	22-May-2023	✓
0960_OTH107_221123,	0960_SW208_221123,							
0960_QC121_221123,	0960_OTH106_221123,							
0960_SW205_221123,	0960_SW301_221123,							
0960_SW207_221123								
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)		23-Nov-2022	05-Dec-2022	22-May-2023	✓	08-Dec-2022	22-May-2023	✓
0960_OTH107_221123,	0960_SW208_221123,							
0960_QC121_221123,	0960_OTH106_221123,							
0960_SW205_221123,	0960_SW301_221123,							
0960_SW207_221123								
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)		23-Nov-2022	05-Dec-2022	22-May-2023	✓	08-Dec-2022	22-May-2023	✓
0960_OTH107_221123,	0960_SW208_221123,							
0960_QC121_221123,	0960_OTH106_221123,							
0960_SW205_221123,	0960_SW301_221123,							
0960_SW207_221123								
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)		23-Nov-2022	05-Dec-2022	22-May-2023	✓	08-Dec-2022	22-May-2023	✓
0960_OTH107_221123,	0960_SW208_221123,							
0960_QC121_221123,	0960_OTH106_221123,							
0960_SW205_221123,	0960_SW301_221123,							
0960_SW207_221123								



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

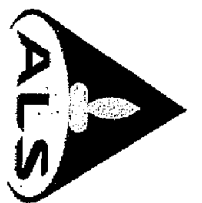
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



Environmental Division
Perth
Work Order Reference
EP2215814



Telephone : -- 61-8-9416 1301

Custody Document for Submissions via ALS Compass App

Project: WA-0960-PEAS OGP Client: STANTEC

Project Manager:

Phone:

ALS Compass COC Reference: 45291 45298 45307 45310 45300

Sampler:

Phone:

Samples: 45293 45302 45295 45290

Turnaround Requirements: Standard ☒ Urgent ☐

Special Instructions:

Custody:

Relinquished by: <u>STANTEC</u>	Received by:	Relinquished by:	Received by:
Date / Time: <u>24/11/22</u> <u>7AM</u>	Date / Time:	Date / Time:	Date / Time:
	<u>25/11</u> <u>12pm</u>		

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP

SITE: Learmonth SD - SC

ORDER NO.: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

CONTACT PH: [REDACTED]
QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

SAMPLER MOBILE: [REDACTED]

TURNAROUND REQUIREMENTS: 5 Days
Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact? Yes No N/A
Free ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comments:

SAMPLE DETAILS					ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	
001	0960_SD208		23/11/2022 07:47 AM	SOIL	ALS: 1 Non ALS: 0	No	X
002	0960_SD205		23/11/2022 08:33 AM	SOIL	ALS: 1 Non ALS: 0	No	X
003	0960_SS301		23/11/2022 09:13 AM	SOIL	ALS: 1 Non ALS: 0	No	X
004	0960_SS298		23/11/2022 09:35 AM	SOIL	ALS: 1 Non ALS: 0	No	X
005	0960_SD207		23/11/2022 10:59 AM	SOIL	ALS: 1 Non ALS: 0	No	X

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD		RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
PROJECT: WA_0960_PFSOMP		DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:
SITE: Learmonth SD - SC		TURNAROUND REQUIREMENTS: 5 Days		LABORATORY USE ONLY (Circle)	
ORDER NO: pfas-omp Learmonth		Biohazard info:		Custody Seal intact? Yes No N/A	
PROJECT MANAGER:		CONTACT PH: /		Free ice / frozen ice bricks present upon receipt? Yes No N/A	
PRIMARY SAMPLER:		SAMPLER MOBILE: / ES2022MWHAUS0002		Random Sample Temperature on Receipt: °C	
EMAIL REPORTS TO:		Other comments:			
EMAIL INVOICES TO:					

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_SD208	HDPE Soil Jar	200 mL	00620322054893	Grey	No	
002	0960_SD205	HDPE Soil Jar	200 mL	00620322054898	Grey	No	
003	0960_SS301	HDPE Soil Jar	200 mL	00620322054869	Grey	No	
004	0960_SS298	HDPE Soil Jar	200 mL	00620322054850	Grey	No	
005	0960_SD207	HDPE Soil Jar	200 mL	00620322054893	Grey	No	

Total Bottle Count: ALS: 5, Non ALS: 0

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EP2215814**

Client : STANTEC AUSTRALIA PTY LTD
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail : [REDACTED]
Telephone : ----
Facsimile : ----

E-mail : [REDACTED]
Telephone : [REDACTED]
Facsimile : [REDACTED]

Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45295
Site : Learmonth SD - SC
Sampler : [REDACTED] [REDACTED]

Page : 1 of 2
Quote number : ES2022MWH AUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 25-Nov-2022 12:00
Client Requested Due Date : 08-Dec-2022

Issue Date : 29-Nov-2022
Scheduled Reporting Date : **08-Dec-2022**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 3
Receipt Detail :

Security Seal : Intact.
Temperature : 21.2 - Ice present
No. of samples received / analysed : 5 / 5

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples, samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2215814-001	23-Nov-2022 07:47	0960_SS208_221123	✓	✓
EP2215814-002	23-Nov-2022 08:33	0960_SS205_221123	✓	✓
EP2215814-003	23-Nov-2022 09:13	0960_SS301_221123	✓	✓
EP2215814-004	23-Nov-2022 09:35	0960_SS298_221123	✓	✓
EP2215814-005	23-Nov-2022 10:59	0960_SD207_221123	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

- A4 - AU Tax Invoice (INV)

Email

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)

Email

(STANTEC)

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

Email
Email
Email
Email
Email
Email
Email

CERTIFICATE OF ANALYSIS

Work Order : **EP2215814**
Client : **STANTEC AUSTRALIA PTY LTD**
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE TERRACE
 PERTH 6000
Telephone : ----
Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45295
Sampler : [REDACTED]
Site : Learmonth SD - SC
Quote number : SY/139/19 B
No. of samples received : 5
No. of samples analysed : 5

Page : 1 of 5
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : [REDACTED]
Date Samples Received : 25-Nov-2022 12:00
Date Analysis Commenced : 05-Dec-2022
Issue Date : 07-Dec-2022 11:46



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS208_221123	0960_SS205_221123	0960_SS301_221123	0960_SS298_221123	0960_SD207_221123
Sampling date / time				23-Nov-2022 07:47	23-Nov-2022 08:33	23-Nov-2022 09:13	23-Nov-2022 09:35	23-Nov-2022 10:59
Compound	CAS Number	LOR	Unit	EP2215814-001	EP2215814-002	EP2215814-003	EP2215814-004	EP2215814-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	20.3	33.1	28.6	1.4	21.6
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS208_221123	0960_SS205_221123	0960_SS301_221123	0960_SS298_221123	0960_SD207_221123
Sampling date / time				23-Nov-2022 07:47	23-Nov-2022 08:33	23-Nov-2022 09:13	23-Nov-2022 09:35	23-Nov-2022 10:59
Compound	CAS Number	LOR	Unit	EP2215814-001	EP2215814-002	EP2215814-003	EP2215814-004	EP2215814-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	96.0	93.5	98.0	98.5	93.0
13C8-PFOA	----	0.0002	%	98.0	89.0	94.5	101	100

Page : 5 of 5
Work Order : EP2215814
Client : STANTEC AUSTRALIA PTY LTD
Project : WA_0960_PFASOMP



Surrogate Control Limits

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)

QUALITY CONTROL REPORT

Work Order	: EP2215814	Page	: 1 of 7
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 05-Dec-2022
C-O-C number	: 45295	Issue Date	: 07-Dec-2022
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SD - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 5		
No. of samples analysed	: 5		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4749329)									
EP2215811-002	Anonymous	EA055: Moisture Content	----	0.1	%	14.9	15.0	0.8	0% - 20%
EP2215817-002	Anonymous	EA055: Moisture Content	----	0.1	%	12.2	12.3	0.9	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0003	0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2215814-003	0960_SS301_221123	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4746045) - continued									
EP2215789-009	Anonymous	EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2215814-003	0960_SS301_221123	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215814-003	0960_SS301_221123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit

Page : 4 of 7
 Work Order : EP2215814
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4746045)									
EP2215789-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2215814-003	0960_SS301_221123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746045)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.4	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	74.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	76.8	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	75.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	62.0	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746045)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	79.9	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.0	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.6	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.2	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.6	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	69.0	135
EP231X: Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.4	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.4	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.4	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	81.9	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	80.4	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	63.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	68.8	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	78.4	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	72.4	65.0	137



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	89.6	69.2	143

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	86.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	94.8	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	89.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	93.6	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	82.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	66.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	91.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	96.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	88.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	90.4	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	102	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	105	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	89.6	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	106	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	119	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.00125 mg/kg	112	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	104	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	86.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	99.0	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	88.8	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	105	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	86.5	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	93.2	63.0	144



Sub-Matrix: SOIL

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4746045) - continued							
EP2215789-009	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	72.0	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4746045)							
EP2215789-009	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	82.4	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	97.6	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	69.6	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	79.2	69.2	143

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2215814	Page	: 1 of 4
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: Learmonth SD - SC	Issue Date	: 07-Dec-2022
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 5
Order number	: pfas-omp Learmonth	No. of samples analysed	: 5

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055) 0960_SS208_221123, 0960_SS301_221123, 0960_SD207_221123	0960_SS205_221123, 0960_SS298_221123,	23-Nov-2022	----	----	----	06-Dec-2022	07-Dec-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SS208_221123, 0960_SS301_221123, 0960_SD207_221123	0960_SS205_221123, 0960_SS298_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X) 0960_SS208_221123, 0960_SS301_221123, 0960_SD207_221123	0960_SS205_221123, 0960_SS298_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X) 0960_SS208_221123, 0960_SS301_221123, 0960_SD207_221123	0960_SS205_221123, 0960_SS298_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SS208_221123, 0960_SS301_221123, 0960_SD207_221123	0960_SS205_221123, 0960_SS298_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X) 0960_SS208_221123, 0960_SS301_221123, 0960_SD207_221123	0960_SS205_221123, 0960_SS298_221123,	23-Nov-2022	05-Dec-2022	22-May-2023	✓	07-Dec-2022	14-Jan-2023	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



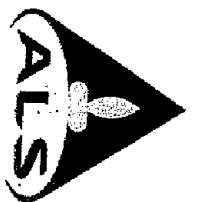
Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
QuEChERS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.



Custody Document for Submissions via ALS Compass App



Environmental Division
Perth

Work Order Reference
EP2215815



Telephone : - 61-8-9406 1301

Project: WA - 0960 - PEASONG Client: STANTEC

ALS Compass COC Reference: 45291 45298 45307 45310 45300
Samples: 45293 45302 45295 45290

Project Manager:
Phone:
Sampler:
Phone:

Turnaround Requirements: Standard ☒ Urgent

Special Instructions:

Custody:

Relinquished by: <u>STANTEC</u>	Received by:	Relinquished by:	Received by:
Date / Time: <u>24/11/22</u> <u>7AM</u>	Date / Time:	Date / Time:	Date / Time:
	<u>25/11/22</u> <u>11pm</u>		

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSASOMP

SITE: Learmonth GW - SC

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

LABORATORY USE ONLY (Circle)

Biohazard Info:

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Yes No N/A

CONTACT PH:

SAMPLER MOBILE:

Random Sample Temperature on Receipt:

QUOTE NO: SY/139/19 B

/ ES2022MMHAUS0002

Other comments:

C

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_MMW141_3.0-3.5	2 x extra lab QC	23/11/2022 08:23 AM	WATER	ALS: 5 Non ALS: 0	No	Partial 4/8		
002	0960_MMW140_1.5-2.0		23/11/2022 10:05 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
003	0960_MMW181_1.5-2.0		23/11/2022 10:27 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0960_MMW180_3.5-4.0		23/11/2022 10:53 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0960_MMW147_3.0-3.5		23/11/2022 11:32 AM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0960_MMW146_3.0-3.5		23/11/2022 12:05 PM	WATER	ALS: 3 Non ALS: 0	No	Partial 4/8		

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP

SITE: Learmonth GW - SC

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER: [REDACTED]
PRIMARY SAMPLER: [REDACTED]

EMAIL REPORTS TO: [REDACTED]

EMAIL INVOICES TO: [REDACTED]

CONTACT PH: [REDACTED] SAMPLER MOBILE: [REDACTED]
QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

SAMPLE SAMPLE NAME PARTIAL ANALYSIS GROUP NAME MATRIX

SELECTED ANALYSIS NAME

001	0960_MW141_3.0-3.5	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
002	0960_MW140_1.5-2.0	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
003	0960_MW181_1.5-2.0	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
004	0960_MW180_3.5-4.0	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
005	0960_MW147_3.0-3.5	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)
006	0960_MW146_3.0-3.5	Ground Waters WATER	WATER	- NT-02 Major Anions (Chloride, Sulphate, Alkalinity) - NT-01 Major Cations (Ca, Mg, Na, K) - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & ED093F - EP231X PFAS - Full Suite (28 analytes)

CLIENT: MM/HAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PASOMP
SITE: Learmonth GW - SC
ORDER NO: pfas-omp Learmonth
PROJECT MANAGER:
PRIMARY SAMPLER:
EMAIL REPORTS TO:
EMAIL INVOICES TO:
CONTACT PH:
QUOTE NO: SY/139/19 B / ES2022MM/HAUS0002

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days	LABORATORY USE ONLY (Circle)
Biohazard info:	Custody Seal Intact? Yes No N/A
	Free ice / frozen ice bricks present upon receipt? Yes No N/A
	Random Sample Temperature on Receipt: C
	Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_MM/141_3.0-3.5	HDPE (no PTFE)	20 mL	00350821023872	Grey	No	
001	0960_MM/141_3.0-3.5	HDPE (no PTFE)	20 mL	00350821087812	Grey	No	
001	0960_MM/141_3.0-3.5	HDPE (no PTFE)	20 mL	00350821023920	Grey	No	
001	0960_MM/141_3.0-3.5	HDPE (no PTFE)	20 mL	00350621066793	Grey	No	
002	0960_MM/140_1.5-2.0	Clear Plastic Bottle - Natural	500 mL	00070621089946	Green	No	
002	0960_MM/140_1.5-2.0	Clear Plastic Bottle - Natural	500 mL	00070621089734	Green	No	
002	0960_MM/140_1.5-2.0	HDPE (no PTFE)	20 mL	00350821043222	Grey	No	
003	0960_MM/140_1.5-2.0	HDPE (no PTFE)	20 mL	00350821023926	Grey	No	
003	0960_MM/181_1.5-2.0	HDPE (no PTFE)	20 mL	00350821023821	Grey	No	
003	0960_MM/181_1.5-2.0	HDPE (no PTFE)	20 mL	00350821043230	Grey	No	
004	0960_MM/180_3.5-4.0	Clear Plastic Bottle - Natural	500 mL	00070621089828	Green	No	
004	0960_MM/180_3.5-4.0	HDPE (no PTFE)	20 mL	00350821043216	Grey	No	
004	0960_MM/180_3.5-4.0	HDPE (no PTFE)	20 mL	00350821023823	Grey	No	
005	0960_MM/147_3.0-3.5	Clear Plastic Bottle - Natural	500 mL	00070621089737	Green	No	
005	0960_MM/147_3.0-3.5	HDPE (no PTFE)	20 mL	00070621089863	Green	No	
005	0960_MM/147_3.0-3.5	HDPE (no PTFE)	20 mL	00350821023744	Grey	No	
006	0960_MM/146_3.0-3.5	Clear Plastic Bottle - Natural	500 mL	00070621089895	Green	No	
006	0960_MM/146_3.0-3.5	HDPE (no PTFE)	20 mL	00350821023836	Grey	No	
006	0960_MM/146_3.0-3.5	HDPE (no PTFE)	20 mL	00350821023774	Grey	No	

Total Bottle Count: ALS: 20, Non ALS: 0

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : EP2215815**

Client : STANTEC AUSTRALIA PTY LTD
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail : [REDACTED]
Telephone : ----
Facsimile : ----

E-mail : [REDACTED]
Telephone : [REDACTED]
Facsimile : [REDACTED]

Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45302
Site : Learmonth GW - SC
Sampler : [REDACTED] [REDACTED]

Page : 1 of 2
Quote number : ES2022MWH AUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 25-Nov-2022 12:00
Client Requested Due Date : 08-Dec-2022

Issue Date : 29-Nov-2022
Scheduled Reporting Date : **08-Dec-2022**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 3
Receipt Detail :

Security Seal : Intact.
Temperature : 21.1 - Ice present
No. of samples received / analysed : 6 / 6

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP2215815-001 : 23-Nov-2022 08:23 : 0960_MW141_3.0-3.5_221123
EP2215815-002 : 23-Nov-2022 10:05 : 0960_MW140_1.5-2.0_221123
EP2215815-003 : 23-Nov-2022 10:27 : 0960_MW181_1.5-2.0_221123
EP2215815-004 : 23-Nov-2022 10:53 : 0960_MW180_3.5-4.0_221123
EP2215815-005 : 23-Nov-2022 11:32 : 0960_MW147_3.0-3.5_221123
EP2215815-006 : 23-Nov-2022 12:05 : 0960_MW146_3.0-3.5_221123

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EN055 - PG Ionic Balance by ED037P, ED041G, ED045G & WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 Major Cations (Ca, Mg, Na, K)	WATER - NT-02 Major Anions (Chloride, Sulphate, Alkalinity)
EP2215815-001	23-Nov-2022 08:23	0960_MW141_3.0-3.5_2...	✓	✓	✓
EP2215815-002	23-Nov-2022 10:05	0960_MW140_1.5-2.0_2...	✓	✓	✓
EP2215815-003	23-Nov-2022 10:27	0960_MW181_1.5-2.0_2...	✓	✓	✓
EP2215815-004	23-Nov-2022 10:53	0960_MW180_3.5-4.0_2...	✓	✓	✓
EP2215815-005	23-Nov-2022 11:32	0960_MW147_3.0-3.5_2...	✓	✓	✓
EP2215815-006	23-Nov-2022 12:05	0960_MW146_3.0-3.5_2...	✓	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

- A4 - AU Tax Invoice (INV)

Email

DERP LAB REPORTS

- EDI Format - ESDAT (ESDAT)

Email

(STANTEC)

- *AU Certificate of Analysis - NATA (COA)

Email

- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)

Email

- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)

Email

- A4 - AU Sample Receipt Notification - Environmental HT (SRN)

Email

- Chain of Custody (CoC) (COC)

Email

- EDI Format - ESDAT (ESDAT)

Email

- EDI Format - XTab (XTAB)

Email

CERTIFICATE OF ANALYSIS

Work Order : **EP2215815**
Client : **STANTEC AUSTRALIA PTY LTD**
Contact : [REDACTED] (STANTEC)
Address : GROUND FLOOR 226 ADELAIDE TERRACE
 PERTH 6000
Telephone : ----
Project : WA_0960_PFASOMP
Order number : pfas-omp Learmonth
C-O-C number : 45302
Sampler : [REDACTED]
Site : Learmonth GW - SC
Quote number : SY/139/19 B
No. of samples received : 6
No. of samples analysed : 6

Page : 1 of 9
Laboratory : Environmental Division Perth
Contact : [REDACTED]
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : [REDACTED]
Date Samples Received : 25-Nov-2022 12:00
Date Analysis Commenced : 30-Nov-2022
Issue Date : 08-Dec-2022 22:14



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
[REDACTED]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW141_3.0-3.5 _221123	0960_MW140_1.5-2.0 _221123	0960_MW181_1.5-2.0 _221123	0960_MW180_3.5-4.0 _221123	0960_MW147_3.0-3.5 _221123
Sampling date / time				23-Nov-2022 08:23	23-Nov-2022 10:05	23-Nov-2022 10:27	23-Nov-2022 10:53	23-Nov-2022 11:32
Compound	CAS Number	LOR	Unit	EP2215815-001	EP2215815-002	EP2215815-003	EP2215815-004	EP2215815-005
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	317	153	226	241	135
Total Alkalinity as CaCO3	----	1	mg/L	317	153	226	241	135
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1860	5500	5600	4600	5430
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	11500	38400	39300	32200	37000
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	444	829	1030	779	1050
Magnesium	7439-95-4	1	mg/L	975	2780	2980	2430	2820
Sodium	7440-23-5	1	mg/L	7300	23200	24000	19700	22800
Potassium	7440-09-7	1	mg/L	387	1160	1100	936	1090
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	369	1200	1230	1010	1160
ø Total Cations	----	0.01	meq/L	430	1310	1370	1120	1300
ø Ionic Balance	----	0.01	%	7.55	4.31	5.35	5.20	5.87
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW141_3.0-3.5 _221123	0960_MW140_1.5-2.0 _221123	0960_MW181_1.5-2.0 _221123	0960_MW180_3.5-4.0 _221123	0960_MW147_3.0-3.5 _221123
Sampling date / time				23-Nov-2022 08:23	23-Nov-2022 10:05	23-Nov-2022 10:27	23-Nov-2022 10:53	23-Nov-2022 11:32
Compound	CAS Number	LOR	Unit	EP2215815-001	EP2215815-002	EP2215815-003	EP2215815-004	EP2215815-005
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW141_3.0-3.5 _221123	0960_MW140_1.5-2.0 _221123	0960_MW181_1.5-2.0 _221123	0960_MW180_3.5-4.0 _221123	0960_MW147_3.0-3.5 _221123
Sampling date / time				23-Nov-2022 08:23	23-Nov-2022 10:05	23-Nov-2022 10:27	23-Nov-2022 10:53	23-Nov-2022 11:32
Compound	CAS Number	LOR	Unit	EP2215815-001	EP2215815-002	EP2215815-003	EP2215815-004	EP2215815-005
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	95.7	96.1	90.0	101	86.3
13C8-PFOA	----	0.02	%	105	101	93.6	92.9	97.0



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

0960_MW146_3.0-3.5
 _221123

Sampling date / time

23-Nov-2022 12:05

Compound	CAS Number	LOR	Unit	Result				
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	113	----	----	----	----
Total Alkalinity as CaCO ₃	----	1	mg/L	113	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	5120	----	----	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	34100	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	970	----	----	----	----
Magnesium	7439-95-4	1	mg/L	2430	----	----	----	----
Sodium	7440-23-5	1	mg/L	20600	----	----	----	----
Potassium	7440-09-7	1	mg/L	984	----	----	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	1070	----	----	----	----
∅ Total Cations	----	0.01	meq/L	1170	----	----	----	----
∅ Ionic Balance	----	0.01	%	4.41	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	----	----	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

0960_MW146_3.0-3.5
 _221123

Sampling date / time

23-Nov-2022 12:05

Compound

CAS Number

LOR

Unit

EP2215815-006

Result

EP231B: Perfluoroalkyl Carboxylic Acids - Continued

Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	----	----	----	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	----	----	----	----

EP231C: Perfluoroalkyl Sulfonamides

Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	----	----	----	----

EP231D: (n:2) Fluorotelomer Sulfonic Acids

4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	----	----	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

0960_MW146_3.0-3.5
 _221123

Sampling date / time

23-Nov-2022 12:05

Compound

CAS Number

LOR

Unit

EP2215815-006

Result

EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued

10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	----	----	----	----
--	-------------	------	------	-------	------	------	------	------

EP231P: PFAS Sums

Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	----	----	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

EP231S: PFAS Surrogate

13C4-PFOS	----	0.02	%	97.6	----	----	----	----
13C8-PFOA	----	0.02	%	95.3	----	----	----	----

Page : 9 of 9
Work Order : EP2215815
Client : STANTEC AUSTRALIA PTY LTD
Project : WA_0960_PFASOMP



Surrogate Control Limits

Sub-Matrix: GROUNDWATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231D: (n:2) Fluorotelomer Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

QUALITY CONTROL REPORT

Work Order	: EP2215815	Page	: 1 of 8
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Contact	: [REDACTED]
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 30-Nov-2022
C-O-C number	: 45302	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth GW - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 6		
No. of samples analysed	: 6		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	LCMS Coordinator	Sydney Organics, Smithfield, NSW



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 4752743)									
EP2215797-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	125	124	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	125	124	0.0	0% - 20%
EP2215813-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	133	144	7.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	133	144	7.6	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4736352)									
EP2215797-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4930	4740	3.7	0% - 20%
EP2215815-006	0960_MW146_3.0-3.5_221 123	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5120	5280	3.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4736351)									
EP2215797-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	29700	29600	0.4	0% - 20%
EP2215815-006	0960_MW146_3.0-3.5_221 123	ED045G: Chloride	16887-00-6	1	mg/L	34100	34400	0.9	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4736105)									
EP2215813-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	469	493	5.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1460	1530	4.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11700	12200	4.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	596	628	5.2	0% - 20%
EP2215815-006	0960_MW146_3.0-3.5_221 123	ED093F: Calcium	7440-70-2	1	mg/L	970	1020	5.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	2430	2440	0.1	0% - 20%

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 4736105) - continued									
EP2215815-006	0960_MW146_3.0-3.5_221 123	ED093F: Sodium	7440-23-5	1	mg/L	20600	20300	1.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	984	983	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EP2215819-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorononanoic acid (PFNA)	375-95-1			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8			0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7			0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4			0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743880)									



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4743880) - continued									
EP2215816-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2215819-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

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 Work Order : EP2215815
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4743880) - continued									
EP2215819-001	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4743880)									
EP2215816-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2215819-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED037P: Alkalinity by PC Titrator (QCLot: 4752743)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	110	87.8	118
				<1	200 mg/L	102	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736352)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	89.9	112
				<1	500 mg/L	99.1	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4736351)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.0	88.6	113
				<1	1000 mg/L	98.1	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4736105)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	100	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.4	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.3	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	83.8	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	108	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	98.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	102	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	98.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	100.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	98.4	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	99.4	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	97.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	99.8	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	104	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	133	72.0	134



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	119	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	117	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743880)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	107	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	97.8	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	90.9	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.4	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	96.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	102	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	92.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743880)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	94.6	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	100	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.25 µg/L	82.6	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	77.4	71.4	144

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number			Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4736352)							
EP2215797-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4736351)							
EP2215797-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	93.4	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	107	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	99.0	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	97.4	69.0	134



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4743880) - continued							
EP2215818-001	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	96.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	97.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	103	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	109	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	105	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	105	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	102	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	110	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	107	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	94.0	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	117	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTeDA)	72629-94-8	0.25 µg/L	121	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	123	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	99.8	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	120	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	94.8	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	97.4	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	97.6	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	99.4	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	94.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4743880)							
EP2215818-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	102	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	96.8	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	109	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	86.6	71.4	144

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2215815	Page	: 1 of 5
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED] (STANTEC)	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP	Date Samples Received	: 25-Nov-2022
Site	: Learmonth GW - SC	Issue Date	: 08-Dec-2022
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 6
Order number	: pfas-omp Learmonth	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	EP2215797--001	Anonymous	Sulfate as SO₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EP2215797--001	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) 0960_MW141_3.0-3.5_221123, 0960_MW181_1.5-2.0_221123, 0960_MW147_3.0-3.5_221123,	0960_MW140_1.5-2.0_221123, 0960_MW180_3.5-4.0_221123, 0960_MW146_3.0-3.5_221123	23-Nov-2022	----	----	----	07-Dec-2022	07-Dec-2022	✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) 0960_MW141_3.0-3.5_221123, 0960_MW181_1.5-2.0_221123, 0960_MW147_3.0-3.5_221123,	0960_MW140_1.5-2.0_221123, 0960_MW180_3.5-4.0_221123, 0960_MW146_3.0-3.5_221123	23-Nov-2022	----	----	----	08-Dec-2022	21-Dec-2022	✔
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 0960_MW141_3.0-3.5_221123, 0960_MW181_1.5-2.0_221123, 0960_MW147_3.0-3.5_221123,	0960_MW140_1.5-2.0_221123, 0960_MW180_3.5-4.0_221123, 0960_MW146_3.0-3.5_221123	23-Nov-2022	----	----	----	08-Dec-2022	21-Dec-2022	✔
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) 0960_MW141_3.0-3.5_221123, 0960_MW181_1.5-2.0_221123, 0960_MW147_3.0-3.5_221123,	0960_MW140_1.5-2.0_221123, 0960_MW180_3.5-4.0_221123, 0960_MW146_3.0-3.5_221123	23-Nov-2022	----	----	----	30-Nov-2022	30-Nov-2022	✔

Page : 3 of 5
 Work Order : EP2215815
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_MW141_3.0-3.5_221123, 0960_MW181_1.5-2.0_221123, 0960_MW147_3.0-3.5_221123,	0960_MW140_1.5-2.0_221123, 0960_MW180_3.5-4.0_221123, 0960_MW146_3.0-3.5_221123	23-Nov-2022	03-Dec-2022	22-May-2023	✔	08-Dec-2022	22-May-2023	✔
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) 0960_MW141_3.0-3.5_221123, 0960_MW181_1.5-2.0_221123, 0960_MW147_3.0-3.5_221123,	0960_MW140_1.5-2.0_221123, 0960_MW180_3.5-4.0_221123, 0960_MW146_3.0-3.5_221123	23-Nov-2022	03-Dec-2022	22-May-2023	✔	08-Dec-2022	22-May-2023	✔
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) 0960_MW141_3.0-3.5_221123, 0960_MW181_1.5-2.0_221123, 0960_MW147_3.0-3.5_221123,	0960_MW140_1.5-2.0_221123, 0960_MW180_3.5-4.0_221123, 0960_MW146_3.0-3.5_221123	23-Nov-2022	03-Dec-2022	22-May-2023	✔	08-Dec-2022	22-May-2023	✔
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_MW141_3.0-3.5_221123, 0960_MW181_1.5-2.0_221123, 0960_MW147_3.0-3.5_221123,	0960_MW140_1.5-2.0_221123, 0960_MW180_3.5-4.0_221123, 0960_MW146_3.0-3.5_221123	23-Nov-2022	03-Dec-2022	22-May-2023	✔	08-Dec-2022	22-May-2023	✔
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0960_MW141_3.0-3.5_221123, 0960_MW181_1.5-2.0_221123, 0960_MW147_3.0-3.5_221123,	0960_MW140_1.5-2.0_221123, 0960_MW180_3.5-4.0_221123, 0960_MW146_3.0-3.5_221123	23-Nov-2022	03-Dec-2022	22-May-2023	✔	08-Dec-2022	22-May-2023	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.

QS3009 R0 Issue Date: 25 February 2013 Page 1 of 1

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IANZ# 1327

Christchurch
43 Detroit Drive
Rolleston,
Christchurch 7675
Tel: 0800 856 450
IANZ# 1290

Sample Receipt Advice

Company name: Stantec Australia Pty Ltd (WA)
Contact name: [REDACTED]
Project name: WA_0960_PFASOMP
Project ID: WA_0960_PFASOMP
Turnaround time: 5 Day
Date/Time received: Nov 28, 2022 10:25 AM
Eurofins reference: 945170

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- N/A Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

[REDACTED] on phone : or by email: [REDACTED]

Results will be delivered electronically via email to [REDACTED] - [REDACTED]

Note: A copy of these results will also be delivered to the general Stantec Australia Pty Ltd (WA) email address.

**Eurofins ARL Pty Ltd**

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email: EnviroSales@eurofins.com

Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
Perth
WA 6000

Project Name: WA_0960_PFASOMP
Project ID: WA_0960_PFASOMP

Order No.: PFAS-OMP 304700525
Report #: 945170
Phone: [REDACTED]
Fax: [REDACTED]

Received: Nov 28, 2022 10:25 AM
Due: Dec 5, 2022
Priority: 5 Day
Contact Name: [REDACTED]

Eurofins Analytical Services Manager : [REDACTED]

Sample Detail

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA # 1261 Site # 1254

X

X

External Laboratory

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	0960_QC209_221122	Nov 22, 2022		Soil	L22-No0066944	X	X
2	0960_QC210_221122	Nov 22, 2022		Water	L22-No0066945		X
3	0960_QC211_221122	Nov 22, 2022		Water	L22-No0066946		X
4	0960_QC212_221122	Nov 22, 2022		Water	L22-No0066947		X
5	0960_QC213_221122	Nov 22, 2022		Soil	L22-No0066948	X	X
6	0960_QC214_221122	Nov 22, 2022		Water	L22-No0066949		X
7	0960_QC215_221122	Nov 22, 2022		Water	L22-No0066950		X
8	0960_QC216_221122	Nov 22, 2022		Soil	L22-No0066951	X	X



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Christchurch 7675
Tel: 0800 856 450
IANZ# 1290

Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226, Adelaide Terrace
Perth
WA 6000

Project Name: WA_0960_PFASOMP
Project ID: WA_0960_PFASOMP

Order No.: PFAS-OMP 304700525
Report #: 945170
Phone: [REDACTED]
Fax: [REDACTED]

Received: Nov 28, 2022 10:25 AM
Due: Dec 5, 2022
Priority: 5 Day
Contact Name: [REDACTED]

Eurofins Analytical Services Manager : [REDACTED]

Sample Detail

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA # 1261 Site # 1254

9	0960_QC217_221122	Nov 22, 2022		Water	L22-No0066952	X	X
10	0960_QC218_221122	Nov 22, 2022		Water	L22-No0066953		X
11	0960_QC219_221122	Nov 22, 2022		Soil	L22-No0066954	X	X
12	0960_QC220_221122	Nov 22, 2022		Soil	L22-No0066955	X	X
13	0960_QC221_221123	Nov 23, 2022		Water	L22-No0066956		X
14	0960_QC222_221123	Nov 23, 2022		Water	L22-No0066957		X
15	0960_QC223_221123	Nov 23, 2022		Water	L22-No0066958		X

Test Counts

5

15

Stantec Australia Pty Limited
6F 226, Adelaide Terrace
Perth
WA 6000



NATA Accredited
Accreditation Number 2377
Site Number 2370

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition
Arrangement for the mutual recognition of the
equivalence of testing, medical testing, calibration,
inspection, proficiency testing scheme providers and
reference materials producers reports and certificates.

Attention:

Report 945170-S
Project name WA_0960_PFASOMP
Project ID WA_0960_PFASOMP
Received Date Nov 28, 2022

Client Sample ID			0960_QC209_2 21122	0960_QC213_2 21122	0960_QC216_2 21122	0960_QC219_2 21122
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L22- No0066944	L22- No0066948	L22- No0066951	L22- No0066954
Date Sampled			Nov 22, 2022	Nov 22, 2022	Nov 22, 2022	Nov 22, 2022
Test/Reference	LOR	Unit				
% Moisture	1	%	1.9	1.1	1.8	2.3
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTeDA) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	79	87	72	81
13C5-PFPeA (surr.)	1	%	98	104	70	103
13C5-PFHxA (surr.)	1	%	91	95	84	96
13C4-PFHpA (surr.)	1	%	78	82	65	87
13C8-PFOA (surr.)	1	%	71	73	66	75
13C5-PFNA (surr.)	1	%	83	83	71	83
13C6-PFDA (surr.)	1	%	75	75	68	75
13C2-PFUnDA (surr.)	1	%	81	83	70	85
13C2-PFDoDA (surr.)	1	%	94	96	71	100
13C2-PFTeDA (surr.)	1	%	89	103	76	115
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10

Client Sample ID			0960_QC209_2 21122	0960_QC213_2 21122	0960_QC216_2 21122	0960_QC219_2 21122
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L22- No0066944	L22- No0066948	L22- No0066951	L22- No0066954
Date Sampled			Nov 22, 2022	Nov 22, 2022	Nov 22, 2022	Nov 22, 2022
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
13C8-FOSA (surr.)	1	%	77	78	68	81
D3-N-MeFOSA (surr.)	1	%	110	112	89	108
D5-N-EtFOSA (surr.)	1	%	118	123	110	120
D7-N-MeFOSE (surr.)	1	%	88	87	71	83
D9-N-EtFOSE (surr.)	1	%	115	114	69	117
D5-N-EtFOSAA (surr.)	1	%	89	92	56	103
D3-N-MeFOSAA (surr.)	1	%	89	91	79	93
Perfluoroalkyl sulfonic acids (PFSA's)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	^{N09} 120	< 5	^{N09} 5.2	5.1
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	87	88	69	92
18O2-PFHxS (surr.)	1	%	76	74	62	75
13C8-PFOS (surr.)	1	%	66	69	63	70
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	98	99	91	112
13C2-6:2 FTSA (surr.)	1	%	81	76	70	97
13C2-8:2 FTSA (surr.)	1	%	77	76	70	93
13C2-10:2 FTSA (surr.)	1	%	109	102	121	115
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	120	< 5	5.2	5.1
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	120	< 5	5.2	5.1
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	120	< 5	5.2	5.1
Sum of WA DWER PFAS (n=10)*	10	ug/kg	120	< 10	< 10	< 10
Sum of PFASs (n=30)*	50	ug/kg	120	< 50	< 50	< 50

Client Sample ID			0960_QC220_2 21122
Sample Matrix			Soil
Eurofins Sample No.			L22- No0066955
Date Sampled			Nov 22, 2022
Test/Reference	LOR	Unit	
% Moisture	1	%	< 1
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5
Perfluorotridecanoic acid (PFTeDA) ^{N15}	5	ug/kg	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5
13C4-PFBA (surr.)	1	%	29
13C5-PFPeA (surr.)	1	%	53
13C5-PFHxA (surr.)	1	%	65
13C4-PFHpA (surr.)	1	%	49
13C8-PFOA (surr.)	1	%	53
13C5-PFNA (surr.)	1	%	73
13C6-PFDA (surr.)	1	%	77
13C2-PFUnDA (surr.)	1	%	86
13C2-PFDoDA (surr.)	1	%	94
13C2-PFTeDA (surr.)	1	%	108
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10
13C8-FOSA (surr.)	1	%	117
D3-N-MeFOSA (surr.)	1	%	126
D5-N-EtFOSA (surr.)	1	%	127
D7-N-MeFOSE (surr.)	1	%	95
D9-N-EtFOSE (surr.)	1	%	122
D5-N-EtFOSAA (surr.)	1	%	39
D3-N-MeFOSAA (surr.)	1	%	49
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5

Client Sample ID			0960_QC220_2
Sample Matrix			Soil
Eurofins Sample No.			L22- No0066955
Date Sampled			Nov 22, 2022
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonic acids (PFASs)			
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	< 5
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5
13C3-PFBS (surr.)	1	%	96
18O2-PFHxS (surr.)	1	%	70
13C8-PFOS (surr.)	1	%	109
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5
13C2-4:2 FTSA (surr.)	1	%	50
13C2-6:2 FTSA (surr.)	1	%	69
13C2-8:2 FTSA (surr.)	1	%	95
13C2-10:2 FTSA (surr.)	1	%	136
PFASs Summations			
Sum (PFHxS + PFOS)*	5	ug/kg	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	Nov 28, 2022	14 Days
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Melbourne	Nov 30, 2022	28 Days
Perfluoroalkyl sulfonamido substances - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Melbourne	Nov 30, 2022	28 Days
Perfluoroalkyl sulfonic acids (PFSAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Melbourne	Nov 30, 2022	28 Days
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Melbourne	Nov 30, 2022	28 Days
PFASs Summations - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Melbourne	Nov 28, 2022	

Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
Perth
WA 6000

Project Name: WA_0960_PFASOMP
Project ID: WA_0960_PFASOMP

Order No.: PFAS-OMP 304700525
Report #: 945170
Phone: [REDACTED]
Fax: [REDACTED]

Received: Nov 28, 2022 10:25 AM
Due: Dec 5, 2022
Priority: 5 Day
Contact Name: [REDACTED]

Eurofins Analytical Services Manager : [REDACTED]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	0960_QC209_221122	Nov 22, 2022		Soil	L22-No0066944	X	X
2	0960_QC210_221122	Nov 22, 2022		Water	L22-No0066945		X
3	0960_QC211_221122	Nov 22, 2022		Water	L22-No0066946		X
4	0960_QC212_221122	Nov 22, 2022		Water	L22-No0066947		X
5	0960_QC213_221122	Nov 22, 2022		Soil	L22-No0066948	X	X
6	0960_QC214_221122	Nov 22, 2022		Water	L22-No0066949		X
7	0960_QC215_221122	Nov 22, 2022		Water	L22-No0066950		X
8	0960_QC216_221122	Nov 22, 2022		Soil	L22-No0066951	X	X

Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
Perth
WA 6000

Project Name: WA_0960_PFASOMP
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Order No.: PFAS-OMP 304700525
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Received: Nov 28, 2022 10:25 AM
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Contact Name: [REDACTED]

Eurofins Analytical Services Manager : [REDACTED]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
9	0960_QC217_221122	Nov 22, 2022		Water	L22-No0066952		X
10	0960_QC218_221122	Nov 22, 2022		Water	L22-No0066953		X
11	0960_QC219_221122	Nov 22, 2022		Soil	L22-No0066954	X	X
12	0960_QC220_221122	Nov 22, 2022		Soil	L22-No0066955	X	X
13	0960_QC221_221123	Nov 23, 2022		Water	L22-No0066956		X
14	0960_QC222_221123	Nov 23, 2022		Water	L22-No0066957		X
15	0960_QC223_221123	Nov 23, 2022		Water	L22-No0066958		X
Test Counts						5	15

Internal Quality Control Review and Glossary

General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	µg/L: micrograms per litre
ppm: parts per million	ppb: parts per billion	%: Percentage
org/100 mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (<i>bis</i> -tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
- For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSA's)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	82			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	79			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	76			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	75			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	73			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	76			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	85			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	81			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	84			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	80			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	82			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Perfluoroalkyl sulfonamido substances									
Perfluorooctane sulfonamide (FOSA)			%	87			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)			%	86			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)			%	85			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)			%	91			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)			%	81			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	81			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	84			50-150	Pass	
LCS - % Recovery									
Perfluoroalkyl sulfonic acids (PFASs)									
Perfluorobutanesulfonic acid (PFBS)			%	75			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)			%	76			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)			%	82			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)			%	77			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	76			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	88			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	77			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	78			50-150	Pass	
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	85			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)			%	89			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	87			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	80			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)									
				Result 1					
Perfluorobutanoic acid (PFBA)	M22-No0072521	NCP	%	88			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M22-No0072521	NCP	%	88			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M22-No0072521	NCP	%	83			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M22-No0072521	NCP	%	92			50-150	Pass	
Perfluorooctanoic acid (PFOA)	M22-No0072521	NCP	%	85			50-150	Pass	
Perfluorononanoic acid (PFNA)	M22-No0072521	NCP	%	86			50-150	Pass	
Perfluorodecanoic acid (PFDA)	M22-No0072521	NCP	%	93			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M22-No0072521	NCP	%	96			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M22-No0072521	NCP	%	95			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M22-No0072521	NCP	%	90			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M22-No0072521	NCP	%	91			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances									
				Result 1					
Perfluorooctane sulfonamide (FOSA)	M22-No0072521	NCP	%	89			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M22-No0072521	NCP	%	87			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M22-No0072521	NCP	%	84			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M22-No0072521	NCP	%	93			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M22-No0072521	NCP	%	90			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M22-No0072521	NCP	%	83			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M22-No0072521	NCP	%	92			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M22-No0072521	NCP	%	78			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M22-No0072521	NCP	%	110			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M22-No0072521	NCP	%	85			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M22-No0072521	NCP	%	85			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M22-No0072521	NCP	%	83			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M22-No0072521	NCP	%	75			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M22-No0072521	NCP	%	86			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M22-No0072521	NCP	%	74			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M22-No0072521	NCP	%	87			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M22-No0072521	NCP	%	81			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M22-No0072521	NCP	%	95			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M22-No0072521	NCP	%	83			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M22-No0072078	NCP	ug/kg	< 10	< 10	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M22-No0072078	NCP	ug/kg	< 10	< 10	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M22-No0072078	NCP	ug/kg	< 10	< 10	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M22-No0072078	NCP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	L22-No0066951	CP	%	1.8	1.8	1.1	30%	Pass

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

	Analytical Services Manager
	Senior Analyst-PFAS
	Senior Analyst-Sample Properties



Business Unit Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request

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Stantec Australia Pty Limited
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Attention:

Report **945170-W**
Project name **WA_0960_PFASOMP**
Project ID **WA_0960_PFASOMP**
Received Date **Nov 28, 2022**

Client Sample ID			0960_QC210_2 21122	0960_QC211_2 21122	0960_QC212_2 21122	0960_QC214_2 21122
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L22- No0066945	L22- No0066946	L22- No0066947	L22- No0066949
Date Sampled			Nov 22, 2022	Nov 22, 2022	Nov 22, 2022	Nov 22, 2022
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05	1.0	< 0.05	0.10
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01	N09 1.9	N09 0.06	N09 0.11
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01	N09 11	N09 0.18	N09 0.25
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01	N09 0.61	N09 0.03	N09 0.05
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01	N09 1.6	N09 0.03	N09 0.05
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	85	90	76	76
13C5-PFPeA (surr.)	1	%	104	110	94	94
13C5-PFHxA (surr.)	1	%	114	96	96	101
13C4-PFHpA (surr.)	1	%	94	105	67	84
13C8-PFOA (surr.)	1	%	117	94	54	92
13C5-PFNA (surr.)	1	%	85	116	34	74
13C6-PFDA (surr.)	1	%	69	115	23	62
13C2-PFUnDA (surr.)	1	%	64	111	15	49
13C2-PFDoDA (surr.)	1	%	55	113	19	38
13C2-PFTeDA (surr.)	1	%	55	108	13	20
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	71	105	13	69
D3-N-MeFOSA (surr.)	1	%	41	87	29	36

Client Sample ID			0960_QC210_2 21122	0960_QC211_2 21122	0960_QC212_2 21122	0960_QC214_2 21122
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L22- No0066945	L22- No0066946	L22- No0066947	L22- No0066949
Date Sampled			Nov 22, 2022	Nov 22, 2022	Nov 22, 2022	Nov 22, 2022
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
D5-N-EtFOSA (surr.)	1	%	38	62	26	27
D7-N-MeFOSE (surr.)	1	%	35	102	13	19
D9-N-EtFOSE (surr.)	1	%	39	117	11	24
D5-N-EtFOSAA (surr.)	1	%	64	98	29	43
D3-N-MeFOSAA (surr.)	1	%	68	106	17	52
Perfluoroalkyl sulfonic acids (PFSA's)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01	2.9	0.06	0.09
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	< 0.01	1.3	0.03	0.04
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	< 0.01	^{N09} 4.0	^{N09} 0.09	^{N09} 0.09
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	< 0.01	^{N09} 21	^{N09} 0.61	^{N09} 0.71
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	< 0.01	^{N09} 1.7	0.02	^{N09} 0.03
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	^{N09} < 0.01	^{N09} 10	^{N09} 0.44	^{N09} 4.4
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	92	107	87	88
18O2-PFHxS (surr.)	1	%	99	106	66	84
13C8-PFOS (surr.)	1	%	68	106	91	98
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	117	68	92	96
13C2-6:2 FTSA (surr.)	1	%	103	80	64	81
13C2-8:2 FTSA (surr.)	1	%	121	80	61	92
13C2-10:2 FTSA (surr.)	1	%	66	91	16	53
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	31	1.05	5.11
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	11.6	0.47	4.45
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	32.6	1.08	5.16
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	50.01	1.41	5.76
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	57.01	1.55	5.92

Client Sample ID			0960_QC215_2 21122	0960_QC217_2 21122	0960_QC218_2 21122	0960_QC221_2 21123
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L22- No0066950	L22- No0066952	L22- No0066953	L22- No0066956
Date Sampled			Nov 22, 2022	Nov 22, 2022	Nov 22, 2022	Nov 23, 2022
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	0.11	0.10	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	^{N09} 0.18	^{N09} 0.18	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	^{N09} 0.75	^{N09} 0.18	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	^{N09} 0.06	^{N09} 0.14	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	^{N09} 0.12	^{N09} 0.09	< 0.01	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	79	81	55	86
13C5-PFPeA (surr.)	1	%	96	93	92	94
13C5-PFHxA (surr.)	1	%	92	96	107	95
13C4-PFHpA (surr.)	1	%	89	73	101	84
13C8-PFOA (surr.)	1	%	75	59	137	78
13C5-PFNA (surr.)	1	%	69	40	98	76
13C6-PFDA (surr.)	1	%	49	26	71	53
13C2-PFUnDA (surr.)	1	%	42	15	58	46
13C2-PFDoDA (surr.)	1	%	34	10	48	38
13C2-PFTeDA (surr.)	1	%	27	13	40	21
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	48	14	78	68
D3-N-MeFOSA (surr.)	1	%	12	25	34	125
D5-N-EtFOSA (surr.)	1	%	11	26	29	36
D7-N-MeFOSE (surr.)	1	%	14	25	33	22
D9-N-EtFOSE (surr.)	1	%	13	28	37	63
D5-N-EtFOSAA (surr.)	1	%	43	14	49	29
D3-N-MeFOSAA (surr.)	1	%	46	18	62	61
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	0.25	0.03	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	0.08	0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	^{N09} 0.34	^{N09} 0.03	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	^{N09} 2.1	^{N09} 0.21	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	^{N09} 0.11	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	^{N09} 0.93	^{N09} 0.12	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01

Client Sample ID			0960_QC215_2 21122	0960_QC217_2 21122	0960_QC218_2 21122	0960_QC221_2 21123
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L22- No0066950	L22- No0066952	L22- No0066953	L22- No0066956
Date Sampled			Nov 22, 2022	Nov 22, 2022	Nov 22, 2022	Nov 23, 2022
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonic acids (PFSA)						
13C3-PFBS (surr.)	1	%	87	86	90	88
18O2-PFHxS (surr.)	1	%	89	59	111	81
13C8-PFOS (surr.)	1	%	65	85	88	79
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	105	104	71	41
13C2-6:2 FTSA (surr.)	1	%	89	78	90	42
13C2-8:2 FTSA (surr.)	1	%	95	55	108	28
13C2-10:2 FTSA (surr.)	1	%	41	18	45	72
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	3.03	0.33	< 0.01	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	1.05	0.21	< 0.01	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	3.15	0.42	< 0.01	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	4.5	1.05	< 0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	5.03	1.09	< 0.1	< 0.1

Client Sample ID			0960_QC222_2 21123	0960_QC223_2 21123
Sample Matrix			Water	Water
Eurofins Sample No.			L22- No0066957	L22- No0066958
Date Sampled			Nov 23, 2022	Nov 23, 2022
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCA)				
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	0.02	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTeDA) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	48	74
13C5-PFPeA (surr.)	1	%	58	99
13C5-PFHxA (surr.)	1	%	58	93
13C4-PFHpA (surr.)	1	%	46	80
13C8-PFOA (surr.)	1	%	38	85
13C5-PFNA (surr.)	1	%	33	95
13C6-PFDA (surr.)	1	%	17	97

Client Sample ID			0960_QC222_2 21123	0960_QC223_2 21123
Sample Matrix			Water	Water
Eurofins Sample No.			L22- No0066957	L22- No0066958
Date Sampled			Nov 23, 2022	Nov 23, 2022
Test/Reference	LOR	Unit		
Perfluoroalkyl carboxylic acids (PFCAs)				
13C2-PFUnDA (surr.)	1	%	49	104
13C2-PFDoDA (surr.)	1	%	26	114
13C2-PFTeDA (surr.)	1	%	33	82
Perfluoroalkyl sulfonamido substances				
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	44	58
D3-N-MeFOSA (surr.)	1	%	60	117
D5-N-EtFOSA (surr.)	1	%	34	99
D7-N-MeFOSE (surr.)	1	%	55	33
D9-N-EtFOSE (surr.)	1	%	72	34
D5-N-EtFOSAA (surr.)	1	%	151	16
D3-N-MeFOSAA (surr.)	1	%	101	21
Perfluoroalkyl sulfonic acids (PFSA)				
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	^{G01} < 0.1	^{N09} < 0.01
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	70	93
18O2-PFHxS (surr.)	1	%	58	84
13C8-PFOS (surr.)	1	%	124	98
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	33	47
13C2-6:2 FTSA (surr.)	1	%	19	46
13C2-8:2 FTSA (surr.)	1	%	29	36
13C2-10:2 FTSA (surr.)	1	%	109	16

Client Sample ID			0960_QC222_2 21123	0960_QC223_2 21123
Sample Matrix			Water	Water
Eurofins Sample No.			L22- No0066957	L22- No0066958
Date Sampled			Nov 23, 2022	Nov 23, 2022
Test/Reference	LOR	Unit		
PFASs Summations				
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.1	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.1	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.1	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.1	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	Nov 30, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	Nov 30, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Melbourne	Nov 30, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	Nov 30, 2022	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	Nov 28, 2022	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
Perth
WA 6000

Project Name: WA_0960_PFASOMP
Project ID: WA_0960_PFASOMP

Order No.: PFAS-OMP 304700525
Report #: 945170
Phone: [REDACTED]
Fax: [REDACTED]

Received: Nov 28, 2022 10:25 AM
Due: Dec 5, 2022
Priority: 5 Day
Contact Name: [REDACTED]

Eurofins Analytical Services Manager : [REDACTED]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	0960_QC209_221122	Nov 22, 2022		Soil	L22-No0066944	X	X
2	0960_QC210_221122	Nov 22, 2022		Water	L22-No0066945		X
3	0960_QC211_221122	Nov 22, 2022		Water	L22-No0066946		X
4	0960_QC212_221122	Nov 22, 2022		Water	L22-No0066947		X
5	0960_QC213_221122	Nov 22, 2022		Soil	L22-No0066948	X	X
6	0960_QC214_221122	Nov 22, 2022		Water	L22-No0066949		X
7	0960_QC215_221122	Nov 22, 2022		Water	L22-No0066950		X
8	0960_QC216_221122	Nov 22, 2022		Soil	L22-No0066951	X	X

Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226,Adelaide Terrace
Perth
WA 6000

Project Name: WA_0960_PFASOMP
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Order No.: PFAS-OMP 304700525
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Received: Nov 28, 2022 10:25 AM
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Contact Name: [REDACTED]

Eurofins Analytical Services Manager : [REDACTED]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA # 1261 Site # 1254						X	X
9	0960_QC217_221122	Nov 22, 2022		Water	L22-No0066952		X
10	0960_QC218_221122	Nov 22, 2022		Water	L22-No0066953		X
11	0960_QC219_221122	Nov 22, 2022		Soil	L22-No0066954	X	X
12	0960_QC220_221122	Nov 22, 2022		Soil	L22-No0066955	X	X
13	0960_QC221_221123	Nov 23, 2022		Water	L22-No0066956		X
14	0960_QC222_221123	Nov 23, 2022		Water	L22-No0066957		X
15	0960_QC223_221123	Nov 23, 2022		Water	L22-No0066958		X
Test Counts						5	15

Internal Quality Control Review and Glossary

General

- Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	µg/L: micrograms per litre
ppm: parts per million	ppb: parts per billion	%: Percentage
org/100 mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (<i>bis</i> -tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
- For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSA's)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	104			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	78			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	80			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	86			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	73			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	77			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	99			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	91			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	92			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	92			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	83			50-150	Pass	

Test			Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery								
Perfluoroalkyl sulfonamido substances								
Perfluorooctane sulfonamide (FOSA)			%	84		50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)			%	75		50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)			%	99		50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)			%	68		50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)			%	91		50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	80		50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	85		50-150	Pass	
LCS - % Recovery								
Perfluoroalkyl sulfonic acids (PFSA's)								
Perfluorobutanesulfonic acid (PFBS)			%	75		50-150	Pass	
Perfluorononanesulfonic acid (PFNS)			%	72		50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)			%	86		50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)			%	73		50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	71		50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	84		50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	84		50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	59		50-150	Pass	
LCS - % Recovery								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)								
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	82		50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)			%	67		50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	72		50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	73		50-150	Pass	
CRM - % Recovery								
Perfluoroalkyl sulfonamido substances								
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	82		70-130	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	72		70-130	Pass	
CRM - % Recovery								
Perfluoroalkyl sulfonic acids (PFSA's)								
Perfluorohexanesulfonic acid (PFHxS)			%	87		70-130	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	102		70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Perfluoroalkyl carboxylic acids (PFCAs)								
Perfluorobutanoic acid (PFBA)	L22-De0002658	NCP	%	106		50-150	Pass	
Perfluoropentanoic acid (PFPeA)	L22-De0002658	NCP	%	84		50-150	Pass	
Perfluorohexanoic acid (PFHxA)	L22-De0002658	NCP	%	83		50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	L22-De0002658	NCP	%	78		50-150	Pass	
Perfluorooctanoic acid (PFOA)	L22-De0002658	NCP	%	81		50-150	Pass	
Perfluorononanoic acid (PFNA)	L22-De0002658	NCP	%	83		50-150	Pass	
Perfluorodecanoic acid (PFDA)	L22-De0002658	NCP	%	77		50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	L22-De0002658	NCP	%	98		50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	L22-De0002658	NCP	%	99		50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	L22-De0002658	NCP	%	111		50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L22-De0002658	NCP	%	111		50-150	Pass	
Spike - % Recovery								
Perfluoroalkyl sulfonamido substances								
Perfluorooctane sulfonamide (FOSA)	L22-De0002658	NCP	%	121		50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	L22-De0002658	NCP	%	106			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	L22-De0002658	NCP	%	83			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	L22-De0002658	NCP	%	97			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	L22-De0002658	NCP	%	96			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	L22-De0002658	NCP	%	107			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	L22-De0002658	NCP	%	72			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFASs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	L22-De0002658	NCP	%	78			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	L22-De0002658	NCP	%	58			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	L22-De0002658	NCP	%	74			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	L22-De0002658	NCP	%	87			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	L22-De0002658	NCP	%	65			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	L22-De0002658	NCP	%	88			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M22-De0002043	NCP	%	89			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	L22-De0002658	NCP	%	51			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	L22-De0002658	NCP	%	85			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	L22-De0002658	NCP	%	80			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	L22-De0002658	NCP	%	81			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	L22-De0002658	NCP	%	100			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	M22-No0073916	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	L22-No0066910	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	L22-No0066910	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

	Analytical Services Manager
	Senior Analyst-PFAS
	Senior Analyst-PFAS



Business Unit Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request

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APPENDIX

D

FIELD RECORDS & CALIBRATION CERTIFICATES



now



Monitoring						Well		SWL											
Monitoring Date	Location	Sample ID	Screen Interval	Bore Type	TOC (mAHD)	Depth (m)	(mbTOC)	RWL (mAHD)	Other Observations	Sampling Method	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	QC Dup Sample #	Odour ?	Colour
22/11/2022	MW018	0960_MW018_221122	5.5-8.5_	Single Level	6.403	8.5		5.23	1.173	HydraSleeve	27.6	3.42	3202	2080	7.48	-9		no	Brown
22/11/2022	MW021	0960_MW021_221122	5.6-8.6_	Single Level	6.745	8.6		5.575	1.17	HydraSleeve	27.9	2.92	3079	2002	7.26	36.6		no	Cloudy
22/11/2022	MW102	0960_MW102_221122	2.5-8.5_	Single Level	4.6266	8.5		4.37	0.257	HydraSleeve	28.7	1.71	88291	57371	7.03	-109.4	QC118 , QC218	no	Cloudy,Brown
23/11/2022	MW103	0960_MW103_221123	1-5-8_	Single Level	2.2785	5.8		2.14	0.139	HydraSleeve	26.7	0.93	78218	50820	7.15	-99.5		no	Cloudy,Black
22/11/2022	MW104	0960_MW104_221122	1-6.5_	Single Level	2.7256	6.5		2.48	0.246	HydraSleeve	28.1	235	60290	39190	7.26	-112		no	Cloudy,Brown
22/11/2022	MW105	0960_MW105_221122	2.0-8.0_	Single Level	3.7272	8		3.18	0.547	HydraSleeve	28.9	1.49	45273	29428	6.9	-106.9		no	Cloudy,Brown
22/11/2022	MW112	0960_MW112_221122	3.0-8.0_	Single Level	5.1191	8.0		3.69	1.429	HydraSleeve	28.7	2.09	11751	7637.5	6.63	-20		no	Brown
22/11/2022	MW113	0960_MW113_221122	4.0-10.0_	Single Level	7.3165	10		6.16	1.156	HydraSleeve	31.4	3.14	11223	7296	6.95	-88.8		no	Cloudy,Brown
22/11/2022	MW114	0960_MW114_221122	4.0-10.0_	Single Level	7.7467	10.0		6.56	1.187	HydraSleeve	28	2.56	9109	5921.5	6.26	18.3		no	Brown
22/11/2022	MW115	0960_MW115_221122	3.0-8.0_	Single Level	4.9133	8		4.05	0.863	HydraSleeve	30.1	1.57	33250	21622	6.86	-95.2		no	Cloudy,Brown
22/11/2022	MW122	0960_MW122_221122	1.7-7.7_	Single Level	3.9702	7.7		3.405	0.565	HydraSleeve	28.6	0.68	30644	19917	7.45	-98.4		no	Cloudy
22/11/2022	MW124	0960_MW124_221122	1.0-6.0_	Single Level	2.9183	6		2.68	0.238	HydraSleeve	28	2.65	83726	54488	7.15	-109.4		no	Cloudy,Brown
22/11/2022	MW126	0960_MW126_221122	2.0-8.0_	Single Level	4.5088	8.0		3.87	0.639	HydraSleeve	28.2	1.35	63192	41075	7.1	-69.3		no	Clear
22/11/2022	MW127	0960_MW127_221122	2.5-8.5_	Single Level	5.6238	8.5		4.57	1.054	HydraSleeve	28.5	1.51	69407	45116	6.99	-91.1		no	Cloudy
22/11/2022	MW134	0960_MW134_221122	1-5-7.0_	Single Level	2.5155	5.7		2.21	0.305	HydraSleeve	30.6	1.55	60866	89585	5.97	66.4		no	Brown
23/11/2022	MW135	0960_MW135_2.5-3.0_221123	2.5-3.0_	Multi level	2.7781	3.0		2.34	0.438	Peristaltic Pump	28.4	3.35	31107	20221.5	6.54	28.8		no	Brown
22/11/2022	MW137	0960_MW137_2.5-3.0_221122	2.5-3.0_	Multi level	2.1691	3.0		1.57	0.599	Peristaltic Pump	28	2.14	79011	51358	7.94	-44.6		no	Cloudy
22/11/2022	MW138	0960_MW138_3.0-3.5_221122	3.0-3.5_	Multi level	3.3074	3.5		3.01	0.297	Peristaltic Pump	28.2	2.01	42775	27800	7.28	-52.4		no	Brown
22/11/2022	MW139	0960_MW139_221122	2.0-7.0_	Single Level	4.1386	7.0		3.595	0.544	HydraSleeve	28.8	0.62	61883	40216	7.17	-107		no	Cloudy
23/11/2022	MW140	0960_MW140_1.5-2.0_221123	1.5-2.0_	Multi level	2.4916	2		1.89	0.602	Peristaltic Pump	28.8	0.01	106157	69000	7.3	-101.7		no	Cloudy,Brown
23/11/2022	MW141	0960_MW141_3.0-3.5_221123	3.0-3.5_	Multi level	2.8073	3.5		2.23	0.577	Peristaltic Pump	26.7	0.81	36399	23658	7.23	-98.8		no	Cloudy,Brown
23/11/2022	MW143	0960_MW143_3.0-3.5_221123	3.0-3.5_	Multi level	2.8174	3.5		2.58	0.237	Peristaltic Pump	27	2.16	86170	55990	7.13	13.7		no	Brown
22/11/2022	MW144	0960_MW144_3.0-3.5_221122	3.0-3.5_	Multi level	3.0481	3.5		2.7	0.348	Peristaltic Pump	27.3	2.07	36842	23952.5	6.58	24		no	Brown
23/11/2022	MW145	0960_MW145_3.0-3.5_221123	3.0-3.5_	Multi level	3.1416	3.5		2.88	0.262	Peristaltic Pump	27.2	3.01	92839	60380	7.27	-6.4		no	Brown
23/11/2022	MW146	0960_MW146_3.0-3.5_221123	3.0-3.5_	Multi level	2.7937	3.5		2.43	0.364	Peristaltic Pump	29.1	3.36	91675	59635	7.32	-89.6		no	Cloudy,Brown
23/11/2022	MW147	0960_MW147_3.0-3.5_221123	3.0-3.5_	Multi level	2.9123	3.5		2.48	0.432	Peristaltic Pump	29.4	0.93	96268	62587	7.04	-103.8		no	Cloudy,Brown
22/11/2022	MW148D	0960_MW148D_221122	14-20_	Single Level	3.5778	20.0		3.27	0.308	HydraSleeve	27.6	3.31	77180	50125	7.76	-26		no	Clear
22/11/2022	MW148S	0960_MW148S_221122	2-8_	Single Level	3.6851	8.0		3.24	0.445	HydraSleeve	27.8	0.88	33410	21706	7.04	-35		no	Cloudy
22/11/2022	MW151	0960_MW151_221122	2-8_	Single Level	4.0631	8.0		3.54	0.523	HydraSleeve	28.9	1.13	12032	7828	7.22	-92	QC111/211	no	Brown,Cloudy
23/11/2022	MW159	0960_MW159_221123	3-9_	Single Level	4.1895	9.0		3.6	0.589	HydraSleeve	27.3	0.95	28272	18400	7.01	-100		no	Clear
22/11/2022	MW162	0960_MW162_221122	17-20_	Single Level	6.856	20.0		5.685	1.171	HydraSleeve	28.8	1.58	12721	6288	6.77	39		no	Cloudy
22/11/2022	MW163	0960_MW163_221122	17-20_	Single Level	6.7808	20.0		5.8	0.981	HydraSleeve	26.3	4.08	14146	9197.5	6.37	55.5		no	Brown
22/11/2022	MW164	0960_MW164_221122	17-20_	Single Level	6.7893	20.0		5.6	1.189	HydraSleeve	27.5	4.27	6105	3971.5	7.78	10.5	QC112/212	no	Clear
22/11/2022	MW165	0960_MW165_221122	3-9_	Single Level	6.1043	9.0		5.23	0.874	HydraSleeve	26.8	2.83	3025	1963	7.52	1.6	QC110/210	no	Brown
22/11/2022	MW166	0960_MW166_221122	2.5-8.5_	Single Level	5.7441	8.5		4.56	1.184	HydraSleeve	28.7	2.58	2837	1846	6.82	41.3	QC117/217	no	Clear
22/11/2022	MW167	0960_MW167_221122	2.5-8.5_	Single Level	6.2094	8.5		5.075	1.134	HydraSleeve	28.2	2.75	5222	3393	5.89	68.6		no	Brown
22/11/2022	MW168	0960_MW168_221122	2.5-8.5_	Single Level	6.1713	8.5		4.985	1.186	HydraSleeve	27.9	0.99	12035	7819.5	5.6	71.8		no	Clear
22/11/2022	MW170	0960_MW170_221122	2.5-8.5_	Single Level	5.639	8.5		4.785	0.854	HydraSleeve	28.7	2.01	23355	14544	7.11	-68.1		no	Cloudy
22/11/2022	MW172	0960_MW172_221122	2.5-8.5_	Single Level	5.6193	8.5		4.73	0.889	HydraSleeve	30	2.6	32853	21353	7.25	-53		no	Cloudy
23/11/2022	MW175	0960_MW175_4.0-4.5_221123	4.0-4.5_	Multi level	4.7916	4.5		4.21	0.582	Peristaltic Pump	32.3	1.59	5058	3289	6.99	-9.1		no	Cloudy
22/11/2022	MW176	0960_MW176_1.5-2.0_221122	1.5-2.0_	Multi level	2.1274	2		1.85	0.277	Peristaltic Pump	28.1	0.27	54365	35334	7.09	-136.7		no	Cloudy,Brown
22/11/2022	MW177	0960_MW177_1.5-2.0_221122	1.5-2.0_	Multi level	2.2299	2		1.77	0.46	Peristaltic Pump	27.2	1.09	91058	59197	7	-101.3		no	Cloudy
22/11/2022	MW178	0960_MW178_2.0-2.5_221122	2.0-2.5_	Multi level	2.1612	2.5		1.99	0.171	Peristaltic Pump	26.9	3.23	93195	60575	7.22	-82.1		no	Cloudy,Clear
23/11/2022	MW179	0960_MW179_1.0-1.5_221123	1.0-1.5_	Multi level	2.222	1.5		1.37	0.852	Peristaltic Pump	26.9	2.48	40430	26237	7.65	-57		no	Cloudy
23/11/2022	MW180	0960_MW180_3.5-4.0_221123	3.5-4.0_	Multi level	1.9226	4		1.52	0.403	Peristaltic Pump	29	2.23	90725	59015	7.47	-104.7		no	Cloudy,Brown
23/11/2022	MW181	0960_MW181_1.5-2.0_221123	1.5-2.0_	Multi level	2.2333	2.0		2.14	0.093	Peristaltic Pump	28.6	2.04	97674	63476	7.08	-87.7		no	Cloudy,Brown
22/11/2022	MW211	0960_MW211_221122	NA	Single Level	6.3409	NA		5.13	1.211	HydraSleeve	27.9	3.76	1997	1300	7.69	5.5	QC114/214	no	Brown
22/11/2022	MW233	0960_MW233_221122	4-7_	Single Level	6.262	7.0		5.05	1.212	HydraSleeve	28.8	2.89	2026	1319.5	7.66	-6.3	QC115/215	no	Cloudy
22/11/2022	MW238	0960_MW238_221122	3-6_	Single Level	3.98	6.0		3.48	0.5	HydraSleeve	27.9	7.24	17.5	11.1	8.18	-17.2		no	Cloudy

Note: NA - no bore log available

Monitoring		Sampling								QC Dup			
Monitoring Date	Location	Sample ID	Depth (m)	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Sample #	Odour ?	Odour Comments	Colour
23/11/2022	OTH103	0960_OTH103_221123	0.5	27.9	3.24	54575	35490	7.89	98.6		no		Clear
23/11/2022	OTH106	0960_OTH106_221123	0.35	24.8	4.66	57508	37383	7.98	-95		yes	Slightly saline	Cloudy,Clear
23/11/2022	OTH107	0960_OTH107_221123	0.3	23.7	5.86	56989	37061	8.17	-93.7		no		Clear
23/11/2022	OTH129	0960_OTH129_221123	0.5	29.5	3.05	53742	34905	7.74	22		no		Clear
23/11/2022	OTH132	0960_OTH132_221123	0.5	26.9	2.88	53723	34905	6.95	74.4		no		Clear
23/11/2022	OTH134	0960_OTH134_221123	0.5	29.4	8.2	53233	34580	7.63	42	QC123/223	no		Clear

Monitoring Location	Date	Sample ID	Sampling Method	Sample Depth (m)	WaterBody Depth (m)	Flow Rate	Comments	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS	pH	Eh (mV)	Colour	Turbidity
SW001	23/11/2022	0960_SW001_221123	Direct into Bottle	0.05		0.1 Slow		35.9	3.36	94197	61240	7.76	-23.1	Clear	Low
SW108	22/11/2022						DRY								
SW113	22/11/2022						DRY								
SW114	22/11/2022						Dry								
SW121	22/11/2022						Dry								
SW122	22/11/2022						Dry								
SW123	22/11/2022						Dry								
SW124	22/11/2022						Dry								
SW125	22/11/2022						Dry								
SW157	22/11/2022						Dry								
SW166	22/11/2022						Dry								
SW168	22/11/2022						Dry								
SW170	22/11/2022						DRY								
SW174	22/11/2022						Dry								
SW176	22/11/2022						Dry								
SW189	22/11/2022						Dry								
SW190	23/11/2022						Dry								
SW192	23/11/2022						Dry								
SW193	23/11/2022						Dry								
SW198	22/11/2022						Dry								
SW199	22/11/2022						Dry								
SW200	22/11/2022						Dry								
SW205	23/11/2022	0960_SW205_221123	Direct into Bottle	0.1		0.1 Slow		27.9	4.6	94406	61377	8.16	-82.1	Cloudy brown	Medium
SW207	23/11/2022	0960_SW207_221123	Direct into Bottle	0.1		0.1 Slow		30	4.16	69745	45355	7.94	104.2	Clear	Medium
SW208	23/11/2022	0960_SW208_221123	Direct into Bottle	0.15		1.2 Medium	QC121, QC221	24.1	3.22	57843	37597	8.02	-87.1	Clear	Low
SW209	23/11/2022	0960_SW209_221123	Direct into Bottle	0.1		0.3 Slow		28.1	2.47	63970	41598	7.91	-58.8	Clear	Low
SW210	23/11/2022	0960_SW210_221123	Direct into Bottle	0.1		0.2 Slow	QC122/222	30.7	3.21	68444	44532	7.99	7.99	Clear	Low
SW211	23/11/2022	0960_SW211_221123	Direct into Bottle	0.1		0.2 Slow		31.5	1.96	49375	31990	7.7	-47	Cloudy	Medium
SW219	23/11/2022						Dry								
SW227	22/11/2022						Dry								
SW231	22/11/2022						DRY								
SW234	22/11/2022						Dry								
SW235	23/11/2022						Dry								
SW243	22/11/2022						Dry								
SW265	22/11/2022						DRY								
SW277	22/11/2022						Dry								
SW278	22/11/2022						Dry								
SW279	22/11/2022						Dry								
SW288	23/11/2022						Dry								
SW291	22/11/2022						Dry								
SW292	22/11/2022						Dry								
SW293	22/11/2022						Dry								
SW298	23/11/2022						DRY								
SW300	23/11/2022	0960_SW300_221123	Direct into Bottle	0.1		0.2 Slow		32.2	2.22	55265	36030	7.64	-28.2	Cloudy	Low
SW301	23/11/2022	0960_SW301_221123	Direct into Bottle	0.1		0.1 Slow		30.9	4.41	82627	53697	8.31	-92.2	Clear	Medium
SW302	23/11/2022	0960_SW302_221123	Direct into Bottle	0.1		0.5 Slow		27	1.27	77626	50507	7.8	-68.2	Clear	Low
SW303	23/11/2022	0960_SW303_221123	Direct into Bottle	0.1		0.3 Slow		29.4	1.93	59682	38805	8.61	113.5	Brown	Medium
SW304	23/11/2022	0960_SW304_221123	Direct into Bottle	0.1		0.4 Slow		29.4	1.6	69632	45240	8.12	105.9	Brown	Medium
SW305	23/11/2022	0960_SW305_221123	Direct into Bottle	1		0.3 Slow		28.5	3.81	59045	38357	7.98	-54.7	Clear	Low

Monitoring Location	Date	Sample ID	Depth of Sediment Sampling (m)	Sampling Method	Sample Condition	Sample Description	Comments
SD199	22/11/2022	0960_SD199_221122	0.1	Shovel, Trowel	Dry	Brown fine clay	
SD200	22/11/2022	0960_SD200_221122	0.1	Shovel, Trowel	Dry	Brown fine clay	QC120/220
SD205	23/11/2022	0960_SD205_221123	0.1	Shovel, Trowel	Wet	Brown CLAY, very wet	
SD207	23/11/2022	0960_SD207_221123	0.1	Shovel, Trowel	Wet	Brown clayey SAND	
SD208	23/11/2022	0960_SD208_221123	0.2	Shovel, Trowel	Wet	Beach SAND, yellow/grey, med grain, wet	
SD209	23/11/2022	0960_SD209_221123	0.1	Shovel, Trowel	Wet	Brown sandy clay	
SD210	23/11/2022	0960_SD210_221123	0.1	Shovel, Trowel	Wet	Stiff brown clay	
SD211	23/11/2022	0960_SD211_221123	0.1	Shovel, Trowel	Wet	Brown clay	
SD219	23/11/2022	0960_SD219_221123	0.1	Shovel, Trowel	Dry	Brown clay	
SD300	23/11/2022	0960_SD300_221123	0.1	Shovel, Trowel	Wet	Brown clay	
SD301	23/11/2022	0960_SD301_221123	0.1	Shovel, Trowel	Wet	Brown clay	
SD302	23/11/2022	0960_SD302_221123	0.1	Shovel, Trowel	Wet	Sandy clay, stiff, brown	
SD303	23/11/2022	0960_SD303_221123	0.1	Shovel, Trowel	Wet	Clay, fine grained, grey to brown, trace shells/organics	
SD304	23/11/2022	0960_SD304_221123	0.1	Shovel, Trowel	Wet	Clay, fine grained, brown, hard, trace shells/organics	
SD305	23/11/2022	0960_SD305_221123	0.1	Shovel, Trowel	Wet	Brown clayey sand	
SS108	22/11/2022	0960_SS108_221122	0.1	Shovel, Trowel	Dry	Red/brown, silty, sandy CLAY	QC116 / QC216
SS113	22/11/2022	0960_SS113_221122	0.1	Shovel, Trowel	Dry	Red/brown, silty, clayey SAND, small grain, very dry	
SS114	22/11/2022	0960_SS114_221122	0.1	Shovel, Trowel	Dry	Orange clay fine	QC113/213
SS121	22/11/2022	0960_SS121_221122	0.1	Shovel, Trowel	Dry	Sandy clay, fine to med grained, brown, trace organics	
SS122	22/11/2022	0960_SS122_221122	0.1	Shovel, Trowel	Dry	Orange fine clay	
SS123	22/11/2022	0960_SS123_221122	0.1	Shovel, Trowel	Dry	Sandy clay, fine to med grained, brown, trace organics, trace gravels	
SS124	22/11/2022	0960_SS124_221122	0.1	Shovel, Trowel	Dry	Clayey sand, fine to med grained, trace organics, brown	
SS125	22/11/2022	0960_SS125_221122	0.1	Shovel, Trowel	Dry	Orange clay	
SS157	22/11/2022	0960_SS157_221122	0.1	Shovel, Trowel	Dry	Orange clay	
SS166	22/11/2022	0960_SS166_221122	0.1	Shovel, Trowel	Dry	Orange clay	
SS168	22/11/2022	0960_SS168_221122	0.1	Shovel, Trowel	Dry	Orange clay fine	
SS170	22/11/2022	0960_SS170_221122	0.1	Shovel, Trowel	Dry	Red/brown sandy CLAY, very dry	QC119, QC219
SS174	22/11/2022	0960_SS174_221122	0.1	Shovel, Trowel	Dry	Orange clay	
SS176	22/11/2022	0960_SS176_221122	0.1	Shovel, Trowel	Dry	Orange clay	
SS189	22/11/2022	0960_SS189_221122	0.1	Shovel, Trowel	Dry	Clayey sand, fine to med grained, dark brown, moist	
SS190	23/11/2022	0960_SS190_221123	0.1	Shovel, Trowel	Dry	Gravelly clay, fine to med grained gravels, brown, trace organics	
SS192	23/11/2022	0960_SS192_221123	0.1	Shovel, Trowel	Dry	Sand, fine to med grained, well graded, trace shells, beige	
SS193	23/11/2022	0960_SS193_221123	0.1	Shovel, Trowel	Wet	Sandy clay, fine grained, brown, trace shells, moist	
SS198	22/11/2022	0960_SS198_221122	0.1	Shovel, Trowel	Dry	Beige sandy clay	
SS227	22/11/2022	0960_SS227_221122	0.1	Shovel, Trowel	Dry	Orange fine clay	
SS231	22/11/2022	0960_SS231_221122	0.1	Shovel, Trowel	Dry	Sabdy CLAY, Red/brown, no odour, very dry	
SS234	22/11/2022	0960_SS234_221122	0.1	Shovel, Trowel	Dry	Orange clay	QC109/209
SS235	23/11/2022	0960_SS235_221123	0.1	Shovel, Trowel	Dry	Brown fine clay	
SS243	22/11/2022	0960_SS243_221122	0.1	Shovel, Trowel	Dry	Orange clay	
SS265	22/11/2022	0960_SS265_221122	0.1	Shovel, Trowel	Dry	Red/brown sandy CLAY, very dry	
SS277	22/11/2022	0960_SS277_221122	0.1	Shovel, Trowel	Dry	Orange clay	
SS278	22/11/2022	0960_SS278_221122	0.1	Shovel, Trowel	Dry	Orange clay	
SS279	22/11/2022	0960_SS279_221122	0.1	Shovel, Trowel	Dry	Orange clay	
SS288	23/11/2022	0960_SS288_221123	0.1	Shovel, Trowel	Dry	Sandy clay, fine to med grained, trace organics,brown	
SS291	22/11/2022	0960_SS291_221122	0.1	Shovel, Trowel	Dry	Brown fine clay	
SS292	22/11/2022	0960_SS292_221122	0.1	Shovel, Trowel	Dry	Brown fine clay	
SS293	22/11/2022	0960_SS293_221122	0.1	Shovel, Trowel	Dry	Fine beige sandy clay	
SS298	23/11/2022	0960_SS298_221123	0.1	Shovel, Trowel	Dry	Red Sand, fine grained, dry	
SS301	23/11/2022	0960_SS301_221123	0.1	Shovel, Trowel	Wet	Brown CLAY, very wet	

APPENDIX

E

DATA QUALITY REVIEW



now



Data Quality Review PFAS Ongoing Monitoring Plan November 2022 Monitoring Event

This appendix reviews the Quality Assurance (QA) and Quality Control (QC) documentation. Quality assurance encompasses the actions, procedures, checks and decisions undertaken to ensure sample integrity and representativeness, and the reliability and accuracy of analysis results. The QA documentation should also include an indication of the Data Quality Objectives sought in relation to each significant action, test or process involved in the assessment.

QC activities measure the effectiveness of the QA procedures by undertaking testing, and then comparing results to previously established objectives. QC work will include the internal laboratory testing as well as results of QC samples submitted such as trip blanks and duplicates. The quality of the information and/or data is deemed satisfactory when the QC results demonstrate that agreed objectives have been met.

QA/QC Aspects	Evidence & Evaluation
QA Documentation	
Project Quality Plan/Work Plan and Data Quality Objectives	The field investigation was carried out between the 22 and 23 November 2022 and is generally in accordance with the proposed scope of work, as documented in the SAQP (PFAS OMP SAQP RAAF Base Learmonth, Rev.7, Cardno, November 2022) issued to the client and in general compliance with Standards Australia 1998. AS/NZ 5667:1998 <i>Water quality – sampling</i>, NEPM <i>National Environment Protection (Assessment of Site Contamination) Measure</i> and PFAS NEMP 2.0. A quality control program was implemented during the Investigation and the quality assurance procedures used have been reiterated in the report (PFAS OMP November 2022 Factual Report). In addition, a safety, health and environment work method statement (SHEWMS) was also prepared. The Data Quality Objectives were expressed in terms of the purpose of the assessment and the relevant assessment criteria.
Data Representativeness	
Use of Composites	No Composites were used during the investigation
Holding Times	Chain of custody and laboratory reports provide evidence of holding times. All holding times were in compliance with required timeframes.
Verification of field procedures	The methodology conducted during this investigation is documented in the body of the report and was in general conformance with the SAQP. Experienced field scientists familiar with the sampling procedures were involved in the field works. Non-disposable equipment was decontaminated between sample locations.
Laboratory Reports	The following laboratory reports were considered for this data quality review: ▪ ALS reports: EP2215708, EP2215710, EP2215711, EP2215713, EP2215722, EP2215723, EP2215789, EP2215791, EP2215792, EP2215797, EP2215811, EP2215812, EP2215813, EP2215814, EP2215815. ▪ Eurofins ARL report: 945170

QA/QC Aspects

Evidence & Evaluation

Data Precision & Accuracy

QC sample Frequency

QC sample type	SAQP required frequency	Sample Collected
Blind duplicate	1 in 10 primary samples (10%)	6 for 55 groundwater samples (10.9%) 2 in 13 surface water samples (15.4%) 5 in 49 sediment samples (10.2%)
Interlab duplicate	1 in 10 primary samples (10%)	6 for 55 groundwater samples (10.9%) 2 in 13 surface water samples (15.4%) 5 in 49 sediment samples (10.2%)
Rinsate	1 per field personnel per day	6 for 2 days (3 field personnel) (100%)
Field Blank	1 per field personnel per day	6 for 2 days (3 field personnel) (100%)

The required QC frequency was achieved for all sample types.

RPD Acceptance criteria

Magnitude of Results	Acceptable RPD range
< 10 x LOR	No limits
10 – 20 LOR	0% - 50%
> 20 x LOR	0% - 20%

QC Testing – Blind Duplicates (Primary Lab)

Groundwater

- Primary Groundwater Samples Analysed: 55
- Blind Duplicate Samples Analysed: 6

All RPDs were within acceptance criteria

Surface water

- Primary surface water Samples Analysed: 13
- Blind Duplicate Samples Analysed: 2

All RPDs were within acceptance criteria.

Sediment

- Primary Sediment Samples Analysed: 49
- Blind Duplicate Samples Analysed: 5

All RPDs were within acceptance criteria.

QC Testing – Interlab Duplicates (Secondary Lab)

Groundwater

- Primary Groundwater Samples Analysed: 55
- Interlab Duplicate Samples Analysed: 6

All RPDs were within acceptance criteria with the following exceptions:

- QC211 (PFHxS – 44%, PFHpS – 66%, PFOS – 90%, PFOA – 26%).
- QC212 (PFHxS – 52%, PFOS – 118%)
- QC214 (PFHxS – 30%, PFHxA – 21%)
- QC215 (PFBS – 33%, PFPeS – 32%, PFHxS – 51%, PFOS – 50%, PFHxA – 25%)

QA/QC Aspects	Evidence & Evaluation
	▪ QC217 (PFOS – 77%, PFOA – 67%) These exceedances are likely due the difference of methodologies and detection levels between the primary and secondary laboratories and the low concentrations of analytes under review. In all cases the primary sample reported higher concentrations than the duplicate sample therefore the results reported on are considered conservative. This is not considered to have impacted the validity of the interpretation drawn upon this dataset. Surface water ▪ Primary surface water Samples Analysed: 13 ▪ Interlab Duplicate Samples Analysed: 2 All RPDs were within acceptance criteria. Sediment ▪ Primary sediment Samples Analysed: 49 ▪ Interlab Duplicate Samples Analysed: 5 All RPDs were within acceptance criteria with the following exception: ▪ QC209 (PFOS 68%) This RPD difference is likely due to the difference of methodologies between the primary and secondary laboratories and the low concentrations of analytes under review. This is not considered to have impacted the reliability of the dataset.
Field Blanks	Field Blanks were collected at a rate of one per fieldwork day. All field blank samples tested reported analytes below the laboratory limit of reporting.
Laboratory Internal QC	Evidence of the laboratories internal QC testing is present and complete in the reports. ALS (Primary) performed internal QC with adequate testing and satisfactory results for method blank, matrix spikes, laboratory control samples and laboratory duplicates. All Method Blank results were within acceptable range. No quality control samples frequency outliers were reported. All Matrix Spikes generally reported recoveries within the acceptance range of 70% to 130% with the exception of the following: ▪ EP2215710: - Samples ID: MW238, Anonymous: PFOS, PFHxS and Sulfate matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. ▪ EP2215711: - Sample ID: MW163: PFOS and PFHxS matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. ▪ EP2215722: - Samples ID: MW105, Anonymous: PFOS, Sulfate and Chloride matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. ▪ EP2215792, EP2215797, EP2215813, EP2215815: - Samples ID: SW210, MW143, Anonymous: Sulfate and Chloride matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. ▪ EP2215708, EP2215712, EP2215723: - Samples ID: SS234, SS122, SS121, Anonymous: PFOS matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. ▪ EP2215789: - Sample ID: Anonymous: PFTeDA and EtFOSAA matrix spike recovery greater than upper data quality objective. The above outliers/exceptions are not considered to affect the reliability of the dataset.

QA/QC Aspects	Evidence & Evaluation
Laboratory Method Detection Limit	Laboratory reports indicate the method detection limits were generally lower than the respective assessment criteria.
NATA endorsement of laboratory reports	Laboratory reports were stamped with the NATA endorsement stamp and signature. ALS Accreditation No. 825 Eurofins ARL Accreditation No. 1261
Calibration of Field Equipment	All equipment used during the investigation was calibrated by the supplier prior to use and daily readings of reference solutions (bump tests) were completed. The equipment calibration certificates, and daily field bump test records are provided in Appendix D.
Decontamination and Equipment Blanks	Rinsate blanks were collected at a rate of one per day per sampler when reusable equipment was used. All rinsate samples tested reported analytes concentrations below the laboratory LORs.
Data Comparability	
Standard Procedures	Fieldwork procedures are detailed in the SAQP and reports and are comparable for each phase of Investigation.
Qualified Personnel	Staff involved in managing and reviewing the project and those involved in fieldwork are qualified personnel.
Sample Integrity	Field Chain of Custody/Laboratory request forms can be found in Appendix C.
Data Completeness	
Completeness of test program	The scope of work undertaken was generally consistent with the SAQP.
Validity of Data Set	The data quality review indicates no significant systematic errors in the data collection process and therefore, the data set used as the basis for groundwater, surface water, porewater and sediment investigation is considered valid and complete.

PFAS OMP Biannual Monitoring Event Factual Report

June 2023

RAAF Learmonth

304700525



Prepared for
Department of Defence

8 September 2023



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Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.

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Chemical Names

DOC	Dissolved Organic Carbon
DO	Dissolved Oxygen
PFAS	Per- and Poly-fluoroalkyl Substances
PFHxS	Per-fluorohexane Sulphonate
PFOA	Per-fluorooctanoic Acid
PFOS	Per-fluorooctane Sulfonate
TDS	Total Dissolved Solids (salinity of water)

Technical Terms

AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
AS	Australian Standard
BGL	Below Ground Level
COC	Chain of Custody
DQI	Data Quality Indicator
DQO	Data Quality Objective
DSI	Detailed Site Investigation
EC	Electrical Conductivity
EPA	Environment Protection Authority
ERA	Ecological Risk Assessment
ESA	Environmental Site Assessment
HIL	Health Investigation Level
HSL	Health Screening Level
LOR	Limit of Reporting
N/A	Not Applicable
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
SAQP	Sampling and Analysis Quality Plan
SWL	Standing water level

Units

ha	Hectares
mAHD	Metres relative to the Australian Height Datum
mBGL	Metres Below Ground Level
mbTOC	Metres below Top of Casing
Meq/L	Milliequivalents per Litre
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
µg/L	Microgram per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

OMP	Ongoing Monitoring Plan
FTG	Fire Training Ground
RAAF	Royal Australian Airforce

1 Introduction

1.1 Background

Cardno now Stantec (“Cardno”) was engaged by the Australian Department of Defence (“Defence” or “the Client”) to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP) biannual monitoring event at the Royal Australian Airforce (RAAF) Learmonth (“the site”). The site is located approximately 30 km south of Exmouth, Western Australia (WA) (Figure 1, Appendix A).

The OMP was carried out in accordance with the scope and limitations presented in Cardno’s Sampling and Analysis Quality Plan (SAQP):

- > Cardno, June 2023, Reference: DEF19009, ‘*PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) RAAF Base Learmonth*’. Rev 9

The SAQP was reviewed prior to the monitoring event, and methodology updates were made.

For the purposes of this report:

- > “the site” was defined as RAAF Base Learmonth.
- > the “Management Area” was defined as comprising the site, plus the land east of the Base, including the salt pan, drainage channels, Wapet Creek and extends to Exmouth Gulf (Figure 2, Appendix A).

1.2 Purpose & Objectives

The objective of the OMP is to assess the changes in the nature and extent of PFAS within the environment, specifically where there is an identified potentially elevated risk to a receptor or a potential future risk to a receptor associated with Defence’s historical use of legacy Aqueous Film Forming Foam (AFFF).

The purpose of this PFAS OMP factual report is to provide an up-to-date status of the condition of the site as it is currently understood in relation to the most recent sampling event.

The objectives of the report are:

- > To provide a succinct summary of the June 2023 monitoring event and provision of analytical results with supporting tables and figures.
- > To provide confirmation of the current understanding of risk.
- > To provide supporting data for the assessment of management actions, where relevant.

1.3 Relevant Guidelines

This assessment has been undertaken in general accordance with applicable industry standards for a site investigation for the purpose, objectives and scope identified in this report. These standards are set out in:

- > National Environment Protection Council (NEPC), 1999, *National Environmental Protection (Assessment of Site Contamination) Measure* (as amended 2013) (ASC NEPM).
- > Heads of Environmental Protection Authority’s Australia and New Zealand (HEPA), January 2020, *PFAS National Environmental Management Plan (NEMP) 2.0*.
- > Australian Standard AS 4482-2005 *Guide to the investigation and sampling of sites with potentially contaminated soils, Part 1 - Non-volatile and semi-volatile compounds*.
- > Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling*.
- > Australian and New Zealand Guidelines, 2018. *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*.

- > Department of Water and Environmental Regulation (DWER), 2021, *Assessment and Management of Contaminated Sites*¹.
- > Department of Defence, Department of Energy, 2018, *Quality System Manual Schedule B15*.
- > U.S. Environmental Protection Agency (EPA), 2000, *Guidance for the Data Quality Objectives Process (EPA QA/G-4)*.
- > USEPA, 2002, *Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)*.
- > National Health and Medical Research Council (NHMRC), August 2019, *Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water*.

2 Scope of Work

Cardno carried out the tasks detailed in the following sections in order to satisfy the purpose and objectives of this assessment.

2.1 Groundwater Monitoring

Sampling of selected groundwater wells was performed in accordance with the SAQP, applying methods set out in Section 3 of this report. The groundwater wells monitored as part of the OMP are presented in Table 2-1, and are shown on Figure 4, Appendix A.

Table 2-1 Groundwater Monitoring Locations

Monitoring Area	Location ID	Number
Source Area 1 – Maintenance Area	MW018, MW021, MW112, MW113, MW114, MW115, MW162, MW163, MW164, MW165, MW166, MW167, MW168, MW211, MW233.	15
Source Area 2 – Fuel Farm	MW105, MW148D, MW148S, MW151, MW159, MW238.	6
Pathway	MW102, MW103, MW104, MW122, MW124, MW126, MW127, MW134, MW135, MW138, MW139, MW140, MW143, MW144, MW145, MW146, MW147, MW170, MW172, MW175, MW180, MW181.	22
Receptor	MW137, MW141, MW176, MW177, MW178, MW179.	6

2.2 Seepage Water Monitoring

Sampling of selected seepage water monitoring locations was performed in accordance with the SAQP, applying methods set out in section 3 of this report. The seepage water locations monitored as part of the OMP are presented in Table 2-2 and are shown on Figure 4, Appendix A.

Table 2-2 Seepage Water Monitoring Locations

Monitoring Area	Location ID	Number
Seepage	OTH103, OTH106, OTH107, OTH129, OTH132, OTH134.	6

2.3 Surface water Monitoring

Sampling of selected surface water monitoring locations was performed in accordance with the SAQP, applying methods set out in Section 3 of this report. The surface water locations monitored as part of the OMP are presented in Table 2-3 and are shown on Figure 5, Appendix A.

¹ It is noted that site is located on Commonwealth Land and is regulated under the Commonwealth environmental legislation, the State based DWER guidelines are relevant for the sampling of off-Site private properties and waterways.

Table 2-3 Surface water Monitoring Locations

Monitoring Area	Location ID	Number
Drainage channels	SW108, SW113, SW114, SW121, SW122, SW123, SW124, SW125, SW157, SW166, SW168, SW170, SW174, SW176, SW189, SW190, SW192, SW193, SW198, SW199, SW200, SW219, SW227, SW231, SW234, SW235, SW243, SW265, SW277, SW278, SW279, SW288, SW291, SW292, SW293, SW298.	36
WAPET Creek	SW001, SW205, SW207, SW208, SW209, SW210, SW211, SW300, SW301, SW302, SW303, SW304, SW305.	13

2.4 Sediment Monitoring

Sampling of selected sediment (or shallow soil if dry) monitoring locations was performed in accordance with the SAQP, applying methods set out in Section 3 of this report. The sediment locations monitored as part of the OMP are presented in Table 2-4 and are shown on Figure 6, Appendix A.

Table 2-4 Sediment Monitoring Locations

Monitoring Area	Location ID	Number
Drainage channels	SD199, SD200, SD219, SS108, SS113, SS114, SS121, SS122, SS123, SS124, SS125, SS157, SS166, SS168, SS170, SS174, SS176, SS189, SS190, SS192, SS193, SS198, SS227, SS231, SS234, SS235, SS243, SS265, SS277, SS278, SS279, SS288, SS291, SS292, SS293, SS298.	36
WAPET Creek	SD205, SD207, SD208, SD209, SD210, SD211, SD300, SD301, SD302, SD303, SD304, SD305, SS301.	13

Note: 'SS' prefix indicates a shallow soil (dry) location, 'SD' prefix a sediment (wet) location

2.5 Data Management

All the data included in the report has been collected, uploaded and reviewed according to the data management requirements of the *Defence Contamination Management Manual (DCMM)* Annex L, including:

- > The sample naming convention detailed in the DCMM Annex L was used in the field;
- > All field data collected was uploaded to the ESdat database;
- > Laboratory data was uploaded and approved; and
- > QA/QC data was reconciled.

2.6 Deviations from the OMP SAQP

Deviations from the SAQP (Cardno, June 2023) for the June 2023 monitoring event are presented in Table 2-5.

Table 2-5 Summary of deviations from the OMP SAQP

Location	Deviation	Comments
SW108, SW113, SW114, SW121, SW122, SW123, SW124, SW125, SW157, SW166, SW168, SW170, SW174, SW176, SW189, SW190, SW192, SW193, SW198, SW199, SW200, SW205, SW219, SW227, SW231, SW234, SW235, SW243, SW265, SW277, SW278, SW279, SW288, SW291, SW292, SW293, SW298, SW301.	Not sampled	These surface water monitoring locations were found dry. No impact on the OMP – sediment samples were collected at these locations and analysed for PFAS.
MW138	Not Sampled	Bores casings (multi level) have been damaged at 0.9 mbTOC. Medium impact – PFAS concentrations have been detected at this monitoring location since the start of the OMP. This well is located off-site along the central drainage channel exiting the site.

3 Methodology

3.1 Groundwater Sampling Methodology

Groundwater monitoring was undertaken applying the methods detailed in Table 3-1.

Table 3-1 Groundwater Sampling Method

Activity	Details
Well Gauging	Standing Water Level (SWL) were gauged using an interface probe. All wells were measured against a surveyed mark at the top of the well casing.
Groundwater Field Parameters	For the single level wells, the field parameters were recorded via a water quality meter from HydraSleeves® or hand-bailed water. For the multilevel wells, the field parameters were recorded with a flow cell during purging. The following field parameters were recorded: - pH. - electrical conductivity (EC). - oxidation reduction potential (ORP). - Dissolved oxygen (DO). - Temperature. Once field parameters have stabilised (as indicated by at least three consecutive measurements falling within +/- 10% of each other) measurement were recorded on field data records. All field instruments (e.g. water quality meter) were calibrated by the equipment supplier and reading of reference solutions (bump tests) undertaken daily in the field to optimise the accuracy of the measurements taken. Calibration certificates and bump tests records are provided in Appendix D.
Deployment and Retrieval of HydraSleeves® (single level well sample collection)	HydraSleeves® were deployed with top weight sample collection to begin at the lowest point. HydraSleeves® sampling devices were left in wells for a minimum of 24 hours to allow restabilisation of the well following the slight disturbance caused by sampler deployment. Samples were collected via continuous pull method at a rate allowing the water to pass through the check valve into the sample sleeve. Samples were discharged immediately (minimise changes in chemistry) via discharge tube. Following sampling, HydraSleeves® were deployed in preparation for the next OMP monitoring event using the same string for consistency between event (same depth of sampling i.e. within screen).
Peristaltic pump (multi-level wells sample collection)	The shallowest (non-dry) screen intervals were sampled at each multi-level well location, using Teflon-free dedicated and disposable high-density polyethylene (HDPE) tubing coupled to a peristaltic pump system. The groundwater was purged at a low flow rate of 0.2 mL/min. SWL and field parameters were measured during purging and post sample collection to ensure limited drawdown effects. The groundwater was sampled when the field parameters had stabilised.
Alternative sampling methodology (hand bailing)	Disposable HDPE hand bailers, attached to a polypropylene string, were used when the water column wasn't sufficient to fill the HydraSleeve®. Purging of the well (i.e. removal of 3x well volume) was undertaken prior to sampling to ensure that a sample representative of the aquifer is taken. Field parameters were regularly recorded during the bailer purge to confirm field parameter stability is achieved.
Decontamination procedure	Dedicated HydraSleeves®/tubing and single use nitrile gloves were used at each groundwater well thus removing the need for decontamination. All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.

Activity	Details
Sample identification, preservation transport and holding times	Each sample container was pre-labelled by the laboratory with a unique barcode for identification. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under Chain of Custody (CoC) documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	Groundwater samples were submitted for the following analysis: - Full PFAS analytical suite (refer to the SAQP for full list of analytes). - Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance). The primary laboratory was ALS Global Laboratories (Perth), and the secondary laboratory (quality control) was Eurofins ARL (Perth). Both laboratories are NATA-accredited for the parameters tested. Copies of the NATA stamped laboratory reports and CoC documentation are included in Appendix C.
Laboratory Testing – Quality Control	Groundwater QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, November 2022): - Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. - Field triplicate (inter-laboratory) samples at 1 per 10 water samples and sent to a secondary laboratory. - Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. - Field blank samples at 1 per day.

3.2 Seepage Water Sampling Methodology

Seepage water monitoring procedure is detailed in Table 3-2.

Table 3-2 Seepage water Sampling method

Activity	Details
Field parameters	The following field parameters were recorded using a water quality meter: - pH. - EC. - ORP. - DO. - Temperature. Field observations such as water flow, odours or sheen presence were also recorded on field sampling sheets.
Sampling Method	Sampling was carried out in a two-hour period; one hour each side of the low tide. Sampling protocol involved a shallow excavation in the beach sand; just above where inundation by wave action is occurring. Sampling containers were lowered into the exposed seepage water and filled.
Decontamination procedure	All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample container was pre-labelled by the laboratory with a unique barcode for identification. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under CoC documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	Seepage water samples were submitted for the following analysis:

Activity	Details
	- Full PFAS analytical suite (refer to the SAQP for full list of analytes). - Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance).
Laboratory Testing – Quality Control	Seepage water QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, June 2023): - Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. - Field triplicate (inter-laboratory) samples at 1 per 10 water samples and sent to a secondary laboratory. - Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. - Field blank samples at 1 per day.

3.3 Surface Water Sampling Methodology

Surface water monitoring procedure is detailed in Table 3-3.

Table 3-3 Surface water Sampling Method

Activity	Details
Field parameters	The following field parameters were recorded using a water quality meter: - pH. - EC. - ORP. - DO. - Temperature. Field observations such as water flow, odours or sheen presence were also recorded on field sampling sheets.
Sampling Method	Surface water samples were collected directly into sample containers using a 'Grab' (manual) sample method via a long-handled sampling device. Where depth permits, the sample container was positioned at least 10 cm below the surface water level and above the sediment bed and oriented with the capped opening facing downwards to avoid the collection of surface films.
Decontamination procedure	All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Sample identification, preservation transport and holding times	Each sample container was pre-labelled by the laboratory with a unique barcode for identification. Samples were collected directly into appropriately preserved laboratory supplied bottles (Teflon-free) and packed in chilled containers for delivery to the laboratory under CoC documentation. Sample containers, preservation procedures, sample storage requirements and holding times were undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate).
Laboratory Testing	Surface water samples were submitted for the following analysis: - Full PFAS analytical suite (refer to the SAQP for full list of analytes). - Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance).
Laboratory Testing – Quality Control	Surface water QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, June 2023): - Field duplicate (intra-laboratory) samples at 1 per 10 water samples or 1 per batch if the batch is less than 10 samples. - Field triplicate (inter-laboratory) samples at 1 per 10 water samples and sent to a secondary laboratory.

Activity	Details
	- Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. interface probe)]. - Field blank samples at 1 per day.

3.4 Sediment Sampling Methodology

Sediment sampling methodology is detailed in Table 3-4.

Table 3-4 Sediment Sampling Method

Activity	Details
Sample Collection	Sediment samples were collected at the sediment/water interface using hand tools (e.g. trowel, hand auger, PVC pipe etc.) with samples placed directly into appropriately labelled, laboratory supplied sample containers and packed in chilled containers for delivery to the laboratory under CoC documentation. At each sampling location, the sediment sample was visually assessed, and observations (including physical description) recorded on field data sheets.
Field Records	The following information was recorded on the field data sheets: - Sample description. - Sampling time and date. - Weather conditions. - Sample Collection method. - Sampling equipment decontamination procedures where non-disposable sampling equipment is utilised.
Decontamination	All re-usable sampling equipment was thoroughly washed using PFAS & phosphate-free detergent, then double rinsed with clean water before the sample collection.
Laboratory Testing	Sediment samples were submitted for the following analysis: Full PFAS analytical suite (refer to the SAQP for full list of analytes).
Laboratory Testing – Quality Control	Sediment QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, June 2023): - Field duplicate (intra-laboratory) samples greater than 1 per 20 sediment samples or 1 per batch if the batch is less than 20 samples. - Field triplicate (inter-laboratory) samples greater than 1 per 20 sediment samples and sent to a secondary laboratory. - Rinsate blank sample at 1 per day [collected off re-used sampling equipment (e.g. trowel)]. - Field blank samples at 1 per day.

3.5 Quality Control / Quality Assurance

A critical aspect of site assessments is the demonstration of the quality of the data used as the basis for the assessment. This is achieved through a Data Validation process which includes a review of the following data quality indicators, as described in the SAQP:

- > QA documentation.
- > Bias.
- > Data Representativeness.
- > Data Precision & Accuracy.
- > Laboratory Performance.
- > Data Comparability.
- > Data Set Completeness.

A detailed review of these aspects has been undertaken, the results of which are presented in Appendix E.

The QA/QC review concluded that there are no significant systematic errors in the data collection process and therefore, the dataset used for the assessment is considered valid and complete.

3.6 Assessment Criteria

3.6.1 Groundwater, Seepage water and surface water

The adopted assessment criteria for groundwater are detailed in Table 3-5.

Table 3-5 Criteria for groundwater, seepage water and surface water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS µg/L	PFOA	
Human Health – Recreational Water	2 ¹	10	NHMRC 2019, HEPA 2020
Ecological – 99% species protection	0.00023 ²	19	HEPA 2020

1. Sum of PFOS and PFHxS.
2. PFOS only; Practical screening guideline of 0.01 µg/L is based on typical current laboratory limit of reporting. Therefore, it should be noted that warning and action levels would not be relevant until the detection limits are reduced or the screening levels are increased (HEPA 2020).

3.6.2 Sediment

It is noted that there are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment.

4 Field Observations and Results

4.1 General Site Observations

No significant weather event or site activities that could have impacted the monitoring event or results obtained were noted during the June 2023. No rainfall occurred leading to or during the June 2023 monitoring event and the daily maximum temperatures varied between 21.8 and 24.9°C.

4.2 Groundwater

4.2.1 Summary of Field Observations

4.2.1.1 Physicochemical parameters

Stabilised physicochemical parameters, water colour and observations recorded during the groundwater sampling program are presented in field sampling records, included in Appendix D. Groundwater was fresh to hyper saline [TDS ranging from 1,200 mg/L (MW211) to 60,052 mg/L (MW177)], and generally near neutral [pH ranging 6.78 (MW1115) to 8.33 (MW211)]. Groundwater temperature was on average 26.1°C, and DO readings generally indicate aerobic groundwater condition at most monitoring wells [DO ranging from 0.78 mg/L (MW168) to 4.65 mg/L (MW163)]. Field parameters were generally consistent with the previous monitoring events.

4.2.1.2 Groundwater Elevation and Migration

Well gauging was undertaken over several tide cycles which has been considered when interpreting inferred groundwater contours and flow direction.

Groundwater elevations ranged from -0.291 mAHD (MW127) to 1.052 mAHD (MW113).

Groundwater flow beneath the site was interpreted to be easterly, towards the Exmouth Gulf, consistent with the previous monitoring events. Groundwater is generally inferred to flow towards areas of groundwater depression that lie between the Base and the coast (refer to Figure 3). Groundwater elevation in wells closer to the shore might be influenced by tidal effects.

Groundwater elevation contours and flow direction are shown in Figure 3, Appendix A. Gauging records are presented in Appendix D.

4.2.2 Groundwater Laboratory Results

4.2.2.1 PFAS analytes

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results are provided within Appendix B. A summary of results exceeding the adopted criteria is presented in Table 4-1. Laboratory results have also been compared to available historical data to identify monitoring wells where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Figure 4 in Appendix A presents the groundwater monitoring locations. The laboratory reports are provided in Appendix C.

Table 4-1 Summary of Groundwater Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results ¹	No. Results Above Criteria
PFOA	-	10 ²	2.03 (MW151)	48	0
PFOS	MW018, MW021, MW103, MW105, MW112, MW115, MW148D, MW148S, MW151, MW162, MW163, MW164, MW165, MW166, MW167, MW168, MW172, MW211, MW233, MW238.	0.01 ³	24.8 (MW151)	48	20
Sum of PFOS and PFHxS	MW148D, MW148S, MW151, MW162, MW163, MW164, MW172, MW211, MW233, MW238	2 ²	49.6 (MW148S)	48	10

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – Recreational Use
3. HEPA 2020 guideline value for ecological 99% species protection (LOR adopted)

Findings are summarised as follows:

- > There was no first-time detection of PFOA or the sum of PFOS and PFHxS for any of the groundwater monitoring locations in June 2023.
- > No new exceedance of a guideline value was reported for any of the groundwater monitoring locations in June 2023.

4.2.2.2 Non-PFAS analytes

Tabulated laboratory results for non-PFAS analytes are provided within Appendix B. Results were compared to historical range for each monitoring location. Total anions concentrations ranged from 18 (MW211) and 1,210 (MW181) meq/L. Total cations concentrations ranged from 15.8 (MW211) and 1,410 (MW181) meq/L. Non-PFAS analytes concentrations were of the same order of magnitude as previous monitoring events.

4.3 Seepage Water

4.3.1 Summary of Field Observations

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the groundwater sampling program are presented in field sampling record sheets, included in Appendix D. Seepage water temperature was on average 28.7°C, DO readings indicate aerobic conditions, pH was near neutral, and TDS indicates saline water condition. Field parameters were generally consistent with the previous monitoring events.

4.3.2 Laboratory Results

4.3.2.1 PFAS analytes

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results are provided within Appendix B. A summary of results is presented in Table 4-2. Laboratory results have also been compared to available historical data in order to identify monitoring wells where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Figure 4 in Appendix A presents the seepage water monitoring locations. The laboratory reports are provided in Appendix C.

Table 4-2 Summary of Seepage water Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results ¹	No. Results Above Criteria
PFOA	-	10 ²	<0.01	6	0
PFOS	-	0.01 ³	<0.01	6	0
Sum of PFOS and PFHxS	-	2 ²	<0.01	6	0

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – Recreational Use
3. HEPA 2020 guideline value for ecological 99% species protection (LOR adopted)

Findings are summarised as follows:

- > None of the six (6) seepage water samples reported PFAS concentrations above the LOR.
- > There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the seepage water monitoring locations during the June 2023 monitoring event.

4.3.2.2 Non-PFAS analytes

Tabulated laboratory results for non-PFAS analytes are provided within Appendix B. Results were compared to historical range for each monitoring location. Total anions concentrations ranged from 563 (OTH132) and 622 (OTH129) meq/L. Total cations concentrations ranged from 655 (OTH107) and 751 (OTH129) meq/L. Non-PFAS analytes concentrations were of the same order of magnitude as previous monitoring events.

4.4 Surface Water

4.4.1 Summary of Field Observations

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the groundwater sampling program are presented in field sampling record sheets, included in Appendix D. Field parameters were generally consistent with the previous monitoring events. pH was near neutral to slightly alkaline, and water condition was aerobic and saline [TDS ranging from 28,011 (SW208) to 55,315 mg/L (SW300)].

4.4.2 Laboratory Results

4.4.2.1 PFAS analytes

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results are provided within Appendix B. A summary of results exceeding the adopted criteria is presented in Table 4-3. Laboratory results have also been compared to available historical data in order to identify monitoring wells where a first-time detection of Sum of PFOS and PFHxS or PFOA; or a new exceedance of guideline values were reported. Figure 5 in Appendix A presents the surface water monitoring locations. The laboratory reports are provided in Appendix C.

Table 4-3 Summary of Surface water Results Exceeding Adopted Criteria

Analytes	Locations Exceeding Criteria	Lowest Criteria (µg/L)	Max Conc. (µg/L)	No. Analytical Results ¹	No. Results Above Criteria
PFOA	-	10 ²	<0.01	11	0
PFOS	SW211, SW300	0.01 ³	0.06 (SW211)	11	2
Sum of PFOS and PFHxS	-	2 ²	0.06 (SW211)	11	0

Notes:

1. Non-inclusive of quality control samples
2. HEPA 2020 guideline value for human health – Recreational Use
3. HEPA 2020 guideline value for ecological 99% species protection (primary laboratory LOR adopted)

Findings are summarised as follows:

- > There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the surface water monitoring locations during the June 2023 monitoring event.

4.4.2.2 Non-PFAS analytes

Tabulated laboratory results for non-PFAS analytes are provided within Appendix B. Results were compared to historical range, where available, for each monitoring location. Total anions concentrations ranged from 566 (SW208) and 940 (SW300) meq/L. Total cations concentrations ranged from 668 (SW207) and 1,100 (SW300) meq/L. Non-PFAS analytes concentrations were of the same order of magnitude as previous monitoring events.

4.5 Sediment

4.5.1 Summary of Field Observations

Observations recorded during the sediment sampling program are provided in the field sampling record sheets within Appendix D.

4.5.2 Laboratory Results

Tabulated analytical results are provided within Appendix B. Laboratory results have been compared to available historical data to identify sediment monitoring locations where a first-time detection of Sum of PFOS and PFHxS or PFOA was reported. Figure 6 in Appendix A presents the sediment monitoring locations.

Findings are summarised as follows:

- > SS227 (central drainage channel) and SD211 (WAPET Creek northern reach) recorded a first-time detection of PFOA (0.0002 mg/kg recorded).

4.6 Changes to the Monitoring Network Condition

The following change to the monitoring network condition was noted during the June 2023 monitoring event:

- > MW138 was found damaged, the bores casings were blocked at 0.9 mBGL.

No other changes to the monitoring network condition were noted during the June 2023 monitoring event.

5 Summary and Conclusions

Cardno undertook the June 2023 groundwater, seepage water, surface water and sediment monitoring event at RAAF Base Learmonth as part of the PFAS OMP. Groundwater sampling and testing was undertaken at 48 groundwater monitoring wells, 11 surface water locations, six (6) seepage water locations and 49 sediment monitoring locations. 38 surface water monitoring locations could not be sampled as these were found dry, and one monitoring well (MW138) was found damaged.

Groundwater levels were gauged in all wells before sampling. Groundwater is inferred to flow towards an area of groundwater depression that lies between the site and the coast.

The groundwater laboratory results reported the following:

- > Of the 48 samples that were tested, PFOS (20 samples) and Sum of PFHxS and PFOS (10 samples) reported concentrations that exceeded the HEPA (2020) ecological guideline value for 99% protection species and HEPA (2020) guideline value for recreational use respectively.
- > There was no first-time detection of PFOA or the Sum of PFOS and PFHxS for any of the groundwater monitoring locations.
- > No new exceedance of a guideline value was reported for any of the groundwater monitoring locations.

The seepage water laboratory results reported the following:

- > None of the six (6) seepage water samples reported PFAS concentrations above LOR.
- > There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the seepage water monitoring locations during the November 2022 monitoring event.

The surface water laboratory results reported the following:

- > Of the 11 surface water samples that were tested, PFOS (2 samples) reported concentrations that exceeded the HEPA (2020) ecological guideline value for 99% protection species.
- > There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the surface water monitoring locations during the November 2022 monitoring event.

The sediment laboratory results reported the following:

- > SS227 (central drainage channel) and SD211 (WAPET Creek northern reach) recorded a first-time detection of PFOA (0.0002 mg/kg recorded).

PFAS concentrations were generally within the historical range for all media sampled.

The next OMP sampling event for RAAF Base Learmonth will be the November 2023 monitoring event. An Ongoing Monitoring Interpretive Report will be prepared for the November 2021 – October 2022 monitoring period.

6 References

General References

1. Australian Standard AS 4482-2005 *Guide to the investigation and sampling of sites with potentially contaminated soils*, Part 1 – Non-volatile and semi-volatile compounds.
2. Australian Standard AS 4482-1999 *Guide to the investigation and sampling of sites with potentially contaminated soils*, Part 2 – Volatile substances.
3. *Contaminated Sites Act 2003*, Western Australia.
4. Department of Defence, May 2021, *PFAS OMP Factual Report Guidance* Version 0.2.
5. Department of Defence, July 2018 amended June 2021, *Contamination Management Manual*, Annex L *Guidance on Data Management*.
6. Department of the Environment and Energy (2017) in the National Greenhouse and Energy Reporting Scheme Measurement *Technical Guidelines for the Estimation of Emissions by Facilities in Australia*.
7. Department of Water and Environmental Regulation (DWER), 2021, *Assessment and Management of Contaminated Sites*.
8. Department of Water and Environment Regulation (DWER), 2018, Perth Groundwater Atlas, (<https://maps.water.wa.gov.au/#/webmap/gwm>).
9. Environmental Protection Agency (United States EPA), November 2002, Reference: EPA/240/R-02/004, 'Guidance on Environmental Data Verification and Data Validation'.
10. The Heads of EPAs Australia and New Zealand (HEPA; 2020) *PFAS National Environmental Management Plan (NEMP) 2.0*, January 2020.
11. National Environment Protection Council (NEPC), 1999, *National Environmental Protection (Assessment of Site Contamination) Measure* (as amended), registered May 2013.
12. National Health and Medical Research Council (NHMRC) (2011, as updated 2022) *National Water Quality Management Strategy Australian Drinking Water Guidelines 6*, Version 3.8, September 2022.
13. NHMRC, August 2019, *Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water*.
14. Standards Australia/Standards New Zealand (1998) AS5667.1:1998 'Water Quality – Sampling, Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples'.
15. U.S. Environmental Protection Agency (EPA), 2000, *Guidance for the Data Quality Objectives Process* (EPA QA/G-4).
16. USEPA, 2002, *Guidance on Environmental Data Verification and Data Validation* (EPA QA/G-8).

Site Specific References

17. Cardno, June 2023, Reference: DEF19009, 'PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) RAAF Base Learmonth'. Rev 9.
18. Cardno, April 2023, *2021 Annual Interpretive Report RAAF Base Learmonth*.
19. Cardno, October 2022, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Base Learmonth*.
20. Cardno, August 2022, *PFAS OMP First Flush Sampling Event Factual Report RAAF Base Learmonth*.
21. Cardno, April 2021, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Base Learmonth*.
22. Cardno, August 2021, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Base Learmonth*.
23. Cardno, July 2021, *PFAS OMP 2020 Annual Interpretive Report, RAAF Base Learmonth*.
24. Cardno, May 2021, *PFAS OMP First Flush Sampling Event Factual Report RAAF Base Learmonth*.
25. Cardno, February 2021, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Base Learmonth*.
26. Cardno, July 2020, *PFAS OMP First Flush Sampling Event Factual Report RAAF Base Learmonth*.
27. Cardno, April 2020, *PFAS OMP Biannual Monitoring Event Factual Report RAAF Base Learmonth*.
28. Department of Defence, May 2019, *RAAF Base Learmonth PFAS Ongoing Monitoring Plan*.

29. GHD, December 2018, *RAAF Base Learmonth – PFAS Investigations – Preliminary and Detailed Site Investigation Report*.
30. GHD, April 2019, *RAAF Base Learmonth – PFAS Investigations – Ecological Risk Assessment Preliminary (ERA)*.

APPENDIX

A

FIGURES



now



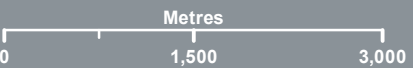


Legend

 Management Area

 RAAF Learmonth

FIGURE 1
1:60,000 Scale at A3



Site Location

JUNE 2023 BIENNIAL MONITORING EVENT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



Map Produced by Cardno WA
Date: 2023-07-13 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-001_RegionalLocation 02.mxd
Aerial Imagery Supplied by Google Earth

1a	Maintenance Area (Source Area)
1b	Pathway (site drains and groundwater)
1c	Pathway (groundwater)
1d	Southern Drainage Channel (Pathway)
1e	Central Drainage Channel (Pathway)
1f	Southern reach of WAPET Creek (Receptor)
1g	Northern reach of WAPET Creek (Receptor)
2a	Current Fuel Farm (Source Area)
2b	Former Fuel Farm (Pathway)
2c	Northern Drainage Channel (Pathway)
3a	Pathway (groundwater)
3b	Site drains (Pathway)

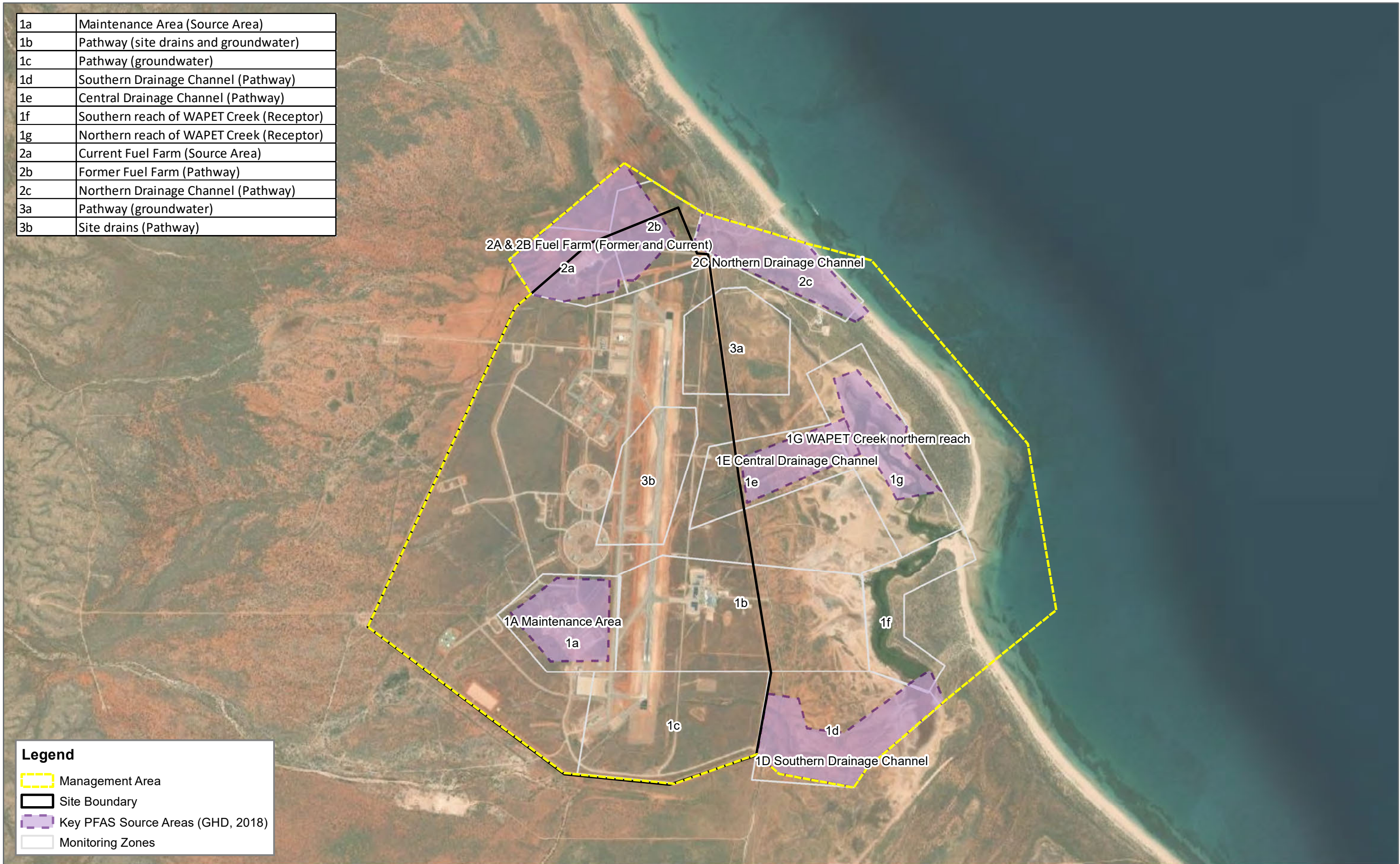


FIGURE 2
1:31,000 Scale at A3

0 1,000 2,000
Metres

Management Area

JUNE 2023 BIENNIAL MONITORING EVENT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



Cardno

Map Produced by Cardno WA
Date: 2023-07-13 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-002_ManagementAreas 02.mxd
Aerial Imagery Supplied by Google Earth

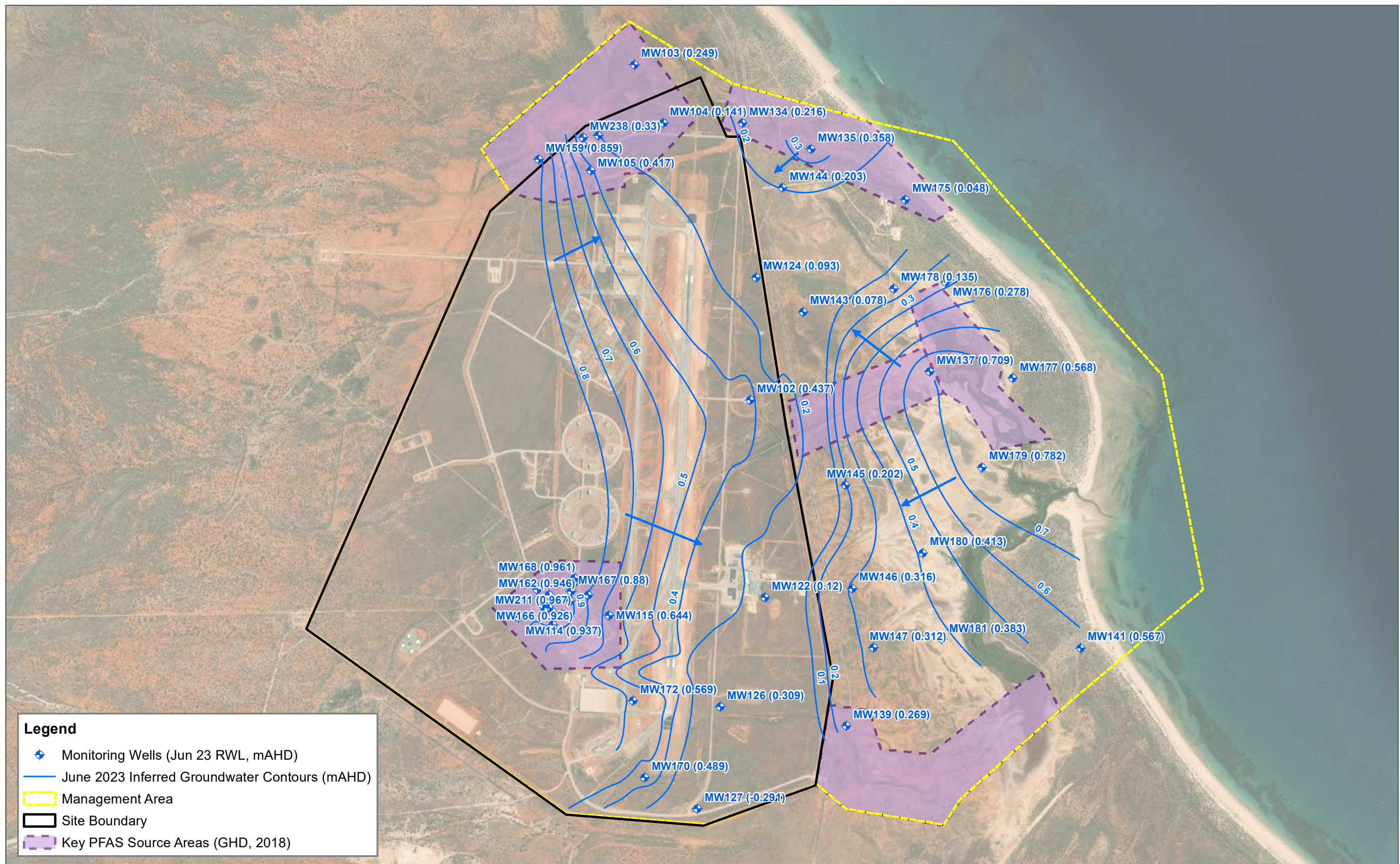


FIGURE 3
1:22,000 Scale at A3

Metres
0 750 1,500

Inferred Groundwater Contours

JUNE 2023 BIANNUAL SAMPLING EVENT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



Map Produced by Cardno WA
Date: 2023-07-19 | Project: DEF19009
Coordinate System: GDA 1994 MGA Zone 50
Map: DEF19009_WA_0960-GS-003_GroundwaterElevationContours 01.mxd
Aerial Imagery Supplied by Google Earth

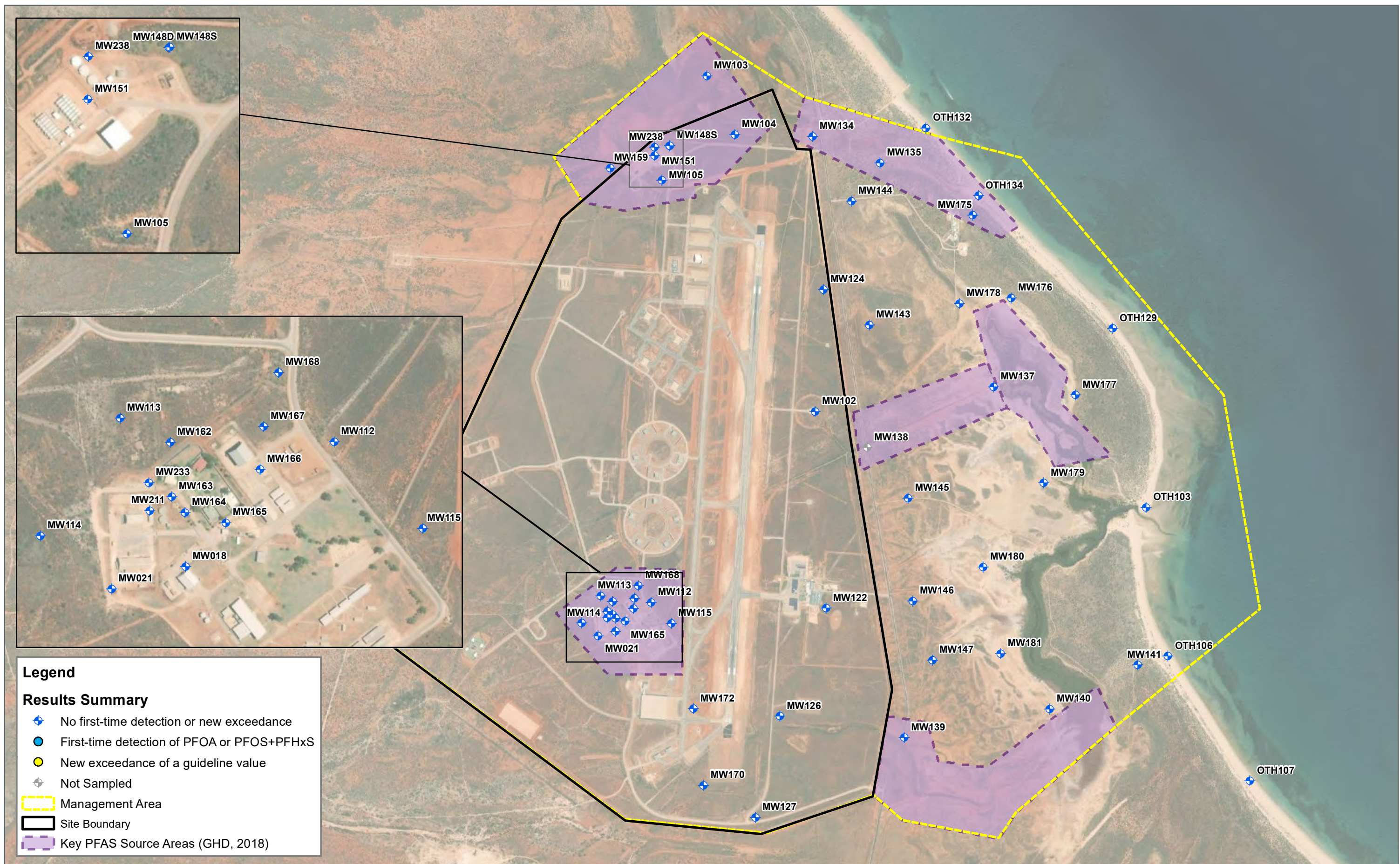


FIGURE 4
1:24,000 Scale at A3

Metres
0 1,000 2,000

Groundwater and Seepage water Monitoring Locations and Results

JUNE 2023 BIENNIAL SAMPLING EVENT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



Map Produced by Cardno WA
Date: 2023-07-19 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-004_GWResults_Jun23 01.mxd
Aerial Imagery Supplied by Google Earth

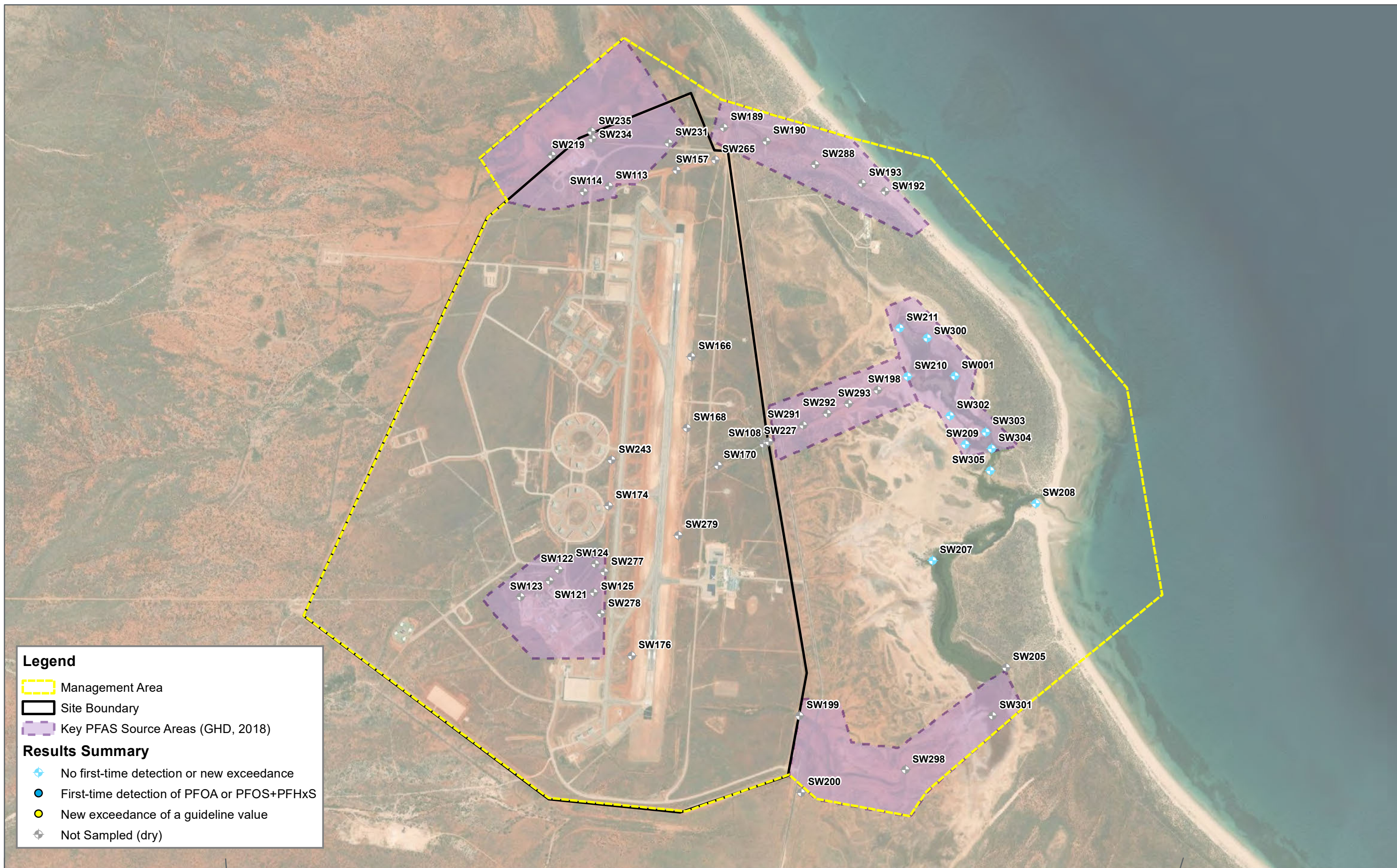


FIGURE 5
1:25,000 Scale at A3

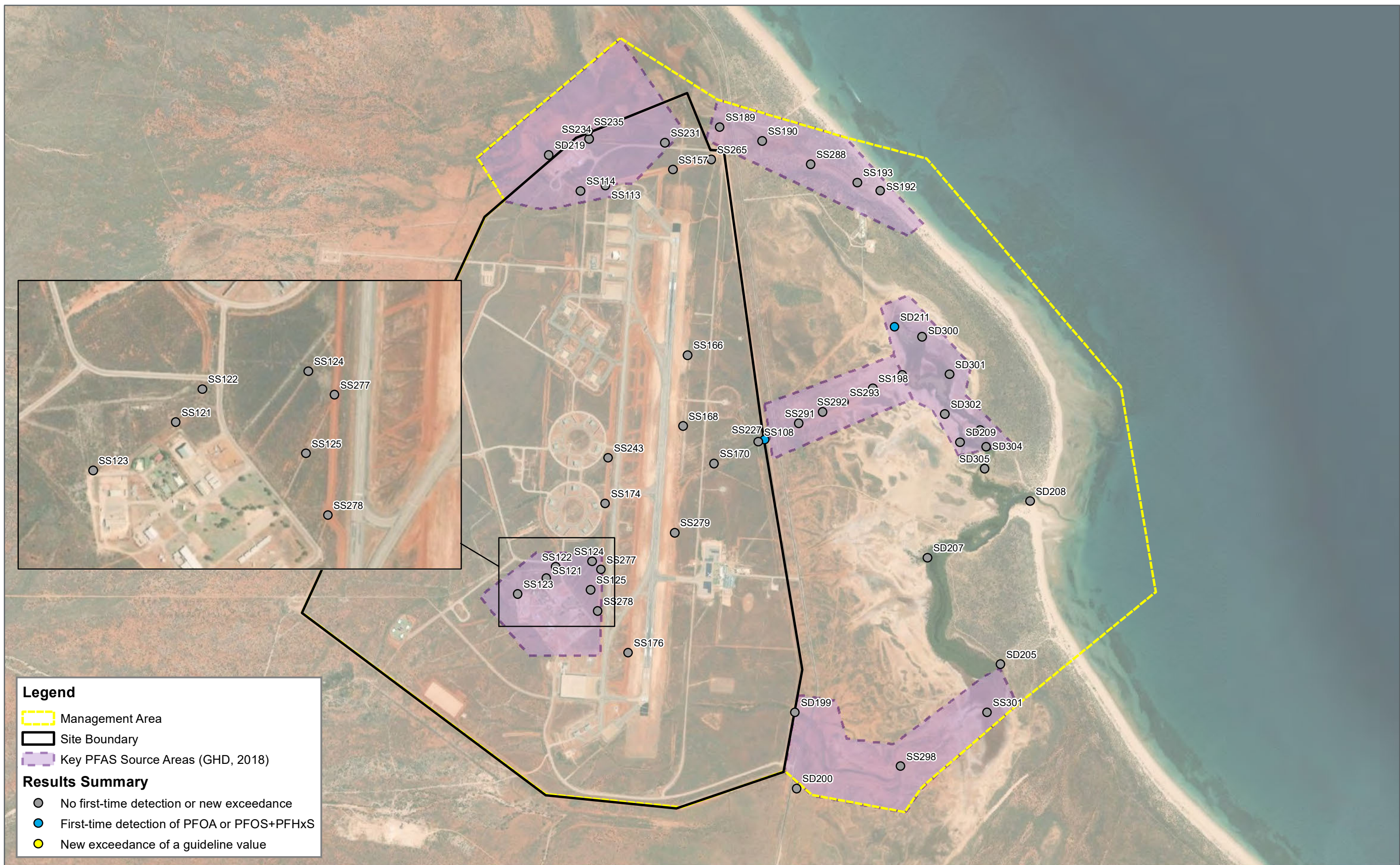
0 1,000 2,000
Metres

Surface water Monitoring Locations and Results

JUNE 2023 BIENNIAL MONITORING EVENT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



Map Produced by Cardno WA
Date: 2023-07-19 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-005_SWResults_Jun23 01.mxd



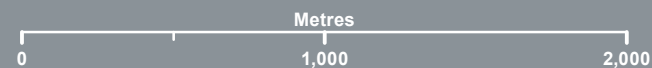
Legend

- Management Area
- Site Boundary
- Key PFAS Source Areas (GHD, 2018)

Results Summary

- No first-time detection or new exceedance
- First-time detection of PFOA or PFOS+PFHxS
- New exceedance of a guideline value

FIGURE 6
1:25,000 Scale at A3



Sediment Monitoring Locations and Results

JUNE 2023 BIENNIAL MONITORING EVENT
RAAF BASE LEARMONTH
DEPARTMENT OF DEFENCE



Map Produced by Cardno WA
Date: 2023-07-19 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0960-GS-006_SDResults_Jun23 01.mxd

APPENDIX

B

DATA ASSESSMENT TABLES



now



	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids								
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOs)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PFAS NEMP 2020 Interim Marine 99%					0.00023*						19				
PFAS NEMP 2020 Recreational Water											10				

Location Code	Date	Field ID	Sample Type	Lab Report Number															
	28/06/2023	0960_QC301_230628	Rinsate	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
	28/06/2023	0960_QC302_230628	Rinsate	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
	28/06/2023	0960_QC303_230628	Rinsate	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
	28/06/2023	0960_QC304_230628	Rinsate	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
	28/06/2023	0960_QC401_230628	Field Blank	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
	28/06/2023	0960_QC402_230628	Field Blank	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
	28/06/2023	0960_QC403_230628	Field Blank	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
	28/06/2023	0960_QC404_230628	Field Blank	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW018	28/06/2023	0960_MW018_230628	Normal	EP2308704	0.08	0.10	1.07	0.05	0.82	<0.02	0.4	0.63	0.79	0.44	0.06	<0.02	<0.02	<0.02	<0.02
MW021	28/06/2023	0960_MW021_230628	Normal	EP2308708	0.10	0.13	0.82	<0.02	0.61	<0.02	<0.1	0.05	0.18	0.02	0.02	<0.02	<0.02	<0.02	<0.02
MW102	28/06/2023	0960_MW102_230628	Normal	EP2308702	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW103	28/06/2023	0960_MW103_230628	Normal	EP2308702	0.25	0.16	0.78	<0.02	0.04	<0.02	<0.1	0.02	0.10	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW104	28/06/2023	0960_MW104_230628	Normal	EP2308708	0.02	<0.02	0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW105	28/06/2023	0960_MW105_230628	Normal	EP2308708	0.15	0.20	0.78	<0.02	0.03	<0.02	<0.1	0.03	0.14	<0.02	0.01	<0.02	<0.02	<0.02	<0.02
MW105	28/06/2023	0960_QC125_230628	Field Duplicate	EP2308708	0.14	0.19	0.88	<0.02	0.03	<0.02	<0.1	0.03	0.13	<0.02	0.01	<0.02	<0.02	<0.02	<0.02
MW105	28/06/2023	0960_QC225_230628	Interlab Duplicate	1004396	0.10	0.16	0.68	<0.01	<0.04	<0.01	<0.05	0.02	0.11	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MW112	28/06/2023	0960_MW112_230628	Normal	EP2308708	0.03	0.04	0.39	<0.02	0.57	<0.02	<0.1	<0.02	0.07	<0.02	0.01	<0.02	<0.02	<0.02	<0.02
MW113	28/06/2023	0960_MW113_230628	Normal	EP2308704	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW114	28/06/2023	0960_MW114_230628	Normal	EP2308704	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW115	28/06/2023	0960_MW115_230628	Normal	EP2308704	0.24	0.22	1.40	0.04	0.46	<0.02	<0.1	0.09	0.40	0.02	0.04	<0.02	<0.02	<0.02	<0.02
MW122	28/06/2023	0960_MW122_230628	Normal	EP2308704	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW124	28/06/2023	0960_MW124_230628	Normal	EP2308708	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW126	28/06/2023	0960_MW126_230628	Normal	EP2308702	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW127	28/06/2023	0960_MW127_230628	Normal	EP2308704	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW134	28/06/2023	0960_MW134_230628	Normal	EP2308702	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW135	28/06/2023	0960_MW135_2.5-3.0_230	Normal	EP2308702	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW137	28/06/2023	0960_MW137_2.5-3.0_230	Normal	EP2308708	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW139	28/06/2023	0960_MW139_230628	Normal	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW140	28/06/2023	0960_MW140_1.5-2.0_230	Normal	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW141	28/06/2023	0960_MW141_3.0-3.5_230	Normal	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW143	28/06/2023	0960_MW143_3.0-3.5_230	Normal	EP2308704	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW144	28/06/2023	0960_MW144_3.0-3.5_230	Normal	EP2308704	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW145	28/06/2023	0960_MW145_3-3.5_23062	Normal	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW146	28/06/2023	0960_MW146_3.0-3.5_230	Normal	EP2308704	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW147	28/06/2023	0960_MW147_3.0-3.5_230	Normal	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW148D	28/06/2023	0960_MW148D_230628	Normal	EP2308708	1.03	0.81	4.00	0.31	2.04	<0.02	0.3	0.27	1.21	0.14	0.21	<0.02	<0.02	<0.02	<0.02
MW148S	28/06/2023	0960_MW148S_230628	Normal	EP2308708	6.61	5.62	27.7	2.55	21.9	<0.02	1.7	1.87	8.57	0.91	1.47	<0.02	<0.02	<0.02	<0.02
MW151	28/06/2023	0960_MW151_230628	Normal	EP2308708	3.12	3.82	24.7	5.06	24.8	<0.02	1.5	1.88	7.39	0.70	2.03	<0.02	<0.02	<0.02	<0.02
MW159	28/06/2023	0960_MW159_230628	Normal	EP2308702	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW162	28/06/2023	0960_MW162_230628	Normal	EP2308704	0.51	0.56	3.91	0.08	0.44	<0.02	0.2	0.27	1.04	0.10	0.12	<0.02	<0.02	<0.02	<0.02
MW163	28/06/2023	0960_MW163_230628	Normal	EP2308704	0.13	0.16	1.44	0.10	0.77	<0.02	<0.1	0.08	0.32	0.04	0.06	<0.02	<0.02	<0.02	<0.02
MW163	28/06/2023	0																	

	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids								
	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
PFAS NEMP 2020 Interim Marine 99%					0.00023*						19				
PFAS NEMP 2020 Recreational Water											10				

Location Code	Date	Field ID	Sample Type	Lab Report Number														
MW177	28/06/2023	0960_MW177_1.5-2.0_230	Normal	EP2308704	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW178	28/06/2023	0960_MW178_4.0-4.5_230	Normal	EP2308704	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW179	28/06/2023	0960_MW179_1.0-1.5_230	Normal	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW180	28/06/2023	0960_MW180_3.5-4.0_230	Normal	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW181	28/06/2023	0960_MW181_1.5-2.0_230	Normal	EP2308707	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
MW211	28/06/2023	0960_MW211_230628	Normal	EP2308704	0.09	0.08	0.64	0.04	5.84	<0.02	0.1	0.10	0.20	0.05	0.06	<0.02	<0.02	<0.02
MW211	28/06/2023	0960_QC115_230628	Field Duplicate	EP2308704	0.09	0.08	0.70	0.04	5.11	<0.02	0.1	0.10	0.21	0.05	0.06	<0.02	<0.02	<0.02
MW211	28/06/2023	0960_QC215_230628	Interlab Duplicate	1004396	0.06	0.07	0.55	0.07	5.0	<0.01	0.09	0.08	0.17	0.04	0.05	<0.01	<0.01	<0.01
MW233	28/06/2023	0960_MW233_230628	Normal	EP2308704	1.38	2.07	24.6	1.43	8.15	<0.02	0.4	0.68	3.27	0.41	1.04	<0.02	<0.02	<0.02
MW233	28/06/2023	0960_QC122_230628	Field Duplicate	EP2308704	1.36	2.04	23.1	1.36	8.34	<0.02	0.4	0.70	3.28	0.42	1.01	<0.02	<0.02	<0.02
MW233	28/06/2023	0960_QC222_230628	Interlab Duplicate	1004396	1.1	2.0	20	0.81	6.3	<0.01	0.29	0.65	2.6	0.43	1.2	<0.01	<0.01	<0.01
MW238	28/06/2023	0960_MW238_230628	Normal	EP2308708	1.31	1.24	9.73	1.08	9.02	<0.02	0.6	0.96	4.53	0.39	0.66	<0.02	<0.02	<0.02
MW238	28/06/2023	0960_QC116_230628	Field Duplicate	EP2308708	1.17	1.16	9.95	1.04	8.89	<0.02	0.6	0.92	4.07	0.35	0.68	<0.02	<0.02	<0.02
MW238	28/06/2023	0960_QC216_230628	Interlab Duplicate	1004396	1.0	1.6	11	0.98	9.9	<0.01	0.51	0.87	4.5	0.33	0.74	<0.01	<0.01	<0.01
OTH103	28/06/2023	0960_OTH103_230628	Normal	EP2308709	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
OTH106	28/06/2023	0960_OTH106_230628	Normal	EP2308709	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
OTH107	28/06/2023	0960_OTH107_230628	Normal	EP2308709	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
OTH129	28/06/2023	0960_OTH129_230628	Normal	EP2308711	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
OTH132	28/06/2023	0960_OTH132_230628	Normal	EP2308711	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
OTH134	28/06/2023	0960_OTH134_230628	Normal	EP2308711	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
SW001	28/06/2023	0960_SW001_230628	Normal	EP2308712	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
SW207	28/06/2023	0960_QC123_230628	Field Duplicate	EP2308709	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
SW207	28/06/2023	0960_QC223_230628	Interlab Duplicate	1004396	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW207	28/06/2023	0960_SW207_230628	Normal	EP2308709	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
SW208	28/06/2023	0960_SW208_230628	Normal	EP2308709	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
SW209	28/06/2023	0960_SW209_230628	Normal	EP2308712	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
SW210	28/06/2023	0960_QC127_230628	Field Duplicate	EP2308712	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
SW210	28/06/2023	0960_QC227_230628	Interlab Duplicate	1004396	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SW210	28/06/2023	0960_SW210_230628	Normal	EP2308712	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
SW211	28/06/2023	0960_SW211_230628	Normal	EP2308712	<0.02	<0.02	<0.01	<0.02	0.06	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
SW300	28/06/2023	0960_SW300_230628	Normal	EP2308712	<0.02	<0.02	<0.01	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
SW302	28/06/2023	0960_SW302_230628	Normal	EP2308712	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
SW303	28/06/2023	0960_SW303_230628	Normal	EP2308712	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
SW304	28/06/2023	0960_SW304_230628	Normal	EP2308709	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02
SW305	28/06/2023	0960_SW305_230628	Normal	EP2308709	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%

HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Notes:

* Practical screening value of 0.01 µg/L adopted based on current laboratory limit of reporting (HEPA, 2020)

First-time detection of PFOA or PFOS+PFHxS

New exceedance of guideline value

			PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides								PFAS	
	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
LOR - Limit of Reporting	0.01	0.01	0.01	0.05	0.01	0.01	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	
PFAS NEMP 2020 Interim Marine 99%																
PFAS NEMP 2020 Recreational Water														2		

Location Code	Date	Field ID	Sample Type	Lab Report Number															
	28/06/2023	0960_QC301_230628	Rinsate	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
	28/06/2023	0960_QC302_230628	Rinsate	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
	28/06/2023	0960_QC303_230628	Rinsate	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
	28/06/2023	0960_QC304_230628	Rinsate	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
	28/06/2023	0960_QC401_230628	Field Blank	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
	28/06/2023	0960_QC402_230628	Field Blank	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
	28/06/2023	0960_QC403_230628	Field Blank	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
	28/06/2023	0960_QC404_230628	Field Blank	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW018	28/06/2023	0960_MW018_230628	Normal	EP2308704	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.89	4.29
MW021	28/06/2023	0960_MW021_230628	Normal	EP2308708	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.43	1.80
MW102	28/06/2023	0960_MW102_230628	Normal	EP2308702	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW103	28/06/2023	0960_MW103_230628	Normal	EP2308702	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.82	1.19
MW104	28/06/2023	0960_MW104_230628	Normal	EP2308708	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.02	0.04
MW105	28/06/2023	0960_MW105_230628	Normal	EP2308708	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.81	1.14
MW105	28/06/2023	0960_QC125_230628	Field Duplicate	EP2308708	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.91	1.22
MW105	28/06/2023	0960_QC225_230628	Interlab Duplicate	1004396	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.68	0.91
MW112	28/06/2023	0960_MW112_230628	Normal	EP2308708	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.96	1.07
MW113	28/06/2023	0960_MW113_230628	Normal	EP2308704	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW114	28/06/2023	0960_MW114_230628	Normal	EP2308704	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW115	28/06/2023	0960_MW115_230628	Normal	EP2308704	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.86	2.65
MW122	28/06/2023	0960_MW122_230628	Normal	EP2308704	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW124	28/06/2023	0960_MW124_230628	Normal	EP2308708	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW126	28/06/2023	0960_MW126_230628	Normal	EP2308702	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW127	28/06/2023	0960_MW127_230628	Normal	EP2308704	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW134	28/06/2023	0960_MW134_230628	Normal	EP2308702	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW135	28/06/2023	0960_MW135_2.5-3.0_230	Normal	EP2308702	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW137	28/06/2023	0960_MW137_2.5-3.0_230	Normal	EP2308708	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW139	28/06/2023	0960_MW139_230628	Normal	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW140	28/06/2023	0960_MW140_1.5-2.0_230	Normal	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW141	28/06/2023	0960_MW141_3.0-3.5_230	Normal	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW143	28/06/2023	0960_MW143_3.0-3.5_230	Normal	EP2308704	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW144	28/06/2023	0960_MW144_3.0-3.5_230	Normal	EP2308704	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW145	28/06/2023	0960_MW145_3-3.5_23062	Normal	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW146	28/06/2023	0960_MW146_3.0-3.5_230	Normal	EP2308704	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW147	28/06/2023	0960_MW147_3.0-3.5_230	Normal	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW148D	28/06/2023	0960_MW148D_230628	Normal	EP2308708	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	6.04	9.20
MW148S	28/06/2023	0960_MW148S_230628	Normal	EP2308708	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	49.6	70.7
MW151	28/06/2023	0960_MW151_230628	Normal	EP2308708	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	49.5	66.1
MW159	28/06/2023	0960_MW159_230628	Normal	EP2308702	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01
MW162	28/06/2023	0960_MW162_230628	Normal	EP2308704	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	4.35	6.59
MW163	28/06/2023	0																	

	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides								PFAS	
	µg/L	µg/L	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	
LOR - Limit of Reporting	0.01	0.01	0.01	0.05	0.01	0.01	0.02	0.05	0.02	0.05	0.05	0.02	0.05	0.01	0.01	
PFAS NEMP 2020 Interim Marine 99%																
PFAS NEMP 2020 Recreational Water														2		

Location Code	Date	Field ID	Sample Type	Lab Report Number														
MW177	28/06/2023	0960_MW177_1.5-2.0_230	Normal	EP2308704	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
MW178	28/06/2023	0960_MW178_4.0-4.5_230	Normal	EP2308704	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
MW179	28/06/2023	0960_MW179_1.0-1.5_230	Normal	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
MW180	28/06/2023	0960_MW180_3.5-4.0_230	Normal	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
MW181	28/06/2023	0960_MW181_1.5-2.0_230	Normal	EP2308707	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
MW211	28/06/2023	0960_MW211_230628	Normal	EP2308704	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	6.48
MW211	28/06/2023	0960_QC115_230628	Field Duplicate	EP2308704	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	5.81
MW211	28/06/2023	0960_QC215_230628	Interlab Duplicate	1004396	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	5.55
MW233	28/06/2023	0960_MW233_230628	Normal	EP2308704	<0.02	<0.05	<0.05	0.61	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	32.8
MW233	28/06/2023	0960_QC122_230628	Field Duplicate	EP2308704	<0.02	<0.05	<0.05	0.61	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	31.4
MW233	28/06/2023	0960_QC222_230628	Interlab Duplicate	1004396	<0.01	<0.01	<0.01	0.50	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	26.3
MW238	28/06/2023	0960_MW238_230628	Normal	EP2308708	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	18.8
MW238	28/06/2023	0960_QC116_230628	Field Duplicate	EP2308708	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	18.8
MW238	28/06/2023	0960_QC216_230628	Interlab Duplicate	1004396	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	20.9
OTH103	28/06/2023	0960_OTH103_230628	Normal	EP2308709	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
OTH106	28/06/2023	0960_OTH106_230628	Normal	EP2308709	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
OTH107	28/06/2023	0960_OTH107_230628	Normal	EP2308709	<0.02	<0.05	<0.05	0.09	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
OTH129	28/06/2023	0960_OTH129_230628	Normal	EP2308711	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
OTH132	28/06/2023	0960_OTH132_230628	Normal	EP2308711	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
OTH134	28/06/2023	0960_OTH134_230628	Normal	EP2308711	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
SW001	28/06/2023	0960_SW001_230628	Normal	EP2308712	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
SW207	28/06/2023	0960_QC123_230628	Field Duplicate	EP2308709	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
SW207	28/06/2023	0960_QC223_230628	Interlab Duplicate	1004396	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01
SW207	28/06/2023	0960_SW207_230628	Normal	EP2308709	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
SW208	28/06/2023	0960_SW208_230628	Normal	EP2308709	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
SW209	28/06/2023	0960_SW209_230628	Normal	EP2308712	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
SW210	28/06/2023	0960_QC127_230628	Field Duplicate	EP2308712	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
SW210	28/06/2023	0960_QC227_230628	Interlab Duplicate	1004396	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01
SW210	28/06/2023	0960_SW210_230628	Normal	EP2308712	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
SW211	28/06/2023	0960_SW211_230628	Normal	EP2308712	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.06
SW300	28/06/2023	0960_SW300_230628	Normal	EP2308712	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01
SW302	28/06/2023	0960_SW302_230628	Normal	EP2308712	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
SW303	28/06/2023	0960_SW303_230628	Normal	EP2308712	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
SW304	28/06/2023	0960_SW304_230628	Normal	EP2308709	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01
SW305	28/06/2023	0960_SW305_230628	Normal	EP2308709	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%

HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Notes:

* Practical screening value of 0.01 µg/L adopted based on current laboratory limit of reporting (HEPA, 2020)

First-time detection of PFOA or PFOS+PFHxS

New exceedance of guideline value

	Sum of PFAS	Alkalinity (Hydroxide) as CaCO ₃	Alkalinity (total) as CaCO ₃	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO ₄ - Turbidimetric (filtered)	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
	µg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L
LOR - Limit of Reporting	0.01	1	1	0.01	0.01	1	0.01	1	1	1	1	1
PFAS NEMP 2020 Interim Marine 99%												
PFAS NEMP 2020 Recreational Water												

Location Code	Date	Field ID	Sample Type	Lab Report Number												
	28/06/2023	0960_QC301_230628	Rinsate	EP2308707	<0.01											
	28/06/2023	0960_QC302_230628	Rinsate	EP2308707	<0.01											
	28/06/2023	0960_QC303_230628	Rinsate	EP2308707	<0.01											
	28/06/2023	0960_QC304_230628	Rinsate	EP2308707	<0.01											
	28/06/2023	0960_QC401_230628	Field Blank	EP2308707	<0.01											
	28/06/2023	0960_QC402_230628	Field Blank	EP2308707	<0.01											
	28/06/2023	0960_QC403_230628	Field Blank	EP2308707	<0.01											
	28/06/2023	0960_QC404_230628	Field Blank	EP2308707	<0.01											
MW018	28/06/2023	0960_MW018_230628	Normal	EP2308704	4.44	<1	898	34.2	29.9	393	6.81	251	7	10	24	646
MW021	28/06/2023	0960_MW021_230628	Normal	EP2308708	1.93	<1	1,140	31.4	26.7	250	8.17	76	3	5	19	589
MW102	28/06/2023	0960_MW102_230628	Normal	EP2308702	<0.01	<1	134	959	1,120	31,100	7.86	3,780	1,400	2,330	657	19,400
MW103	28/06/2023	0960_MW103_230628	Normal	EP2308702	1.35	<1	390	742	823	24,200	5.17	2,490	1,350	2,020	605	13,200
MW104	28/06/2023	0960_MW104_230628	Normal	EP2308708	0.04	<1	250	850	1,020	27,000	9.19	4,010	790	2,210	874	17,900
MW105	28/06/2023	0960_MW105_230628	Normal	EP2308708	1.34	<1	438	422	504	13,500	8.76	1,580	574	1,180	418	8,440
MW105	28/06/2023	0960_QC125_230628	Field Duplicate	EP2308708	1.41											
MW105	28/06/2023	0960_QC225_230628	Interlab Duplicate	1004396	1.1											
MW112	28/06/2023	0960_MW112_230628	Normal	EP2308708	1.11	<1	783	114	112	2,670	0.76	1,120	68	126	121	2,200
MW113	28/06/2023	0960_MW113_230628	Normal	EP2308704	<0.01	<1	455	118	118	3,630	0.13	312	226	224	79	1,990
MW114	28/06/2023	0960_MW114_230628	Normal	EP2308704	<0.01	<1	461	77.1	82.4	2,230	3.35	238	127	125	55	1,480
MW115	28/06/2023	0960_MW115_230628	Normal	EP2308704	2.91	<1	375	331	359	10,300	4.06	1,580	516	730	255	6,130
MW122	28/06/2023	0960_MW122_230628	Normal	EP2308704	<0.01	<1	374	416	481	13,000	7.28	2,010	350	930	450	8,640
MW124	28/06/2023	0960_MW124_230628	Normal	EP2308708	<0.01	<1	224	889	1,080	28,200	9.66	4,270	887	2,200	895	19,100
MW126	28/06/2023	0960_MW126_230628	Normal	EP2308702	<0.01	<1	210	667	740	21,800	5.18	2,310	972	1,410	396	13,000
MW127	28/06/2023	0960_MW127_230628	Normal	EP2308704	<0.01	<1	158	690	821	22,500	8.63	2,520	1,070	1,710	518	14,100
MW134	28/06/2023	0960_MW134_230628	Normal	EP2308702	<0.01	<1	307	620	672	19,500	4.01	3,070	581	1,230	434	12,200
MW135	28/06/2023	0960_MW135_2.5-3.0_230	Normal	EP2308702	<0.01	<1	1,420	343	360	9,960	2.47	1,610	366	833	315	6,100
MW137	28/06/2023	0960_MW137_2.5-3.0_230	Normal	EP2308708	<0.01	<1	259	815	969	26,000	8.63	3,680	634	2,220	944	16,800
MW139	28/06/2023	0960_MW139_230628	Normal	EP2308707	<0.01	<1	207	674	780	21,100	7.30	3,600	788	1,860	716	13,100
MW140	28/06/2023	0960_MW140_1.5-2.0_230	Normal	EP2308707	<0.01	<1	149	1,110	1,330	35,500	9.04	5,180	829	2,990	1,100	23,400
MW141	28/06/2023	0960_MW141_3.0-3.5_230	Normal	EP2308707	<0.01	<1	308	387	409	12,200	2.79	1,760	427	974	363	6,860
MW143	28/06/2023	0960_MW143_3.0-3.5_230	Normal	EP2308704	<0.01	<1	152	929	1,100	29,300	8.30	4,800	1,040	2,430	1,100	18,800
MW144	28/06/2023	0960_MW144_3.0-3.5_230	Normal	EP2308704	<0.01	<1	176	426	488	12,600	6.75	3,220	926	1,030	458	7,930
MW145	28/06/2023	0960_MW145_3-3.5_23062	Normal	EP2308707	<0.01	<1	126	1,060	1,260	33,900	8.56	5,030	1,040	2,810	1,050	21,900
MW146	28/06/2023	0960_MW146_3.0-3.5_230	Normal	EP2308704	<0.01	<1	124	997	1,190	31,600	8.78	4,960	1,020	2,580	1,000	20,700
MW147	28/06/2023	0960_MW147_3.0-3.5_230	Normal	EP2308707	<0.01	<1	129	1,080	1,280	34,400	8.34	5,280	1,030	2,860	1,080	22,200
MW148D	28/06/2023	0960_MW148D_230628	Normal	EP2308708	10.3	<1	166	831	989	26,800	8.70	3,450	887	1,840	764	17,800
MW148S	28/06/2023	0960_MW148S_230628	Normal	EP2308708	78.9	<1	462	403	454	12,700	5.93	1,720	527	937	328	7,870
MW151	28/06/2023	0960_MW151_230628	Normal	EP2308708	75.0	<1	1,060	132	126	3,560	2.28	507	71	187	115	2,400
MW159	28/06/2023	0960_MW159_230628	Normal	EP2308702	<0.01	<1	530	309	354	9,550	6.79	1,390	504	747	281	5,980
MW162	28/06/2023	0960_MW162_230628	Normal	EP2308704	7.23	<1	546	120	126	3,580	2.43	370	163	237	121	2,180
MW163	28/06/2023	0960_MW163_230628	Normal	EP2308704	3.10	<1	412	96.1	109	2,760	6.26	481	125	181	100	1,960
MW163	28/06/2023	0960_QC120_230628	Field Duplicate	EP2308704	3.23											
MW163	28/06/2023	0960_QC220_230628	Interlab Duplicate	1004396	2.7											
MW164	28/06/2023	0960_MW164_230628	Normal	EP2308704	2.53	<1	990	60.1	56.1	1,270	3.40	215	8	34	46	1,190
MW164	28/06/2023	0960_QC117_230628	Field Duplicate	EP2308704	2.43	<1	1,000	59.4	56.1	1,240	2.82	213	8	34	46	1,190
MW164	28/06/2023	0960_QC217_230628	Interlab Duplicate	1004396	2											
MW165	28/06/2023	0960_MW165_230628	Normal	EP2308702	0.03	<1	819	28.4	24.6	382	7.20	62	3	4	20	543
MW166	28/06/2023	0960_MW166_230628	Normal	EP2308704	1.56	<1	993	30.0	25.6	295	8.02	89	3	4	23	563
MW167	28/06/2023	0969_MW167_230628	Normal	EP2308704	2.28	<1	937	56.0	51.6	1,070	4.06	342	14	30	42	1,090
MW168	28/06/2023	0960_MW168_230628	Normal	EP2308708	1.70	<1	653	117	118	3,210	0.66	643	135	186	116	2,150
MW170	28/06/2023	0960_MW170_230628	Normal	EP2308702	0.67	<1	246	424	471	13,700	5.28	1,560	880	783	136	8,260
MW172	28/06/2023	0960_MW172_230628	Normal	EP2308702	16.2	<1	385	317	364	9,150	6.94	2,450	421	586	201	6,660
MW175	28/06/2023	0960_MW175_5.0-6.0_230	Normal	EP2308702	<0.01	<1	963	54.6	45.8	1,200	8.73	73	75	201	40	564
MW176	28/06/2023	0960_MW176_3.5-4.0_230	Normal	EP2308704	<0.01	<1	213	549	648	17,000	8.28	3,120	637	1,520	660	10,900

	Sum of PFAS	Inorganics							Metals			
		Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
LOR - Limit of Reporting	µg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L
	0.01	1	1	0.01	0.01	1	0.01	1	1	1	1	1
PFAS NEMP 2020 Interim Marine 99%												
PFAS NEMP 2020 Recreational Water												

Location Code	Date	Field ID	Sample Type	Lab Report Number												
MW177	28/06/2023	0960_MW177_1.5-2.0_230	Normal	EP2308704	<0.01	<1	186	1,020	1,180	32,400	7.34	4,880	958	2,720	1,190	20,200
MW178	28/06/2023	0960_MW178_4.0-4.5_230	Normal	EP2308704	<0.01	<1	105	1,020	1,220	32,200	8.88	5,250	1,120	2,710	1,020	21,000
MW179	28/06/2023	0960_MW179_1.0-1.5_230	Normal	EP2308707	<0.01	<1	213	862	1,030	27,600	9.01	3,810	655	2,390	972	17,900
MW180	28/06/2023	0960_MW180_3.5-4.0_230	Normal	EP2308707	<0.01	<1	214	954	1,140	30,400	9.07	4,420	815	2,580	1,170	19,800
MW181	28/06/2023	0960_MW181_1.5-2.0_230	Normal	EP2308707	<0.01	<1	241	1,210	1,410	38,600	7.64	5,620	1,010	3,180	1,130	24,600
MW211	28/06/2023	0960_MW211_230628	Normal	EP2308704	7.20	<1	695	18.0	15.8	104	6.65	59	1	2	14	350
MW211	28/06/2023	0960_QC115_230628	Field Duplicate	EP2308704	6.54											
MW211	28/06/2023	0960_QC215_230628	Interlab Duplicate	1004396	6.21											
MW233	28/06/2023	0960_MW233_230628	Normal	EP2308704	44.0	<1	392	114	118	3,380	2.04	501	143	212	111	2,090
MW233	28/06/2023	0960_QC122_230628	Field Duplicate	EP2308704	42.6	<1	393	113	119	3,350	2.57	497	139	213	111	2,100
MW233	28/06/2023	0960_QC222_230628	Interlab Duplicate	1004396	36.35											
MW238	28/06/2023	0960_MW238_230628	Normal	EP2308708	29.5	<1	787	60.0	57.3	926	2.31	871	12	28	68	1,210
MW238	28/06/2023	0960_QC116_230628	Field Duplicate	EP2308708	28.8											
MW238	28/06/2023	0960_QC216_230628	Interlab Duplicate	1004396	32											
OTH103	28/06/2023	0960_OTH103_230628	Normal	EP2308709	<0.01	<1	437	610	700	19,100	6.88	2,980	495	1,610	631	12,100
OTH106	28/06/2023	0960_OTH106_230628	Normal	EP2308709	<0.01	<1	240	582	676	18,400	7.50	2,790	472	1,560	606	11,700
OTH107	28/06/2023	0960_OTH107_230628	Normal	EP2308709	0.09	<1	185	575	655	18,200	6.46	2,800	462	1,520	595	11,300
OTH129	28/06/2023	0960_OTH129_230628	Normal	EP2308711	<0.01	<1	120	622	751	19,900	9.37	2,800	524	1,720	685	13,000
OTH132	28/06/2023	0960_OTH132_230628	Normal	EP2308711	<0.01	<1	149	563	684	17,900	9.68	2,650	482	1,590	611	11,800
OTH134	28/06/2023	0960_OTH134_230628	Normal	EP2308711	<0.01	<1	142	606	686	19,300	6.24	2,800	494	1,600	645	11,800
SW001	28/06/2023	0960_SW001_230628	Normal	EP2308712	<0.01	<1	252	784	893	25,000	6.52	3,550	643	2,080	796	15,400
SW207	28/06/2023	0960_QC123_230628	Field Duplicate	EP2308709	<0.01											
SW207	28/06/2023	0960_QC223_230628	Interlab Duplicate	1004396	<0.1											
SW207	28/06/2023	0960_SW207_230628	Normal	EP2308709	<0.01	<1	146	594	668	19,000	5.87	2,630	500	1,390	420	11,900
SW208	28/06/2023	0960_SW208_230628	Normal	EP2308709	<0.01	<1	138	566	672	18,000	8.52	2,690	472	1,560	609	11,600
SW209	28/06/2023	0960_SW209_230628	Normal	EP2308712	<0.01	<1	230	656	766	20,900	7.74	2,990	568	1,780	684	13,200
SW210	28/06/2023	0960_QC127_230628	Field Duplicate	EP2308712	<0.01											
SW210	28/06/2023	0960_QC227_230628	Interlab Duplicate	1004396	<0.1											
SW210	28/06/2023	0960_SW210_230628	Normal	EP2308712	<0.01	<1	224	725	846	23,100	7.69	3,320	606	1,960	758	14,600
SW211	28/06/2023	0960_SW211_230628	Normal	EP2308712	0.06	<1	230	890	1,070	28,000	9.03	4,570	757	2,440	894	18,500
SW300	28/06/2023	0960_SW300_230628	Normal	EP2308712	0.01	<1	278	940	1,100	29,900	8.02	4,350	773	2,580	1,020	19,000
SW302	28/06/2023	0960_SW302_230628	Normal	EP2308712	<0.01	<1	209	678	794	21,600	7.86	3,110	574	1,840	704	13,700
SW303	28/06/2023	0960_SW303_230628	Normal	EP2308712	<0.01	<1	206	667	758	21,300	6.39	3,000	548	1,750	679	13,100
SW304	28/06/2023	0960_SW304_230628	Normal	EP2308709	<0.01	<1	291	680	821	21,400	9.45	3,370	606	1,880	737	14,200
SW305	28/06/2023	0960_SW305_230628	Normal	EP2308709	<0.01	<1	292	659	784	20,800	8.62	3,210	594	1,810	703	13,500

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%

HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Notes:

* Practical screening value of 0.01 µg/L adopted based on current laboratory limit of reporting (HEPA, 2020)

First-time detection of PFOA or PFOS+PFHxS

New exceedance of guideline value

LOR - Limit of Reporting

SD199	28/06/2023	0960_SD199_230628	Normal	EP2308706	5.9	<0.0002	<0.0002	<0.0002	<0.0002	0.0007	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD200	28/06/2023	0960_SD200_230628	Normal	EP2308705	9.6	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD205	28/06/2023	0960_SD205_230628	Normal	EP2308706	24.3	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD207	28/06/2023	0960_QC124_230628	Field Duplicate	EP2308706	33.4	<0.0002	<0.0002	<0.0002	<0.0002	0.0016	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD207	28/06/2023	0960_QC224_230628	Interlab Duplicate	1004396	32	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
SD207	28/06/2023	0960_SD207_230628	Normal	EP2308706	36.0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD208	28/06/2023	0960_SD208_230628	Normal	EP2308706	18.9	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD209	28/06/2023	0960_SD209_230628	Normal	EP2308710	23.8	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD210	28/06/2023	0960_SD210_230628	Normal	EP2308710	26.7	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD211	28/06/2023	0960_SD211_230628	Normal	EP2308710	34.0	<0.0002	<0.0002	<0.0002	<0.0002	0.0544	0.0004	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0008	0.0009	<0.0002	0.0002
SD219	28/06/2023	0960_SD219_230628	Normal	EP2308703	3.2	<0.0002	<0.0002	<0.0002	<0.0002	0.0019	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD300	28/06/2023	0960_SD300_230628	Normal	EP2308710	26.5	<0.0002	<0.0002	<0.0002	<0.0002	0.0304	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	0.0004	<0.0002	<0.0002	<0.0005
SD301	28/06/2023	0960_SD301_230628	Normal	EP2308710	27.2	<0.0002	<0.0002	<0.0002	<0.0002	0.0114	0.0006	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD302	28/06/2023	0960_SD302_230628	Normal	EP2308710	20.5	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD303	28/06/2023	0960_SD303_230628	Normal	EP2308710	20.0	<0.0002	<0.0002	<0.0002	<0.0002	0.0104	0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD304	28/06/2023	0960_SD304_230628	Normal	EP2308706	32.8	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD305	28/06/2023	0960_SD305_230628	Normal	EP2308706	31.0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS108	28/06/2023	0960_SS108_230628	Normal	EP2308710	6.4	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS113	28/06/2023	0960_SS113_230628	Normal	EP2308710	2.2	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS114	28/06/2023	0960_SS114_230628	Normal	EP2308710	4.4	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS121	28/06/2023	0960_SS121_230628	Normal	EP2308705	2.2	<0.0002	<0.0002	0.0003	<0.0002	0.100	0.0027	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0017	0.0004	<0.0002	<0.0005
SS122	28/06/2023	0960_SS122_230628	Normal	EP2308710	4.0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS123	28/06/2023	0960_SS123_230628	Normal	EP2308705	2.6	<0.0002	<0.0002	0.0002	<0.0002	0.0090	0.0038	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS124	28/06/2023	0960_SS124_230628	Normal	EP2308710	3.6	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS125	28/06/2023	0960_SS125_230628	Normal	EP2308710	3.8	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS157	28/06/2023	0960_SS157_230628	Normal	EP2308703	5.1	<0.0002	<0.0002	0.0007	<0.0002	0.0076	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS166	28/06/2023	0960_SS166_230628	Normal	EP2308703	7.9	<0.0002	<0.0002	<0.0002	<0.0002	0.0027	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS168	28/06/2023	0960_SS168_230628	Normal	EP2308703	8.0	<0.0002	<0.0002	<0.0002	<0.0002	0.0013	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS170	28/06/2023	0960_QC118_230628	Field Duplicate	EP2308703	4.7	<0.0002	<0.0002	<0.0002	<0.0002	0.0039	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS170	28/06/2023	0960_QC218_230628	Interlab Duplicate	1004396	3.9	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
SS170	28/06/2023	0960_SS170_230628	Normal	EP2308703	4.1	<0.0002	<0.0002	<0.0002	<0.0002	0.0040	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS174	28/06/2023	0960_SS174_230628	Normal	EP2308703	1.7	<0.0002	<0.0002	<0.0002	<0.0002	0.0086	0.0005	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS176	28/06/2023	0960_SS176_230628	Normal	EP2308703	1.4	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS189	28/06/2023	0960_SS189_230628	Normal	EP2308703	9.5	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS190	28/06/2023	0960_SS190_230628	Normal	EP2308703	16.7	<0.0002	<0.0002	<0.0002	<0.0002	0.0114	0.0007	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS192	28/06/2023	0960_SS192_230628	Normal	EP2308703	0.7	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS193	28/06/2023	0960_SS193_230628	Normal	EP2308703	25.6	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS198	28/06/2023	0960_SS198_230628	Normal	EP2308710	3.0	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS227	28/06/2023	0960_SS227_230628	Normal	EP2308705	4.3	<0.0002	<0.0002	0.0015	<0.0002	0.0043	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS231	28/06/2023	0960_SS231_230628	Normal	EP2308710	2.4	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS234	28/06/2023	0960_QC119_230628	Field Duplicate	EP2308710	3.7	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS234	28/06/2023	0960_QC219_230628	Interlab Duplicate	1004396	3.9	<0.005	<0.005	<0.005	<0.005	0.039	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
SS234	28/06/2023	0960_SS234_230628	Normal	EP2308710	3.5	<0.0002	<0.0002	<0.0002	<0.0002	0.0008	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS235	28/06/2023	0960_SS235_230628	Normal	EP2308703	2.3	<0.0002	<0.0002	0.0007	0.0003	0.0713	0.0003	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SS243	28/06/2023	0960_SS243_230628	Normal	EP2308703	2.6	<0.0002	<0.0002														

First-time detection of PFOA or PFOS+PFHxS

LOR - Limit of Reporting

Notes:
First-time detection of PFOA or PFOS+PFHxS

Date Field ID Matrix Type Lab Report Number			28 Jun 2023	28 Jun 2023	RPD	28 Jun 2023	28 Jun 2023	RPD	28 Jun 2023	28 Jun 2023	RPD	28 Jun 2023	28 Jun 2023	RPD
			0960_MW211_230628	0960_QC115_230628		0960_MW211_230628	0960_QC215_230628		0960_MW238_230628	0960_QC116_230628		0960_MW238_230628	0960_QC216_230628	
			Water	Water		Water	Water		Water	Water		Water	Water	
			EP2308704	EP2308704		EP2308704	1004396		EP2308708	EP2308708		EP2308708	1004396	
	Unit	LOR												
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	0.09	0.09	0	0.09	0.06	40	1.31	1.17	11	1.31	1.0	27
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	0.08	0.08	0	0.08	0.07	13	1.24	1.16	7	1.24	1.6	25
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	0.64	0.70	9	0.64	0.55	15	9.73	9.95	2	9.73	11	12
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	0.04	0.04	0	0.04	0.07	55	1.08	1.04	4	1.08	0.98	10
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	5.84	5.11	13	5.84	5.0	15	9.02	8.89	1	9.02	9.9	9
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.05	0.1	0.1	0	0.1	0.09	11	0.6	0.6	0	0.6	0.51	16
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	0.10	0.10	0	0.10	0.08	22	0.96	0.92	4	0.96	0.87	10
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	0.20	0.21	5	0.20	0.17	16	4.53	4.07	11	4.53	4.5	1
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	0.05	0.05	0	0.05	0.04	22	0.39	0.35	11	0.39	0.33	17
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.06	0.06	0	0.06	0.05	18	0.66	0.68	3	0.66	0.74	11
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
PFAS - Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0
PFAS														
Sum of PFHxS and PFOS	µg/L	0.01	6.48	5.81	11	6.48	5.55	15	18.8	18.8	0	18.8	20.9	11
Sum of PFAS (WA DER List)	µg/L	0.01	7.08	6.42	10	7.08	6.04	16	27.2	26.6	2	27.2	28.85	6
Sum of PFAS	µg/L	0.01	7.20	6.54	10	7.20	6.21	15	29.5	28.8	2	29.5	32	8

*RPDs have only been considered where a concentration is greater than 1 times the LOR.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each LOR multiplier range are: No Limit (1 - 10 x LOR); 50 (10 - 20 x LOR); 20 (> 20 x LOR))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Date Field ID Matrix Type Lab Report Number			28 Jun 2023		RPD	28 Jun 2023		RPD	28 Jun 2023		RPD	28 Jun 2023		RPD	28 Jun 2023		RPD	28 Jun 2023		RPD
			0960_MW164_230628			0960_QC117_230628			0960_MW163_230628			0960_QC220_230628			0960_MW233_230628			0960_QC122_230628		
			Water			Water			Water			Water			Water			Water		
			EP2308704			EP2308704			EP2308704			1004396			EP2308704			EP2308704		
	Unit	LOR																		
PFAS - Perfluoroalkyl Sulfonic Acids																				
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	0.08	0.07	13	0.08	0.05	46	0.13	0.14	7	0.13	0.09	36	1.38	1.36	1			
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	0.09	0.09	0	0.09	0.08	12	0.16	0.17	6	0.16	0.16	0	2.07	2.04	1			
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	0.76	0.76	0	0.76	0.58	27	1.44	1.48	3	1.44	1.2	18	24.6	23.1	6			
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	0.04	0.04	0	0.04	0.03	29	0.10	0.11	10	0.10	0.08	22	1.43	1.36	5			
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	1.27	1.17	8	1.27	1.0	24	0.77	0.81	5	0.77	0.70	10	8.15	8.34	2			
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0			
PFAS - Perfluoroalkyl Carboxylic Acids																				
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	0.4	0.4	0			
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	0.05	0.06	18	0.05	0.04	22	0.08	0.08	0	0.08	0.06	29	0.68	0.70	3			
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	0.18	0.18	0	0.18	0.15	18	0.32	0.33	3	0.32	0.28	13	3.27	3.28	0			
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	0.03	0.03	0	0.03	0.03	0	0.04	0.04	0	0.04	0.03	29	0.41	0.42	2			
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.03	0.03	0	0.03	0.02	40	0.06	0.07	15	0.06	0.06	0	1.04	1.01	3			
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0			
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0			
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0			
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0			
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0			
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0			
PFAS - (n:2) Fluorotelomer Sulfonic Acids																				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0			
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	0.61	0.61	0			
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0			
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0			
PFAS - Perfluoroalkyl Sulfonamides																				
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0			
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0			
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0			
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0			
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0			
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0			
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0			
PFAS																				
Sum of PFHxS and PFOS	µg/L	0.01	2.03	1.93	5	2.03	1.58	25	2.21	2.29	4	2.21	1.9	15	32.8	31.4	4			
Sum of PFAS (WA DER List)	µg/L	0.01	2.40	2.30	4	2.40	1.87	25	2.84	2.95	4	2.84	2.42	16	40.5	39.2	3			
Sum of PFAS	µg/L	0.01	2.53	2.43	4	2.53	2	23	3.10	3.23	4	3.10	2.7	14	44.0	42.6	3			

Date Field ID Matrix Type Lab Report Number			28 Jun 2023		RPD	28 Jun 2023		RPD	28 Jun 2023		RPD	28 Jun 2023		RPD	28 Jun 2023		RPD	
			0960_MW233_230628	0960_QC232_230628		0960_SW207_230628	0960_QC123_230628		0960_SW207_230628	0960_QC223_230628		0960_MW105_230628	0960_QC125_230628		0960_MW105_230628	0960_QC225_230628		
			Water	Water		Water	Water		Water	Water		Water	Water		Water	Water		
			EP2308704	1004396		EP2308709	EP2308709		EP2308709	1004396		EP2308708	EP2308708		EP2308708	1004396		
	Unit	LOR																
PFAS - Perfluoroalkyl Sulfonic Acids																		
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	1.38	1.1	23	<0.02	<0.02	0	<0.02	<0.01	0	0.15	0.14	7	0.15	0.10	40	
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	2.07	2.0	3	<0.02	<0.02	0	<0.02	<0.01	0	0.20	0.19	5	0.20	0.16	22	
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	24.6	20	21	<0.01	<0.01	0	<0.01	<0.01	0	0.78	0.88	12	0.78	0.68	14	
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	1.43	0.81	55	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	8.15	6.3	26	<0.01	<0.01	0	<0.01	<0.01	0	0.03	0.03	0	0.03	<0.04	0	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
PFAS - Perfluoroalkyl Carboxylic Acids																		
Perfluorobutanoic acid (PFBA)	µg/L	0.05	0.4	0.29	32	<0.1	<0.1	0	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0	
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	0.68	0.65	5	<0.02	<0.02	0	<0.02	<0.01	0	0.03	0.03	0	0.03	0.02	40	
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	3.27	2.6	23	<0.02	<0.02	0	<0.02	<0.01	0	0.14	0.13	7	0.14	0.11	24	
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	0.41	0.43	5	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluorooctanoic acid (PFOA)	µg/L	0.01	1.04	1.2	14	<0.01	<0.01	0	<0.01	<0.01	0	0.01	0.01	0	0.01	<0.01	0	
Perfluorononanoic acid (PFNA)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluorodecanoic acid (PFDA)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluorododecanoic acid (PFDoDA)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.01	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0	
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.01	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	
PFAS - (n:2) Fluorotelomer Sulfonic Acids																		
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.01	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	0.61	0.50	20	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.01	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.01	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0	
PFAS - Perfluoroalkyl Sulfonamides																		
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	0	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	<0.05	<0.05	0	
PFAS																		
Sum of PFHxS and PFOS	µg/L	0.01	32.8	26.3	22	<0.01	<0.01	0	<0.01	<0.01	0	0.81	0.91	12	0.81	0.68	17	
Sum of PFAS (WA DER List)	µg/L	0.01	40.5	33.07	20	<0.01	<0.01	0	<0.01	<0.05	0	1.14	1.22	7	1.14	0.91	22	
Sum of PFAS	µg/L	0.01	44.0	36.35	19	<0.01	<0.01	0	<0.01	<0.1	0	1.34	1.41	5	1.34	1.1	20	

Date Field ID Matrix Type Lab Report Number			28 Jun 2023		RPD	28 Jun 2023		RPD	28 Jun 2023		RPD	28 Jun 2023		RPD	28 Jun 2023		RPD		
			0960_S5170_230628			0960_QC118_230628			0960_S5234_230628			0960_QC119_230628			0960_S5265_230628			0960_QC121_230628	
			Soil			Soil			Soil			Soil			Soil			Soil	
			EP2308703			EP2308703			EP2308710			EP2308710			EP2308710			EP2308710	
	Unit	LOR																	
PFAS - Perfluoroalkyl Sulfonic Acids																			
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	0.0040	0.0039	3	0.0040	<0.005	0	0.0008	0.0006	29	0.0008	0.039	192	<0.0002	<0.0002	0		
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
PFAS - Perfluoroalkyl Carboxylic Acids																			
Perfluorobutanoic acid (PFBA)	mg/kg	0.001	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0		
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
Perfluorononanoic acid (PFNA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
Perfluorotridecanoic acid (PFTriDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0		
PFAS - (n:2) Fluorotelomer Sulfonic Acids																			
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0		
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0		
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0		
PFAS - Perfluoroalkyl Sulfonamides																			
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0		
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0		
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0		
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0		
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0		
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0		
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0		
PFAS																			
Sum of PFHxS and PFOS	mg/kg	0.0002	0.0040	0.0039	3	0.0040	<0.005	0	0.0008	0.0006	29	0.0008	0.039	192	<0.0002	<0.0002	0		
Sum of PFAS (WA DER List)	mg/kg	0.0002	0.0040	0.0039	3	0.0040	<0.01	0	0.0008	0.0006	29	0.0008	0.039	192	<0.0002	<0.0002	0		
Sum of PFAS	mg/kg	0.0002	0.0040	0.0039	3	0.0040	<0.05	0	0.0008	0.0006	29	0.0008	<0.05	0	<0.0002	<0.0002	0		

*RPDs have only been considered where a concentration is greater than 1 times the LOR.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each LOR multiplier range are: No Limit (1 - 10 x LOR); 50 (10 - 20 x LOR); 20 (> 20 x LOR))
***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

		Date	Field ID	Matrix Type	Lab Report Number	28 Jun 2023		RPD	28 Jun 2023		RPD	28 Jun 2023		RPD	28 Jun 2023		RPD	28 Jun 2023		RPD
						0960_SS265_230628	0960_QC221_230628		0960_SD207_230628	0960_QC124_230628		0960_SD207_230628	0960_QC224_230628		0960_SS301_230628	0960_QC126_230628		0960_SS301_230628	0960_QC226_230628	
						Soil	Soil		Soil	Soil		Soil	Soil		Soil	Soil		Soil	Soil	
						EP2308710	1004396		EP2308706	EP2308706		EP2308706	1004396		EP2308706	EP2308706		EP2308706	1004396	
	Unit	LOR																		
PFAS - Perfluoroalkyl Sulfonic Acids																				
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	<0.0002	0.0062	188	<0.0002	0.0016	156	<0.0002	<0.005	0	<0.0002	0.0034	178	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
PFAS - Perfluoroalkyl Carboxylic Acids																				
Perfluorobutanoic acid (PFBA)	mg/kg	0.001	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.005	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids																				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.01	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
PFAS - Perfluoroalkyl Sulfonamides																				
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.01	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.0002	0	<0.0002	<0.01	0	<0.0002	<0.01	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.005	0
PFAS																				
Sum of PFHxS and PFOS	mg/kg	0.0002	<0.0002	0.0062	188	<0.0002	0.0016	156	<0.0002	<0.005	0	<0.0002	0.0034	178	<0.0002	<0.005	0	<0.0002	<0.005	0
Sum of PFAS (WA DER List)	mg/kg	0.0002	<0.0002	<0.01	0	<0.0002	0.0016	156	<0.0002	<0.01	0	<0.0002	0.0034	178	<0.0002	<0.01	0	<0.0002	<0.01	0
Sum of PFAS	mg/kg	0.0002	<0.0002	<0.05	0	<0.0002	0.0016	156	<0.0002	<0.05	0	<0.0002	0.0034	178	<0.0002	<0.05	0	<0.0002	<0.05	0

APPENDIX

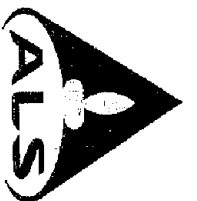
C

LABORATORY CERTIFICATES



now





Environmental Division
Perth
Work Order Reference
EP2308702



Telephone : +61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA - D960 - PPKS040-23 Client: Stantec Project Manager: [Redacted]
Phone: _____

ALS Compass COC Reference: 54094, 54069, # Samples: 54080, 54064, 54065, 54063, 54068, 54072, 54062, 54074 Sampler: [Redacted]
Phone: _____

Turnaround Requirements: Standard

Special Instructions:

Custody:	
Relinquished by: <u>[Redacted]</u>	Received by: <u>[Redacted]</u>
Date / Time: <u>28/6/23</u>	Date / Time: <u>30/6 11am</u>
Relinquished by:	Received by:
Date / Time:	Date / Time:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP_23

SITE: Learmonth GW - JS

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER: [REDACTED]

PRIMARY SAMPLER: [REDACTED]

EMAIL REPORTS TO: [REDACTED]

EMAIL INVOICES TO: [REDACTED]

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

CONTACT PH: [REDACTED]

SAMPLER MOBILE: [REDACTED]

QUOTE NO: SY139/19 B

/ ES2022MWHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_MW165		28/06/2023 07:51 AM	WATER	ALS: 5 Non ALS: 0	No	X		
002	0960_MW172		28/06/2023 08:24 AM	WATER	ALS: 3 Non ALS: 0	No	X		
003	0960_MW170		28/06/2023 08:39 AM	WATER	ALS: 3 Non ALS: 0	No	X		
004	0960_MW126		28/06/2023 08:56 AM	WATER	ALS: 3 Non ALS: 0	No	X		
005	0960_MW102		28/06/2023 09:29 AM	WATER	ALS: 5 Non ALS: 0	No	X		
006	0960_MW159		28/06/2023 10:15 AM	WATER	ALS: 3 Non ALS: 0	No	X		
007	0960_MW103		28/06/2023 10:40 AM	WATER	ALS: 3 Non ALS: 0	No	X		
008	0960_MW134		28/06/2023 11:55 AM	WATER	ALS: 5 Non ALS: 0	No	X		
009	0960_MW135_2.5-3.0		28/06/2023 12:17 PM	WATER	ALS: 3 Non ALS: 0	No	X		

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0980_PFASOMP_23

SITE: Learmonth GW - JS

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free Ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY139/19 B

/ ES2022MWHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0980_MW175_5.0-6.0		28/06/2023 02:16 PM	WATER	ALS: 3 Non ALS: 0	No	X		

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSASOMP_23

SITE: Learmonth GW - JS

ORDER NO: plas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

°C

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 B

/ ES2022MMHAUSD0002

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_MW185	HDPE (no PTFE)	20 mL	00350621035867	Grey	No	
001	0960_MW165	HDPE (no PTFE)	20 mL	00350621035875	Grey	No	
001	0960_MW165	Clear Plastic Bottle - Natural	125 mL	00070522145176	Green	No	
001	0960_MW165	HDPE (no PTFE)	20 mL	00350821001818	Grey	No	
001	0960_MW165	HDPE (no PTFE)	20 mL	00350821001736	Grey	No	
002	0960_MW172	HDPE (no PTFE)	20 mL	00350821001962	Grey	No	
002	0960_MW172	HDPE (no PTFE)	20 mL	00350821001857	Grey	No	
002	0960_MW172	Clear Plastic Bottle - Natural	125 mL	00070522145141	Green	No	
003	0960_MW170	Clear Plastic Bottle - Natural	125 mL	00070522144880	Green	No	
003	0960_MW170	HDPE (no PTFE)	20 mL	00350821001834	Grey	No	
003	0960_MW170	HDPE (no PTFE)	20 mL	00350821001748	Grey	No	
003	0960_MW170	HDPE (no PTFE)	20 mL	00350821001852	Grey	No	
004	0960_MW126	HDPE (no PTFE)	20 mL	00350821001944	Green	No	
004	0960_MW126	Clear Plastic Bottle - Natural	125 mL	00070522162828	Green	No	
004	0960_MW126	HDPE (no PTFE)	20 mL	00350821035841	Grey	No	
005	0960_MW102	HDPE (no PTFE)	20 mL	00350821036362	Grey	No	
005	0960_MW102	HDPE (no PTFE)	20 mL	00350821031702	Grey	No	
005	0960_MW102	HDPE (no PTFE)	20 mL	00350821001868	Grey	No	
005	0960_MW102	Clear Plastic Bottle - Natural	125 mL	00070522144970	Green	No	
006	0960_MW159	HDPE (no PTFE)	20 mL	00350522062434	Grey	No	
006	0960_MW159	HDPE (no PTFE)	20 mL	00350522062485	Grey	No	
006	0960_MW159	Clear Plastic Bottle - Natural	125 mL	00070522145002	Green	No	
007	0960_MW103	Clear Plastic Bottle - Natural	125 mL	00070522145138	Green	No	
007	0960_MW103	HDPE (no PTFE)	20 mL	00350522042717	Grey	No	
007	0960_MW103	HDPE (no PTFE)	20 mL	00350522042881	Grey	No	
008	0960_MW134	HDPE (no PTFE)	20 mL	00350522043191	Grey	No	

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PFSASOMP_23
SITE: Learmonth GW - JS
ORDER NO: pfas-omp Learmonth
PROJECT MANAGER: [REDACTED]
PRIMARY SAMPLER: [REDACTED]
EMAIL REPORTS TO: [REDACTED]
EMAIL INVOICES TO: [REDACTED]

CONTACT PH: [REDACTED] **SAMPLER MOBILE:** [REDACTED]
QUOTE NO: SY139/19 B / ES2022MWHAUS0002

RELINQUISHED BY:
DATE TIME:
TURNAROUND REQUIREMENTS: 5 Days
Biohazard info:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

LABORATORY USE ONLY (Circle)
Custody Seal intact? Yes No N/A
Free Ice / Frozen Ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comments:

008	0960_MW134	HDPE (no PTFE)	20 mL	00350522043161	Grey	No	
008	0960_MW134	Clear Plastic Bottle - Natural	125 mL	00070522144994	Green	No	
008	0960_MW134	HDPE (no PTFE)	20 mL	00350621035892	Grey	No	
008	0960_MW134	HDPE (no PTFE)	20 mL	00350621000635	Grey	No	
009	0960_MW135_2.5-3.0	Clear Plastic Bottle - Natural	125 mL	00070522145192	Green	No	
009	0960_MW135_2.5-3.0	HDPE (no PTFE)	20 mL	00350821001971	Grey	No	
009	0960_MW135_2.5-3.0	HDPE (no PTFE)	20 mL	00350821001778	Grey	No	
010	0960_MW175_5.0-6.0	Clear Plastic Bottle - Natural	125 mL	00070522162829	Green	No	
010	0960_MW175_5.0-6.0	HDPE (no PTFE)	20 mL	00350522042901	Grey	No	
010	0960_MW175_5.0-6.0	HDPE (no PTFE)	20 mL	00350522042898	Grey	No	

Total Bottle Count: ALS: 36, Non ALS: 0



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2308702

Client : STANTEC AUSTRALIA PTY LTD
Contact :
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : Customer Services EP
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail :
Telephone :
Facsimile :

E-mail : ALSEnviro.Perth@alsglobal.com
Telephone :
Facsimile :

Project : WA_0960_PFASOMP_23
Order number : pfas-omp Learmonth
C-O-C number : 54062
Site : Learmonth GW - JS
Sampler :

Page : 1 of 2
Quote number : ES2022MWH AUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 30-Jun-2023 11:00
Client Requested Due : 12-Jul-2023
Date :

Issue Date : 03-Jul-2023
Scheduled Reporting Date : **12-Jul-2023**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 4
Receipt Detail :

Security Seal : Not Available
Temperature : 8.0 - Ice present
No. of samples received / analysed : 10 / 10

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP2308702-009 : 28-Jun-2023 12:17 : 0960_MW135_2.5-3.0_230628

EP2308702-010 : 28-Jun-2023 14:16 : 0960_MW175_5.0-6.0_230628

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: WATER

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EP2308702-001	28-Jun-2023 07:51	0960_MW165_230628	✓	✓
EP2308702-002	28-Jun-2023 08:24	0960_MW172_230628	✓	✓
EP2308702-003	28-Jun-2023 08:39	0960_MW170_230628	✓	✓
EP2308702-004	28-Jun-2023 08:56	0960_MW126_230628	✓	✓
EP2308702-005	28-Jun-2023 09:29	0960_MW102_230628	✓	✓
EP2308702-006	28-Jun-2023 10:15	0960_MW159_230628	✓	✓
EP2308702-007	28-Jun-2023 10:40	0960_MW103_230628	✓	✓
EP2308702-008	28-Jun-2023 11:55	0960_MW134_230628	✓	✓
EP2308702-009	28-Jun-2023 12:17	0960_MW135_2.5-3.0_2...	✓	✓
EP2308702-010	28-Jun-2023 14:16	0960_MW175_5.0-6.0_2...	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

██████████	- A4 - AU Tax Invoice (INV)	Email	██████████cardno.com.au
DERP LAB REPORTS			
██████████	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
	- EDI Format - ESDAT (ESDAT)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████
	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
██████████	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
	- EDI Format - ESDAT (ESDAT)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████



CERTIFICATE OF ANALYSIS

Work Order	: EP2308702	Page	: 1 of 9
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023 11:00
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 54062	Issue Date	: 12-Jul-2023 15:24
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth GW - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 10		
No. of samples analysed	: 10		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EP231X: Sample EP2308704-001 shows poor duplicate results due to suspected sample heterogeneity between bottles. confirmed by visual inspection.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW165_230628	0960_MW172_230628	0960_MW170_230628	0960_MW126_230628	0960_MW102_230628
Sampling date / time				28-Jun-2023 07:51	28-Jun-2023 08:24	28-Jun-2023 08:39	28-Jun-2023 08:56	28-Jun-2023 09:29
Compound	CAS Number	LOR	Unit	EP2308702-001	EP2308702-002	EP2308702-003	EP2308702-004	EP2308702-005
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	6	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	813	385	246	210	134
Total Alkalinity as CaCO ₃	----	1	mg/L	819	385	246	210	134
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	62	2450	1560	2310	3780
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	382	9150	13700	21800	31100
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	3	421	880	972	1400
Magnesium	7439-95-4	1	mg/L	4	586	783	1410	2330
Sodium	7440-23-5	1	mg/L	543	6660	8260	13000	19400
Potassium	7440-09-7	1	mg/L	20	201	136	396	657
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	28.4	317	424	667	959
∅ Total Cations	----	0.01	meq/L	24.6	364	471	740	1120
∅ Ionic Balance	----	0.01	%	7.20	6.94	5.28	5.18	7.86
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.72	0.05	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	1.04	0.06	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.01	7.92	0.47	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.31	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	2.30	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	0.3	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.57	0.03	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	2.32	0.06	<0.02	<0.02



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW165_230628	0960_MW172_230628	0960_MW170_230628	0960_MW126_230628	0960_MW102_230628
Sampling date / time				28-Jun-2023 07:51	28-Jun-2023 08:24	28-Jun-2023 08:39	28-Jun-2023 08:56	28-Jun-2023 09:29
Compound	CAS Number	LOR	Unit	EP2308702-001	EP2308702-002	EP2308702-003	EP2308702-004	EP2308702-005
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.30	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.40	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0960_MW165_230628	0960_MW172_230628	0960_MW170_230628	0960_MW126_230628	0960_MW102_230628
Sampling date / time					28-Jun-2023 07:51	28-Jun-2023 08:24	28-Jun-2023 08:39	28-Jun-2023 08:56	28-Jun-2023 09:29
Compound	CAS Number	LOR	Unit		EP2308702-001	EP2308702-002	EP2308702-003	EP2308702-004	EP2308702-005
				Result	Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		0.03	16.2	0.67	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		0.03	10.2	0.47	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		0.03	14.8	0.61	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		107	103	100	106	100
13C8-PFOA	----	0.02	%		97.1	103	101	98.3	99.2



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0960_MW159_230628	0960_MW103_230628	0960_MW134_230628	0960_MW135_2.5-3.0_230628	0960_MW175_5.0-6.0_230628
Sampling date / time				28-Jun-2023 10:15	28-Jun-2023 10:40	28-Jun-2023 11:55	28-Jun-2023 12:17	28-Jun-2023 14:16	
Compound	CAS Number	LOR	Unit	EP2308702-006	EP2308702-007	EP2308702-008	EP2308702-009	EP2308702-010	
				Result	Result	Result	Result	Result	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	530	390	307	1420	963	
Total Alkalinity as CaCO3	----	1	mg/L	530	390	307	1420	963	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1390	2490	3070	1610	73	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	9550	24200	19500	9960	1200	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	504	1350	581	366	75	
Magnesium	7439-95-4	1	mg/L	747	2020	1230	833	201	
Sodium	7440-23-5	1	mg/L	5980	13200	12200	6100	564	
Potassium	7440-09-7	1	mg/L	281	605	434	315	40	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	309	742	620	343	54.6	
∅ Total Cations	----	0.01	meq/L	354	823	672	360	45.8	
∅ Ionic Balance	----	0.01	%	6.79	5.17	4.01	2.47	8.73	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25	<0.02	<0.02	<0.02	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.16	<0.02	<0.02	<0.02	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.78	<0.01	<0.01	<0.01	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.04	<0.01	<0.01	<0.01	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.02	<0.02	<0.02	<0.02	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.10	<0.02	<0.02	<0.02	



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0960_MW159_230628	0960_MW103_230628	0960_MW134_230628	0960_MW135_2.5-3.0_230628	0960_MW175_5.0-6.0_230628
Sampling date / time				28-Jun-2023 10:15	28-Jun-2023 10:40	28-Jun-2023 11:55	28-Jun-2023 12:17	28-Jun-2023 14:16	
Compound	CAS Number	LOR	Unit	EP2308702-006	EP2308702-007	EP2308702-008	EP2308702-009	EP2308702-010	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0960_MW159_230628	0960_MW103_230628	0960_MW134_230628	0960_MW135_2.5-3.0_230628	0960_MW175_5.0-6.0_230628
Sampling date / time					28-Jun-2023 10:15	28-Jun-2023 10:40	28-Jun-2023 11:55	28-Jun-2023 12:17	28-Jun-2023 14:16
Compound	CAS Number	LOR	Unit	EP2308702-006	EP2308702-007	EP2308702-008	EP2308702-009	EP2308702-010	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L	<0.01	1.35	<0.01	<0.01	<0.01	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	0.82	<0.01	<0.01	<0.01	
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	1.19	<0.01	<0.01	<0.01	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%	92.5	96.8	90.7	110	100	
13C8-PFOA	----	0.02	%	113	112	113	101	102	



Surrogate Control Limits

Sub-Matrix: GROUNDWATER

		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133



QUALITY CONTROL REPORT

Work Order	: EP2308702	Page	: 1 of 13
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 54062	Issue Date	: 12-Jul-2023
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth GW - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 10		
No. of samples analysed	: 10		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 5150905)									
EP2308702-002	0960_MW172_230628	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	385	379	1.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	385	379	1.6	0% - 20%
EP2308704-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	35	36	2.9	0% - 20%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	660	662	0.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	695	698	0.4	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5148895)									
EP2308611-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2310	2300	0.6	0% - 20%
EP2308702-004	0960_MW126_230628	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2310	2350	1.5	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5148896)									
EP2308611-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	15300	15000	1.8	0% - 20%
EP2308702-004	0960_MW126_230628	ED045G: Chloride	16887-00-6	1	mg/L	21800	21800	0.2	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5148265)									
EP2308702-001	0960_MW165_230628	ED093F: Calcium	7440-70-2	1	mg/L	3	2	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	543	539	0.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	20	20	0.0	0% - 20%
EP2308704-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	7	7	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	10	10	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	646	645	0.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	24	24	0.0	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164523)									
EP2308702-001	0960_MW165_230628	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.01	0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2308704-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	1.07	0.98	9.0	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.82	0.71	14.4	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.08	0.07	14.2	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.10	0.09	15.7	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.05	0.05	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164532)									
EP2308704-014	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.72	0.73	1.7	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.88	0.86	1.6	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	0.05	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2308704-017	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164523)									
EP2308702-001	0960_MW165_230628	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2308704-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.06	0.10	44.1	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.63	# 1.16	60.2	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.79	# 1.30	48.7	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164523) - continued									
EP2308704-001	Anonymous	EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.44	# 0.89	68.4	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.4	0.6	50.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164532)									
EP2308704-014	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.17	0.18	0.0	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.09	0.09	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.17	0.17	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.11	0.10	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2308704-017	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164523)									
EP2308702-001	0960_MW165_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164523) - continued									
EP2308702-001	0960_MW165_230628	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308704-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164532)									
EP2308704-014	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308704-017	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164532) - continued									
EP2308704-017	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164523)									
EP2308702-001	0960_MW165_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308704-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164532)									
EP2308704-014	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308704-017	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5164523)									

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 Work Order : EP2308702
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP_23



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231P: PFAS Sums (QC Lot: 5164523) - continued									
EP2308702-001	0960_MW165_230628	EP231X: Sum of PFAS	----	0.01	µg/L	0.03	0.02	40.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.03	0.02	40.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	0.03	0.02	40.0	No Limit
EP2308704-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	4.44	# 5.95	29.1	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	1.89	1.69	11.2	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	4.29	# 5.81	30.1	0% - 20%
EP231P: PFAS Sums (QC Lot: 5164532)									
EP2308704-014	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	2.28	2.27	0.4	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	1.60	1.59	0.6	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	2.17	2.16	0.5	0% - 20%
EP2308704-017	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED037P: Alkalinity by PC Titrator (QCLot: 5150905)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	96.2	87.8	118
				<1	200 mg/L	101	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148895)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.7	89.9	112
				<1	500 mg/L	92.6	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 5148896)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.5	88.6	113
				<1	1000 mg/L	95.2	88.6	113
ED093F: Dissolved Major Cations (QCLot: 5148265)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.6	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.4	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.0	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.2	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164523)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	91.7	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	94.0	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	99.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	99.2	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	95.5	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	95.8	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164532)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	95.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	107	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	98.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	101	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	93.3	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	108	53.0	142



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164523)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	97.8	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	92.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	89.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	95.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	95.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	92.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	86.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	95.6	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	93.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	88.4	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164532)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	102	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	97.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	89.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	90.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	101	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	95.0	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	91.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	90.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	84.8	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164523)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	90.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	90.6	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	102	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	96.7	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	98.7	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	90.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	83.8	61.0	135



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164532)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	106	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	122	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	127	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	93.9	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	108	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	97.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	98.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164523)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	102	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	98.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	117	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	96.5	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164532)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	100	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	96.1	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	83.5	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	107	64.2	133
EP231P: PFAS Sums (QCLot: 5164523)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5164532)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Matrix Spike (MS) Report



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148895)							
EP2308611-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 5148896)							
EP2308611-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164523)							
EP2308702-005	0960_MW102_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	100	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	116	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	102	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	102	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	101	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	99.2	53.0	129
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164532)							
EP2308704-015	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	82.5	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	89.8	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	# Not Determined	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	89.3	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	75.5	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	97.3	53.0	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164523)							
EP2308702-005	0960_MW102_230628	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	104	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	97.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	94.0	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	99.8	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	98.2	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	97.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	96.4	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	112	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	101	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.25 µg/L	98.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	96.4	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164532)							
EP2308704-015	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	94.9	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	90.6	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	84.2	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	87.4	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	92.6	71.0	133

Matrix Spike (MS) Report

EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164532)



Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164532) - continued							
EP2308704-015	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	95.6	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	91.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	97.9	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	101	70.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2308702	Page	: 1 of 6
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Site	: Learmonth GW - JS	Issue Date	: 12-Jul-2023
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 10
Order number	: pfas-omp Learmonth	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Laboratory Control outliers occur.
- Duplicate outliers exist - please see following pages for full details.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EP231B: Perfluoroalkyl Carboxylic Acids	EP2308704--001	Anonymous	Perfluoropentanoic acid (PFPeA)	2706-90-3	60.2 %	0% - 20%	RPD exceeds LOR based limits
EP231B: Perfluoroalkyl Carboxylic Acids	EP2308704--001	Anonymous	Perfluorohexanoic acid (PFHxA)	307-24-4	48.7 %	0% - 20%	RPD exceeds LOR based limits
EP231B: Perfluoroalkyl Carboxylic Acids	EP2308704--001	Anonymous	Perfluoroheptanoic acid (PFHpA)	375-85-9	68.4 %	0% - 20%	RPD exceeds LOR based limits
EP231P: PFAS Sums	EP2308704--001	Anonymous	Sum of PFAS	----	29.1 %	0% - 20%	RPD exceeds LOR based limits
EP231P: PFAS Sums	EP2308704--001	Anonymous	Sum of PFAS (WA DER List)	----	30.1 %	0% - 20%	RPD exceeds LOR based limits

ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2308611--001	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EP2308611--001	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231A: Perfluoroalkyl Sulfonic Acids	EP2308704--015	Anonymous	Perfluorohexane sulfonic acid (PFHxS)	355-46-4	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Matrix: WATER

Method	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED093F: Dissolved Major Cations						
Clear Plastic Bottle - Natural						
0960_MW165_230628,	0960_MW172_230628,					
0960_MW170_230628,	0960_MW126_230628,					
0960_MW102_230628,	0960_MW159_230628,					
0960_MW103_230628,	0960_MW134_230628,					
0960_MW135_2.5-3.0_230628,	0960_MW175_5.0-6.0_230628					



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for **VOC in soils** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER** Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) 0960_MW165_230628, 0960_MW170_230628, 0960_MW102_230628, 0960_MW103_230628, 0960_MW135_2.5-3.0_230628,	0960_MW172_230628, 0960_MW126_230628, 0960_MW159_230628, 0960_MW134_230628, 0960_MW175_5.0-6.0_230628	28-Jun-2023	----	----	----	04-Jul-2023	12-Jul-2023	✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) 0960_MW165_230628, 0960_MW170_230628, 0960_MW102_230628, 0960_MW103_230628, 0960_MW135_2.5-3.0_230628,	0960_MW172_230628, 0960_MW126_230628, 0960_MW159_230628, 0960_MW134_230628, 0960_MW175_5.0-6.0_230628	28-Jun-2023	----	----	----	08-Jul-2023	26-Jul-2023	✔
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 0960_MW126_230628		28-Jun-2023	----	----	----	08-Jul-2023	26-Jul-2023	✔
Clear Plastic Bottle - Natural (ED045G) 0960_MW165_230628, 0960_MW170_230628, 0960_MW159_230628, 0960_MW134_230628, 0960_MW175_5.0-6.0_230628	0960_MW172_230628, 0960_MW102_230628, 0960_MW103_230628, 0960_MW135_2.5-3.0_230628,	28-Jun-2023	----	----	----	10-Jul-2023	26-Jul-2023	✔
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) 0960_MW165_230628, 0960_MW170_230628, 0960_MW102_230628, 0960_MW103_230628, 0960_MW135_2.5-3.0_230628,	0960_MW172_230628, 0960_MW126_230628, 0960_MW159_230628, 0960_MW134_230628, 0960_MW175_5.0-6.0_230628	28-Jun-2023	----	----	----	07-Jul-2023	05-Jul-2023	✖



Matrix: WATER Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_MW165_230628, 0960_MW170_230628, 0960_MW102_230628, 0960_MW103_230628, 0960_MW135_2.5-3.0_230628,	0960_MW172_230628, 0960_MW126_230628, 0960_MW159_230628, 0960_MW134_230628, 0960_MW175_5.0-6.0_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) 0960_MW165_230628, 0960_MW170_230628, 0960_MW102_230628, 0960_MW103_230628, 0960_MW135_2.5-3.0_230628,	0960_MW172_230628, 0960_MW126_230628, 0960_MW159_230628, 0960_MW134_230628, 0960_MW175_5.0-6.0_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) 0960_MW165_230628, 0960_MW170_230628, 0960_MW102_230628, 0960_MW103_230628, 0960_MW135_2.5-3.0_230628,	0960_MW172_230628, 0960_MW126_230628, 0960_MW159_230628, 0960_MW134_230628, 0960_MW175_5.0-6.0_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_MW165_230628, 0960_MW170_230628, 0960_MW102_230628, 0960_MW103_230628, 0960_MW135_2.5-3.0_230628,	0960_MW172_230628, 0960_MW126_230628, 0960_MW159_230628, 0960_MW134_230628, 0960_MW175_5.0-6.0_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0960_MW165_230628, 0960_MW170_230628, 0960_MW102_230628, 0960_MW103_230628, 0960_MW135_2.5-3.0_230628,	0960_MW172_230628, 0960_MW126_230628, 0960_MW159_230628, 0960_MW134_230628, 0960_MW175_5.0-6.0_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

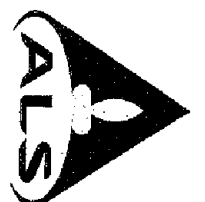
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	29	13.79	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	* ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



Environmental Division
Perth

Work Order Reference
EP2308703



Telephone : -- 01-9-0406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_0960 - PERKINQ-23 Client: Stantec

Project Manager: [Redacted]
Phone: [Redacted]

ALS Compass COC Reference: 54091, 54069, # Samples:
54080, 54064, 54065, 54063, 54068, 54072, 54062, 54074
Sampler: [Redacted]
Phone: [Redacted]

Turnaround Requirements: Standard

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
<u>[Redacted]</u>	<u>[Redacted]</u>		
Date / Time: <u>28/6/23</u>	Date / Time: <u>30/6</u>	Date / Time:	Date / Time:
	<u>11am</u>		

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP_23

SITE: Leammonth SD - JS

ORDER NO: pfas-omp Leammonth

PROJECT MANAGER

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

Yes No N/A
Yes No N/A
C

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_SS279		28/06/2023 09:11 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
002	0960_SS170		28/06/2023 09:19 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
003	0960_QC118		28/06/2023 09:19 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
004	0960_SS168		28/06/2023 09:42 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
005	0960_SS166		28/06/2023 09:50 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
006	0960_SS157		28/06/2023 10:01 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
007	0960_SD219		28/06/2023 10:27 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
008	0960_SS235		28/06/2023 10:34 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
009	0960_SS243		28/06/2023 11:11 AM	SOIL	ALS: 1 Non ALS: 0	No	X		

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PFASOMP_23
SITE: Learmonth SD - JS
ORDER NO: pfas-omp Learmonth
PROJECT MANAGER:
PRIMARY SAMPLER:
EMAIL REPORTS TO:
EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:
RECEIVED BY:
DATE TIME:
RELINQUISHED BY:
DATE TIME:
RECEIVED BY:
DATE TIME:

LABORATORY USE ONLY (Circle)
Custody Seal intact? Yes No N/A
Free Ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comments:

SAMPLE DETAILS					ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	
010	0960_SS174		28/06/2023 11:17 AM	SOIL	ALS: 1 Non ALS: 0	No	X
011	0960_SS189		28/06/2023 11:57 AM	SOIL	ALS: 1 Non ALS: 0	No	X
012	0960_SS176		28/06/2023 11:24 AM	SOIL	ALS: 1 Non ALS: 0	No	X
013	0960_SS190		28/06/2023 12:14 PM	SOIL	ALS: 1 Non ALS: 0	No	X
014	0960_SS288		28/06/2023 12:15 PM	SOIL	ALS: 1 Non ALS: 0	No	X
015	0960_SS193		28/06/2023 01:39 PM	SOIL	ALS: 1 Non ALS: 0	No	X
016	0960_SS192		28/06/2023 01:40 PM	SOIL	ALS: 1 Non ALS: 0	No	X

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP_23

SITE: Leamonth SD - JS

ORDER NO: pfas-omp Leamonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free Ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
°C

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_SS279	HDPE Soil Jar	200 mL	00620322054947	Grey	No	
002	0960_SS170	HDPE Soil Jar	200 mL	00620322036371	Grey	No	
003	0960_QC118	HDPE Soil Jar	200 mL	00620322054891	Grey	No	
004	0960_SS168	HDPE Soil Jar	200 mL	00620322054853	Grey	No	
005	0960_SS166	HDPE Soil Jar	200 mL	00620322054882	Grey	No	
006	0960_SS167	HDPE Soil Jar	200 mL	00620322054894	Grey	No	
007	0960_SD219	HDPE Soil Jar	200 mL	00620322054956	Grey	No	
008	0960_SS235	HDPE Soil Jar	200 mL	00620322054917	Grey	No	
009	0960_SS243	HDPE Soil Jar	200 mL	00620322054859	Grey	No	
010	0960_SS174	HDPE Soil Jar	200 mL	00620322054889	Grey	No	
011	0960_SS189	HDPE Soil Jar	200 mL	00620322054979	Grey	No	
012	0960_SS176	HDPE Soil Jar	200 mL	00620322054852	Grey	No	
013	0960_SS190	HDPE Soil Jar	200 mL	00620322054904	Grey	No	
014	0960_SS288	HDPE Soil Jar	200 mL	00620322054908	Grey	No	
015	0960_SS193	HDPE Soil Jar	200 mL	00620322054964	Grey	No	
016	0960_SS192	HDPE Soil Jar	200 mL	00620322054861	Grey	No	

Total Bottle Count: ALS: 16, Non ALS: 0



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2308703

Client : STANTEC AUSTRALIA PTY LTD
Contact :
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : Customer Services EP
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail :
Telephone :
Facsimile :

E-mail : ALSEnviro.Perth@alsglobal.com
Telephone :
Facsimile :

Project : WA_0960_PFASOMP_23
Order number : pfas-omp Learmonth
C-O-C number : 54063
Site : Learmonth SD - JS
Sampler :

Page : 1 of 3
Quote number : ES2022MWHAUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 30-Jun-2023 11:00
Client Requested Due : 12-Jul-2023
Date :

Issue Date : 03-Jul-2023
Scheduled Reporting Date : **12-Jul-2023**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 4
Receipt Detail :

Security Seal : Not Available
Temperature : 8.0 - Ice present
No. of samples received / analysed : 16 / 16

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2308703-001	28-Jun-2023 09:11	0960_SS279_230628	✓	✓
EP2308703-002	28-Jun-2023 09:19	0960_SS170_230628	✓	✓
EP2308703-003	28-Jun-2023 09:19	0960_QC118_230628	✓	✓
EP2308703-004	28-Jun-2023 09:42	0960_SS168_230628	✓	✓
EP2308703-005	28-Jun-2023 09:50	0960_SS166_230628	✓	✓
EP2308703-006	28-Jun-2023 10:01	0960_SS157_230628	✓	✓
EP2308703-007	28-Jun-2023 10:27	0960_SD219_230628	✓	✓
EP2308703-008	28-Jun-2023 10:34	0960_SS235_230628	✓	✓
EP2308703-009	28-Jun-2023 11:11	0960_SS243_230628	✓	✓
EP2308703-010	28-Jun-2023 11:17	0960_SS174_230628	✓	✓
EP2308703-011	28-Jun-2023 11:57	0960_SS189_230628	✓	✓
EP2308703-012	28-Jun-2023 11:24	0960_SS176_230628	✓	✓
EP2308703-013	28-Jun-2023 12:14	0960_SS190_230628	✓	✓
EP2308703-014	28-Jun-2023 12:15	0960_SS288_230628	✓	✓
EP2308703-015	28-Jun-2023 13:39	0960_SS193_230628	✓	✓
EP2308703-016	28-Jun-2023 13:40	0960_SS192_230628	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.



Requested Deliverables

[REDACTED]

- A4 - AU Tax Invoice (INV)

Email

[REDACTED]cardno.com.au

DERP LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

Email

Email

Email

Email

Email

Email

Email

[REDACTED]

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

Email

Email

Email

Email

Email

Email

Email



CERTIFICATE OF ANALYSIS

Work Order	: EP2308703	Page	: 1 of 11
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023 11:00
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 07-Jul-2023
C-O-C number	: 54063	Issue Date	: 12-Jul-2023 13:54
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SD - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 16		
No. of samples analysed	: 16		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X: High failing matrix spike deemed acceptable as all associated analytes are <LOR.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS279_230628	0960_SS170_230628	0960_QC118_230628	0960_SS168_230628	0960_SS166_230628
Sampling date / time				28-Jun-2023 09:11	28-Jun-2023 09:19	28-Jun-2023 09:19	28-Jun-2023 09:42	28-Jun-2023 09:50
Compound	CAS Number	LOR	Unit	EP2308703-001	EP2308703-002	EP2308703-003	EP2308703-004	EP2308703-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	3.3	4.1	4.7	8.0	7.9
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0102	0.0040	0.0039	0.0013	0.0027
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS279_230628	0960_SS170_230628	0960_QC118_230628	0960_SS168_230628	0960_SS166_230628
Sampling date / time				28-Jun-2023 09:11	28-Jun-2023 09:19	28-Jun-2023 09:19	28-Jun-2023 09:42	28-Jun-2023 09:50
Compound	CAS Number	LOR	Unit	EP2308703-001	EP2308703-002	EP2308703-003	EP2308703-004	EP2308703-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0102	0.0040	0.0039	0.0013	0.0027
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0102	0.0040	0.0039	0.0013	0.0027
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0102	0.0040	0.0039	0.0013	0.0027
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	104	110	103	130	129
13C8-PFOA	----	0.0002	%	105	99.0	101	102	106



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS157_230628	0960_SD219_230628	0960_SS235_230628	0960_SS243_230628	0960_SS174_230628
Sampling date / time				28-Jun-2023 10:01	28-Jun-2023 10:27	28-Jun-2023 10:34	28-Jun-2023 11:11	28-Jun-2023 11:17
Compound	CAS Number	LOR	Unit	EP2308703-006	EP2308703-007	EP2308703-008	EP2308703-009	EP2308703-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	5.1	3.2	2.3	2.6	1.7
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0007	<0.0002	0.0007	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0003	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0076	0.0019	0.0713	0.0202	0.0086
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0003	0.0003	0.0005
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS157_230628	0960_SD219_230628	0960_SS235_230628	0960_SS243_230628	0960_SS174_230628
Sampling date / time				28-Jun-2023 10:01	28-Jun-2023 10:27	28-Jun-2023 10:34	28-Jun-2023 11:11	28-Jun-2023 11:17
Compound	CAS Number	LOR	Unit	EP2308703-006	EP2308703-007	EP2308703-008	EP2308703-009	EP2308703-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0083	0.0019	0.0728	0.0205	0.0091
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0083	0.0019	0.0720	0.0202	0.0086
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0083	0.0019	0.0720	0.0202	0.0086
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	110	116	113	99.5	114
13C8-PFOA	----	0.0002	%	106	95.5	104	102	100



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS189_230628	0960_SS176_230628	0960_SS190_230628	0960_SS288_230628	0960_SS193_230628
Sampling date / time				28-Jun-2023 11:57	28-Jun-2023 11:24	28-Jun-2023 12:14	28-Jun-2023 12:15	28-Jun-2023 13:39
Compound	CAS Number	LOR	Unit	EP2308703-011	EP2308703-012	EP2308703-013	EP2308703-014	EP2308703-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	9.5	1.4	16.7	1.7	25.6
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0003	0.0003	0.0114	0.0007	0.0005
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0007	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS189_230628	0960_SS176_230628	0960_SS190_230628	0960_SS288_230628	0960_SS193_230628
Sampling date / time				28-Jun-2023 11:57	28-Jun-2023 11:24	28-Jun-2023 12:14	28-Jun-2023 12:15	28-Jun-2023 13:39
Compound	CAS Number	LOR	Unit	EP2308703-011	EP2308703-012	EP2308703-013	EP2308703-014	EP2308703-015
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0003	0.0003	0.0121	0.0007	0.0005
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0003	0.0003	0.0114	0.0007	0.0005
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0003	0.0003	0.0114	0.0007	0.0005
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	108	120	120	113	128
13C8-PFOA	----	0.0002	%	103	103	102	97.5	102



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

0960_SS192_230628

Sampling date / time				28-Jun-2023 13:40	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2308703-016	-----	-----	-----	-----
Result				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	0.7	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0005	----	----	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	----	----	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	----	----	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	----	----	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	----	----	----	----



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

0960_SS192_230628

Sampling date / time

28-Jun-2023 13:40

Compound

CAS Number

LOR

Unit

EP2308703-016

Result

EP231C: Perfluoroalkyl Sulfonamides - Continued

N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	----	----	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	----	----	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	----	----	----	----

EP231D: (n:2) Fluorotelomer Sulfonic Acids

4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	----	----	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	----	----	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	----	----	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	----	----	----	----

EP231P: PFAS Sums

Sum of PFAS	----	0.0002	mg/kg	0.0005	----	----	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0005	----	----	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0005	----	----	----	----

EP231S: PFAS Surrogate

13C4-PFOS	----	0.0002	%	129	----	----	----	----
13C8-PFOA	----	0.0002	%	108	----	----	----	----



Surrogate Control Limits

Sub-Matrix: **SEDIMENT**

		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	76	136
13C8-PFOA	----	78	131



QUALITY CONTROL REPORT

Work Order	: EP2308703	Page	: 1 of 11
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 07-Jul-2023
C-O-C number	: 54063	Issue Date	: 12-Jul-2023
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SD - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 16		
No. of samples analysed	: 16		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 5162225)									
EP2308703-001	0960_SS279_230628	EA055: Moisture Content	----	0.1	%	3.3	3.4	4.4	0% - 20%
EP2308703-010	0960_SS174_230628	EA055: Moisture Content	----	0.1	%	1.7	1.6	7.0	0% - 50%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5157232)									
EP2308703-001	0960_SS279_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0102	0.0123	18.6	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2308889-010	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0006	0.0006	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159569)									
EP2308703-004	0960_SS168_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0013	0.0011	15.1	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2308703-014	0960_SS288_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159569) - continued									
EP2308703-014	0960_SS288_230628	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0007	0.0007	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5157232)									
EP2308703-001	0960_SS279_230628	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2308889-010	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0009	<0.0009	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0009	<0.0009	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0009	<0.0009	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0009	<0.0009	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0024	<0.0024	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159569)									
EP2308703-004	0960_SS168_230628	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP2308703-014	0960_SS288_230628	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159569) - continued									
EP2308703-014	0960_SS288_230628	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5157232)									
EP2308703-001	0960_SS279_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308889-010	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0009	<0.0009	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0009	<0.0009	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0009	<0.0009	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0024	<0.0024	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0024	<0.0024	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0024	<0.0024	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0024	<0.0024	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159569)									
EP2308703-004	0960_SS168_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159569) - continued									
EP2308703-004	0960_SS168_230628	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308703-014	0960_SS288_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5157232)									
EP2308703-001	0960_SS279_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308889-010	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0009	<0.0009	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0009	<0.0009	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159569)									



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159569) - continued									
EP2308703-004	0960_SS168_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308703-014	0960_SS288_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5157232)									
EP2308703-001	0960_SS279_230628	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0102	0.0123	18.7	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0102	0.0123	18.7	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0102	0.0123	18.7	0% - 20%
EP2308889-010	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0006	0.0006	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0006	0.0006	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0006	0.0006	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159569)									
EP2308703-004	0960_SS168_230628	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0013	0.0011	16.7	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0013	0.0011	16.7	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0013	0.0011	16.7	No Limit
EP2308703-014	0960_SS288_230628	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0007	0.0007	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0007	0.0007	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0007	0.0007	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5157232)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0011 mg/kg	104	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	96.6	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	101	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	97.0	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0012 mg/kg	103	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159569)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0011 mg/kg	103	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	97.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	107	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	86.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0012 mg/kg	95.8	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5157232)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	98.7	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.6	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.4	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.4	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.0	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00125 mg/kg	104	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159569)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	102	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	71.0	131



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159569) - continued								
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.2	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00125 mg/kg	101	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5157232)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	104	59.6	143
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.2	62.8	140
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	95.4	61.5	139
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	109	61.9	139
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.6	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159569)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.6	59.6	143
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	123	62.8	140
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	112	61.5	139
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	99.8	61.9	139
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5157232)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00117 mg/kg	96.6	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00118 mg/kg	103	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.0012 mg/kg	105	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.0012 mg/kg	105	54.8	124

Matrix Spike (MS) Report

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5157232)							
EP2308703-002	0960_SS170_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0011 mg/kg	110	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00117 mg/kg	111	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00118 mg/kg	95.0	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	106	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	114	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0012 mg/kg	107	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159569)							
EP2308703-005	0960_SS166_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0011 mg/kg	104	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00117 mg/kg	# 129	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00118 mg/kg	106	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	119	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	78.5	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0012 mg/kg	106	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5157232)							



Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5157232) - continued							
EP2308703-002	0960_SS170_230628	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	99.8	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	95.6	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	94.8	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	104	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	102	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	97.3	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	95.3	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	103	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	102	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.00125 mg/kg	106	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00125 mg/kg	108	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159569)							
EP2308703-005	0960_SS166_230628	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	110	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	108	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	96.8	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	100	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	100.0	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	103	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	89.9	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	93.9	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	95.6	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.00125 mg/kg	91.2	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00125 mg/kg	102	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5157232)							
EP2308703-002	0960_SS170_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	101	48.0	128
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	108	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	98.3	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	95.3	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	104	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	112	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	93.6	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159569)							
EP2308703-005	0960_SS166_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	106	48.0	128



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159569) - continued							
EP2308703-005	0960_SS166_230628	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	95.7	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	82.2	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	124	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	105	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	98.4	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	111	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5157232)							
EP2308703-002	0960_SS170_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	94.8	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00118 mg/kg	111	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	108	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0012 mg/kg	109	60.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159569)							
EP2308703-005	0960_SS166_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	110	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00118 mg/kg	112	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	114	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0012 mg/kg	96.6	60.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2308703	Page	: 1 of 6
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Site	: Learmonth SD - JS	Issue Date	: 12-Jul-2023
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 16
Order number	: pfas-omp Learmonth	No. of samples analysed	: 16

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2308703--005	0960_SS166_230628	Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	129 %	73.0-123%	Recovery greater than upper data quality objective

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055) 0960_SS279_230628, 0960_QC118_230628, 0960_SS166_230628, 0960_SD219_230628, 0960_SS243_230628, 0960_SS189_230628, 0960_SS190_230628, 0960_SS193_230628,	0960_SS170_230628, 0960_SS168_230628, 0960_SS157_230628, 0960_SS235_230628, 0960_SS174_230628, 0960_SS176_230628, 0960_SS288_230628, 0960_SS192_230628	28-Jun-2023	----	----	----	10-Jul-2023	12-Jul-2023	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SS279_230628, 0960_QC118_230628	0960_SS170_230628,	28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	11-Jul-2023	16-Aug-2023	✓
HDPE Soil Jar (EP231X) 0960_SS168_230628, 0960_SS157_230628, 0960_SS235_230628, 0960_SS174_230628, 0960_SS176_230628, 0960_SS288_230628, 0960_SS192_230628	0960_SS166_230628, 0960_SD219_230628, 0960_SS243_230628, 0960_SS189_230628, 0960_SS190_230628, 0960_SS193_230628,	28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓



Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X) 0960_SS279_230628, 0960_QC118_230628	0960_SS170_230628,	28-Jun-2023	07-Jul-2023	25-Dec-2023	✔	11-Jul-2023	16-Aug-2023	✔
HDPE Soil Jar (EP231X) 0960_SS168_230628, 0960_SS157_230628, 0960_SS235_230628, 0960_SS174_230628, 0960_SS176_230628, 0960_SS288_230628, 0960_SS192_230628	0960_SS166_230628, 0960_SD219_230628, 0960_SS243_230628, 0960_SS189_230628, 0960_SS190_230628, 0960_SS193_230628,	28-Jun-2023	07-Jul-2023	25-Dec-2023	✔	12-Jul-2023	16-Aug-2023	✔
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X) 0960_SS279_230628, 0960_QC118_230628	0960_SS170_230628,	28-Jun-2023	07-Jul-2023	25-Dec-2023	✔	11-Jul-2023	16-Aug-2023	✔
HDPE Soil Jar (EP231X) 0960_SS168_230628, 0960_SS157_230628, 0960_SS235_230628, 0960_SS174_230628, 0960_SS176_230628, 0960_SS288_230628, 0960_SS192_230628	0960_SS166_230628, 0960_SD219_230628, 0960_SS243_230628, 0960_SS189_230628, 0960_SS190_230628, 0960_SS193_230628,	28-Jun-2023	07-Jul-2023	25-Dec-2023	✔	12-Jul-2023	16-Aug-2023	✔
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SS279_230628, 0960_QC118_230628	0960_SS170_230628,	28-Jun-2023	07-Jul-2023	25-Dec-2023	✔	11-Jul-2023	16-Aug-2023	✔
HDPE Soil Jar (EP231X) 0960_SS168_230628, 0960_SS157_230628, 0960_SS235_230628, 0960_SS174_230628, 0960_SS176_230628, 0960_SS288_230628, 0960_SS192_230628	0960_SS166_230628, 0960_SD219_230628, 0960_SS243_230628, 0960_SS189_230628, 0960_SS190_230628, 0960_SS193_230628,	28-Jun-2023	07-Jul-2023	25-Dec-2023	✔	12-Jul-2023	16-Aug-2023	✔



Matrix: SOIL

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231P: PFAS Sums									
HDPE Soil Jar (EP231X) 0960_SS279_230628, 0960_QC118_230628		0960_SS170_230628,	28-Jun-2023	07-Jul-2023	25-Dec-2023	✔	11-Jul-2023	16-Aug-2023	✔
HDPE Soil Jar (EP231X) 0960_SS168_230628, 0960_SS157_230628, 0960_SS235_230628, 0960_SS174_230628, 0960_SS176_230628, 0960_SS288_230628, 0960_SS192_230628		0960_SS166_230628, 0960_SD219_230628, 0960_SS243_230628, 0960_SS189_230628, 0960_SS190_230628, 0960_SS193_230628,	28-Jun-2023	07-Jul-2023	25-Dec-2023	✔	12-Jul-2023	16-Aug-2023	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification .

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	16	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	40	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



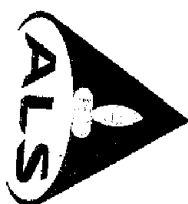
Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
QuEChERS Extraction of Solids	* ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.



Custody Document for Submissions via ALS Compass App



Environmental Division
Perth
Work Order Reference
EP2308704



Telephone : +61-8-9496 1301

Project: WA - 0960 - PERKOWA-23 client: Stantec

ALS Compass COC Reference: 54080, 54064, 54065, 54063, 54068, 54072, 54062, 54074 # Samples: Standard

Turnaround Requirements: Standard

Special Instructions: _____

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
			
Date / Time: <u>28/6/23</u>	Date / Time: <u>30/6</u> <u>11am</u>	Date / Time:	Date / Time:

Right Solutions - Right Partner

alsglobal.com/als-compass

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PFSASOMP_23

SITE: Learmonth GW - CG

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

CONTACT PH: [REDACTED]
QUOTE NO: SY7139/19 B

SAMPLER MOBILE: [REDACTED]
/ ES2022MMHAUS0002

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days
Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

°C

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE/ TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Rinsate WATER	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_MM018		28/06/2023 08:15 AM	WATER	ALS: 5 Non ALS: 0	No		X		Extra lab QAQC PFAS
002	0960_MM211		28/06/2023 08:56 AM	WATER	ALS: 5 Non ALS: 0	No		X		Extra lab QAQC PFAS
003	0960_QC115		28/06/2023 08:57 AM	WATER	ALS: 3 Non ALS: 0	No	X			Extra lab QAQC PFAS
004	0960_MM164		28/06/2023 09:17 AM	WATER	ALS: 5 Non ALS: 0	No		X		
005	0960_QC117		28/06/2023 09:18 AM	WATER	ALS: 3 Non ALS: 0	No		X		Extra lab QAQC PFAS
006	0960_MM163		28/06/2023 09:50 AM	WATER	ALS: 3 Non ALS: 0	No		X		
007	0960_QC120		28/06/2023 09:51 AM	WATER	ALS: 3 Non ALS: 0	No	X			
008	0960_MM233		28/06/2023 10:13 AM	WATER	ALS: 3 Non ALS: 0	No		X		
009	0960_QC122		28/06/2023 10:14 AM	WATER	ALS: 3 Non ALS: 0	No	X			

CHAIN OF CUSTODY

OC#: 54064

ALS Laboratory, EP Perth

CLIENT: MW/HAUS - STANTEC AUSTRALIA PTY LTD
 PROJECT: WA_0960_PFSOMP_23
 SITE: Learmonth GW - CG
 ORDER NO.: pfas-omp Learmonth
 PROJECT MANAGER
 PRIMARY SAMPLER:
 EMAIL REPORTS TO:
 EMAIL INVOICES TO:

CONTACT PH: [REDACTED]
 QUOTE NO: SY139/19 B

SAMPLER MOBILE: [REDACTED]
 / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)
 Custody Seal intact? Yes No N/A
 Free ice / frozen ice bricks present upon receipt? Yes No N/A
 Random Sample Temperature on Receipt: °C
 Other comments:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days
 Biohazard info:

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Rinse Water	WA OMP Water Suite Water	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0960_MW162		28/06/2023 10:44 AM	WATER	ALS: 5 Non ALS: 0	No		X		Extra lab QAQC PFAS
011	0960_MW113		28/06/2023 11:10 AM	WATER	ALS: 5 Non ALS: 0	No		X		Extra lab QAQC PFAS
012	0960_MW114		28/06/2023 11:45 AM	WATER	ALS: 5 Non ALS: 0	No		X		Extra lab QAQC PFAS
013	0960_MW166		28/06/2023 12:10 PM	WATER	ALS: 5 Non ALS: 0	No		X		Extra lab QAQC PFAS
014	0960_MW167		28/06/2023 12:20 PM	WATER	ALS: 5 Non ALS: 0	No		X		Extra lab QAQC PFAS
015	0960_MW115		28/06/2023 12:38 PM	WATER	ALS: 5 Non ALS: 0	No		X		Extra lab QAQC PFAS
016	0960_MW127		28/06/2023 12:59 PM	WATER	ALS: 3 Non ALS: 0	No		X		Extra lab QAQC PFAS
017	0960_MW122		28/06/2023 01:35 PM	WATER	ALS: 5 Non ALS: 0	No		X		Extra lab QAQC PFAS
018	0960_MW146_3.0-3.5		28/06/2023 01:54 PM	WATER	ALS: 5 Non ALS: 0	No		X		Extra lab QAQC PFAS

Thursday, June 28, 2023

9:31:03 PM

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP_23

SITE: Learmonth GW - CG

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 B

/ ES2022/MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

Yes No N/A

Yes No N/A

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Rinsate WATER	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	0960_MW143_3.0-3.5		28/06/2023 02:14 PM	WATER	ALS: 3 Non ALS: 0	No		X		
020	0960_MW144_3.0-3.5		28/06/2023 02:40 PM	WATER	ALS: 5 Non ALS: 0	No		X		Extra lab QA/QC PFAS
021	0960_MW178_4.0-4.5		28/06/2023 02:53 PM	WATER	ALS: 3 Non ALS: 0	No		X		
022	0960_MW176_3.5-4.0		28/06/2023 03:10 PM	WATER	ALS: 3 Non ALS: 0	No		X		
023	0960_MW177_1.5-2.0		28/06/2023 03:22 PM	WATER	ALS: 3 Non ALS: 0	No		X		

CLIENT: MW/HAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PASOMP_23

SITE: Learmonth GW - CG

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 B

/ ES2022MW/HAUS0002

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_MW018	HDPE (no PTFE)	20 mL	00350822000491	Grey	No	
001	0960_MW018	HDPE (no PTFE)	20 mL	00350822000576	Grey	No	
001	0960_MW018	HDPE (no PTFE)	20 mL	00350821067283	Grey	No	
001	0960_MW018	HDPE (no PTFE)	20 mL	00350821067632	Grey	No	
002	0960_MW211	Clear Plastic Bottle - Natural	125 mL	00071121129729	Green	No	
002	0960_MW211	HDPE (no PTFE)	20 mL	00350821000259	Grey	No	
002	0960_MW211	HDPE (no PTFE)	20 mL	00350821000398	Grey	No	
002	0960_MW211	HDPE (no PTFE)	20 mL	00350821036975	Grey	No	
002	0960_MW211	Clear Plastic Bottle - Natural	125 mL	00350821036870	Grey	No	
003	0960_QC115	HDPE (no PTFE)	20 mL	00070821219904	Green	No	
003	0960_QC115	HDPE (no PTFE)	20 mL	00350822000418	Grey	No	
003	0960_QC115	Clear Plastic Bottle - Natural	125 mL	00071121129675	Green	No	
004	0960_MW164	HDPE (no PTFE)	20 mL	00350821035874	Grey	No	
004	0960_MW164	HDPE (no PTFE)	20 mL	00350821035921	Grey	No	
004	0960_MW164	HDPE (no PTFE)	20 mL	00350821000392	Grey	No	
004	0960_MW164	Clear Plastic Bottle - Natural	125 mL	00070821219825	Green	No	
005	0960_QC117	HDPE (no PTFE)	20 mL	00350822082277	Grey	No	
005	0960_QC117	Clear Plastic Bottle - Natural	125 mL	00071121129692	Green	No	
006	0960_MW163	HDPE (no PTFE)	20 mL	00350821001775	Grey	No	
006	0960_MW163	HDPE (no PTFE)	20 mL	00350821001916	Grey	No	
007	0960_QC120	HDPE (no PTFE)	20 mL	00070522145020	Green	No	
007	0960_QC120	HDPE (no PTFE)	20 mL	00350822000566	Grey	No	

CLIENT: MWHHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSASOMP_23

SITE: Learmonth GW - CG

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
C

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ESS2022MWHHAUS0002

Clear Plastic Bottle - Natural

HDPE (no PTFE)

125 mL

00071121129637

Green

No

HDPE (no PTFE)

20 mL

00350821001718

Grey

No

Clear Plastic Bottle - Natural

125 mL

00070822145181

Green

No

HDPE (no PTFE)

20 mL

00350822082167

Grey

No

Clear Plastic Bottle - Natural

125 mL

00350822082178

Grey

No

HDPE (no PTFE)

20 mL

00071121129647

Green

No

HDPE (no PTFE)

20 mL

00350621000368

Grey

No

HDPE (no PTFE)

20 mL

003506839567466

Grey

No

HDPE (no PTFE)

20 mL

00350621035835

Grey

No

Clear Plastic Bottle - Natural

125 mL

00350621036190

Grey

No

HDPE (no PTFE)

20 mL

00070821151221

Green

No

HDPE (no PTFE)

20 mL

00350822000545

Grey

No

HDPE (no PTFE)

20 mL

00350822000336

Grey

No

HDPE (no PTFE)

20 mL

00350821036001

Grey

No

Clear Plastic Bottle - Natural

125 mL

00350821036579

Grey

No

HDPE (no PTFE)

20 mL

00071121129910

Green

No

HDPE (no PTFE)

20 mL

00350822000537

Grey

No

HDPE (no PTFE)

20 mL

00350822000453

Grey

No

HDPE (no PTFE)

20 mL

00350821001945

Grey

No

Clear Plastic Bottle - Natural

125 mL

00070522145185

Green

No

HDPE (no PTFE)

20 mL

00350821001894

Grey

No

HDPE (no PTFE)

20 mL

00350821001715

Grey

No

HDPE (no PTFE)

20 mL

00350621035901

Grey

No

HDPE (no PTFE)

20 mL

00350621035908

Grey

No

Clear Plastic Bottle - Natural

125 mL

00070522145155

Green

No

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PFSASCOMP_23

SITE: Learmonth GW - CG

ORDER NO: pfas-comp Learmonth

PROJECT MANAGER:
PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
C

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

014	0969_MW167	HDPE (no PTFE)	20 mL	00350821001935	Grey	No	
014	0969_MW167	HDPE (no PTFE)	20 mL	00350821001761	Grey	No	
014	0969_MW167	HDPE (no PTFE)	20 mL	00350821036660	Grey	No	
014	0969_MW167	HDPE (no PTFE)	20 mL	00350821035865	Grey	No	
015	0960_MW115	HDPE (no PTFE)	125 mL	00070522145112	Green	No	
015	0960_MW115	HDPE (no PTFE)	20 mL	00350821035880	Grey	No	
015	0960_MW115	HDPE (no PTFE)	20 mL	00350821000314	Grey	No	
015	0960_MW115	HDPE (no PTFE)	20 mL	00350821035838	Grey	No	
016	0960_MW127	HDPE (no PTFE)	125 mL	00070821151266	Green	No	
016	0960_MW127	HDPE (no PTFE)	20 mL	00350821001910	Grey	No	
017	0960_MW122	HDPE (no PTFE)	125 mL	00070522145009	Green	No	
017	0960_MW122	HDPE (no PTFE)	20 mL	00350821001827	Grey	No	
017	0960_MW122	HDPE (no PTFE)	20 mL	00350821001808	Grey	No	
017	0960_MW122	HDPE (no PTFE)	20 mL	00350821035922	Grey	No	
018	0960_MW146_3.0-3.5	HDPE (no PTFE)	125 mL	00070522162835	Green	No	
018	0960_MW146_3.0-3.5	HDPE (no PTFE)	20 mL	00350821001776	Grey	No	
018	0960_MW146_3.0-3.5	HDPE (no PTFE)	20 mL	00350821036601	Grey	No	
018	0960_MW146_3.0-3.5	HDPE (no PTFE)	20 mL	00350821036734	Grey	No	
019	0960_MW143_3.0-3.5	HDPE (no PTFE)	125 mL	00070522145153	Green	No	
019	0960_MW143_3.0-3.5	HDPE (no PTFE)	20 mL	00350522062445	Grey	No	
019	0960_MW143_3.0-3.5	HDPE (no PTFE)	20 mL	00350522042879	Grey	No	
020	0960_MW144_3.0-3.5	HDPE (no PTFE)	125 mL	00070522144913	Green	No	
		HDPE (no PTFE)	20 mL	00350821001981	Grey	No	

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PFSOMP_23

SITE: Learmonth GW - CG
ORDER NO: pfs-omp Learmonth

PROJECT MANAGER: [REDACTED]
PRIMARY SAMPLER: [REDACTED]

EMAIL REPORTS TO: [REDACTED]

EMAIL INVOICES TO: [REDACTED]

CONTACT PH: [REDACTED]
QUOTE NO: SY/139/19 B

SAMPLER MOBILE

/ ES2022MWHAUS0002

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A
Free Ice / Frozen Ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comments:

020	0960_MW144_3.0-3.5	HDPE (no PTFE)	20 mL	00350821001955	Grey	No	
020	0960_MW144_3.0-3.5	HDPE (no PTFE)	20 mL	00350821036015	Grey	No	
020	0960_MW144_3.0-3.5	HDPE (no PTFE)	20 mL	00350821035924	Grey	No	
021	0960_MW178_4.0-4.5	Clear Plastic Bottle - Natural	125 mL	00070522162808	Green	No	
021	0960_MW178_4.0-4.5	HDPE (no PTFE)	20 mL	00350522042711	Grey	No	
021	0960_MW178_4.0-4.5	HDPE (no PTFE)	20 mL	00350522042809	Grey	No	
022	0960_MW176_3.5-4.0	Clear Plastic Bottle - Natural	125 mL	00070522162811	Green	No	
022	0960_MW176_3.5-4.0	HDPE (no PTFE)	20 mL	00350522062473	Grey	No	
023	0960_MW177_1.5-2.0	Clear Plastic Bottle - Natural	125 mL	00070522144879	Green	No	
023	0960_MW177_1.5-2.0	HDPE (no PTFE)	20 mL	00350821001902	Grey	No	
023	0960_MW177_1.5-2.0	HDPE (no PTFE)	20 mL	00350821001860	Grey	No	
023	0960_MW177_1.5-2.0	Clear Plastic Bottle - Natural	125 mL	00070522145039	Green	No	

Total Bottle Count: ALS: 93, Non ALS: 0



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2308704

Client : STANTEC AUSTRALIA PTY LTD
Contact :
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : Customer Services EP
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail :
Telephone :
Facsimile :

E-mail : ALSEnviro.Perth@alsglobal.com
Telephone :
Facsimile :

Project : WA_0960_PFASOMP_23
Order number : pfas-omp Learmonth
C-O-C number : 54064
Site : Learmonth GW - CG
Sampler :

Page : 1 of 3
Quote number : ES2022MWHAUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 30-Jun-2023 11:00
Client Requested Due : 12-Jul-2023
Date :

Issue Date : 03-Jul-2023
Scheduled Reporting Date : 12-Jul-2023

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 4
Receipt Detail :

Security Seal : Not Available
Temperature : 8.0 - Ice present
No. of samples received / analysed : 23 / 23

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP2308704-018 : 28-Jun-2023 13:54 : 0960_MW146_3.0-3.5_230628
EP2308704-019 : 28-Jun-2023 14:14 : 0960_MW143_3.0-3.5_230628
EP2308704-020 : 28-Jun-2023 14:40 : 0960_MW144_3.0-3.5_230628
EP2308704-021 : 28-Jun-2023 14:53 : 0960_MW178_4.0-4.5_230628
EP2308704-022 : 28-Jun-2023 15:10 : 0960_MW176_3.5-4.0_230628
EP2308704-023 : 28-Jun-2023 15:22 : 0960_MW177_1.5-2.0_230628

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO ₄ , Alkalinity
EP2308704-001	28-Jun-2023 08:15	0960_MW018_230628	✓	✓
EP2308704-002	28-Jun-2023 08:56	0960_MW211_230628	✓	✓
EP2308704-003	28-Jun-2023 08:57	0960_QC115_230628	✓	
EP2308704-004	28-Jun-2023 09:17	0960_MW164_230628	✓	✓
EP2308704-005	28-Jun-2023 09:18	0960_QC117_230628	✓	✓
EP2308704-006	28-Jun-2023 09:50	0960_MW163_230628	✓	✓
EP2308704-007	28-Jun-2023 09:51	0960_QC120_230628	✓	
EP2308704-008	28-Jun-2023 10:13	0960_MW233_230628	✓	✓
EP2308704-009	28-Jun-2023 10:14	0960_QC122_230628	✓	✓
EP2308704-010	28-Jun-2023 10:44	0960_MW162_230628	✓	✓
EP2308704-011	28-Jun-2023 11:10	0960_MW113_230628	✓	✓
EP2308704-012	28-Jun-2023 11:45	0960_MW114_230628	✓	✓
EP2308704-013	28-Jun-2023 12:10	0960_MW166_230628	✓	✓
EP2308704-014	28-Jun-2023 12:20	0969_MW167_230628	✓	✓
EP2308704-015	28-Jun-2023 12:38	0960_MW115_230628	✓	✓
EP2308704-016	28-Jun-2023 12:59	0960_MW127_230628	✓	✓
EP2308704-017	28-Jun-2023 13:35	0960_MW122_230628	✓	✓
EP2308704-018	28-Jun-2023 13:54	0960_MW146_3.0-3.5_...	✓	✓
EP2308704-019	28-Jun-2023 14:14	0960_MW143_3.0-3.5_2...	✓	✓
EP2308704-020	28-Jun-2023 14:40	0960_MW144_3.0-3.5_2...	✓	✓
EP2308704-021	28-Jun-2023 14:53	0960_MW178_4.0-4.5_2...	✓	✓
EP2308704-022	28-Jun-2023 15:10	0960_MW176_3.5-4.0_2...	✓	✓
EP2308704-023	28-Jun-2023 15:22	0960_MW177_1.5-2.0_2...	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.



Requested Deliverables

[REDACTED]

- A4 - AU Tax Invoice (INV)

Email

[REDACTED]cardno.com.au

DERP LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

Email

Email

Email

Email

Email

Email

Email

[REDACTED]

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

Email

Email

Email

Email

Email

Email

Email



CERTIFICATE OF ANALYSIS

Work Order	: EP2308704	Page	: 1 of 18
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023 11:00
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 54064	Issue Date	: 12-Jul-2023 15:43
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth GW - CG		
Quote number	: SY/139/19 B		
No. of samples received	: 23		
No. of samples analysed	: 23		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EP231X: Sample EP2308704-001 shows poor duplicate results due to suspected sample heterogeneity between bottles. confirmed by visual inspection.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW018_230628	0960_MW211_230628	0960_QC115_230628	0960_MW164_230628	0960_QC117_230628
Sampling date / time				28-Jun-2023 08:15	28-Jun-2023 08:56	28-Jun-2023 08:57	28-Jun-2023 09:17	28-Jun-2023 09:18
Compound	CAS Number	LOR	Unit	EP2308704-001	EP2308704-002	EP2308704-003	EP2308704-004	EP2308704-005
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	----	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	35	----	34	37
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	898	660	----	955	963
Total Alkalinity as CaCO ₃	----	1	mg/L	898	695	----	990	1000
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	251	59	----	215	213
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	393	104	----	1270	1240
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	7	1	----	8	8
Magnesium	7439-95-4	1	mg/L	10	2	----	34	34
Sodium	7440-23-5	1	mg/L	646	350	----	1190	1190
Potassium	7440-09-7	1	mg/L	24	14	----	46	46
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	34.2	18.0	----	60.1	59.4
∅ Total Cations	----	0.01	meq/L	29.9	15.8	----	56.1	56.1
∅ Ionic Balance	----	0.01	%	6.81	6.65	----	3.40	2.82
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.08	0.09	0.09	0.08	0.07
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.10	0.08	0.08	0.09	0.09
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	1.07	0.64	0.70	0.76	0.76
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.05	0.04	0.04	0.04	0.04
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.82	5.84	5.11	1.27	1.17
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.4	0.1	0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.63	0.10	0.10	0.05	0.06
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.79	0.20	0.21	0.18	0.18



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW018_230628	0960_MW211_230628	0960_QC115_230628	0960_MW164_230628	0960_QC117_230628
Sampling date / time				28-Jun-2023 08:15	28-Jun-2023 08:56	28-Jun-2023 08:57	28-Jun-2023 09:17	28-Jun-2023 09:18
Compound	CAS Number	LOR	Unit	EP2308704-001	EP2308704-002	EP2308704-003	EP2308704-004	EP2308704-005
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.44	0.05	0.05	0.03	0.03
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.06	0.06	0.06	0.03	0.03
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW018_230628	0960_MW211_230628	0960_QC115_230628	0960_MW164_230628	0960_QC117_230628
Sampling date / time				28-Jun-2023 08:15	28-Jun-2023 08:56	28-Jun-2023 08:57	28-Jun-2023 09:17	28-Jun-2023 09:18
Compound	CAS Number	LOR	Unit	EP2308704-001	EP2308704-002	EP2308704-003	EP2308704-004	EP2308704-005
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	4.44	7.20	6.54	2.53	2.43
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	1.89	6.48	5.81	2.03	1.93
Sum of PFAS (WA DER List)	----	0.01	µg/L	4.29	7.08	6.42	2.40	2.30
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	94.8	102	98.2	104	108
13C8-PFOA	----	0.02	%	106	106	104	102	101



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW163_230628	0960_QC120_230628	0960_MW233_230628	0960_QC122_230628	0960_MW162_230628
Sampling date / time				28-Jun-2023 09:50	28-Jun-2023 09:51	28-Jun-2023 10:13	28-Jun-2023 10:14	28-Jun-2023 10:44
Compound	CAS Number	LOR	Unit	EP2308704-006	EP2308704-007	EP2308704-008	EP2308704-009	EP2308704-010
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	----	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	----	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	412	----	392	393	546
Total Alkalinity as CaCO ₃	----	1	mg/L	412	----	392	393	546
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	481	----	501	497	370
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	2760	----	3380	3350	3580
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	125	----	143	139	163
Magnesium	7439-95-4	1	mg/L	181	----	212	213	237
Sodium	7440-23-5	1	mg/L	1960	----	2090	2100	2180
Potassium	7440-09-7	1	mg/L	100	----	111	111	121
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	96.1	----	114	113	120
∅ Total Cations	----	0.01	meq/L	109	----	118	119	126
∅ Ionic Balance	----	0.01	%	6.26	----	2.04	2.57	2.43
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.13	0.14	1.38	1.36	0.51
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.16	0.17	2.07	2.04	0.56
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	1.44	1.48	24.6	23.1	3.91
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.10	0.11	1.43	1.36	0.08
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.77	0.81	8.15	8.34	0.44
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.4	0.4	0.2
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.08	0.08	0.68	0.70	0.27
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.32	0.33	3.27	3.28	1.04



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW163_230628	0960_QC120_230628	0960_MW233_230628	0960_QC122_230628	0960_MW162_230628
Sampling date / time				28-Jun-2023 09:50	28-Jun-2023 09:51	28-Jun-2023 10:13	28-Jun-2023 10:14	28-Jun-2023 10:44
Compound	CAS Number	LOR	Unit	EP2308704-006	EP2308704-007	EP2308704-008	EP2308704-009	EP2308704-010
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.04	0.04	0.41	0.42	0.10
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.06	0.07	1.04	1.01	0.12
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.61	0.61	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0960_MW163_230628	0960_QC120_230628	0960_MW233_230628	0960_QC122_230628	0960_MW162_230628
Sampling date / time					28-Jun-2023 09:50	28-Jun-2023 09:51	28-Jun-2023 10:13	28-Jun-2023 10:14	28-Jun-2023 10:44
Compound	CAS Number	LOR	Unit		EP2308704-006	EP2308704-007	EP2308704-008	EP2308704-009	EP2308704-010
				Result	Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		3.10	3.23	44.0	42.6	7.23
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		2.21	2.29	32.8	31.4	4.35
Sum of PFAS (WA DER List)	----	0.01	µg/L		2.84	2.95	40.5	39.2	6.59
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		103	104	107	108	98.9
13C8-PFOA	----	0.02	%		101	103	105	103	102



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW113_230628	0960_MW114_230628	0960_MW166_230628	0969_MW167_230628	0960_MW115_230628
Sampling date / time				28-Jun-2023 11:10	28-Jun-2023 11:45	28-Jun-2023 12:10	28-Jun-2023 12:20	28-Jun-2023 12:38
Compound	CAS Number	LOR	Unit	EP2308704-011	EP2308704-012	EP2308704-013	EP2308704-014	EP2308704-015
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	455	461	993	937	375
Total Alkalinity as CaCO ₃	----	1	mg/L	455	461	993	937	375
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	312	238	89	342	1580
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	3630	2230	295	1070	10300
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	226	127	3	14	516
Magnesium	7439-95-4	1	mg/L	224	125	4	30	730
Sodium	7440-23-5	1	mg/L	1990	1480	563	1090	6130
Potassium	7440-09-7	1	mg/L	79	55	23	42	255
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	118	77.1	30.0	56.0	331
∅ Total Cations	----	0.01	meq/L	118	82.4	25.6	51.6	359
∅ Ionic Balance	----	0.01	%	0.13	3.35	8.02	4.06	4.06
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.04	0.03	0.24
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.03	0.05	0.22
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.28	0.72	1.40
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	0.04	0.04
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.26	0.88	0.46
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.24	0.09	0.09
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.23	0.17	0.40



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW113_230628	0960_MW114_230628	0960_MW166_230628	0969_MW167_230628	0960_MW115_230628
Sampling date / time				28-Jun-2023 11:10	28-Jun-2023 11:45	28-Jun-2023 12:10	28-Jun-2023 12:20	28-Jun-2023 12:38
Compound	CAS Number	LOR	Unit	EP2308704-011	EP2308704-012	EP2308704-013	EP2308704-014	EP2308704-015
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.24	0.11	0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.14	0.17	0.04
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0960_MW113_230628	0960_MW114_230628	0960_MW166_230628	0969_MW167_230628	0960_MW115_230628
Sampling date / time					28-Jun-2023 11:10	28-Jun-2023 11:45	28-Jun-2023 12:10	28-Jun-2023 12:20	28-Jun-2023 12:38
Compound	CAS Number	LOR	Unit		EP2308704-011	EP2308704-012	EP2308704-013	EP2308704-014	EP2308704-015
				Result	Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	1.56	2.28	2.91
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	0.54	1.60	1.86
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	1.53	2.17	2.65
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		99.4	108	106	102	99.9
13C8-PFOA	----	0.02	%		104	102	95.5	99.1	98.6



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0960_MW127_230628	0960_MW122_230628	0960_MW146_3.0-3.5_230628	0960_MW143_3.0-3.5_230628	0960_MW144_3.0-3.5_230628
Sampling date / time					28-Jun-2023 12:59	28-Jun-2023 13:35	28-Jun-2023 13:54	28-Jun-2023 14:14	28-Jun-2023 14:40
Compound	CAS Number	LOR	Unit	EP2308704-016	EP2308704-017	EP2308704-018	EP2308704-019	EP2308704-020	
				Result	Result	Result	Result	Result	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	158	374	124	152	176	
Total Alkalinity as CaCO3	----	1	mg/L	158	374	124	152	176	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2520	2010	4960	4800	3220	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	22500	13000	31600	29300	12600	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	1070	350	1020	1040	926	
Magnesium	7439-95-4	1	mg/L	1710	930	2580	2430	1030	
Sodium	7440-23-5	1	mg/L	14100	8640	20700	18800	7930	
Potassium	7440-09-7	1	mg/L	518	450	1000	1100	458	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	690	416	997	929	426	
∅ Total Cations	----	0.01	meq/L	821	481	1190	1100	488	
∅ Ionic Balance	----	0.01	%	8.63	7.28	8.78	8.30	6.75	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0960_MW127_230628	0960_MW122_230628	0960_MW146_3.0-3.5_230628	0960_MW143_3.0-3.5_230628	0960_MW144_3.0-3.5_230628
Sampling date / time				28-Jun-2023 12:59	28-Jun-2023 13:35	28-Jun-2023 13:54	28-Jun-2023 14:14	28-Jun-2023 14:40	
Compound	CAS Number	LOR	Unit	EP2308704-016	EP2308704-017	EP2308704-018	EP2308704-019	EP2308704-020	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0960_MW127_230628	0960_MW122_230628	0960_MW146_3.0-3.5_230628	0960_MW143_3.0-3.5_230628	0960_MW144_3.0-3.5_230628
Sampling date / time					28-Jun-2023 12:59	28-Jun-2023 13:35	28-Jun-2023 13:54	28-Jun-2023 14:14	28-Jun-2023 14:40
Compound	CAS Number	LOR	Unit	EP2308704-016	EP2308704-017	EP2308704-018	EP2308704-019	EP2308704-020	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%	104	104	104	106	94.9	
13C8-PFOA	----	0.02	%	99.4	98.0	98.4	99.1	97.8	



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW178_4.0-4.5 _230628	0960_MW176_3.5-4.0 _230628	0960_MW177_1.5-2.0 _230628	----	----
Sampling date / time				28-Jun-2023 14:53	28-Jun-2023 15:10	28-Jun-2023 15:22	----	----
Compound	CAS Number	LOR	Unit	EP2308704-021	EP2308704-022	EP2308704-023	-----	-----
Result				Result	Result	Result	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	105	213	186	----	----
Total Alkalinity as CaCO3	----	1	mg/L	105	213	186	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5250	3120	4880	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	32200	17000	32400	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	1120	637	958	----	----
Magnesium	7439-95-4	1	mg/L	2710	1520	2720	----	----
Sodium	7440-23-5	1	mg/L	21000	10900	20200	----	----
Potassium	7440-09-7	1	mg/L	1020	660	1190	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	1020	549	1020	----	----
∅ Total Cations	----	0.01	meq/L	1220	648	1180	----	----
∅ Ionic Balance	----	0.01	%	8.88	8.28	7.34	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW178_4.0-4.5 _230628	0960_MW176_3.5-4.0 _230628	0960_MW177_1.5-2.0 _230628	----	----
Sampling date / time				28-Jun-2023 14:53	28-Jun-2023 15:10	28-Jun-2023 15:22	----	----
Compound	CAS Number	LOR	Unit	EP2308704-021	EP2308704-022	EP2308704-023	-----	-----
				Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW178_4.0-4.5 _230628	0960_MW176_3.5-4.0 _230628	0960_MW177_1.5-2.0 _230628	----	----
Sampling date / time				28-Jun-2023 14:53	28-Jun-2023 15:10	28-Jun-2023 15:22	----	----
Compound	CAS Number	LOR	Unit	EP2308704-021	EP2308704-022	EP2308704-023	-----	-----
				Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	110	99.0	104	----	----
13C8-PFOA	----	0.02	%	94.8	97.3	98.3	----	----



Surrogate Control Limits

Sub-Matrix: GROUNDWATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133



QUALITY CONTROL REPORT

Work Order	: EP2308704	Page	: 1 of 18
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 54064	Issue Date	: 12-Jul-2023
Sampler	: [REDACTED]		
Site	: Learmonth GW - CG		
Quote number	: SY/139/19 B		
No. of samples received	: 23		
No. of samples analysed	: 23		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5148899) - continued									
EP2308704-023	0960_MW177_1.5-2.0_230 628	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4880	4700	3.8	0% - 20%
EP2308708-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	871	868	0.4	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5148898)									
EP2308704-001	0960_MW018_230628	ED045G: Chloride	16887-00-6	1	mg/L	393	393	0.0	0% - 20%
EP2308704-013	0960_MW166_230628	ED045G: Chloride	16887-00-6	1	mg/L	295	290	1.7	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5148900)									
EP2308704-023	0960_MW177_1.5-2.0_230 628	ED045G: Chloride	16887-00-6	1	mg/L	32400	32000	1.1	0% - 20%
EP2308708-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	926	919	0.7	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5148265)									
EP2308702-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	3	2	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	543	539	0.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	20	20	0.0	0% - 20%
EP2308704-001	0960_MW018_230628	ED093F: Calcium	7440-70-2	1	mg/L	7	7	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	10	10	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	646	645	0.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	24	24	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5148266)									
EP2308704-013	0960_MW166_230628	ED093F: Calcium	7440-70-2	1	mg/L	3	3	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	563	552	1.9	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	23	22	0.0	0% - 20%
EP2308704-023	0960_MW177_1.5-2.0_230 628	ED093F: Calcium	7440-70-2	1	mg/L	958	977	2.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	2720	2770	2.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	20200	20800	2.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1190	1220	2.7	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164523)									
EP2308702-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.01	0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.02	0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2308704-001	0960_MW018_230628	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	1.07	0.98	9.0	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.82	0.71	14.4	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.08	0.07	14.2	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164523) - continued									
EP2308704-001	0960_MW018_230628	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.10	0.09	15.7	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.05	0.05	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164532)									
EP2308704-014	0969_MW167_230628	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.72	0.73	1.7	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.88	0.86	1.6	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	0.05	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2308704-017	0960_MW122_230628	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164541)									
EP2308704-012	0960_MW114_230628	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2308708-005	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	27.7	28.6	3.0	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	21.9	21.4	2.6	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	6.61	7.18	8.2	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	5.62	6.05	7.3	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	2.55	2.68	5.2	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164523)									
EP2308702-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164523) - continued									
EP2308702-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2308704-001	0960_MW018_230628	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.06	0.10	44.1	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.63	# 1.16	60.2	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.79	# 1.30	48.7	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.44	# 0.89	68.4	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	0.4	0.6	50.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164532)									
EP2308704-014	0969_MW167_230628	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.17	0.18	0.0	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.09	0.09	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.17	0.17	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.11	0.10	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2308704-017	0960_MW122_230628	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164541)									
EP2308704-012	0960_MW114_230628	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164541) - continued									
EP2308704-012	0960_MW114_230628	EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2308708-005	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	1.47	1.44	2.5	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	1.87	1.95	4.0	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	8.57	8.93	4.1	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.91	0.91	0.0	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	1.7	1.8	0.0	0% - 50%
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164523)									
EP2308702-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308704-001	0960_MW018_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit

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 Work Order : EP2308704
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP_23



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164523) - continued									
EP2308704-001	0960_MW018_230628	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164532)									
EP2308704-014	0969_MW167_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308704-017	0960_MW122_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164541)									
EP2308704-012	0960_MW114_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164541) - continued									
EP2308704-012	0960_MW114_230628	EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308708-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164523)									
EP2308702-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308704-001	0960_MW018_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164532)									
EP2308704-014	0969_MW167_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164532) - continued									
EP2308704-014	0969_MW167_230628	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308704-017	0960_MW122_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164541)									
EP2308704-012	0960_MW114_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308708-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5164523)									
EP2308702-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.03	0.02	40.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.03	0.02	40.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	0.03	0.02	40.0	No Limit
EP2308704-001	0960_MW018_230628	EP231X: Sum of PFAS	----	0.01	µg/L	4.44	# 5.95	29.1	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	1.89	1.69	11.2	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	4.29	# 5.81	30.1	0% - 20%
EP231P: PFAS Sums (QC Lot: 5164532)									
EP2308704-014	0969_MW167_230628	EP231X: Sum of PFAS	----	0.01	µg/L	2.28	2.27	0.4	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	1.60	1.59	0.6	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	2.17	2.16	0.5	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231P: PFAS Sums (QC Lot: 5164532) - continued									
EP2308704-017	0960_MW122_230628	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5164541)									
EP2308704-012	0960_MW114_230628	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2308708-005	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	78.9	80.9	2.6	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	49.6	50.0	0.8	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	70.7	72.2	2.1	0% - 20%

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
	Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Result				
<1	----	----	----	----
<1	----	----	----	----
<1	----	----	----	----
<1	20 mg/L	96.2	87.8	118
<1	200 mg/L	101	87.8	118
<1	----	----	----	----
<1	----	----	----	----
<1	----	----	----	----
<1	20 mg/L	109	87.8	118
<1	200 mg/L	104	87.8	118
<1	25 mg/L	98.8	89.9	112
<1	500 mg/L	98.4	89.9	112
<1	25 mg/L	97.0	89.9	112
<1	500 mg/L	94.6	89.9	112
<1	10 mg/L	99.4	88.6	113
<1	1000 mg/L	99.4	88.6	113
<1	10 mg/L	95.7	88.6	113
<1	1000 mg/L	100	88.6	113
<1	50 mg/L	97.6	86.5	117
<1	50 mg/L	99.4	88.4	110
<1	50 mg/L	95.0	91.4	113
<1	50 mg/L	93.2	84.6	108



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED093F: Dissolved Major Cations (QCLot: 5148266) - continued								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.2	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.2	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.2	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.6	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164523)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	91.7	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	94.0	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	99.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	99.2	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	95.5	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	95.8	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164532)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	95.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	107	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	98.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	101	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	93.3	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	108	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164541)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	96.5	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	103	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	98.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	101	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	97.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	94.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164523)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	97.8	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	92.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	89.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	95.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	95.8	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	92.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	86.8	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	95.6	69.0	133



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164523) - continued								
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	93.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	88.4	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164532)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	102	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	97.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	89.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	90.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	101	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	95.0	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	91.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	90.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	84.8	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164541)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	99.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	96.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	92.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	101	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	91.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	111	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	134
EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	97.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	100	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164523)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	90.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	90.6	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	102	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	96.7	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	98.7	62.2	138



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit						
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164523) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	90.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	83.8	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164532)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	106	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	122	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	127	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	93.9	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	108	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	97.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	98.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164541)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	97.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	94.7	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	116	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	97.7	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	104	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	105	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	104	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164523)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	102	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	98.0	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	117	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	96.5	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164532)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	100	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	96.1	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	83.5	67.0	138



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164532) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	107	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164541)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	105	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	115	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	96.7	64.2	133
EP231P: PFAS Sums (QCLot: 5164523)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5164532)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5164541)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148897)							
EP2308704-001	0960_MW018_230628	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	89.5	70.4	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148899)							
EP2308704-023	0960_MW177_1.5-2.0_230628	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 5148898)							
EP2308704-001	0960_MW018_230628	ED045G: Chloride	16887-00-6	1000 mg/L	90.9	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED045G: Chloride by Discrete Analyser (QCLot: 5148900)							
EP2308704-023	0960_MW177_1.5-2.0_230628	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164523)							
EP2308702-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	100	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	116	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	102	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	102	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	101	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	99.2	53.0	129
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164532)							
EP2308704-015	0960_MW115_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	82.5	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	89.8	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	# Not Determined	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	89.3	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	75.5	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	97.3	53.0	129
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164541)							
EP2308704-013	0960_MW166_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	102	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	101	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	104	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	112	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	126	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	106	53.0	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164523)							
EP2308702-005	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	104	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	97.4	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	94.0	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	99.8	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	98.2	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	97.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	96.4	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	112	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	101	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.25 µg/L	98.8	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	96.4	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164532)							
EP2308704-015	0960_MW115_230628	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	94.9	73.0	142



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164532) - continued							
EP2308704-015	0960_MW115_230628	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	90.6	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	84.2	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	87.4	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	92.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	97.0	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	95.0	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	111	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	97.4	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	99.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	88.6	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164541)							
EP2308704-013	0960_MW166_230628	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	104	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	91.8	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	92.7	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	94.9	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	114	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	109	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	93.2	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	111	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	106	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	102	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	96.6	71.0	132
		EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164523)					
EP2308702-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	111	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	116	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	119	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	99.7	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	101	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	116	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	96.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164532)							
EP2308704-015	0960_MW115_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	106	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	107	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164532) - continued							
EP2308704-015	0960_MW115_230628	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	104	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	93.7	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	96.2	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	102	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	106	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164541)							
EP2308704-013	0960_MW166_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	105	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	99.0	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	111	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	94.9	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	110	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	102	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	97.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164523)							
EP2308702-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	105	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	98.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	116	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	110	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164532)							
EP2308704-015	0960_MW115_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	95.6	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	91.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	97.9	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	101	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164541)							
EP2308704-013	0960_MW166_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	103	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	103	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	120	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	110	70.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2308704	Page	: 1 of 8
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Site	: Learmonth GW - CG	Issue Date	: 12-Jul-2023
Sampler	: [REDACTED]	No. of samples received	: 23
Order number	: pfas-omp Learmonth	No. of samples analysed	: 23

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Laboratory Control outliers occur.
- Duplicate outliers exist - please see following pages for full details.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
EP231B: Perfluoroalkyl Carboxylic Acids	EP2308704--001	0960_MW018_230628	Perfluoropentanoic acid (PFPeA)	2706-90-3	60.2 %	0% - 20%	RPD exceeds LOR based limits
EP231B: Perfluoroalkyl Carboxylic Acids	EP2308704--001	0960_MW018_230628	Perfluorohexanoic acid (PFHxA)	307-24-4	48.7 %	0% - 20%	RPD exceeds LOR based limits
EP231B: Perfluoroalkyl Carboxylic Acids	EP2308704--001	0960_MW018_230628	Perfluoroheptanoic acid (PFHpA)	375-85-9	68.4 %	0% - 20%	RPD exceeds LOR based limits
EP231P: PFAS Sums	EP2308704--001	0960_MW018_230628	Sum of PFAS	----	29.1 %	0% - 20%	RPD exceeds LOR based limits
EP231P: PFAS Sums	EP2308704--001	0960_MW018_230628	Sum of PFAS (WA DER List)	----	30.1 %	0% - 20%	RPD exceeds LOR based limits
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2308704--023	0960_MW177_1.5-2.0_230628	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EP2308704--023	0960_MW177_1.5-2.0_230628	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231A: Perfluoroalkyl Sulfonic Acids	EP2308704--015	0960_MW115_230628	Perfluorohexane sulfonic acid (PFHxS)	355-46-4	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
0960_MW018_230628,	0960_MW211_230628,	----	----	----	07-Jul-2023	05-Jul-2023	2
0960_MW164_230628,	0960_QC117_230628,						
0960_MW163_230628,	0960_MW233_230628,						
0960_QC122_230628,	0960_MW162_230628,						
0960_MW113_230628,	0960_MW114_230628,						
0960_MW166_230628,	0969_MW167_230628,						
0960_MW115_230628,	0960_MW127_230628,						
0960_MW122_230628,	0960_MW146_3.0-3.5_230628,						
0960_MW143_3.0-3.5_230628,	0960_MW144_3.0-3.5_230628,						
0960_MW178_4.0-4.5_230628,	0960_MW176_3.5-4.0_230628,						
0960_MW177_1.5-2.0_230628							



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 0960_MW018_230628, 0960_MW164_230628, 0960_MW163_230628, 0960_QC122_230628, 0960_MW113_230628, 0960_MW166_230628, 0960_MW115_230628, 0960_MW122_230628, 0960_MW143_3.0-3.5_230628, 0960_MW178_4.0-4.5_230628, 0960_MW177_1.5-2.0_230628	0960_MW211_230628, 0960_QC117_230628, 0960_MW233_230628, 0960_MW162_230628, 0960_MW114_230628, 0969_MW167_230628, 0960_MW127_230628, 0960_MW146_3.0-3.5_230628, 0960_MW144_3.0-3.5_230628, 0960_MW176_3.5-4.0_230628,	28-Jun-2023	----	----	----	12-Jul-2023	26-Jul-2023	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) 0960_MW018_230628, 0960_MW164_230628, 0960_MW163_230628, 0960_QC122_230628, 0960_MW113_230628, 0960_MW166_230628, 0960_MW115_230628, 0960_MW122_230628, 0960_MW143_3.0-3.5_230628, 0960_MW178_4.0-4.5_230628, 0960_MW177_1.5-2.0_230628	0960_MW211_230628, 0960_QC117_230628, 0960_MW233_230628, 0960_MW162_230628, 0960_MW114_230628, 0969_MW167_230628, 0960_MW127_230628, 0960_MW146_3.0-3.5_230628, 0960_MW144_3.0-3.5_230628, 0960_MW176_3.5-4.0_230628,	28-Jun-2023	----	----	----	07-Jul-2023	05-Jul-2023	✗
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_MW018_230628, 0960_QC115_230628, 0960_QC117_230628, 0960_QC120_230628, 0960_QC122_230628, 0960_MW113_230628, 0960_MW166_230628, 0960_MW115_230628, 0960_MW122_230628, 0960_MW143_3.0-3.5_230628, 0960_MW178_4.0-4.5_230628, 0960_MW177_1.5-2.0_230628	0960_MW211_230628, 0960_MW164_230628, 0960_MW163_230628, 0960_MW233_230628, 0960_MW162_230628, 0960_MW114_230628, 0969_MW167_230628, 0960_MW127_230628, 0960_MW146_3.0-3.5_230628, 0960_MW144_3.0-3.5_230628, 0960_MW176_3.5-4.0_230628,	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	12-Jul-2023	25-Dec-2023	✓

Page : 5 of 8
 Work Order : EP2308704
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP_23



Matrix: WATER

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) 0960_MW018_230628, 0960_QC115_230628, 0960_QC117_230628, 0960_QC120_230628, 0960_QC122_230628, 0960_MW113_230628, 0960_MW166_230628, 0960_MW115_230628, 0960_MW122_230628, 0960_MW143_3.0-3.5_230628, 0960_MW178_4.0-4.5_230628, 0960_MW177_1.5-2.0_230628	0960_MW211_230628, 0960_MW164_230628, 0960_MW163_230628, 0960_MW233_230628, 0960_MW162_230628, 0960_MW114_230628, 0969_MW167_230628, 0960_MW127_230628, 0960_MW146_3.0-3.5_230628, 0960_MW144_3.0-3.5_230628, 0960_MW176_3.5-4.0_230628,	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) 0960_MW018_230628, 0960_QC115_230628, 0960_QC117_230628, 0960_QC120_230628, 0960_QC122_230628, 0960_MW113_230628, 0960_MW166_230628, 0960_MW115_230628, 0960_MW122_230628, 0960_MW143_3.0-3.5_230628, 0960_MW178_4.0-4.5_230628, 0960_MW177_1.5-2.0_230628	0960_MW211_230628, 0960_MW164_230628, 0960_MW163_230628, 0960_MW233_230628, 0960_MW162_230628, 0960_MW114_230628, 0969_MW167_230628, 0960_MW127_230628, 0960_MW146_3.0-3.5_230628, 0960_MW144_3.0-3.5_230628, 0960_MW176_3.5-4.0_230628,	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_MW018_230628, 0960_QC115_230628, 0960_QC117_230628, 0960_QC120_230628, 0960_QC122_230628, 0960_MW113_230628, 0960_MW166_230628, 0960_MW115_230628, 0960_MW122_230628, 0960_MW143_3.0-3.5_230628, 0960_MW178_4.0-4.5_230628, 0960_MW177_1.5-2.0_230628	0960_MW211_230628, 0960_MW164_230628, 0960_MW163_230628, 0960_MW233_230628, 0960_MW162_230628, 0960_MW114_230628, 0969_MW167_230628, 0960_MW127_230628, 0960_MW146_3.0-3.5_230628, 0960_MW144_3.0-3.5_230628, 0960_MW176_3.5-4.0_230628,	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)		28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	12-Jul-2023	25-Dec-2023	✓
0960_MW018_230628,	0960_MW211_230628,							
0960_QC115_230628,	0960_MW164_230628,							
0960_QC117_230628,	0960_MW163_230628,							
0960_QC120_230628,	0960_MW233_230628,							
0960_QC122_230628,	0960_MW162_230628,							
0960_MW113_230628,	0960_MW114_230628,							
0960_MW166_230628,	0969_MW167_230628,							
0960_MW115_230628,	0960_MW127_230628,							
0960_MW122_230628,	0960_MW146_3.0-3.5_230628,							
0960_MW143_3.0-3.5_230628,	0960_MW144_3.0-3.5_230628,							
0960_MW178_4.0-4.5_230628,	0960_MW176_3.5-4.0_230628,							
0960_MW177_1.5-2.0_230628								



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

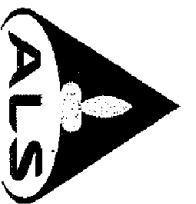
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	37	10.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	6	47	12.77	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	47	6.38	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	47	6.38	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	47	6.38	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	* ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



Environmental Division
Perth

Work Order Reference
EP2308705



Telephone : + 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA_D960_PESKOMU-23 Client: Stantec

Project Manager:
Phone:

ALS Compass COC Reference: 54094, 54069, 54069 # Samples:

Sampler:
Phone:

54080, 54064, 54065, 54063, 54068, 54072, 54082, 54074

Turnaround Requirements:

Standard

Special Instructions:

--

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
Date / Time: <u>28/6/23</u>	Date / Time: <u>30/6 11am</u>		

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME:	DATE TIME:	DATE TIME:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP_23

SITE: Learmonth SD - CG

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

CONTACT PH: [REDACTED] SAMPLER MOBILE: [REDACTED]
QUOTE NO: SY139/19 B / ES2022MWHAUS0002

TURNAROUND REQUIREMENTS: 5 Days	LABORATORY USE ONLY (Circle)
Biohazard info:	Custody Seal intact? Yes No N/A
	Free ice / frozen ice bricks present upon receipt? Yes No N/A
	Random Sample Temperature on Receipt: °C
	Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_SS121		28/06/2023 10:55 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
002	0960_SS123		28/06/2023 11:27 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
003	0960_SD200		28/06/2023 01:18 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
004	0960_SD227		28/06/2023 01:26 PM	SOIL	ALS: 1 Non ALS: 0	No	X		

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFA50MP_23

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

SITE: Learmonth SD - CG

TURNAROUND REQUIREMENTS: 5 Days

LABORATORY USE ONLY (Circle)

Yes No N/A

ORDER NO: pfas-omp Learmonth

Biohazard info:

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

PROJECT MANAGER:

CONTACT PH:

SAMPLER MOBILE:

C

PRIMARY SAMPLER:

QUOTE NO: SY139/19 B / ES2022MWHAUS0002

Random Sample Temperature on Receipt:

EMAIL REPORTS TO:

Other comments:

EMAIL INVOICES TO:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_SS121	HDPE Soil Jar	200 mL	00621222053624	Grey	No	
002	0960_SS123	HDPE Soil Jar	200 mL	00621222053608	Grey	No	
003	0960_SD200	HDPE Soil Jar	200 mL	00621222067031	Grey	No	
004	0960_SD227	HDPE Soil Jar	200 mL	00621222053663	Grey	No	

Total Bottle Count: ALS: 4, Non ALS: 0



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2308705**

Client : **STANTEC AUSTRALIA PTY LTD**
Contact : **[REDACTED]**
Address : **GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000**

Laboratory : **Environmental Division Perth**
Contact : **Customer Services EP**
Address : **26 Rigali Way Wangara WA Australia
6065**

E-mail : **[REDACTED]**
Telephone : **----**
Facsimile : **----**

E-mail : **ALSEnviro.Perth@alsglobal.com**
Telephone : **[REDACTED]**
Facsimile : **[REDACTED]**

Project : **WA_0960_PFASOMP_23**
Order number : **pfas-omp Learmonth**
C-O-C number : **54065**
Site : **Learmonth SD - CG**
Sampler : **[REDACTED] [REDACTED]**

Page : **1 of 2**
Quote number : **ES2022MWHAUS0002 (SY/139/19 B)**
QC Level : **NEPM 2013 B3 & ALS QC Standard**

Dates

Date Samples Received : **30-Jun-2023 11:00**
Client Requested Due : **12-Jul-2023**
Date

Issue Date : **03-Jul-2023**
Scheduled Reporting Date : **12-Jul-2023**

Delivery Details

Mode of Delivery : **Carrier**
No. of coolers/boxes : **4**
Receipt Detail :

Security Seal : **Not Available**
Temperature : **8.0 - Ice present**
No. of samples received / analysed : **4 / 4**

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2308705-001	28-Jun-2023 10:55	0960_SS121_230628	✓	✓
EP2308705-002	28-Jun-2023 11:27	0960_SS123_230628	✓	✓
EP2308705-003	28-Jun-2023 13:18	0960_SD200_230628	✓	✓
EP2308705-004	28-Jun-2023 13:26	0960_SD227_230628	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

██████████	- A4 - AU Tax Invoice (INV)	Email	██████████cardno.com.au
DERP LAB REPORTS			
██████████	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
	- EDI Format - ESDAT (ESDAT)	Email	██████████
██████████	- EDI Format - XTab (XTAB)	Email	██████████
	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
██████████	- EDI Format - ESDAT (ESDAT)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████



CERTIFICATE OF ANALYSIS

Work Order	: EP2308705	Page	: 1 of 5
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023 11:00
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 07-Jul-2023
C-O-C number	: 54065	Issue Date	: 12-Jul-2023 13:54
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SD - CG		
Quote number	: SY/139/19 B		
No. of samples received	: 4		
No. of samples analysed	: 4		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X: High failing matrix spike deemed acceptable as all associated analytes are <LOR.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS121_230628	0960_SS123_230628	0960_SD200_230628	0960_SD227_230628	----
Sampling date / time				28-Jun-2023 10:55	28-Jun-2023 11:27	28-Jun-2023 13:18	28-Jun-2023 13:26	----
Compound	CAS Number	LOR	Unit	EP2308705-001	EP2308705-002	EP2308705-003	EP2308705-004	-----
				Result	Result	Result	Result	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	2.2	2.6	9.6	4.3	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0003	0.0002	<0.0002	0.0015	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.100	0.0090	<0.0002	0.0043	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0027	0.0038	<0.0002	<0.0002	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	0.0002	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0017	<0.0002	<0.0002	<0.0002	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	0.0004	<0.0002	<0.0002	<0.0002	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS121_230628	0960_SS123_230628	0960_SD200_230628	0960_SD227_230628	----
Sampling date / time				28-Jun-2023 10:55	28-Jun-2023 11:27	28-Jun-2023 13:18	28-Jun-2023 13:26	----
Compound	CAS Number	LOR	Unit	EP2308705-001	EP2308705-002	EP2308705-003	EP2308705-004	-----
				Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.105	0.0130	<0.0002	0.0060	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.100	0.0092	<0.0002	0.0058	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.100	0.0092	<0.0002	0.0060	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	102	121	106	114	----
13C8-PFOA	----	0.0002	%	98.0	106	109	115	----



Surrogate Control Limits

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	76	136
13C8-PFOA	----	78	131



QUALITY CONTROL REPORT

Work Order	: EP2308705	Page	: 1 of 7
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 07-Jul-2023
C-O-C number	: 54065	Issue Date	: 12-Jul-2023
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SD - CG		
Quote number	: SY/139/19 B		
No. of samples received	: 4		
No. of samples analysed	: 4		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 5162226)									
EP2308705-001	0960_SS121_230628	EA055: Moisture Content	----	0.1	%	2.2	2.2	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159569)									
EP2308703-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0013	0.0011	15.1	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2308703-014	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0007	0.0007	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159569)									
EP2308703-004	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159569) - continued									
EP2308703-004	Anonymous	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2308703-014	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
		EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159569)							
EP2308703-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308703-014	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159569)									



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159569) - continued									
EP2308703-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308703-014	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159569)									
EP2308703-004	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0013	0.0011	16.7	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0013	0.0011	16.7	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0013	0.0011	16.7	No Limit
EP2308703-014	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0007	0.0007	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0007	0.0007	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0007	0.0007	0.0	No Limit

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
	Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) LowHigh	
Result				
<0.0002	0.0011 mg/kg	103	72.0	128
<0.0002	0.00125 mg/kg	102	73.0	123
<0.0002	0.00118 mg/kg	97.4	67.0	130
<0.0002	0.00119 mg/kg	107	70.0	132
<0.0002	0.00116 mg/kg	86.2	68.0	136
<0.0002	0.0012 mg/kg	95.8	59.0	134
<0.001	0.00625 mg/kg	102	71.0	135
<0.0002	0.00125 mg/kg	96.0	69.0	132
<0.0002	0.00125 mg/kg	101	70.0	132
<0.0002	0.00125 mg/kg	104	71.0	131
<0.0002	0.00125 mg/kg	95.2	69.0	133
<0.0002	0.00125 mg/kg	99.2	72.0	129
<0.0002	0.00125 mg/kg	93.2	69.0	133
<0.0002	0.00125 mg/kg	93.2	64.0	136
<0.0002	0.00125 mg/kg	116	69.0	135
<0.0002	0.00125 mg/kg	122	66.0	139
<0.0005	0.00125 mg/kg	101	69.0	133
<0.0002	0.00125 mg/kg	108	67.0	137
<0.0005	0.00312 mg/kg	94.6	59.6	143
<0.0005	0.00312 mg/kg	123	62.8	140
<0.0005	0.00312 mg/kg	112	61.5	139
<0.0005	0.00312 mg/kg	99.8	61.9	139
<0.0002	0.00125 mg/kg	104	63.0	144
<0.0002	0.00125 mg/kg	112	61.0	139

Matrix Spike (MS) Report

Sub-Matrix: SOIL

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159569)							
EP2308703-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0011 mg/kg	104	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00117 mg/kg	# 129	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00118 mg/kg	106	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	119	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	78.5	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0012 mg/kg	106	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159569)							
EP2308703-005	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	110	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	108	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	96.8	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	100	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	100.0	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	103	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	89.9	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	93.9	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	95.6	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.00125 mg/kg	91.2	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTTeDA)	376-06-7	0.00125 mg/kg	102	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159569)							



Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159569) - continued							
EP2308703-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	106	48.0	128
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	95.7	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	82.2	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	124	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	105	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	98.4	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	111	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159569)							
EP2308703-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	110	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00118 mg/kg	112	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	114	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0012 mg/kg	96.6	60.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2308705	Page	: 1 of 4
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Site	: Learmonth SD - CG	Issue Date	: 12-Jul-2023
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 4
Order number	: pfas-omp Learmonth	No. of samples analysed	: 4

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2308703--005	Anonymous	Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	129 %	73.0-123%	Recovery greater than upper data quality objective

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055) 0960_SS121_230628, 0960_SD200_230628,	0960_SS123_230628, 0960_SD227_230628	28-Jun-2023	----	----	----	10-Jul-2023	12-Jul-2023	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SS121_230628, 0960_SD200_230628,	0960_SS123_230628, 0960_SD227_230628	28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X) 0960_SS121_230628, 0960_SD200_230628,	0960_SS123_230628, 0960_SD227_230628	28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X) 0960_SS121_230628, 0960_SD200_230628,	0960_SS123_230628, 0960_SD227_230628	28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SS121_230628, 0960_SD200_230628,	0960_SS123_230628, 0960_SD227_230628	28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X) 0960_SS121_230628, 0960_SD200_230628,	0960_SS123_230628, 0960_SD227_230628	28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification .

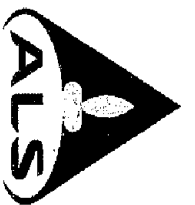
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
QuEChERS Extraction of Solids	* ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.



Environmental Division
Perth

Work Order Reference
EP2308706



Telephone : + 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA - D960 - PPKSDM023 Client: Stantec

Project Manager:
Phone:

ALS Compass COC Reference: 54094, 54061, # Samples:

54080, 54064, 54065, 54063, 54068, 54072, 54062, 54074

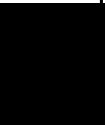
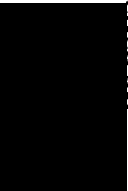
Sampler:
Phone:

Turnaround Requirements:

Standard

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
			
Date / Time: <u>28/6/23</u>	Date / Time: <u>30/6</u> <u>11am</u>	Date / Time:	Date / Time:

CLIENT: MWH/HAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PFA5OMP_23

SITE: Learmonth SD - SC

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days
Biohazard Info:

CONTACT PH: [REDACTED]
QUOTE NO: SY/139/19 B
SAMPLER MOBILE: [REDACTED]
/ ES2022MWH/HAUS0002

LABORATORY USE ONLY (Circle)
Custody Seal intact? Yes No N/A
Free Ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comments:

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_SD208		28/06/2023 09:25 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
002	0960_SD205		28/06/2023 10:04 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
003	0960_SD207		28/06/2023 10:48 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
004	0960_QC124		28/06/2023 10:21 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
005	0960_SS298		28/06/2023 10:49 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
006	0960_SD301		28/06/2023 11:22 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
007	0960_QC126		28/06/2023 11:22 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
008	0960_SD199		28/06/2023 01:29 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
009	0960_SD305		28/06/2023 02:31 PM	SOIL	ALS: 1 Non ALS: 0	No	X		

(ALS) COC#: 54068

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

MW-HAUS - STANTEC ALISTRA 1A DIV 172

PROJECT: WA_0960 PFASOMP 23

SITE: Learmonth SD - SC

ORDER NO: pías-omp Learmonth

PROJECT MANAGER

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE

/ ES2022MWHAS0002

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Yes	No	N/A
Yes	No	N/A

Other comments:

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ANALYSIS REQUIRED

SAMPLE INFORMATION							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0960_SD304		28/06/2023 03:06 PM	SOIL	ALS: 1 Non ALS: 0	No	X		

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PFIASOMP_23

SITE: Leamonth SD - SC

ORDER NO: pfas-omp Leamonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
°C

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_SD208	HDPE Soil Jar	200 mL	00620322054967	Grey	No	
002	0960_SD205	HDPE Soil Jar	200 mL	00620322054945	Grey	No	
003	0960_SD207	HDPE Soil Jar	200 mL	00620322054894	Grey	No	
004	0960_QC124	HDPE Soil Jar	200 mL	00620322054934	Grey	No	
005	0960_SS298	HDPE Soil Jar	200 mL	00620322054914	Grey	No	
006	0960_SD301	HDPE Soil Jar	200 mL	00621222067099	Grey	No	
007	0960_QC126	HDPE Soil Jar	200 mL	00620322036406	Grey	No	
008	0960_SD199	HDPE Soil Jar	200 mL	00620322054898	Grey	No	
009	0960_SD305	HDPE Soil Jar	200 mL	00620322054912	Grey	No	
010	0960_SD304	HDPE Soil Jar	200 mL	00621222067112	Grey	No	

Total Bottle Count: ALS: 10, Non ALS: 0



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2308706

Client : STANTEC AUSTRALIA PTY LTD
Contact :
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : Customer Services EP
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail :
Telephone :
Facsimile :

E-mail : ALSEnviro.Perth@alsglobal.com
Telephone :
Facsimile :

Project : WA_0960_PFASOMP_23
Order number : pfas-omp Learmonth
C-O-C number : 54068
Site : Learmonth SD - SC
Sampler :

Page : 1 of 2
Quote number : ES2022MWH AUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 30-Jun-2023 11:00
Client Requested Due : 12-Jul-2023
Date :

Issue Date : 03-Jul-2023
Scheduled Reporting Date : **12-Jul-2023**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 4
Receipt Detail :

Security Seal : Not Available
Temperature : 8.0 - Ice present
No. of samples received / analysed : 10 / 10

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2308706-001	28-Jun-2023 09:25	0960_SD208_230628	✓	✓
EP2308706-002	28-Jun-2023 10:04	0960_SD205_230628	✓	✓
EP2308706-003	28-Jun-2023 10:48	0960_SD207_230628	✓	✓
EP2308706-004	28-Jun-2023 10:21	0960_QC124_230628	✓	✓
EP2308706-005	28-Jun-2023 10:49	0960_SS298_230628	✓	✓
EP2308706-006	28-Jun-2023 11:22	0960_SD301_230628	✓	✓
EP2308706-007	28-Jun-2023 11:22	0960_QC126_230628	✓	✓
EP2308706-008	28-Jun-2023 13:29	0960_SD199_230628	✓	✓
EP2308706-009	28-Jun-2023 14:31	0960_SD305_230628	✓	✓
EP2308706-010	28-Jun-2023 15:06	0960_SD304_230628	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

██████████	- A4 - AU Tax Invoice (INV)	Email	██████████cardno.com.au
DERP LAB REPORTS			
██████████	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
	- EDI Format - ESDAT (ESDAT)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████
██████████	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
	- EDI Format - ESDAT (ESDAT)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████



CERTIFICATE OF ANALYSIS

Work Order	: EP2308706	Page	: 1 of 7
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023 11:00
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 07-Jul-2023
C-O-C number	: 54068	Issue Date	: 12-Jul-2023 13:54
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SD - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 10		
No. of samples analysed	: 10		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X: High failing matrix spike deemed acceptable as all associated analytes are <LOR.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SD208_230628	0960_SD205_230628	0960_SD207_230628	0960_QC124_230628	0960_SS298_230628
Sampling date / time				28-Jun-2023 09:25	28-Jun-2023 10:04	28-Jun-2023 10:48	28-Jun-2023 10:21	28-Jun-2023 10:49
Compound	CAS Number	LOR	Unit	EP2308706-001	EP2308706-002	EP2308706-003	EP2308706-004	EP2308706-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	18.9	24.3	36.0	33.4	3.8
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	0.0016	0.0005
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SD208_230628	0960_SD205_230628	0960_SD207_230628	0960_QC124_230628	0960_SS298_230628
Sampling date / time				28-Jun-2023 09:25	28-Jun-2023 10:04	28-Jun-2023 10:48	28-Jun-2023 10:21	28-Jun-2023 10:49
Compound	CAS Number	LOR	Unit	EP2308706-001	EP2308706-002	EP2308706-003	EP2308706-004	EP2308706-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	0.0016	0.0005
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	0.0016	0.0005
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	0.0016	0.0005
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	122	124	110	108	97.0
13C8-PFOA	----	0.0002	%	115	106	108	108	99.5



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SD301_230628	0960_QC126_230628	0960_SD199_230628	0960_SD305_230628	0960_SD304_230628
Sampling date / time				28-Jun-2023 11:22	28-Jun-2023 11:22	28-Jun-2023 13:29	28-Jun-2023 14:31	28-Jun-2023 15:06
Compound	CAS Number	LOR	Unit	EP2308706-006	EP2308706-007	EP2308706-008	EP2308706-009	EP2308706-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	19.2	19.4	5.9	31.0	32.8
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.0034	0.0007	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SD301_230628	0960_QC126_230628	0960_SD199_230628	0960_SD305_230628	0960_SD304_230628
Sampling date / time				28-Jun-2023 11:22	28-Jun-2023 11:22	28-Jun-2023 13:29	28-Jun-2023 14:31	28-Jun-2023 15:06
Compound	CAS Number	LOR	Unit	EP2308706-006	EP2308706-007	EP2308706-008	EP2308706-009	EP2308706-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	0.0034	0.0007	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	0.0034	0.0007	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	0.0034	0.0007	<0.0002	<0.0002
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	110	110	114	116	106
13C8-PFOA	----	0.0002	%	104	102	102	107	104



Surrogate Control Limits

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	76	136
13C8-PFOA	----	78	131



QUALITY CONTROL REPORT

Work Order	: EP2308706	Page	: 1 of 11
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 07-Jul-2023
C-O-C number	: 54068	Issue Date	: 12-Jul-2023
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SD - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 10		
No. of samples analysed	: 10		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 5162399)									
EP2308706-001	0960_SD208_230628	EA055: Moisture Content	----	0.1	%	18.9	19.8	4.6	0% - 20%
EP2308706-010	0960_SD304_230628	EA055: Moisture Content	----	0.1	%	32.8	31.7	3.2	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159569)									
EP2308703-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0013	0.0011	15.1	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2308703-014	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0007	0.0007	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159571)									
EP2308706-004	0960_QC124_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0016	0.0018	11.2	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2308710-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)		
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159571) - continued											
EP2308710-004	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159569)											
EP2308703-004	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit		
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit		
EP2308703-014	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit		
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit		
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159571)											
EP2308706-004	0960_QC124_230628	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit		
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit		
		EP2308710-004	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159571) - continued									
EP2308710-004	Anonymous	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit		
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159569)									
EP2308703-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308703-014	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159571)									
EP2308706-004	0960_QC124_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159571) - continued									
EP2308706-004	0960_QC124_230628	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308710-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159569)									
EP2308703-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308703-014	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159571)									



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159571) - continued									
EP2308706-004	0960_QC124_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308710-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159569)									
EP2308703-004	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0013	0.0011	16.7	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0013	0.0011	16.7	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0013	0.0011	16.7	No Limit
EP2308703-014	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0007	0.0007	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0007	0.0007	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0007	0.0007	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159571)									
EP2308706-004	0960_QC124_230628	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0016	0.0018	11.8	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0016	0.0018	11.8	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0016	0.0018	11.8	No Limit
EP2308710-004	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159569)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0011 mg/kg	103	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	97.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	107	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	86.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0012 mg/kg	95.8	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159571)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0011 mg/kg	107	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	103	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	114	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	102	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0012 mg/kg	106	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159569)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	102	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.2	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.2	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00125 mg/kg	101	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159571)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	102	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	71.0	131



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159571) - continued								
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00125 mg/kg	108	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159569)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.6	59.6	143
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	123	62.8	140
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	112	61.5	139
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	99.8	61.9	139
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159571)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	113	59.6	143
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	62.8	140
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	100	61.5	139
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	61.9	139
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159569)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00117 mg/kg	101	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00118 mg/kg	119	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.0012 mg/kg	108	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.0012 mg/kg	104	54.8	124

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159569)							
EP2308703-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0011 mg/kg	104	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00117 mg/kg	# 129	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00118 mg/kg	106	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	119	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	78.5	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0012 mg/kg	106	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159571)							
EP2308706-005	0960_SS298_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0011 mg/kg	94.5	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00117 mg/kg	108	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00118 mg/kg	95.7	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	108	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	114	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0012 mg/kg	106	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159569)							



Sub-Matrix: SOIL

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159569) - continued							
EP2308703-005	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	110	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	108	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	96.8	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	100	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	100.0	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	103	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	89.9	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	93.9	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	95.6	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	91.2	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00125 mg/kg	102	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159571)							
EP2308706-005	0960_SS298_230628	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	99.6	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	96.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	98.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	102	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	106	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	105	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	101	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	100.0	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	106	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	107	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00125 mg/kg	101	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159569)							
EP2308703-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	106	48.0	128
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	95.7	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	82.2	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	124	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	105	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	98.4	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	111	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159571)							
EP2308706-005	0960_SS298_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	92.8	48.0	128



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159571) - continued							
EP2308706-005	0960_SS298_230628	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	115	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	94.5	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	102	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	106	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	108	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	100	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159569)							
EP2308703-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	110	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00118 mg/kg	112	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	114	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0012 mg/kg	96.6	60.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159571)							
EP2308706-005	0960_SS298_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	107	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00118 mg/kg	105	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	116	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0012 mg/kg	121	60.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2308706	Page	: 1 of 5
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Site	: Learmonth SD - SC	Issue Date	: 12-Jul-2023
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 10
Order number	: pfas-omp Learmonth	No. of samples analysed	: 10

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2308703--005	Anonymous	Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	129 %	73.0-123%	Recovery greater than upper data quality objective

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results. This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein. Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055) 0960_SD208_230628, 0960_SD207_230628, 0960_SS298_230628, 0960_QC126_230628, 0960_SD305_230628,	0960_SD205_230628, 0960_QC124_230628, 0960_SD301_230628, 0960_SD199_230628, 0960_SD304_230628	28-Jun-2023	----	----	----	10-Jul-2023	12-Jul-2023	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SD208_230628, 0960_SD207_230628, 0960_SS298_230628, 0960_QC126_230628, 0960_SD305_230628,	0960_SD205_230628, 0960_QC124_230628, 0960_SD301_230628, 0960_SD199_230628, 0960_SD304_230628	28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X) 0960_SD208_230628, 0960_SD207_230628, 0960_SS298_230628, 0960_QC126_230628, 0960_SD305_230628,	0960_SD205_230628, 0960_QC124_230628, 0960_SD301_230628, 0960_SD199_230628, 0960_SD304_230628	28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X) 0960_SD208_230628, 0960_SD207_230628, 0960_SS298_230628, 0960_QC126_230628, 0960_SD305_230628,	0960_SD205_230628, 0960_QC124_230628, 0960_SD301_230628, 0960_SD199_230628, 0960_SD304_230628	28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X) 0960_SD208_230628, 0960_SD207_230628, 0960_SS298_230628, 0960_QC126_230628, 0960_SD305_230628,	0960_SD205_230628, 0960_QC124_230628, 0960_SD301_230628, 0960_SD199_230628, 0960_SD304_230628	28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X) 0960_SD208_230628, 0960_SD207_230628, 0960_SS298_230628, 0960_QC126_230628, 0960_SD305_230628,	0960_SD205_230628, 0960_QC124_230628, 0960_SD301_230628, 0960_SD199_230628, 0960_SD304_230628	28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification .

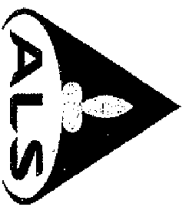
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	10	20.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
QuEChERS Extraction of Solids	* ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.



Environmental Division
Perth

Work Order Reference
EP2308707



Telephone - 61-8-9406 1301

Custody Document for Submissions via ALS Compass App

Project: WA - D960 - PPKSDMD-23 Client: Stantec

Project Manager
Phone:

ALS Compass COC Reference: 540944 540601 # Samples:

54080; 54064; 54065; 54063; 54068; 54072; 54062; 54074

Sampler:
Phone:

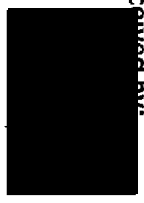
Turnaround Requirements:

Standard

Special Instructions:

--

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
			
Date / Time: <u>28/6/23</u>	Date / Time: <u>30/6</u> <u>11am</u>	Date / Time:	Date / Time:

CHAIN OF CUSTODY

ALS COC#: 54069

ALS Laboratory: EP Perth

CLIENT:

MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP_23

SITE: Learmonth GW - SC

ORDER NO: plas-omp Learmonth

PROJECT MANAGE

PRIMARY SAMPLER

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

CONTACT PH:

QUOTE NO: SYD20230602

SAMPLER MOBILE:

/ ES2022MMHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

SAMPLE DETAILS

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	ANALYSIS REQUIRED	ADDITIONAL INFORMATION
001	0960_MMV141_3.0-3.5	LAB QCs added	28/06/2023 08:20 AM	WATER	ALS: 5 Non ALS: 0	No	WA OMP Water Suite WATER	
002	0960_MMV140_1.5-2.0		28/06/2023 09:11 AM	WATER	ALS: 3 Non ALS: 0	No	X	
003	0960_MMV181_1.5-2.0		28/06/2023 11:53 AM	WATER	ALS: 3 Non ALS: 0	No	X	
004	0960_MMV180_3.5-4.0		28/06/2023 12:43 PM	WATER	ALS: 5 Non ALS: 0	No	X	
005	0960_MMV147_3.0-3.5		28/06/2023 12:56 PM	WATER	ALS: 3 Non ALS: 0	No	X	
006	0960_MMV139		28/06/2023 01:38 PM	WATER	ALS: 3 Non ALS: 0	No	X	
007	0960_MMV145_3.3-3.5		28/06/2023 01:52 PM	WATER	ALS: 3 Non ALS: 0	No	X	
008	0960_MMV179_1.0-1.5		28/06/2023 02:11 PM	WATER	ALS: 3 Non ALS: 0	No	X	
009	0960_QC301		28/06/2023 04:20 PM	WATER	ALS: 2 Non ALS: 0	No	X	



CHAIN OF CUSTODY

COC# 54069

ALS Laboratory, EP Perth

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_FFASOMP_23

SITE: Learmonth GW - SC

ORDER NO: plas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

°C

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MMHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Rinsate WATER	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0960_QC302		28/06/2023 04:21 PM	WATER	ALS: 2 Non ALS: 0	No	X			
011	0960_QC303		28/06/2023 04:22 PM	WATER	ALS: 2 Non ALS: 0	No	X			
012	0960_QC304		28/06/2023 04:24 PM	WATER	ALS: 2 Non ALS: 0	No	X			
013	0960_QC401		28/06/2023 04:23 PM	WATER	ALS: 2 Non ALS: 0	No	X			
014	0960_QC402		28/06/2023 04:25 PM	WATER	ALS: 2 Non ALS: 0	No	X			
015	0960_QC403		28/06/2023 04:26 PM	WATER	ALS: 2 Non ALS: 0	No	X			
016	0960_QC404		28/06/2023 04:26 PM	WATER	ALS: 2 Non ALS: 0	No	X			

CHAIN OF CUSTODY
ALS
COC#: 54069
ALS / 260

ALS Laboratory: EP Parth

CLIENT: MICHAEL STANLEY

PROJECT: WA 0960 PEASOMB 22

SITE: 1 Eastmont, Ave

ORDER NO: pfas-omp Learnmore!

PROJECT MANAGER

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

CONTACT PR

QUOTE NO. SYSS0149 E

LSZ02ZMWWFAUS0003

LABORATORY USE ONLY (Circle)		
Custody Seal Intact?	Yes	No
Free ice / frozen ice bricks present upon receipt?	Yes	No
Random Sample Temperature on Receipt:	N/A	
Other comments:	°C	

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY

1

DATE TIME

DATE:

TURNAROUND REQUIREMENTS: 5 Days

LABORATORY USE ONLY (Circle)

Custody Seal intact

Free ice / frozen lbs. 11-

Ice bricks present upon receipt:

Random Sample Temperature on Receipt

Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_MW141_3.0-3.5						
001	0960_MW141_3.0-3.5	HDPE (no PTFE)	20 mL	00350522042963	Grey	No	
001	0960_MW141_3.0-3.5	HDPE (no PTFE)	20 mL	00350522042953	Grey	No	
001	0960_MW141_3.0-3.5	Clear Plastic Bottle - Natural	20 mL	00352005019564	Grey	No	
002	0960_MW140_1.5-2.0	HDPE (no PTFE)	125 mL	00070522144968	Green	No	
002	0960_MW140_1.5-2.0	HDPE (no PTFE)	20 mL	00352005019770	Grey	No	
002	0960_MW140_1.5-2.0	HDPE (no PTFE)	20 mL	00350522042759	Grey	No	
003	0960_MW181_1.5-2.0	Clear Plastic Bottle - Natural	20 mL	00350522042745	Grey	No	
003	0960_MW181_1.5-2.0	Clear Plastic Bottle - Natural	125 mL	00070522145060	Green	No	
003	0960_MW181_1.5-2.0	HDPE (no PTFE)	125 mL	00070522145011	Green	No	
004	0960_MW180_3.5-4.0	HDPE (no PTFE)	20 mL	00350821001968	Grey	No	
004	0960_MW180_3.5-4.0	Clear Plastic Bottle - Natural	20 mL	00350821001689	Grey	No	
004	0960_MW180_3.5-4.0	HDPE (no PTFE)	125 mL	00070522145145	Green	No	
004	0960_MW180_3.5-4.0	HDPE (no PTFE)	20 mL	00352005019458	Grey	No	
005	0960_MW147_3.0-3.5	HDPE (no PTFE)	20 mL	00350821001767	Grey	No	
005	0960_MW147_3.0-3.5	Clear Plastic Bottle - Natural	20 mL	00350821001765	Grey	No	
005	0960_MW147_3.0-3.5	HDPE (no PTFE)	125 mL	00071121129611	Green	No	
006	0960_MW139	HDPE (no PTFE)	20 mL	00350822082033	Grey	No	
006	0960_MW139	Clear Plastic Bottle - Natural	20 mL	00350822082159	Grey	No	
006	0960_MW139	HDPE (no PTFE)	125 mL	00070522145194	Green	No	
007	0960_MW145_3.3-5	HDPE (no PTFE)	20 mL	00350821001746	Grey	No	
007	0960_MW145_3.3-5	Clear Plastic Bottle - Natural	20 mL	00350821001822	Grey	No	
008	0960_MW179_1.0-1.5	HDPE (no PTFE)	20 mL	00350821001883	Grey	No	
		Clear Plastic Bottle - Natural	125 mL	00070522145197	Green	No	

Wednesday, June 28, 2023

9:36:09 PM

Clear Plastic Bottle - Natural

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP_23

SITE: Learmonth GW - SC

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

Yes No N/A

°C

CONTACT PH: [REDACTED]
QUOTE NO: SY139/19 B

SAMPLER MOBILE: [REDACTED]

/ ES2022MWHAUS0002

		HDPE (no PTFE)	20 mL	00350286142079	Grey	No	
008	0960_MW179_1.0-1.5	HDPE (no PTFE)	20 mL	00350622043019	Grey	No	
009	0960_QC301	HDPE (no PTFE)	20 mL	00350621035803	Grey	No	
010	0960_QC302	HDPE (no PTFE)	20 mL	00350621035834	Grey	No	
011	0960_QC303	HDPE (no PTFE)	20 mL	00350621035841	Grey	No	
012	0960_QC304	HDPE (no PTFE)	20 mL	00350621035870	Grey	No	
013	0960_QC401	HDPE (no PTFE)	20 mL	00350621035998	Grey	No	
014	0960_QC402	HDPE (no PTFE)	20 mL	00350621035902	Grey	No	
015	0960_QC403	HDPE (no PTFE)	20 mL	00350621035876	Grey	No	
016	0960_QC404	HDPE (no PTFE)	20 mL	00350621035936	Grey	No	
017	0960_QC404	HDPE (no PTFE)	20 mL	00350621035993	Grey	No	
018	0960_QC404	HDPE (no PTFE)	20 mL	00350821036714	Grey	No	

Total Bottle Count: ALS: 44, Non ALS: 0



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2308707

Client : STANTEC AUSTRALIA PTY LTD
Contact :
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : Customer Services EP
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail :
Telephone :
Facsimile :

E-mail : ALSEnviro.Perth@alsglobal.com
Telephone :
Facsimile :

Project : WA_0960_PFASOMP_23
Order number : pfas-omp Learmonth
C-O-C number : 54069
Site : Learmonth GW - SC
Sampler :

Page : 1 of 3
Quote number : ES2022MWH AUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 30-Jun-2023 11:00
Client Requested Due : 12-Jul-2023
Date :

Issue Date : 03-Jul-2023
Scheduled Reporting Date : **12-Jul-2023**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 4
Receipt Detail :

Security Seal : Not Available
Temperature : 8.0 - Ice present
No. of samples received / analysed : 16 / 16

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP2308707-001 : 28-Jun-2023 08:20 : 0960_MW141_3.0-3.5_230628
EP2308707-002 : 28-Jun-2023 09:11 : 0960_MW140_1.5-2.0_230628
EP2308707-003 : 28-Jun-2023 11:53 : 0960_MW181_1.5-2.0_230628
EP2308707-004 : 28-Jun-2023 12:43 : 0960_MW180_3.5-4.0_230628
EP2308707-005 : 28-Jun-2023 12:55 : 0960_MW147_3.0-3.5_230628
EP2308707-007 : 28-Jun-2023 13:52 : 0960_MW145_3-3.5_230628
EP2308707-008 : 28-Jun-2023 14:11 : 0960_MW179_1.0-1.5_230628

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO ₄ , Alkalinity
EP2308707-001	28-Jun-2023 08:20	0960_MW141_3.0-3.5_2...	✓	✓
EP2308707-002	28-Jun-2023 09:11	0960_MW140_1.5-2.0_2...	✓	✓
EP2308707-003	28-Jun-2023 11:53	0960_MW181_1.5-2.0_2...	✓	✓
EP2308707-004	28-Jun-2023 12:43	0960_MW180_3.5-4.0_2...	✓	✓
EP2308707-005	28-Jun-2023 12:55	0960_MW147_3.0-3.5_2...	✓	✓
EP2308707-006	28-Jun-2023 13:38	0960_MW139_230628	✓	✓
EP2308707-007	28-Jun-2023 13:52	0960_MW145_3-3.5_230...	✓	✓
EP2308707-008	28-Jun-2023 14:11	0960_MW179_1.0-1.5_2...	✓	✓
EP2308707-009	28-Jun-2023 16:20	0960_QC301_230628	✓	
EP2308707-010	28-Jun-2023 16:21	0960_QC302_230628	✓	
EP2308707-011	28-Jun-2023 16:22	0960_QC303_230628	✓	
EP2308707-012	28-Jun-2023 16:24	0960_QC304_230628	✓	
EP2308707-013	28-Jun-2023 16:23	0960_QC401_230628	✓	
EP2308707-014	28-Jun-2023 16:25	0960_QC402_230628	✓	
EP2308707-015	28-Jun-2023 16:26	0960_QC403_230628	✓	
EP2308707-016	28-Jun-2023 16:26	0960_QC404_230628	✓	

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.



Requested Deliverables

[REDACTED]

- A4 - AU Tax Invoice (INV)

Email

[REDACTED]cardno.com.au

DERP LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

Email

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Email

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Email

Email

Email

[REDACTED]

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

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CERTIFICATE OF ANALYSIS

Work Order	: EP2308707	Page	: 1 of 13
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023 11:00
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 54069	Issue Date	: 13-Jul-2023 10:38
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth GW - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 16		
No. of samples analysed	: 16		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW141_3.0-3.5 _230628	0960_MW140_1.5-2.0 _230628	0960_MW181_1.5-2.0 _230628	0960_MW180_3.5-4.0 _230628	0960_MW147_3.0-3.5 _230628
Sampling date / time				28-Jun-2023 08:20	28-Jun-2023 09:11	28-Jun-2023 11:53	28-Jun-2023 12:43	28-Jun-2023 12:55
Compound	CAS Number	LOR	Unit	EP2308707-001	EP2308707-002	EP2308707-003	EP2308707-004	EP2308707-005
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	308	149	241	214	129
Total Alkalinity as CaCO3	----	1	mg/L	308	149	241	214	129
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1760	5180	5620	4420	5280
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	12200	35500	38600	30400	34400
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	427	829	1010	815	1030
Magnesium	7439-95-4	1	mg/L	974	2990	3180	2580	2860
Sodium	7440-23-5	1	mg/L	6860	23400	24600	19800	22200
Potassium	7440-09-7	1	mg/L	363	1100	1130	1170	1080
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	387	1110	1210	954	1080
∅ Total Cations	----	0.01	meq/L	409	1330	1410	1140	1280
∅ Ionic Balance	----	0.01	%	2.79	9.04	7.64	9.07	8.34
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0960_MW141_3.0-3.5 _230628	0960_MW140_1.5-2.0 _230628	0960_MW181_1.5-2.0 _230628	0960_MW180_3.5-4.0 _230628	0960_MW147_3.0-3.5 _230628
Sampling date / time				28-Jun-2023 08:20	28-Jun-2023 09:11	28-Jun-2023 11:53	28-Jun-2023 12:43	28-Jun-2023 12:55	
Compound	CAS Number	LOR	Unit	EP2308707-001	EP2308707-002	EP2308707-003	EP2308707-004	EP2308707-005	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW141_3.0-3.5 _230628	0960_MW140_1.5-2.0 _230628	0960_MW181_1.5-2.0 _230628	0960_MW180_3.5-4.0 _230628	0960_MW147_3.0-3.5 _230628
Sampling date / time				28-Jun-2023 08:20	28-Jun-2023 09:11	28-Jun-2023 11:53	28-Jun-2023 12:43	28-Jun-2023 12:55
Compound	CAS Number	LOR	Unit	EP2308707-001	EP2308707-002	EP2308707-003	EP2308707-004	EP2308707-005
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	101	87.9	100	101	107
13C8-PFOA	----	0.02	%	95.5	110	101	95.7	106



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW139_230628	0960_MW145_3-3.5_2 30628	0960_MW179_1.0-1.5 _230628	----	----
Sampling date / time				28-Jun-2023 13:38	28-Jun-2023 13:52	28-Jun-2023 14:11	----	----
Compound	CAS Number	LOR	Unit	EP2308707-006	EP2308707-007	EP2308707-008	-----	-----
Result				Result	Result	Result	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	207	126	213	----	----
Total Alkalinity as CaCO3	----	1	mg/L	207	126	213	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3600	5030	3810	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	21100	33900	27600	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	788	1040	655	----	----
Magnesium	7439-95-4	1	mg/L	1860	2810	2390	----	----
Sodium	7440-23-5	1	mg/L	13100	21900	17900	----	----
Potassium	7440-09-7	1	mg/L	716	1050	972	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	674	1060	862	----	----
∅ Total Cations	----	0.01	meq/L	780	1260	1030	----	----
∅ Ionic Balance	----	0.01	%	7.30	8.56	9.01	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW139_230628	0960_MW145_3-3.5_2 30628	0960_MW179_1.0-1.5 _230628	----	----
Sampling date / time				28-Jun-2023 13:38	28-Jun-2023 13:52	28-Jun-2023 14:11	----	----
Compound	CAS Number	LOR	Unit	EP2308707-006	EP2308707-007	EP2308707-008	-----	-----
				Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW139_230628	0960_MW145_3-3.5_2 30628	0960_MW179_1.0-1.5 _230628	----	----
Sampling date / time				28-Jun-2023 13:38	28-Jun-2023 13:52	28-Jun-2023 14:11	----	----
Compound	CAS Number	LOR	Unit	EP2308707-006	EP2308707-007	EP2308707-008	-----	-----
				Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23- 1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	87.0	97.7	97.5	----	----
13C8-PFOA	----	0.02	%	101	100	101	----	----



Analytical Results

Sub-Matrix: RINSATE
 (Matrix: WATER)

Sample ID

				0960_QC301_230628	0960_QC302_230628	0960_QC303_230628	0960_QC304_230628	0960_QC401_230628
Sampling date / time				28-Jun-2023 16:20	28-Jun-2023 16:21	28-Jun-2023 16:22	28-Jun-2023 16:24	28-Jun-2023 16:23
Compound	CAS Number	LOR	Unit	EP2308707-009	EP2308707-010	EP2308707-011	EP2308707-012	EP2308707-013
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: RINSATE
 (Matrix: WATER)

Sample ID

				0960_QC301_230628	0960_QC302_230628	0960_QC303_230628	0960_QC304_230628	0960_QC401_230628
Sampling date / time				28-Jun-2023 16:20	28-Jun-2023 16:21	28-Jun-2023 16:22	28-Jun-2023 16:24	28-Jun-2023 16:23
Compound	CAS Number	LOR	Unit	EP2308707-009	EP2308707-010	EP2308707-011	EP2308707-012	EP2308707-013
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	116	105	115	111	114
13C8-PFOA	----	0.02	%	99.4	101	100	95.2	98.9



Analytical Results

Sub-Matrix: RINSATE
 (Matrix: WATER)

Sample ID

				0960_QC402_230628	0960_QC403_230628	0960_QC404_230628	----	----
Sampling date / time				28-Jun-2023 16:25	28-Jun-2023 16:26	28-Jun-2023 16:26	----	----
Compound	CAS Number	LOR	Unit	EP2308707-014	EP2308707-015	EP2308707-016	-----	-----
				Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----



Analytical Results

Sub-Matrix: RINSATE
 (Matrix: WATER)

Sample ID

				0960_QC402_230628	0960_QC403_230628	0960_QC404_230628	----	----
Sampling date / time				28-Jun-2023 16:25	28-Jun-2023 16:26	28-Jun-2023 16:26	----	----
Compound	CAS Number	LOR	Unit	EP2308707-014	EP2308707-015	EP2308707-016	-----	-----
				Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	104	107	108	----	----
13C8-PFOA	----	0.02	%	98.5	99.5	99.0	----	----



Surrogate Control Limits

Sub-Matrix: GROUNDWATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133

Sub-Matrix: RINSATE		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133



QUALITY CONTROL REPORT

Work Order	: EP2308707	Page	: 1 of 16
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 54069	Issue Date	: 13-Jul-2023
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth GW - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 16		
No. of samples analysed	: 16		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 5150908)									
EP2308704-013	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	993	995	0.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	993	995	0.2	0% - 20%
EP2308704-023	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	186	182	2.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	186	182	2.2	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5148899)									
EP2308704-023	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4880	4700	3.8	0% - 20%
EP2308708-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	871	868	0.4	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5148900)									
EP2308704-023	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	32400	32000	1.1	0% - 20%
EP2308708-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	926	919	0.7	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5148266)									
EP2308704-013	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	3	3	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	563	552	1.9	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	23	22	0.0	0% - 20%
EP2308704-023	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	958	977	2.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	2720	2770	2.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	20200	20800	2.6	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1190	1220	2.7	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 5148267)									
EP2308707-007	0960_MW145_3-3.5_230628	ED093F: Calcium	7440-70-2	1	mg/L	1040	1070	2.4	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	2810	2860	2.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	21900	22400	2.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1050	1060	1.1	0% - 20%
EP2308708-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	68	67	2.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	126	127	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2200	2220	1.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	121	123	1.4	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164532)									
EP2308704-014	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.72	0.73	1.7	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.88	0.86	1.6	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.05	0.05	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	0.04	0.04	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2308704-017	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164541)									
EP2308704-012	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2308708-005	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	27.7	28.6	3.0	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	21.9	21.4	2.6	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	6.61	7.18	8.2	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	5.62	6.05	7.3	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	2.55	2.68	5.2	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164556)									
EP2308707-004	0960_MW180_3.5-4.0_230628	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164556) - continued									
EP2308707-004	0960_MW180_3.5-4.0_230 628	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164532)									
EP2308704-014	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.17	0.18	0.0	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.09	0.09	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.17	0.17	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.11	0.10	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2308704-017	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164541)									
EP2308704-012	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2308708-005	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	1.47	1.44	2.5	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164541) - continued									
EP2308708-005	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	1.87	1.95	4.0	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	8.57	8.93	4.1	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.91	0.91	0.0	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	1.7	1.8	0.0	0% - 50%		
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164556)									
EP2308707-004	0960_MW180_3.5-4.0_230 628	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit		
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164532)									
EP2308704-014	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2308704-017	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164532) - continued									
EP2308704-017	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164541)									
EP2308704-012	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308708-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164556)									
EP2308707-004	0960_MW180_3.5-4.0_230 628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164556) - continued									
EP2308707-004	0960_MW180_3.5-4.0_230 628	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164532)									
EP2308704-014	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308704-017	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164541)									
EP2308704-012	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308708-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164541) - continued									
EP2308708-005	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164556)									
EP2308707-004	0960_MW180_3.5-4.0_230 628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5164532)									
EP2308704-014	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	2.28	2.27	0.4	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	1.60	1.59	0.6	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	2.17	2.16	0.5	0% - 20%
EP2308704-017	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5164541)									
EP2308704-012	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2308708-005	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	78.9	80.9	2.6	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	49.6	50.0	0.8	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	70.7	72.2	2.1	0% - 20%
EP231P: PFAS Sums (QC Lot: 5164556)									
EP2308707-004	0960_MW180_3.5-4.0_230 628	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED037P: Alkalinity by PC Titrator (QCLot: 5150908)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	109	87.8	118
				<1	200 mg/L	104	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148899)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.0	89.9	112
				<1	500 mg/L	94.6	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 5148900)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	95.7	88.6	113
				<1	1000 mg/L	100	88.6	113
ED093F: Dissolved Major Cations (QCLot: 5148266)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.2	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.2	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.2	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.6	84.6	108
ED093F: Dissolved Major Cations (QCLot: 5148267)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.4	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.0	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.4	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164532)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	95.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	107	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	98.4	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	101	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	93.3	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	108	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164541)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	96.5	72.0	130



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164541) - continued								
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	103	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	98.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	101	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	97.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	94.8	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164556)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	94.7	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	100	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	99.9	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	103	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	94.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	99.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164532)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	102	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	97.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	89.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	90.6	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	101	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	95.0	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	103	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	91.2	72.0	134
EP231X: Perfluorotridecanoic acid (PFTriDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	90.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	84.8	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164541)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	99.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	96.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	92.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	101	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	91.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	111	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	134



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164541) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	97.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	100	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164556)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	103	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	89.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	92.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	102	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	92.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	108	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	127	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	99.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	82.6	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164532)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	106	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	122	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	127	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	93.9	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	108	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	97.8	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	98.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164541)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	97.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	94.7	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	116	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	97.7	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	104	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	105	65.0	136



Sub-Matrix: **WATER**

Method Blank (MB) Report				Laboratory Control Spike (LCS) Report				
				Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
					LCS		Low	High
Method: Compound	CAS Number	LOR	Unit	Result				
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164541) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	104	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164556)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	110	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	119	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	116	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	95.0	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	109	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	96.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	85.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164532)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	100	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	96.1	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	83.5	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	107	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164541)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	105	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	115	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	96.7	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164556)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	99.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	97.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	78.3	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	110	64.2	133
EP231P: PFAS Sums (QCLot: 5164532)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5164541)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231P: PFAS Sums (QCLot: 5164541) - continued								
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5164556)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148899)							
EP2308704-023	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 5148900)							
EP2308704-023	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164532)							
EP2308704-015	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	82.5	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	89.8	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	# Not Determined	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	89.3	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	75.5	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	97.3	53.0	129
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164541)							
EP2308704-013	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	102	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	101	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	104	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	112	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	126	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	106	53.0	129



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164556)							
EP2308708-007	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	100	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	105	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	98.8	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	110	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	96.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	91.1	53.0	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164532)							
EP2308704-015	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	94.9	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	90.6	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	84.2	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	87.4	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	92.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	97.0	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	95.0	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	111	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	97.4	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	99.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	88.6	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164541)							
EP2308704-013	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	104	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	91.8	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	92.7	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	94.9	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	114	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	109	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	93.2	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	111	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	106	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	102	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	96.6	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164556)							
EP2308708-007	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	115	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	102	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	89.8	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	92.2	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	94.1	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	99.4	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	97.4	71.0	134



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164556) - continued							
EP2308708-007	Anonymous	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	97.8	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	95.7	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	80.6	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	105	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164532)							
EP2308704-015	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	106	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	107	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	104	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	93.7	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	96.2	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	102	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	106	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164541)							
EP2308704-013	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	105	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	99.0	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	111	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	94.9	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	110	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	102	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	97.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164556)							
EP2308708-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	101	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	109	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	81.1	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	115	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	99.0	70.0	130

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 Work Order : EP2308707
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP_23



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164556) - continued							
EP2308708-007	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	120	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	104	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164532)							
EP2308704-015	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	95.6	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	91.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	97.9	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	101	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164541)							
EP2308704-013	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	103	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	103	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	120	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	110	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164556)							
EP2308708-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	115	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	111	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	100	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	126	70.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2308707	Page	: 1 of 7
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Site	: Learmonth GW - SC	Issue Date	: 13-Jul-2023
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 16
Order number	: pfas-omp Learmonth	No. of samples analysed	: 16

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2308704--023	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EP2308704--023	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231A: Perfluoroalkyl Sulfonic Acids	EP2308704--015	Anonymous	Perfluorohexane sulfonic acid (PFHxS)	355-46-4	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural 0960_MW145_3-3.5_230628,		0960_MW179_1.0-1.5_230628	----	----	06-Jul-2023	05-Jul-2023	1
Clear Plastic Bottle - Natural 0960_MW141_3.0-3.5_230628, 0960_MW181_1.5-2.0_230628, 0960_MW147_3.0-3.5_230628,		0960_MW140_1.5-2.0_230628, 0960_MW180_3.5-4.0_230628, 0960_MW139_230628	----	----	07-Jul-2023	05-Jul-2023	2

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) 0960_MW141_3.0-3.5_230628, 0960_MW181_1.5-2.0_230628, 0960_MW147_3.0-3.5_230628, 0960_MW145_3-3.5_230628,	0960_MW140_1.5-2.0_230628, 0960_MW180_3.5-4.0_230628, 0960_MW139_230628, 0960_MW179_1.0-1.5_230628	28-Jun-2023	----	----	----	06-Jul-2023	12-Jul-2023 ✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) 0960_MW141_3.0-3.5_230628, 0960_MW181_1.5-2.0_230628, 0960_MW147_3.0-3.5_230628, 0960_MW145_3-3.5_230628,	0960_MW140_1.5-2.0_230628, 0960_MW180_3.5-4.0_230628, 0960_MW139_230628, 0960_MW179_1.0-1.5_230628	28-Jun-2023	----	----	----	12-Jul-2023	26-Jul-2023 ✔
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) 0960_MW141_3.0-3.5_230628, 0960_MW181_1.5-2.0_230628, 0960_MW147_3.0-3.5_230628, 0960_MW145_3-3.5_230628,	0960_MW140_1.5-2.0_230628, 0960_MW180_3.5-4.0_230628, 0960_MW139_230628, 0960_MW179_1.0-1.5_230628	28-Jun-2023	----	----	----	12-Jul-2023	26-Jul-2023 ✔
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F) 0960_MW145_3-3.5_230628,	0960_MW179_1.0-1.5_230628	28-Jun-2023	----	----	----	06-Jul-2023	05-Jul-2023 ✖
Clear Plastic Bottle - Natural (ED093F) 0960_MW141_3.0-3.5_230628, 0960_MW181_1.5-2.0_230628, 0960_MW147_3.0-3.5_230628,	0960_MW140_1.5-2.0_230628, 0960_MW180_3.5-4.0_230628, 0960_MW139_230628	28-Jun-2023	----	----	----	07-Jul-2023	05-Jul-2023 ✖
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0960_MW181_1.5-2.0_230628, 0960_MW147_3.0-3.5_230628, 0960_MW145_3-3.5_230628,	0960_MW180_3.5-4.0_230628, 0960_MW139_230628, 0960_MW179_1.0-1.5_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	11-Jul-2023	25-Dec-2023 ✔
HDPE (no PTFE) (EP231X) 0960_MW141_3.0-3.5_230628, 0960_QC301_230628, 0960_QC303_230628, 0960_QC401_230628, 0960_QC403_230628,	0960_MW140_1.5-2.0_230628, 0960_QC302_230628, 0960_QC304_230628, 0960_QC402_230628, 0960_QC404_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023 ✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) 0960_MW181_1.5-2.0_230628, 0960_MW147_3.0-3.5_230628, 0960_MW145_3-3.5_230628,	0960_MW180_3.5-4.0_230628, 0960_MW139_230628, 0960_MW179_1.0-1.5_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	11-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_MW141_3.0-3.5_230628, 0960_QC301_230628, 0960_QC303_230628, 0960_QC401_230628, 0960_QC403_230628,	0960_MW140_1.5-2.0_230628, 0960_QC302_230628, 0960_QC304_230628, 0960_QC402_230628, 0960_QC404_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) 0960_MW181_1.5-2.0_230628, 0960_MW147_3.0-3.5_230628, 0960_MW145_3-3.5_230628,	0960_MW180_3.5-4.0_230628, 0960_MW139_230628, 0960_MW179_1.0-1.5_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	11-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_MW141_3.0-3.5_230628, 0960_QC301_230628, 0960_QC303_230628, 0960_QC401_230628, 0960_QC403_230628,	0960_MW140_1.5-2.0_230628, 0960_QC302_230628, 0960_QC304_230628, 0960_QC402_230628, 0960_QC404_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_MW181_1.5-2.0_230628, 0960_MW147_3.0-3.5_230628, 0960_MW145_3-3.5_230628,	0960_MW180_3.5-4.0_230628, 0960_MW139_230628, 0960_MW179_1.0-1.5_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	11-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_MW141_3.0-3.5_230628, 0960_QC301_230628, 0960_QC303_230628, 0960_QC401_230628, 0960_QC403_230628,	0960_MW140_1.5-2.0_230628, 0960_QC302_230628, 0960_QC304_230628, 0960_QC402_230628, 0960_QC404_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔



Matrix: WATER

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0960_MW181_1.5-2.0_230628, 0960_MW147_3.0-3.5_230628, 0960_MW145_3-3.5_230628,	0960_MW180_3.5-4.0_230628, 0960_MW139_230628, 0960_MW179_1.0-1.5_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	11-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_MW141_3.0-3.5_230628, 0960_QC301_230628, 0960_QC303_230628, 0960_QC401_230628, 0960_QC403_230628,	0960_MW140_1.5-2.0_230628, 0960_QC302_230628, 0960_QC304_230628, 0960_QC402_230628, 0960_QC404_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

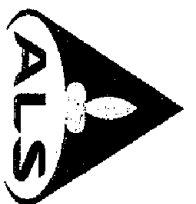
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	37	10.81	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	5	43	11.63	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	43	6.98	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	37	5.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	43	6.98	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	43	6.98	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	* ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



Telephone -- 61-8-9466 1301

Stantec

Phone:

Sampler:

Phone:

Standard

Special instructions:

Received by:

Date / Time:

30/6

119m

alsglobal.com/als-compass

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP_23

SITE: Learmonth GW - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

CONTACT PH:

QUOTE NO: SY139/19 B

SAMPLER MOBILE:

/ ES2022MMWHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Rinse WATER	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_MMW151		28/06/2023 08:54 AM	WATER	ALS: 3 Non ALS: 0	No		X		
002	0960_MMW238		28/06/2023 09:10 AM	WATER	ALS: 3 Non ALS: 0	No		X		
003	0960_QC116		28/06/2023 09:11 AM	WATER	ALS: 2 Non ALS: 0	No	X			
004	0960_MMW148D		28/06/2023 09:32 AM	WATER	ALS: 3 Non ALS: 0	No		X		
005	0960_MMW148S		28/06/2023 09:36 AM	WATER	ALS: 5 Non ALS: 0	No		X		Extra PFAS bottles for lab QC
006	0960_MMW104		28/06/2023 10:01 AM	WATER	ALS: 3 Non ALS: 0	No		X		
007	0960_MMW124		28/06/2023 10:29 AM	WATER	ALS: 5 Non ALS: 0	No		X		Extra PFAS bottles for lab QC
008	0960_MMW105		28/06/2023 11:13 AM	WATER	ALS: 3 Non ALS: 0	No		X		
009	0960_QC125		28/06/2023 11:13 AM	WATER	ALS: 2 Non ALS: 0	No	X			

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP_23

SITE: Leamonth GW - MB

ORDER NO: pfas-omp Leamonth

PROJECT MANAGER: [REDACTED]

PRIMARY SAMPLER: [REDACTED]

EMAIL REPORTS TO: [REDACTED]

EMAIL INVOICES TO: [REDACTED]

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

RELINQUISHED BY:

DATE TIME:

RECEIVED BY:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard Info:

CONTACT PH: [REDACTED]

QUOTE NO: SY/139/19 B

SAMPLER MOBILE: [REDACTED] / ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free Ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comments:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Rinsate WATER	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0960_MMV168		28/06/2023 12:04 PM	WATER	ALS: 3 Non ALS: 0	No		X		
011	0960_MMV112		28/06/2023 12:27 PM	WATER	ALS: 3 Non ALS: 0	No		X		
012	0960_MMV137_2.5-3.0		28/06/2023 01:51 PM	WATER	ALS: 3 Non ALS: 0	No		X		

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PASOMP_23

SITE: Leamonth GW - MB

ORDER NO: pfas-omp Leamonth

PROJECT MANAGER

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
C

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

SAMPLE

BOTTLE NAME

VOLUME

BARCODE

TYPE

FILTERED

REASON

001 0960_MW/151 HDPE (no PTFE)

20 mL

00350822000394

Grey

No

001 0960_MW/151 HDPE (no PTFE)

20 mL

00350822000447

Grey

No

001 0960_MW/151 Clear Plastic Bottle - Natural

125 mL

00071121129748

Green

No

002 0960_MW/238 HDPE (no PTFE)

20 mL

00350822000562

Grey

No

002 0960_MW/238 HDPE (no PTFE)

20 mL

00350822000321

Grey

No

003 0960_QC/116 Clear Plastic Bottle - Natural

125 mL

00071121129731

Green

No

003 0960_QC/116 HDPE (no PTFE)

20 mL

00350522042837

Grey

No

004 0960_MW/148D HDPE (no PTFE)

20 mL

00350522062475

Grey

No

004 0960_MW/148D Clear Plastic Bottle - Natural

125 mL

00350822000385

Grey

No

004 0960_MW/148D HDPE (no PTFE)

20 mL

00071121129667

Green

No

005 0960_MW/148S HDPE (no PTFE)

20 mL

00350822000608

Grey

No

005 0960_MW/148S HDPE (no PTFE)

20 mL

00352101058351

Grey

No

005 0960_MW/148S HDPE (no PTFE)

20 mL

00350019177519

Grey

No

005 0960_MW/148S HDPE (no PTFE)

20 mL

00350822000363

Grey

No

005 0960_MW/148S Clear Plastic Bottle - Natural

125 mL

00350822000357

Grey

No

006 0960_MW/104 HDPE (no PTFE)

20 mL

00071121129642

Green

No

006 0960_MW/104 Clear Plastic Bottle - Natural

20 mL

00350822000516

Grey

No

006 0960_MW/104 HDPE (no PTFE)

20 mL

00350822000609

Grey

No

007 0960_MW/124 HDPE (no PTFE)

125 mL

00071121129644

Green

No

007 0960_MW/124 HDPE (no PTFE)

20 mL

00350621041384

Grey

No

007 0960_MW/124 HDPE (no PTFE)

20 mL

00350621067241

Grey

No

007 0960_MW/124 HDPE (no PTFE)

20 mL

00350822000361

Grey

No

007 0960_MW/124 HDPE (no PTFE)

20 mL

00350822000535

Grey

No

008 0960_MW/105 Clear Plastic Bottle - Natural

125 mL

00071121129707

Green

No

008 0960_MW/105 HDPE (no PTFE)

20 mL

00350822000371

Grey

No

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PFSOMP_23

SITE: Learmonth GW - MB
ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:
PRIMARY SAMPLER:

EMAIL REPORTS TO:
EMAIL INVOICES TO:

CONTACT PH:
QUOTE NO: SY13919 B

SAMPLER MOBILE:
/ ES2022MWHAUS0002

LABORATORY USE ONLY (Circle)
Custody Seal Intact?
Free ice / frozen ice bricks present upon receipt?
Random Sample Temperature on Receipt:
Other comments:

Yes No N/A
Yes No N/A
C

ALS CHAIN OF CUSTODY		COC#: 54072		ALS Laboratory: EP Perth			
CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD		PROJECT: WA_0960_PFA50MP_23		SITE: Learmonth GW - MB			
ORDER NO: pfas-omp Learmonth		PROJECT MANAGER: [REDACTED]		PRIMARY SAMPLER: [REDACTED]			
EMAIL REPORTS TO: [REDACTED]		CONTACT PH: [REDACTED]		QUOTE NO: SY139/19 B			
EMAIL INVOICES TO: [REDACTED]		SAMPLER MOBILE: [REDACTED]		/ ES2022MMHAUS0002			
RELINQUISHED BY:		RECEIVED BY:		RELINQUISHED BY:			
DATE TIME:		DATE TIME:		DATE TIME:			
TURNAROUND REQUIREMENTS: 5 Days		LABORATORY USE ONLY (Circle)		Yes No N/A			
Biohazard info:		Custody Seal Intact?		Yes No N/A			
		Free ice / frozen ice bricks present upon receipt?		Yes No N/A			
		Random Sample Temperature on Receipt:		C			
		Other comments:					
008	0960_MMW105	Clear Plastic Bottle - Natural	125 mL	00071121129907	Green	No	
009	0960_QC125	HDPE (no PTFE)	20 mL	00352005020446	Grey	No	
009	0960_QC125	HDPE (no PTFE)	20 mL	00352005020613	Grey	No	
010	0960_MMW168	HDPE (no PTFE)	20 mL	00350822000372	Grey	No	
010	0960_MMW168	HDPE (no PTFE)	20 mL	00350822000594	Grey	No	
011	0960_MMW112	Clear Plastic Bottle - Natural	125 mL	00071121129732	Green	No	
011	0960_MMW112	HDPE (no PTFE)	20 mL	00350822000337	Grey	No	
011	0960_MMW112	Clear Plastic Bottle - Natural	125 mL	00071121129739	Green	No	
012	0960_MMW137_2.5-3.0	HDPE (no PTFE)	20 mL	00350822000399	Grey	No	
012	0960_MMW137_2.5-3.0	HDPE (no PTFE)	20 mL	00350822000354	Grey	No	
012	0960_MMW137_2.5-3.0	Clear Plastic Bottle - Natural	125 mL	00071121129727	Green	No	
Total Bottle Count: ALS: 38, Non ALS: 0							

Total Bottle Count: ALS: 38, Non ALS: 0



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2308708

Client : STANTEC AUSTRALIA PTY LTD
Contact :
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : Customer Services EP
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail :
Telephone :
Facsimile :

E-mail : ALSEnviro.Perth@alsglobal.com
Telephone :
Facsimile :

Project : WA_0960_PFASOMP_23
Order number : pfas-omp Learmonth
C-O-C number : 54072
Site : Learmonth GW - MB
Sampler :

Page : 1 of 3
Quote number : ES2022MWHAUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 30-Jun-2023 11:00
Client Requested Due : 12-Jul-2023
Date :

Issue Date : 03-Jul-2023
Scheduled Reporting Date : **12-Jul-2023**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 4
Receipt Detail :

Security Seal : Not Available
Temperature : 8.0 - Ice present
No. of samples received / analysed : 13 / 13

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Any sample identifications that cannot be displayed entirely in the analysis summary table will be listed below.

EP2308708-012 : 28-Jun-2023 13:51 : 0960_MW137_2.5-3.0_230628

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: WATER

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EP2308708-001	28-Jun-2023 08:54	0960_MW151_230628	✓	✓
EP2308708-002	28-Jun-2023 09:10	0960_MW238_230628	✓	✓
EP2308708-003	28-Jun-2023 09:11	0960_QC116_230628	✓	
EP2308708-004	28-Jun-2023 09:32	0960_MW148D_230628	✓	✓
EP2308708-005	28-Jun-2023 09:36	0960_MW148S_230628	✓	✓
EP2308708-006	28-Jun-2023 10:01	0960_MW104_230628	✓	✓
EP2308708-007	28-Jun-2023 10:29	0960_MW124_230628	✓	✓
EP2308708-008	28-Jun-2023 11:13	0960_MW105_230628	✓	✓
EP2308708-009	28-Jun-2023 11:13	0960_QC125_230628	✓	
EP2308708-010	28-Jun-2023 12:04	0960_MW168_230628	✓	✓
EP2308708-011	28-Jun-2023 12:27	0960_MW112_230628	✓	✓
EP2308708-012	28-Jun-2023 13:51	0960_MW137_2.5-3.0_2...	✓	✓
EP2308708-013	28-Jun-2023 13:51	0960_MW021_230628	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

██████████	- A4 - AU Tax Invoice (INV)	Email	██████████cardno.com.au
DERP LAB REPORTS			
██████████	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
	- EDI Format - ESDAT (ESDAT)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████
	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
██████████	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
	- EDI Format - ESDAT (ESDAT)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████
		Email	██████████

Issue Date : 03-Jul-2023
Page : 3 of 3
Work Order : EP2308708 Amendment 0
Client : STANTEC AUSTRALIA PTY LTD





CERTIFICATE OF ANALYSIS

Work Order	: EP2308708	Page	: 1 of 12
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023 11:00
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 54072	Issue Date	: 13-Jul-2023 14:53
Sampler	: [REDACTED]		
Site	: Learmonth GW - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 13		
No. of samples analysed	: 13		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW151_230628	0960_MW238_230628	0960_QC116_230628	0960_MW148D_230628	0960_MW148S_230628
Sampling date / time				28-Jun-2023 08:54	28-Jun-2023 09:10	28-Jun-2023 09:11	28-Jun-2023 09:32	28-Jun-2023 09:36
Compound	CAS Number	LOR	Unit	EP2308708-001	EP2308708-002	EP2308708-003	EP2308708-004	EP2308708-005
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	20	----	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1060	767	----	166	462
Total Alkalinity as CaCO3	----	1	mg/L	1060	787	----	166	462
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	507	871	----	3450	1720
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	3560	926	----	26800	12700
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	71	12	----	887	527
Magnesium	7439-95-4	1	mg/L	187	28	----	1840	937
Sodium	7440-23-5	1	mg/L	2400	1210	----	17800	7870
Potassium	7440-09-7	1	mg/L	115	68	----	764	328
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	132	60.0	----	831	403
∅ Total Cations	----	0.01	meq/L	126	57.3	----	989	454
∅ Ionic Balance	----	0.01	%	2.28	2.31	----	8.70	5.93
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	3.12	1.31	1.17	1.03	6.61
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	3.82	1.24	1.16	0.81	5.62
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	24.7	9.73	9.95	4.00	27.7
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	5.06	1.08	1.04	0.31	2.55
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	24.8	9.02	8.89	2.04	21.9
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	1.5	0.6	0.6	0.3	1.7
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	1.88	0.96	0.92	0.27	1.87
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	7.39	4.53	4.07	1.21	8.57



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0960_MW151_230628	0960_MW238_230628	0960_QC116_230628	0960_MW148D_230628	0960_MW148S_230628
Sampling date / time					28-Jun-2023 08:54	28-Jun-2023 09:10	28-Jun-2023 09:11	28-Jun-2023 09:32	28-Jun-2023 09:36
Compound	CAS Number	LOR	Unit	EP2308708-001	EP2308708-002	EP2308708-003	EP2308708-004	EP2308708-005	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.70	0.39	0.35	0.14	0.91	
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	2.03	0.66	0.68	0.21	1.47	
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0960_MW151_230628	0960_MW238_230628	0960_QC116_230628	0960_MW148D_23062 8	0960_MW148S_23062 8
Sampling date / time					28-Jun-2023 08:54	28-Jun-2023 09:10	28-Jun-2023 09:11	28-Jun-2023 09:32	28-Jun-2023 09:36
Compound	CAS Number	LOR	Unit	EP2308708-001	EP2308708-002	EP2308708-003	EP2308708-004	EP2308708-005	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L	75.0	29.5	28.8	10.3	78.9	
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	49.5	18.8	18.8	6.04	49.6	
Sum of PFAS (WA DER List)	----	0.01	µg/L	66.1	27.2	26.6	9.20	70.7	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%	90.0	100	104	105	106	
13C8-PFOA	----	0.02	%	107	105	99.4	98.1	101	



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW104_230628	0960_MW124_230628	0960_MW105_230628	0960_QC125_230628	0960_MW168_230628
Sampling date / time				28-Jun-2023 10:01	28-Jun-2023 10:29	28-Jun-2023 11:13	28-Jun-2023 11:13	28-Jun-2023 12:04
Compound	CAS Number	LOR	Unit	EP2308708-006	EP2308708-007	EP2308708-008	EP2308708-009	EP2308708-010
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	----	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	----	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	250	224	438	----	653
Total Alkalinity as CaCO ₃	----	1	mg/L	250	224	438	----	653
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	4010	4270	1580	----	643
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	27000	28200	13500	----	3210
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	790	887	574	----	135
Magnesium	7439-95-4	1	mg/L	2210	2200	1180	----	186
Sodium	7440-23-5	1	mg/L	17900	19100	8440	----	2150
Potassium	7440-09-7	1	mg/L	874	895	418	----	116
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	850	889	422	----	117
∅ Total Cations	----	0.01	meq/L	1020	1080	504	----	118
∅ Ionic Balance	----	0.01	%	9.19	9.66	8.76	----	0.66
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.02	<0.02	0.15	0.14	0.09
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.20	0.19	0.11
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.02	<0.01	0.78	0.88	0.97
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.03	0.03	0.15
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.03	0.03	0.06
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.14	0.13	0.24



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW104_230628	0960_MW124_230628	0960_MW105_230628	0960_QC125_230628	0960_MW168_230628
Sampling date / time				28-Jun-2023 10:01	28-Jun-2023 10:29	28-Jun-2023 11:13	28-Jun-2023 11:13	28-Jun-2023 12:04
Compound	CAS Number	LOR	Unit	EP2308708-006	EP2308708-007	EP2308708-008	EP2308708-009	EP2308708-010
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	0.03
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.01	0.01	0.03
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW104_230628	0960_MW124_230628	0960_MW105_230628	0960_QC125_230628	0960_MW168_230628
Sampling date / time				28-Jun-2023 10:01	28-Jun-2023 10:29	28-Jun-2023 11:13	28-Jun-2023 11:13	28-Jun-2023 12:04
Compound	CAS Number	LOR	Unit	EP2308708-006	EP2308708-007	EP2308708-008	EP2308708-009	EP2308708-010
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	0.04	<0.01	1.34	1.41	1.70
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.02	<0.01	0.81	0.91	1.12
Sum of PFAS (WA DER List)	----	0.01	µg/L	0.04	<0.01	1.14	1.22	1.57
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	104	109	103	86.7	102
13C8-PFOA	----	0.02	%	98.3	101	99.9	100	101



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW112_230628	0960_MW137_2.5-3.0_230628	0960_MW021_230628	----	----
Sampling date / time				28-Jun-2023 12:27	28-Jun-2023 13:51	28-Jun-2023 13:51	----	----
Compound	CAS Number	LOR	Unit	EP2308708-011	EP2308708-012	EP2308708-013	-----	-----
Result				Result	Result	Result	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	36	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	783	259	1100	----	----
Total Alkalinity as CaCO3	----	1	mg/L	783	259	1140	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1120	3680	76	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	2670	26000	250	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	68	634	3	----	----
Magnesium	7439-95-4	1	mg/L	126	2220	5	----	----
Sodium	7440-23-5	1	mg/L	2200	16800	589	----	----
Potassium	7440-09-7	1	mg/L	121	944	19	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	114	815	31.4	----	----
∅ Total Cations	----	0.01	meq/L	112	969	26.7	----	----
∅ Ionic Balance	----	0.01	%	0.76	8.63	8.17	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.03	<0.02	0.10	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.04	<0.02	0.13	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.39	<0.01	0.82	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.57	<0.01	0.61	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.05	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.07	<0.02	0.18	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW112_230628	0960_MW137_2.5-3.0_230628	0960_MW021_230628	----	----
Sampling date / time				28-Jun-2023 12:27	28-Jun-2023 13:51	28-Jun-2023 13:51	----	----
Compound	CAS Number	LOR	Unit	EP2308708-011	EP2308708-012	EP2308708-013	-----	-----
				Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.01	<0.01	0.02	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----



Analytical Results

Sub-Matrix: GROUNDWATER
 (Matrix: WATER)

Sample ID

				0960_MW112_230628	0960_MW137_2.5-3.0_230628	0960_MW021_230628	----	----
Sampling date / time				28-Jun-2023 12:27	28-Jun-2023 13:51	28-Jun-2023 13:51	----	----
Compound	CAS Number	LOR	Unit	EP2308708-011	EP2308708-012	EP2308708-013	-----	-----
Result				Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	1.11	<0.01	1.93	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.96	<0.01	1.43	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	1.07	<0.01	1.80	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	99.4	107	115	----	----
13C8-PFOA	----	0.02	%	102	103	108	----	----



Surrogate Control Limits

Sub-Matrix: GROUNDWATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133



QUALITY CONTROL REPORT

Work Order	: EP2308708	Page	: 1 of 15
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 54072	Issue Date	: 13-Jul-2023
Sampler	: [REDACTED]		
Site	: Learmonth GW - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 13		
No. of samples analysed	: 13		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Inorganics Supervisor	Perth Inorganics, Wangara, WA
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 5151276)									
EP2308708-002	0960_MW238_230628	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	20	19	0.0	0% - 50%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	767	770	0.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	787	789	0.2	0% - 20%
EP2308709-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	185	189	2.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	185	189	2.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5148899)									
EP2308704-023	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4880	4700	3.8	0% - 20%
EP2308708-002	0960_MW238_230628	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	871	868	0.4	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5148900)									
EP2308704-023	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	32400	32000	1.1	0% - 20%
EP2308708-002	0960_MW238_230628	ED045G: Chloride	16887-00-6	1	mg/L	926	919	0.7	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5148267)									
EP2308707-007	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	1040	1070	2.4	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	2810	2860	2.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	21900	22400	2.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1050	1060	1.1	0% - 20%
EP2308708-011	0960_MW112_230628	ED093F: Calcium	7440-70-2	1	mg/L	68	67	2.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	126	127	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2200	2220	1.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	121	123	1.4	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164541)									
EP2308704-012	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP2308708-005	0960_MW148S_230628	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	27.7	28.6	3.0	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	21.9	21.4	2.6	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	6.61	7.18	8.2	0% - 20%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	5.62	6.05	7.3	0% - 20%
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	2.55	2.68	5.2	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164556)									
EP2308707-004	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164541)									
EP2308704-012	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP2308708-005	0960_MW148S_230628	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	1.47	1.44	2.5	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	1.87	1.95	4.0	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164541) - continued									
EP2308708-005	0960_MW148S_230628	EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	8.57	8.93	4.1	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.91	0.91	0.0	0% - 20%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	1.7	1.8	0.0	0% - 50%	
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164556)									
EP2308707-004	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164541)									
EP2308704-012	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164541) - continued									
EP2308704-012	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308708-005	0960_MW148S_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164556)							
EP2308707-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164560) - continued									
EP2308709-002	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164541)									
EP2308704-012	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2308708-005	0960_MW148S_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164556)									
EP2308707-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.09	0.07	21.8	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

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 Work Order : EP2308708
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP_23



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164560) - continued									
EP2308709-002	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5164541)									
EP2308704-012	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2308708-005	0960_MW148S_230628	EP231X: Sum of PFAS	----	0.01	µg/L	78.9	80.9	2.6	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	49.6	50.0	0.8	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	70.7	72.2	2.1	0% - 20%
EP231P: PFAS Sums (QC Lot: 5164556)									
EP2308707-004	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.09	0.07	25.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	0.09	0.07	25.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED037P: Alkalinity by PC Titrator (QCLot: 5151276)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	99.6	87.8	118
				<1	200 mg/L	102	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148899)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.0	89.9	112
				<1	500 mg/L	94.6	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 5148900)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	95.7	88.6	113
				<1	1000 mg/L	100	88.6	113
ED093F: Dissolved Major Cations (QCLot: 5148267)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.4	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.0	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.4	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164541)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	96.5	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	103	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	98.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	101	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	97.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	94.8	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164556)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	94.7	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	100	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	99.9	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	103	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	94.4	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	99.2	53.0	142



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164560)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	110	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	99.9	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	99.7	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	98.5	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	99.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164541)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	99.6	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	96.2	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	92.0	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	96.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.4	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	101	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	91.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	111	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	97.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	100	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164556)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	103	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	89.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	92.2	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	102	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	92.2	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	108	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	127	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	89.0	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	99.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	82.6	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164560)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	105	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164560) - continued								
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	94.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	101	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164541)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	97.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	94.7	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	116	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	97.7	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	104	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	105	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	104	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164556)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	110	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	119	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	116	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	95.0	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	109	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	96.6	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	85.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164560)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	99.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	112	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	100	60.5	138



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164560) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.0	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	102	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	118	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	103	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164541)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	105	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	101	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	115	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	96.7	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164556)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	99.4	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	97.8	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	78.3	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	110	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164560)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	109	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	105	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	114	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	102	64.2	133
EP231P: PFAS Sums (QCLot: 5164541)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5164556)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5164560)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----

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 Work Order : EP2308708
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP_23



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP231P: PFAS Sums (QCLot: 5164560) - continued								
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148899)							
EP2308704-023	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 5148900)							
EP2308704-023	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164541)							
EP2308704-013	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	102	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	101	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	104	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	112	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	126	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	106	53.0	129
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164556)							
EP2308708-007	0960_MW124_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	100	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	105	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	98.8	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	110	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	96.0	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	91.1	53.0	129
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164560)							
EP2308709-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	100.0	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	103	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	94.1	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	95.0	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	91.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	101	53.0	129



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164541)							
EP2308704-013	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	104	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	91.8	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	92.7	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	94.9	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	114	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	109	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	93.2	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	111	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	106	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	102	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	96.6	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164556)							
EP2308708-007	0960_MW124_230628	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	115	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	102	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	89.8	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	92.2	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	94.1	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	99.4	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	97.4	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	97.8	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	95.7	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	80.6	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	105	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164560)							
EP2308709-006	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	97.4	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	89.7	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	94.8	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	98.6	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	90.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	102	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	94.6	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	95.4	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	93.2	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	93.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	100	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164541)							
EP2308704-013	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	105	59.0	135



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164541) - continued							
EP2308704-013	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	99.0	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	111	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	94.9	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	110	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	102	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	97.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164556)							
EP2308708-007	0960_MW124_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	101	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	109	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	81.1	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	115	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	99.0	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	120	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	104	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164560)							
EP2308709-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	90.6	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	127	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	95.2	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	94.0	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	89.6	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	108	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	88.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164541)							
EP2308704-013	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	103	63.0	143



Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164541) - continued							
EP2308704-013	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	103	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	120	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	110	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164556)							
EP2308708-007	0960_MW124_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	115	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	111	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	100	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	126	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164560)							
EP2308709-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	97.7	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	90.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	104	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	105	70.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order : EP2308708

Page : 1 of 7

Client : STANTEC AUSTRALIA PTY LTD
Contact :
Project : WA_0960_PFASOMP_23
Site : Learmonth GW - MB
Sampler :
Order number : pfas-omp Learmonth

Laboratory : Environmental Division Perth
Telephone :
Date Samples Received : 30-Jun-2023
Issue Date : 13-Jul-2023
No. of samples received : 13
No. of samples analysed : 13

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2308704--023	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EP2308704--023	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
0960_MW151_230628, 0960_MW148D_230628, 0960_MW104_230628, 0960_MW105_230628, 0960_MW112_230628, 0960_MW021_230628		0960_MW238_230628, 0960_MW148S_230628, 0960_MW124_230628, 0960_MW168_230628, 0960_MW137_2.5-3.0_230628,	----	----	----	06-Jul-2023	05-Jul-2023
							1

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)	4				
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	4	45	8.89	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) 0960_MW151_230628, 0960_MW148D_230628, 0960_MW104_230628, 0960_MW105_230628, 0960_MW112_230628, 0960_MW021_230628	0960_MW238_230628, 0960_MW148S_230628, 0960_MW124_230628, 0960_MW168_230628, 0960_MW137_2.5-3.0_230628,	28-Jun-2023	----	----	----	04-Jul-2023	12-Jul-2023	✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) 0960_MW151_230628, 0960_MW148D_230628, 0960_MW104_230628, 0960_MW105_230628, 0960_MW112_230628, 0960_MW021_230628	0960_MW238_230628, 0960_MW148S_230628, 0960_MW124_230628, 0960_MW168_230628, 0960_MW137_2.5-3.0_230628,	28-Jun-2023	----	----	----	12-Jul-2023	26-Jul-2023	✔
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 0960_MW151_230628, 0960_MW148D_230628, 0960_MW104_230628, 0960_MW105_230628, 0960_MW112_230628, 0960_MW021_230628	0960_MW238_230628, 0960_MW148S_230628, 0960_MW124_230628, 0960_MW168_230628, 0960_MW137_2.5-3.0_230628,	28-Jun-2023	----	----	----	12-Jul-2023	26-Jul-2023	✔
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) 0960_MW151_230628, 0960_MW148D_230628, 0960_MW104_230628, 0960_MW105_230628, 0960_MW112_230628, 0960_MW021_230628	0960_MW238_230628, 0960_MW148S_230628, 0960_MW124_230628, 0960_MW168_230628, 0960_MW137_2.5-3.0_230628,	28-Jun-2023	----	----	----	06-Jul-2023	05-Jul-2023	✘



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_MW151_230628, 0960_MW105_230628, 0960_MW137_2.5-3.0_230628,	0960_MW124_230628, 0960_QC125_230628, 0960_MW021_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	11-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_QC116_230628, 0960_MW148S_230628, 0960_MW168_230628	0960_MW148D_230628, 0960_MW104_230628,	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_MW238_230628,	0960_MW112_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	13-Jul-2023	25-Dec-2023	✔
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) 0960_MW151_230628, 0960_MW105_230628, 0960_MW137_2.5-3.0_230628,	0960_MW124_230628, 0960_QC125_230628, 0960_MW021_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	11-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_QC116_230628, 0960_MW148S_230628, 0960_MW168_230628	0960_MW148D_230628, 0960_MW104_230628,	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_MW238_230628,	0960_MW112_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	13-Jul-2023	25-Dec-2023	✔
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) 0960_MW151_230628, 0960_MW105_230628, 0960_MW137_2.5-3.0_230628,	0960_MW124_230628, 0960_QC125_230628, 0960_MW021_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	11-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_QC116_230628, 0960_MW148S_230628, 0960_MW168_230628	0960_MW148D_230628, 0960_MW104_230628,	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_MW238_230628,	0960_MW112_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	13-Jul-2023	25-Dec-2023	✔

Page : 5 of 7
 Work Order : EP2308708
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP_23



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_MW151_230628, 0960_MW105_230628, 0960_MW137_2.5-3.0_230628,	0960_MW124_230628, 0960_QC125_230628, 0960_MW021_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	11-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_QC116_230628, 0960_MW148S_230628, 0960_MW168_230628	0960_MW148D_230628, 0960_MW104_230628,	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_MW238_230628,	0960_MW112_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	13-Jul-2023	25-Dec-2023	✔
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0960_MW151_230628, 0960_MW105_230628, 0960_MW137_2.5-3.0_230628,	0960_MW124_230628, 0960_QC125_230628, 0960_MW021_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	11-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_QC116_230628, 0960_MW148S_230628, 0960_MW168_230628	0960_MW148D_230628, 0960_MW104_230628,	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	12-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_MW238_230628,	0960_MW112_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	13-Jul-2023	25-Dec-2023	✔



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

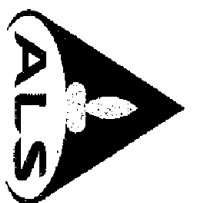
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	45	8.89	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	45	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	45	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	3	45	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	* ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



Work Order Reference
EP2308709



Telephons : - 61-8-9406 1301

Project Manager

Phone:**Sampler:****Phone:**

standard

Special Instructions:

Received by:

Date / Time:

30/6

1192

alsglobal.com/als-compass



CHAIN OF CUSTODY

ALS) COC#: 54074

ALS Laboratory: EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFCASOMP_23

SITE: Learmonth SW/OTH - SC

ORDER NO: plas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

Yes No N/A
Yes No N/A
°C

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Rinse Water	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_SW208		28/06/2023 09:23 AM	WATER	ALS: 3 Non ALS: 0	No		X		
002	0960_OTH107	Lab QC added	28/06/2023 09:31 AM	WATER	ALS: 5 Non ALS: 0	No		X		
003	0960_OTH106		28/06/2023 09:30 AM	WATER	ALS: 3 Non ALS: 0	No		X		
004	0960_SW207		28/06/2023 10:21 AM	WATER	ALS: 3 Non ALS: 0	No		X		
005	0960_QC123		28/06/2023 10:22 AM	WATER	ALS: 3 Non ALS: 0	No	X			
006	0960_SW305		28/06/2023 02:39 PM	WATER	ALS: 5 Non ALS: 0	No		X		
007	0960_OTH103		28/06/2023 02:47 PM	WATER	ALS: 5 Non ALS: 0	No		X		
008	0960_SW304		28/06/2023 03:13 PM	WATER	ALS: 3 Non ALS: 0	No		X		

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD
PROJECT: WA_0960_PFSOMP_23

SITE: Learmonth SW/OTH - SC

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MMWHAUS0002

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

C

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_SW208	Clear Plastic Bottle - Natural	125 mL	00070522144951	Green	No	
001	0960_SW208	HDPE (no PTFE)	20 mL	00350821001809	Grey	No	
001	0960_SW208	HDPE (no PTFE)	20 mL	00350821001866	Grey	No	
002	0960_OTH107	Clear Plastic Bottle - Natural	125 mL	00070522144870	Green	No	
002	0960_OTH107	HDPE (no PTFE)	20 mL	00352005019547	Grey	No	
002	0960_OTH107	HDPE (no PTFE)	20 mL	00350821001921	Grey	No	
002	0960_OTH107	HDPE (no PTFE)	20 mL	00350821001848	Grey	No	
002	0960_OTH107	HDPE (no PTFE)	20 mL	00352005019673	Grey	No	
003	0960_OTH106	HDPE (no PTFE)	20 mL	00350821001891	Grey	No	
003	0960_OTH106	Clear Plastic Bottle - Natural	125 mL	00070522162836	Green	No	
003	0960_OTH106	HDPE (no PTFE)	20 mL	00070522144915	Green	No	
003	0960_OTH106	HDPE (no PTFE)	20 mL	00350821001860	Grey	No	
004	0960_SW207	Clear Plastic Bottle - Natural	125 mL	00070522144866	Green	No	
004	0960_SW207	HDPE (no PTFE)	20 mL	00350821001841	Grey	No	
004	0960_SW207	HDPE (no PTFE)	20 mL	00070522145132	Green	No	
005	0960_QC123	Clear Plastic Bottle - Natural	125 mL	000705221001922	Grey	No	
005	0960_QC123	HDPE (no PTFE)	20 mL	00350821001789	Grey	No	
006	0960_SW305	Clear Plastic Bottle - Natural	125 mL	00070522144866	Green	No	
006	0960_SW305	HDPE (no PTFE)	20 mL	00352005019666	Grey	No	
006	0960_SW305	HDPE (no PTFE)	20 mL	00352005006729	Grey	No	
006	0960_SW305	HDPE (no PTFE)	20 mL	00350821001850	Grey	No	
007	0960_OTH103	HDPE (no PTFE)	20 mL	00350821001888	Grey	No	
007	0960_OTH103	HDPE (no PTFE)	20 mL	00350522042862	Grey	No	
007	0960_OTH103	HDPE (no PTFE)	20 mL	00350522043128	Grey	No	
007	0960_OTH103	Clear Plastic Bottle - Natural	125 mL	00070522145142	Green	No	
007	0960_OTH103	HDPE (no PTFE)	20 mL	00352005019340	Grey	No	

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP_23

SITE: Learmonth SW/OTH - SC

ORDER NO: pfas-otmp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free Ice / frozen Ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
°C

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

007	0960_OTH103	HDPE (no PTFE)	20 mL	00352005019698	Grey	No	
008	0960_SW304	Clear Plastic Bottle - Natural	125 mL	00070522146169	Green	No	
008	0960_SW304	HDPE (no PTFE)	20 mL	00350821001783	Grey	No	
008	0960_SW304	HDPE (no PTFE)	20 mL	00350821001794	Grey	No	

Total Bottle Count: ALS: 30, Non ALS: 0



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2308709

Client : STANTEC AUSTRALIA PTY LTD
Contact :
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : Customer Services EP
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail :
Telephone :
Facsimile :

E-mail : ALSEnviro.Perth@alsglobal.com
Telephone :
Facsimile :

Project : WA_0960_PFASOMP_23
Order number : pfas-omp Learmonth
C-O-C number : 54074
Site : Learmonth SW/OTH - SC
Sampler :

Page : 1 of 2
Quote number : ES2022MWHAUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 30-Jun-2023 11:00
Client Requested Due : 12-Jul-2023
Date :

Issue Date : 03-Jul-2023
Scheduled Reporting Date : **12-Jul-2023**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 4
Receipt Detail :

Security Seal : Not Available
Temperature : 8.0 - Ice present
No. of samples received / analysed : 8 / 8

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EP2308709-001	28-Jun-2023 09:23	0960_SW208_230628	✓	✓
EP2308709-002	28-Jun-2023 09:31	0960_OTH107_230628	✓	✓
EP2308709-003	28-Jun-2023 09:30	0960_OTH106_230628	✓	✓
EP2308709-004	28-Jun-2023 10:21	0960_SW207_230628	✓	✓
EP2308709-005	28-Jun-2023 10:22	0960_QC123_230628	✓	
EP2308709-006	28-Jun-2023 14:39	0960_SW305_230628	✓	✓
EP2308709-007	28-Jun-2023 14:47	0960_OTH103_230628	✓	✓
EP2308709-008	28-Jun-2023 15:13	0960_SW304_230628	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

██████████	- A4 - AU Tax Invoice (INV)	Email	██████████cardno.com.au
DERP LAB REPORTS			
██████████	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
	- EDI Format - ESDAT (ESDAT)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████
	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
██████████	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
	- EDI Format - ESDAT (ESDAT)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████
		Email	██████████



CERTIFICATE OF ANALYSIS

Work Order	: EP2308709	Page	: 1 of 9
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023 11:00
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 54074	Issue Date	: 13-Jul-2023 10:39
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SW/OTH - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 8		
No. of samples analysed	: 8		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW208_230628	0960_OTH107_230628 8	0960_OTH106_230628 8	0960_SW207_230628	0960_QC123_230628
Sampling date / time				28-Jun-2023 09:23	28-Jun-2023 09:31	28-Jun-2023 09:30	28-Jun-2023 10:21	28-Jun-2023 10:22
Compound	CAS Number	LOR	Unit	EP2308709-001	EP2308709-002	EP2308709-003	EP2308709-004	EP2308709-005
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	138	185	240	146	----
Total Alkalinity as CaCO3	----	1	mg/L	138	185	240	146	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2690	2800	2790	2630	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18000	18200	18400	19000	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	472	462	472	500	----
Magnesium	7439-95-4	1	mg/L	1560	1520	1560	1390	----
Sodium	7440-23-5	1	mg/L	11600	11300	11700	11900	----
Potassium	7440-09-7	1	mg/L	609	595	606	420	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	566	575	582	594	----
∅ Total Cations	----	0.01	meq/L	672	655	676	668	----
∅ Ionic Balance	----	0.01	%	8.52	6.46	7.50	5.87	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW208_230628	0960_OTH107_230628 8	0960_OTH106_230628 8	0960_SW207_230628	0960_QC123_230628
Sampling date / time				28-Jun-2023 09:23	28-Jun-2023 09:31	28-Jun-2023 09:30	28-Jun-2023 10:21	28-Jun-2023 10:22
Compound	CAS Number	LOR	Unit	EP2308709-001	EP2308709-002	EP2308709-003	EP2308709-004	EP2308709-005
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.09	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW208_230628	0960_OTH107_230628 8	0960_OTH106_230628 8	0960_SW207_230628	0960_QC123_230628
Sampling date / time				28-Jun-2023 09:23	28-Jun-2023 09:31	28-Jun-2023 09:30	28-Jun-2023 10:21	28-Jun-2023 10:22
Compound	CAS Number	LOR	Unit	EP2308709-001	EP2308709-002	EP2308709-003	EP2308709-004	EP2308709-005
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	0.09	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	0.09	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	97.1	97.9	96.8	98.4	95.4
13C8-PFOA	----	0.02	%	100	101	94.3	101	101



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW305_230628	0960_OTH103_230628 8	0960_SW304_230628	----	----
Sampling date / time				28-Jun-2023 14:39	28-Jun-2023 14:47	28-Jun-2023 15:13	----	----
Compound	CAS Number	LOR	Unit	EP2308709-006	EP2308709-007	EP2308709-008	-----	-----
Result				Result	Result	Result	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	292	437	291	----	----
Total Alkalinity as CaCO3	----	1	mg/L	292	437	291	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3210	2980	3370	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	20800	19100	21400	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	594	495	606	----	----
Magnesium	7439-95-4	1	mg/L	1810	1610	1880	----	----
Sodium	7440-23-5	1	mg/L	13500	12100	14200	----	----
Potassium	7440-09-7	1	mg/L	703	631	737	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	659	610	680	----	----
∅ Total Cations	----	0.01	meq/L	784	700	821	----	----
∅ Ionic Balance	----	0.01	%	8.62	6.88	9.45	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW305_230628	0960_OTH103_230628 8	0960_SW304_230628	----	----
Sampling date / time				28-Jun-2023 14:39	28-Jun-2023 14:47	28-Jun-2023 15:13	----	----
Compound	CAS Number	LOR	Unit	EP2308709-006	EP2308709-007	EP2308709-008	-----	-----
				Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW305_230628	0960_OTH103_230628 8	0960_SW304_230628	----	----
Sampling date / time				28-Jun-2023 14:39	28-Jun-2023 14:47	28-Jun-2023 15:13	----	----
Compound	CAS Number	LOR	Unit	EP2308709-006	EP2308709-007	EP2308709-008	-----	-----
				Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	98.8	110	102	----	----
13C8-PFOA	----	0.02	%	104	101	98.0	----	----



Surrogate Control Limits

Sub-Matrix: SURFACE WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133



QUALITY CONTROL REPORT

Work Order	: EP2308709	Page	: 1 of 11
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 54074	Issue Date	: 13-Jul-2023
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SW/OTH - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 8		
No. of samples analysed	: 8		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 5151276)									
EP2308708-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	20	19	0.0	0% - 50%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	767	770	0.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	787	789	0.2	0% - 20%
EP2308709-002	0960_OTH107_230628	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	185	189	2.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	185	189	2.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5151902)									
EP2308624-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	17	16	0.0	0% - 50%
EP2308914-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	74	75	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5154289)									
EP2308617-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2440	2520	2.9	0% - 20%
EP2308617-011	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2400	2360	1.6	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5151901)									
EP2308624-005	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	268	260	2.7	0% - 20%
EP2308914-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	233	232	0.7	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5154290)									
EP2308617-002	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	17500	16900	3.1	0% - 20%
EP2308617-011	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	16600	16600	0.5	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5148267)									
EP2308707-007	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	1040	1070	2.4	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	2810	2860	2.1	0% - 20%

Page : 3 of 11
 Work Order : EP2308709
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP_23



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 5148267) - continued									
EP2308707-007	Anonymous	ED093F: Sodium	7440-23-5	1	mg/L	21900	22400	2.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1050	1060	1.1	0% - 20%
EP2308708-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	68	67	2.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	126	127	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2200	2220	1.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	121	123	1.4	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164560)									
EP2308709-002	0960_OTH107_230628	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164561)									
EP2308709-007	0960_OTH103_230628	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164560)									
EP2308709-002	0960_OTH107_230628	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164561)									
EP2308709-007	0960_OTH103_230628	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164561) - continued									
EP2308709-007	0960_OTH103_230628	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164560)									
EP2308709-002	0960_OTH107_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164561)									
EP2308709-007	0960_OTH103_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164560)									
EP2308709-002	0960_OTH107_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.09	0.07	21.8	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit

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 Work Order : EP2308709
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP_23



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164560) - continued									
EP2308709-002	0960_OTH107_230628	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164561)									
EP2308709-007	0960_OTH103_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5164560)									
EP2308709-002	0960_OTH107_230628	EP231X: Sum of PFAS	----	0.01	µg/L	0.09	0.07	25.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	0.09	0.07	25.0	No Limit
EP231P: PFAS Sums (QC Lot: 5164561)									
EP2308709-007	0960_OTH103_230628	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
	Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
<1	----	----	----	----
<1	----	----	----	----
<1	----	----	----	----
<1	20 mg/L	99.6	87.8	118
<1	200 mg/L	102	87.8	118
<1	25 mg/L	109	89.9	112
<1	500 mg/L	99.2	89.9	112
<1	25 mg/L	106	89.9	112
<1	500 mg/L	99.7	89.9	112
<1	10 mg/L	99.6	88.6	113
<1	1000 mg/L	97.6	88.6	113
<1	10 mg/L	96.8	88.6	113
<1	1000 mg/L	98.9	88.6	113
<1	50 mg/L	98.4	86.5	117
<1	50 mg/L	100	88.4	110
<1	50 mg/L	96.0	91.4	113
<1	50 mg/L	93.4	84.6	108
<0.02	0.2218 µg/L	110	72.0	130
<0.02	0.2352 µg/L	99.9	71.0	127
<0.01	0.2373 µg/L	99.7	68.0	131
<0.02	0.238 µg/L	104	69.0	134
<0.01	0.232 µg/L	98.5	65.0	140
<0.02	0.241 µg/L	99.4	53.0	142



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164561) - continued								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	98.7	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	105	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	106	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	110	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	102	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	108	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164560)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	105	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	94.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	101	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164561)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	112	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	91.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	87.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	105	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	99.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	112	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	92.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	102	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	105	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164560)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	99.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	112	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	100	60.5	138



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164560) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.0	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	102	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	118	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	103	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164561)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	99.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	114	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	74.7	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	98.2	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	96.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	101	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164560)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	109	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	105	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	114	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	102	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164561)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	110	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	112	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	107	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	104	64.2	133
EP231P: PFAS Sums (QCLot: 5164560)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5164561)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231P: PFAS Sums (QCLot: 5164561) - continued								
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5151902)							
EP2308624-005	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	106	70.4	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5154289)							
EP2308617-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 5151901)							
EP2308624-005	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	92.7	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 5154290)							
EP2308617-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164560)							
EP2308709-006	0960_SW305_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	100.0	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	103	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	94.1	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	95.0	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	91.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	101	53.0	129
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164561)							
EP2308711-002	AnonymouS	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	95.8	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	99.6	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	96.3	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	104	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	106	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	94.4	53.0	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164560)							
EP2308709-006	0960_SW305_230628	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	97.4	73.0	142



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164560) - continued							
EP2308709-006	0960_SW305_230628	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	89.7	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	94.8	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	98.6	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	90.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	102	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	94.6	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	95.4	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	93.2	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	93.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	100	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164561)							
EP2308711-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	110	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	108	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	88.2	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	93.8	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	85.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	101	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	101	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	113	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	89.2	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	91.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	101	71.0	132
		EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164560)					
EP2308709-006	0960_SW305_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	90.6	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	127	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	95.2	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	94.0	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	89.6	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	108	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	88.8	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164561)							
EP2308711-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	105	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	102	70.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164561) - continued							
EP2308711-002	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	70.6	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	73.8	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	102	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	102	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	106	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164560)							
EP2308709-006	0960_SW305_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	97.7	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	90.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	104	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	105	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164561)							
EP2308711-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	100	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	99.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	112	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	118	70.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2308709	Page	: 1 of 6
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Site	: Learmonth SW/OTH - SC	Issue Date	: 13-Jul-2023
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 8
Order number	: pfas-omp Learmonth	No. of samples analysed	: 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	EP2308617--001	Anonymous	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EP2308617--001	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
0960_SW208_230628,	0960_OTH107_230628,	----	----	----	06-Jul-2023	05-Jul-2023	1
0960_OTH106_230628,	0960_SW207_230628,						
0960_SW305_230628,	0960_OTH103_230628,						
0960_SW304_230628							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	21	9.52	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) 0960_SW208_230628, 0960_OTH106_230628, 0960_SW305_230628, 0960_SW304_230628	0960_OTH107_230628, 0960_SW207_230628, 0960_OTH103_230628,	28-Jun-2023	----	----	----	04-Jul-2023	12-Jul-2023	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) 0960_SW208_230628, 0960_OTH106_230628, 0960_SW305_230628, 0960_SW304_230628	0960_OTH107_230628, 0960_SW207_230628, 0960_OTH103_230628,	28-Jun-2023	----	----	----	10-Jul-2023	26-Jul-2023	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 0960_SW208_230628, 0960_OTH106_230628, 0960_SW305_230628, 0960_SW304_230628	0960_OTH107_230628, 0960_SW207_230628, 0960_OTH103_230628,	28-Jun-2023	----	----	----	10-Jul-2023	26-Jul-2023	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) 0960_SW208_230628, 0960_OTH106_230628, 0960_SW305_230628, 0960_SW304_230628	0960_OTH107_230628, 0960_SW207_230628, 0960_OTH103_230628,	28-Jun-2023	----	----	----	06-Jul-2023	05-Jul-2023	✗
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_OTH103_230628		28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	11-Jul-2023	25-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0960_SW208_230628, 0960_OTH106_230628, 0960_QC123_230628, 0960_SW304_230628	0960_OTH107_230628, 0960_SW207_230628, 0960_SW305_230628,	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	13-Jul-2023	25-Dec-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) 0960_OTH103_230628		28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	11-Jul-2023	25-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0960_SW208_230628, 0960_OTH106_230628, 0960_QC123_230628, 0960_SW304_230628	0960_OTH107_230628, 0960_SW207_230628, 0960_SW305_230628,	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	13-Jul-2023	25-Dec-2023	✓



Matrix: WATER

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) 0960_OTH103_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	11-Jul-2023	25-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0960_SW208_230628, 0960_OTH106_230628, 0960_QC123_230628, 0960_SW304_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	13-Jul-2023	25-Dec-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0960_OTH103_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	11-Jul-2023	25-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0960_SW208_230628, 0960_OTH106_230628, 0960_QC123_230628, 0960_SW304_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	13-Jul-2023	25-Dec-2023	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) 0960_OTH103_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	11-Jul-2023	25-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0960_SW208_230628, 0960_OTH106_230628, 0960_QC123_230628, 0960_SW304_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	13-Jul-2023	25-Dec-2023	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

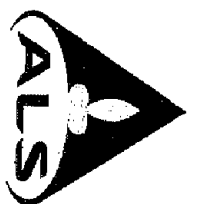
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	21	9.52	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	* ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



Environmental Division
Perth
Work Order Reference
EP2308710



Telephone : +61-8-9406 1801

Custody Document for Submissions via ALS Compass App

Project: WA - D960 - PEXD/10-23 Client: Stantec

Project Manager:
Phone:

Sampler:
Phone:

ALS Compass COC Reference: 54041, 54060, 54061 # Samples:

54080, 54064, 54065, 54063, 54068, 54072, 54062, 54074

Turnaround Requirements: Standard

Special Instructions:

Custody:		Received by:		Received by:	
Relinquished by:		Date / Time:		Relinquished by:	
[Redacted]		[Redacted]		[Redacted]	
Date / Time:		Date / Time:		Date / Time:	
28/6/23		30/6		11am	

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP_23

SITE: Learmonth SD - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal Intact?

Free Ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH:

QUOTE NO: SY139/19 B

SAMPLER MOBILE:

/ ES2022MWWHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_SS234		28/06/2023 09:42 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
002	0960_QC119		28/06/2023 09:42 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
003	0960_SS265		28/06/2023 10:10 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
004	0960_QC121		28/06/2023 10:11 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
005	0960_SS108		28/06/2023 10:40 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
006	0960_SS231		28/06/2023 10:57 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
007	0960_SS114		28/06/2023 11:17 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
008	0960_SS113		28/06/2023 11:23 AM	SOIL	ALS: 1 Non ALS: 0	No	X		
009	0960_SS122		28/06/2023 11:50 AM	SOIL	ALS: 1 Non ALS: 0	No	X		

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP_23

SITE: Learmonth SD - MB

ORDER NO: pfas-omp-learnmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free Ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

C

Other comments:

CONTACT PH:

QUOTE NO: SY139/19 B

SAMPLER MOBILE

/ ES2022MWHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFA5 Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0960_SS124		28/06/2023 12:08 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
011	0960_SS277		28/06/2023 12:31 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
012	0960_SS125		28/06/2023 12:32 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
013	0960_SS278		28/06/2023 12:45 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
014	0960_SS291		28/06/2023 01:16 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
015	0960_SS292		28/06/2023 01:22 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
016	0960_SS293		28/06/2023 01:30 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
017	0960_SS198		28/06/2023 01:36 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
018	0960_SD210		28/06/2023 02:06 PM	SOIL	ALS: 1 Non ALS: 0	No	X		



CHAIN OF CUSTODY

ALS) COC#: 54080

ALS Laboratory: EP Perth

CLIENT: MW/HAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFA50MP_23

SITE: Leammonth SD - MB

ORDER NO: pfas-omp Leammonth

PROJECT MANAGER

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MW/HAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	0960_SD302		28/06/2023 02:18 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
020	0960_SD209		28/06/2023 02:23 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
021	0960_SD211		28/06/2023 02:42 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
022	0960_SD300		28/06/2023 02:49 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
023	0960_SD301		28/06/2023 03:07 PM	SOIL	ALS: 1 Non ALS: 0	No	X		
024	0960_SD303		28/06/2023 03:14 PM	SOIL	ALS: 1 Non ALS: 0	No	X		



CHAIN OF CUSTODY

ALS COC#: 54080

ALS Laboratory: EP Perth

CLIENT: MMHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFA5COMP_23

SITE: Learmonth SD - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MMHAUS0002

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A

Yes No N/A

C

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
--------	-------------	-------------	--------	---------	------	----------	--------

001	0960_SS234	HDPE Soil Jar	200 mL	00620322054851	Grey	No	
002	0960_QC119	HDPE Soil Jar	200 mL	00620322054939	Grey	No	
003	0960_SS265	HDPE Soil Jar	200 mL	00621222067138	Grey	No	
004	0960_QC121	HDPE Soil Jar	200 mL	00620322054892	Grey	No	
005	0960_SS108	HDPE Soil Jar	200 mL	00621222067065	Grey	No	
006	0960_SS231	HDPE Soil Jar	200 mL	00620322054943	Grey	No	
007	0960_SS114	HDPE Soil Jar	200 mL	00621222067107	Grey	No	
008	0960_SS113	HDPE Soil Jar	200 mL	00621222067118	Grey	No	
009	0960_SS122	HDPE Soil Jar	200 mL	00620322054982	Grey	No	
010	0960_SS124	HDPE Soil Jar	200 mL	00621222067116	Grey	No	
011	0960_SS277	HDPE Soil Jar	200 mL	00620322054931	Grey	No	
012	0960_SS125	HDPE Soil Jar	200 mL	00621222067059	Grey	No	
013	0960_SS278	HDPE Soil Jar	200 mL	00621222067126	Grey	No	
014	0960_SS291	HDPE Soil Jar	200 mL	00621222067097	Grey	No	
015	0960_SS292	HDPE Soil Jar	200 mL	00621222067071	Grey	No	
016	0960_SS293	HDPE Soil Jar	200 mL	00621222067081	Grey	No	
017	0960_SS198	HDPE Soil Jar	200 mL	00620322054965	Grey	No	
018	0960_SD210	HDPE Soil Jar	200 mL	00621222067088	Grey	No	
019	0960_SD302	HDPE Soil Jar	200 mL	00620322054844	Grey	No	
020	0960_SD209	HDPE Soil Jar	200 mL	00620322054885	Grey	No	
021	0960_SD211	HDPE Soil Jar	200 mL	00621222067085	Grey	No	
022	0960_SD300	HDPE Soil Jar	200 mL	00620322054866	Grey	No	
023	0960_SD301	HDPE Soil Jar	200 mL	00621222067091	Grey	No	
024	0960_SD303	HDPE Soil Jar	200 mL	00621222067070	Grey	No	

Total Bottle Count: ALS: 24, Non ALS: 0



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2308710

Client : STANTEC AUSTRALIA PTY LTD
Contact :
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : Customer Services EP
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail :
Telephone :
Facsimile :

E-mail : ALSEnviro.Perth@alsglobal.com
Telephone :
Facsimile :

Project : WA_0960_PFASOMP_23
Order number : pfas-omp Learmonth
C-O-C number : 54080
Site : Learmonth SD - MB
Sampler :

Page : 1 of 3
Quote number : ES2022MWHAUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 30-Jun-2023 11:00
Client Requested Due : 12-Jul-2023
Date :

Issue Date : 03-Jul-2023
Scheduled Reporting Date : **12-Jul-2023**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 4
Receipt Detail :

Security Seal : Not Available
Temperature : 8.0 - Ice present
No. of samples received / analysed : 24 / 24

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2308710-001	28-Jun-2023 09:42	0960_SS234_230628	✓	✓
EP2308710-002	28-Jun-2023 09:42	0960_QC119_230628	✓	✓
EP2308710-003	28-Jun-2023 10:10	0960_SS265_230628	✓	✓
EP2308710-004	28-Jun-2023 10:11	0960_QC121_230628	✓	✓
EP2308710-005	28-Jun-2023 10:40	0960_SS108_230628	✓	✓
EP2308710-006	28-Jun-2023 10:57	0960_SS231_230628	✓	✓
EP2308710-007	28-Jun-2023 11:17	0960_SS114_230628	✓	✓
EP2308710-008	28-Jun-2023 11:23	0960_SS113_230628	✓	✓
EP2308710-009	28-Jun-2023 11:50	0960_SS122_230628	✓	✓
EP2308710-010	28-Jun-2023 12:08	0960_SS124_230628	✓	✓
EP2308710-011	28-Jun-2023 12:31	0960_SS277_230628	✓	✓
EP2308710-012	28-Jun-2023 12:32	0960_SS125_230628	✓	✓
EP2308710-013	28-Jun-2023 12:45	0960_SS278_230628	✓	✓
EP2308710-014	28-Jun-2023 13:16	0960_SS291_230628	✓	✓
EP2308710-015	28-Jun-2023 13:22	0960_SS292_230628	✓	✓
EP2308710-016	28-Jun-2023 13:30	0960_SS293_230628	✓	✓
EP2308710-017	28-Jun-2023 13:36	0960_SS198_230628	✓	✓
EP2308710-018	28-Jun-2023 14:06	0960_SD210_230628	✓	✓
EP2308710-019	28-Jun-2023 14:18	0960_SD302_230628	✓	✓
EP2308710-020	28-Jun-2023 14:23	0960_SD209_230628	✓	✓
EP2308710-021	28-Jun-2023 14:42	0960_SD211_230628	✓	✓
EP2308710-022	28-Jun-2023 14:49	0960_SD300_230628	✓	✓
EP2308710-023	28-Jun-2023 15:07	0960_SD301_230628	✓	✓
EP2308710-024	28-Jun-2023 15:14	0960_SD303_230628	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.



Requested Deliverables

[REDACTED]

- A4 - AU Tax Invoice (INV)

Email

[REDACTED]cardno.com.au

DERP LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

Email

Email

Email

Email

Email

Email

Email

[REDACTED]

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

Email

Email

Email

Email

Email

Email

Email



CERTIFICATE OF ANALYSIS

Work Order	: EP2308710	Page	: 1 of 13
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023 11:00
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 07-Jul-2023
C-O-C number	: 54080	Issue Date	: 12-Jul-2023 15:25
Sampler	: [REDACTED]		
Site	: Learmonth SD - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 24		
No. of samples analysed	: 24		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS234_230628	0960_QC119_230628	0960_SS265_230628	0960_QC121_230628	0960_SS108_230628
Sampling date / time				28-Jun-2023 09:42	28-Jun-2023 09:42	28-Jun-2023 10:10	28-Jun-2023 10:11	28-Jun-2023 10:40
Compound	CAS Number	LOR	Unit	EP2308710-001	EP2308710-002	EP2308710-003	EP2308710-004	EP2308710-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	3.5	3.7	3.4	5.3	6.4
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0008	0.0006	<0.0002	<0.0002	0.0005
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS234_230628	0960_QC119_230628	0960_SS265_230628	0960_QC121_230628	0960_SS108_230628
Sampling date / time				28-Jun-2023 09:42	28-Jun-2023 09:42	28-Jun-2023 10:10	28-Jun-2023 10:11	28-Jun-2023 10:40
Compound	CAS Number	LOR	Unit	EP2308710-001	EP2308710-002	EP2308710-003	EP2308710-004	EP2308710-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0008	0.0006	<0.0002	<0.0002	0.0005
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0008	0.0006	<0.0002	<0.0002	0.0005
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0008	0.0006	<0.0002	<0.0002	0.0005
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	129	102	111	110	124
13C8-PFOA	----	0.0002	%	119	104	99.0	112	110



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS231_230628	0960_SS114_230628	0960_SS113_230628	0960_SS122_230628	0960_SS124_230628
Sampling date / time				28-Jun-2023 10:57	28-Jun-2023 11:17	28-Jun-2023 11:23	28-Jun-2023 11:50	28-Jun-2023 12:08
Compound	CAS Number	LOR	Unit	EP2308710-006	EP2308710-007	EP2308710-008	EP2308710-009	EP2308710-010
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	2.4	4.4	2.2	4.0	3.6
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS231_230628	0960_SS114_230628	0960_SS113_230628	0960_SS122_230628	0960_SS124_230628
Sampling date / time				28-Jun-2023 10:57	28-Jun-2023 11:17	28-Jun-2023 11:23	28-Jun-2023 11:50	28-Jun-2023 12:08
Compound	CAS Number	LOR	Unit	EP2308710-006	EP2308710-007	EP2308710-008	EP2308710-009	EP2308710-010
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	0.0009	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0009	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0009	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	110	108	106	110	117
13C8-PFOA	----	0.0002	%	106	107	106	106	105



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS277_230628	0960_SS125_230628	0960_SS278_230628	0960_SS291_230628	0960_SS292_230628
Sampling date / time				28-Jun-2023 12:31	28-Jun-2023 12:32	28-Jun-2023 12:45	28-Jun-2023 13:16	28-Jun-2023 13:22
Compound	CAS Number	LOR	Unit	EP2308710-011	EP2308710-012	EP2308710-013	EP2308710-014	EP2308710-015
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	4.3	3.8	4.0	4.3	3.4
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS277_230628	0960_SS125_230628	0960_SS278_230628	0960_SS291_230628	0960_SS292_230628
Sampling date / time				28-Jun-2023 12:31	28-Jun-2023 12:32	28-Jun-2023 12:45	28-Jun-2023 13:16	28-Jun-2023 13:22
Compound	CAS Number	LOR	Unit	EP2308710-011	EP2308710-012	EP2308710-013	EP2308710-014	EP2308710-015
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	112	117	116	113	117
13C8-PFOA	----	0.0002	%	108	108	112	106	108



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS293_230628	0960_SS198_230628	0960_SD210_230628	0960_SD302_230628	0960_SD209_230628
Sampling date / time				28-Jun-2023 13:30	28-Jun-2023 13:36	28-Jun-2023 14:06	28-Jun-2023 14:18	28-Jun-2023 14:23
Compound	CAS Number	LOR	Unit	EP2308710-016	EP2308710-017	EP2308710-018	EP2308710-019	EP2308710-020
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	6.4	3.0	26.7	20.5	23.8
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0004	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SS293_230628	0960_SS198_230628	0960_SD210_230628	0960_SD302_230628	0960_SD209_230628
Sampling date / time				28-Jun-2023 13:30	28-Jun-2023 13:36	28-Jun-2023 14:06	28-Jun-2023 14:18	28-Jun-2023 14:23
Compound	CAS Number	LOR	Unit	EP2308710-016	EP2308710-017	EP2308710-018	EP2308710-019	EP2308710-020
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	0.0004	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0004	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	0.0004	<0.0002	<0.0002
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	124	124	121	122	123
13C8-PFOA	----	0.0002	%	107	105	102	99.0	102



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SD211_230628	0960_SD300_230628	0960_SD301_230628	0960_SD303_230628	----
Sampling date / time				28-Jun-2023 14:42	28-Jun-2023 14:49	28-Jun-2023 15:07	28-Jun-2023 15:14	----
Compound	CAS Number	LOR	Unit	EP2308710-021	EP2308710-022	EP2308710-023	EP2308710-024	-----
				Result	Result	Result	Result	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	34.0	26.5	27.2	20.0	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0544	0.0304	0.0114	0.0104	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0004	<0.0002	0.0006	0.0005	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0008	0.0004	<0.0002	<0.0002	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0009	0.0004	<0.0002	<0.0002	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----



Analytical Results

Sub-Matrix: SEDIMENT
 (Matrix: SOIL)

Sample ID

				0960_SD211_230628	0960_SD300_230628	0960_SD301_230628	0960_SD303_230628	----
Sampling date / time				28-Jun-2023 14:42	28-Jun-2023 14:49	28-Jun-2023 15:07	28-Jun-2023 15:14	----
Compound	CAS Number	LOR	Unit	EP2308710-021	EP2308710-022	EP2308710-023	EP2308710-024	-----
				Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	<0.0002	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	0.0005	<0.0005	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	0.0574	0.0312	0.0120	0.0109	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0544	0.0304	0.0114	0.0104	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0551	0.0304	0.0114	0.0104	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	110	118	116	112	----
13C8-PFOA	----	0.0002	%	104	109	108	112	----



Surrogate Control Limits

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	76	136
13C8-PFOA	----	78	131



QUALITY CONTROL REPORT

Work Order	: EP2308710	Page	: 1 of 11
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 07-Jul-2023
C-O-C number	: 54080	Issue Date	: 12-Jul-2023
Sampler	: [REDACTED]		
Site	: Learmonth SD - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 24		
No. of samples analysed	: 24		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 5162437)									
EP2308710-001	0960_SS234_230628	EA055: Moisture Content	----	0.1	%	3.5	3.6	0.0	0% - 20%
EP2308710-010	0960_SS124_230628	EA055: Moisture Content	----	0.1	%	3.6	3.4	5.7	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 5162438)									
EP2308710-021	0960_SD211_230628	EA055: Moisture Content	----	0.1	%	34.0	33.9	0.3	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159571)									
EP2308706-004	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0016	0.0018	11.2	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2308710-004	0960_QC121_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159573)									
EP2308710-014	0960_SS291_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)		
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5159573) - continued											
EP2308710-014	0960_SS291_230628	EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
EP2308710-024	0960_SD303_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0104	0.0094	9.3	0% - 20%		
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0005	0.0006	0.0	No Limit		
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159571)											
EP2308706-004	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit		
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit		
EP2308710-004	0960_QC121_230628	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit		
				EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
		EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159573)									
EP2308710-014	0960_SS291_230628	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit		

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5159573) - continued									
EP2308710-014	0960_SS291_230628	EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP2308710-024	0960_SD303_230628	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
		EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159571)							
EP2308706-004	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308710-004	0960_QC121_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159573)									



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5159573) - continued									
EP2308710-014	0960_SS291_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308710-024	0960_SD303_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159571)									
EP2308706-004	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308710-004	0960_QC121_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159571) - continued									
EP2308710-004	0960_QC121_230628	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5159573)									
EP2308710-014	0960_SS291_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP2308710-024	0960_SD303_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159571)									
EP2308706-004	Anonymous	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0016	0.0018	11.8	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0016	0.0018	11.8	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0016	0.0018	11.8	No Limit
EP2308710-004	0960_QC121_230628	EP231X: Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5159573)									
EP2308710-014	0960_SS291_230628	EP231X: Sum of PFAS	----	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2308710-024	0960_SD303_230628	EP231X: Sum of PFAS	----	0.0002	mg/kg	0.0109	0.0100	8.6	0% - 20%
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0104	0.0094	10.1	0% - 20%
		EP231X: Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0104	0.0094	10.1	0% - 20%



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159571)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0011 mg/kg	107	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	103	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	114	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	102	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0012 mg/kg	106	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159573)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.0011 mg/kg	103	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	97.4	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	115	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	113	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.0012 mg/kg	97.9	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159571)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	102	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.0	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00125 mg/kg	108	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159573)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	128	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.8	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	71.0	131



Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159573) - continued								
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	106	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.4	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00125 mg/kg	100	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159571)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.0	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	113	59.6	143
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	62.8	140
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	100	61.5	139
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	61.9	139
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.4	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159573)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	127	59.6	143
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	105	62.8	140
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	107	61.5	139
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	103	61.9	139
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	104	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159571)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00117 mg/kg	109	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00118 mg/kg	108	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.0012 mg/kg	118	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.0012 mg/kg	108	54.8	124

Matrix Spike (MS) Report

Sub-Matrix: SOIL

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159571)							
EP2308706-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0011 mg/kg	94.5	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00117 mg/kg	108	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00118 mg/kg	95.7	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	108	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	114	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0012 mg/kg	106	59.0	134
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5159573)							
EP2308710-015	0960_SS292_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0011 mg/kg	102	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00117 mg/kg	119	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00118 mg/kg	108	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	126	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	116	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0012 mg/kg	108	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159571)							



Sub-Matrix: SOIL

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159571) - continued							
EP2308706-005	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	99.6	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	96.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	98.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	102	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	106	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	105	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	101	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	100.0	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	106	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.00125 mg/kg	107	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00125 mg/kg	101	69.0	133
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5159573)							
EP2308710-015	0960_SS292_230628	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	118	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	105	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	96.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	104	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	102	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	102	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	94.8	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	100	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	92.0	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.00125 mg/kg	96.4	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00125 mg/kg	103	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159571)							
EP2308706-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	92.8	48.0	128
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	115	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	94.5	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	102	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	106	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	108	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	100	61.0	139
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159573)							
EP2308710-015	0960_SS292_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	98.0	48.0	128



Sub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5159573) - continued							
EP2308710-015	0960_SS292_230628	EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	104	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	96.1	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	102	60.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	100	60.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	100	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	106	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159571)							
EP2308706-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	107	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00118 mg/kg	105	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	116	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0012 mg/kg	121	60.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5159573)							
EP2308710-015	0960_SS292_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	107	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00118 mg/kg	104	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	110	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0012 mg/kg	111	60.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2308710	Page	: 1 of 6
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Site	: Learmonth SD - MB	Issue Date	: 12-Jul-2023
Sampler	: [REDACTED]	No. of samples received	: 24
Order number	: pfas-omp Learmonth	No. of samples analysed	: 24

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: SOIL

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055)	28-Jun-2023	----	----	----	10-Jul-2023	12-Jul-2023	✓	
0960_SS234_230628,								0960_QC119_230628,
0960_SS265_230628,								0960_QC121_230628,
0960_SS108_230628,								0960_SS231_230628,
0960_SS114_230628,								0960_SS113_230628,
0960_SS122_230628,								0960_SS124_230628,
0960_SS277_230628,								0960_SS125_230628,
0960_SS278_230628,								0960_SS291_230628,
0960_SS292_230628,								0960_SS293_230628,
0960_SS198_230628,								0960_SD210_230628,
0960_SD302_230628,								0960_SD209_230628,
0960_SD211_230628,								0960_SD300_230628,
0960_SD301_230628,								0960_SD303_230628
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)	28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓	
0960_SS234_230628,								0960_QC119_230628,
0960_SS265_230628,								0960_QC121_230628,
0960_SS108_230628,								0960_SS231_230628,
0960_SS114_230628,								0960_SS113_230628,
0960_SS122_230628,								0960_SS124_230628,
0960_SS277_230628,								0960_SS125_230628,
0960_SS278_230628,								0960_SS291_230628,
0960_SS292_230628,								0960_SS293_230628,
0960_SS198_230628,								0960_SD210_230628,
0960_SD302_230628,								0960_SD209_230628,
0960_SD211_230628,								0960_SD300_230628,
0960_SD301_230628,								0960_SD303_230628

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)		28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓
0960_SS234_230628,	0960_QC119_230628,							
0960_SS265_230628,	0960_QC121_230628,							
0960_SS108_230628,	0960_SS231_230628,							
0960_SS114_230628,	0960_SS113_230628,							
0960_SS122_230628,	0960_SS124_230628,							
0960_SS277_230628,	0960_SS125_230628,							
0960_SS278_230628,	0960_SS291_230628,							
0960_SS292_230628,	0960_SS293_230628,							
0960_SS198_230628,	0960_SD210_230628,							
0960_SD302_230628,	0960_SD209_230628,							
0960_SD211_230628,	0960_SD300_230628,							
0960_SD301_230628,	0960_SD303_230628							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X)		28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓
0960_SS234_230628,	0960_QC119_230628,							
0960_SS265_230628,	0960_QC121_230628,							
0960_SS108_230628,	0960_SS231_230628,							
0960_SS114_230628,	0960_SS113_230628,							
0960_SS122_230628,	0960_SS124_230628,							
0960_SS277_230628,	0960_SS125_230628,							
0960_SS278_230628,	0960_SS291_230628,							
0960_SS292_230628,	0960_SS293_230628,							
0960_SS198_230628,	0960_SD210_230628,							
0960_SD302_230628,	0960_SD209_230628,							
0960_SD211_230628,	0960_SD300_230628,							
0960_SD301_230628,	0960_SD303_230628							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X)		28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓
0960_SS234_230628,	0960_QC119_230628,							
0960_SS265_230628,	0960_QC121_230628,							
0960_SS108_230628,	0960_SS231_230628,							
0960_SS114_230628,	0960_SS113_230628,							
0960_SS122_230628,	0960_SS124_230628,							
0960_SS277_230628,	0960_SS125_230628,							
0960_SS278_230628,	0960_SS291_230628,							
0960_SS292_230628,	0960_SS293_230628,							
0960_SS198_230628,	0960_SD210_230628,							
0960_SD302_230628,	0960_SD209_230628,							
0960_SD211_230628,	0960_SD300_230628,							
0960_SD301_230628,	0960_SD303_230628							

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X)		28-Jun-2023	07-Jul-2023	25-Dec-2023	✓	12-Jul-2023	16-Aug-2023	✓
0960_SS234_230628,	0960_QC119_230628,							
0960_SS265_230628,	0960_QC121_230628,							
0960_SS108_230628,	0960_SS231_230628,							
0960_SS114_230628,	0960_SS113_230628,							
0960_SS122_230628,	0960_SS124_230628,							
0960_SS277_230628,	0960_SS125_230628,							
0960_SS278_230628,	0960_SS291_230628,							
0960_SS292_230628,	0960_SS293_230628,							
0960_SS198_230628,	0960_SD210_230628,							
0960_SD302_230628,	0960_SD209_230628,							
0960_SD211_230628,	0960_SD300_230628,							
0960_SD301_230628,	0960_SD303_230628							



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification .

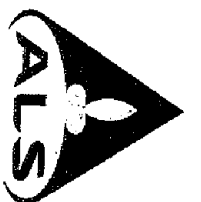
Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	3	24	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
QuEChERS Extraction of Solids	* ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.



Environmental Division
Perth
Work Order Reference
EP2308711



Telephone : -- 61-89406 1301

Custody Document for Submissions via ALS Compass App

Project: WA - D960 - PERSONAL-23 Client: Stantec

Project Manager:

Phone:

ALS Compass COC Reference: 514041, 514060 # Samples:

514080, 514064, 514065, 514063, 514068, 514072, 514082, 514074

Sampler:

Phone:

Turnaround Requirements: Standard

Special Instructions:

Custody:

Relinquished by:	Received by:	Relinquished by:	Received by:
Date / Time: <u>28/6/23</u>	Date / Time: <u>30/6</u>	Date / Time:	Date / Time:
	<u>11am</u>		

Right Solutions - Right Partner

alsglobal.com/als-compass

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSOMP_23

SITE: Learmonth SW/OTH - JS

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / Frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

CONTACT PH:

QUOTE NO: SY139/19 B

SAMPLER MOBILE

/ ES2022MWHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_OTH132		28/06/2023 01:21 PM	WATER	ALS: 3 Non ALS: 0	No	X		
002	0960_OTH134		28/06/2023 01:41 PM	WATER	ALS: 3 Non ALS: 0	No	X		
003	0960_OTH129		28/06/2023 02:49 PM	WATER	ALS: 3 Non ALS: 0	No	X		

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFSAMP_23

SITE: Learmonth SW/OTH - JS

ORDER NO: pfs-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard Info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
C

CONTACT PH:

QUOTE NO: SY/139/19 B

SAMPLER MOBILE:

/ ES2022MWHAUS0002

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_OTH132	Clear Plastic Bottle - Natural	125 mL	00070522162812	Green	No	
001	0960_OTH132	HDPE (no PTFE)	20 mL	00350821001833	Grey	No	
001	0960_OTH132	HDPE (no PTFE)	20 mL	00350821001692	Grey	No	
002	0960_OTH134	Clear Plastic Bottle - Natural	125 mL	00070522145189	Green	No	
002	0960_OTH134	HDPE (no PTFE)	20 mL	00350821001978	Grey	No	
003	0960_OTH129	HDPE (no PTFE)	20 mL	00350821001792	Grey	No	
003	0960_OTH129	HDPE (no PTFE)	20 mL	00350522043053	Grey	No	
003	0960_OTH129	Clear Plastic Bottle - Natural	125 mL	00070522144944	Green	No	

Total Bottle Count: ALS: 9, Non ALS: 0



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2308711

Client : STANTEC AUSTRALIA PTY LTD
Contact :
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : Customer Services EP
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail :
Telephone :
Facsimile :

E-mail : ALSEnviro.Perth@alsglobal.com
Telephone :
Facsimile :

Project : WA_0960_PFASOMP_23
Order number : pfas-omp Learmonth
C-O-C number : 54094
Site : Learmonth SW/OTH - JS
Sampler :

Page : 1 of 2
Quote number : ES2022MWAUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 30-Jun-2023 11:00
Client Requested Due : 12-Jul-2023
Date :

Issue Date : 03-Jul-2023
Scheduled Reporting Date : **12-Jul-2023**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 4
Receipt Detail :

Security Seal : Not Available
Temperature : 8.0 - Ice present
No. of samples received / analysed : 3 / 3

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO ₄ , Alkalinity
EP2308711-001	28-Jun-2023 13:21	0960_OTH132_230628	✓	✓
EP2308711-002	28-Jun-2023 13:41	0960_OTH134_230628	✓	✓
EP2308711-003	28-Jun-2023 14:49	0960_OTH129_230628	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

██████████	- A4 - AU Tax Invoice (INV)	Email	██████████cardno.com.au
DERP LAB REPORTS			
██████████	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
	- EDI Format - ESDAT (ESDAT)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████
██████████	- *AU Certificate of Analysis - NATA (COA)	Email	██████████
	- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	██████████
	- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	██████████
	- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	██████████
	- Chain of Custody (CoC) (COC)	Email	██████████
	- EDI Format - ESDAT (ESDAT)	Email	██████████
	- EDI Format - XTab (XTAB)	Email	██████████



CERTIFICATE OF ANALYSIS

Work Order	: EP2308711	Page	: 1 of 6
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023 11:00
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 54094	Issue Date	: 13-Jul-2023 10:40
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SW/OTH - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 3		
No. of samples analysed	: 3		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_OTH132_23062 8	0960_OTH134_23062 8	0960_OTH129_23062 8	----	----
Sampling date / time				28-Jun-2023 13:21	28-Jun-2023 13:41	28-Jun-2023 14:49	----	----
Compound	CAS Number	LOR	Unit	EP2308711-001	EP2308711-002	EP2308711-003	-----	-----
Result				Result	Result	Result	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	6	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	149	142	113	----	----
Total Alkalinity as CaCO3	----	1	mg/L	149	142	120	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2650	2800	2800	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	17900	19300	19900	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	482	494	524	----	----
Magnesium	7439-95-4	1	mg/L	1590	1600	1720	----	----
Sodium	7440-23-5	1	mg/L	11800	11800	13000	----	----
Potassium	7440-09-7	1	mg/L	611	645	685	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	563	606	622	----	----
∅ Total Cations	----	0.01	meq/L	684	686	751	----	----
∅ Ionic Balance	----	0.01	%	9.68	6.24	9.37	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_OTH132_23062 8	0960_OTH134_23062 8	0960_OTH129_23062 8	----	----
Sampling date / time				28-Jun-2023 13:21	28-Jun-2023 13:41	28-Jun-2023 14:49	----	----
Compound	CAS Number	LOR	Unit	EP2308711-001	EP2308711-002	EP2308711-003	-----	-----
				Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_OTH132_23062 8	0960_OTH134_23062 8	0960_OTH129_23062 8	----	----
Sampling date / time				28-Jun-2023 13:21	28-Jun-2023 13:41	28-Jun-2023 14:49	----	----
Compound	CAS Number	LOR	Unit	EP2308711-001	EP2308711-002	EP2308711-003	-----	-----
				Result	Result	Result	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	93.9	112	102	----	----
13C8-PFOA	----	0.02	%	99.4	99.0	99.3	----	----



Surrogate Control Limits

Sub-Matrix: SURFACE WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133



QUALITY CONTROL REPORT

Work Order	: EP2308711	Page	: 1 of 11
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 54094	Issue Date	: 13-Jul-2023
Sampler	: [REDACTED] [REDACTED]		
Site	: Learmonth SW/OTH - JS		
Quote number	: SY/139/19 B		
No. of samples received	: 3		
No. of samples analysed	: 3		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 5151276)									
EP2308708-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	20	19	0.0	0% - 50%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	767	770	0.3	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	787	789	0.2	0% - 20%
EP2308709-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	185	189	2.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	185	189	2.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 5155950)									
EP2308711-003	0960_OTH129_230628	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	6	7	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	113	113	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	120	120	0.0	0% - 20%
EP2308842-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	892	893	0.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	892	893	0.2	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5148895)									
EP2308611-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2310	2300	0.6	0% - 20%
EP2308702-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2310	2350	1.5	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5148896)									
EP2308611-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	15300	15000	1.8	0% - 20%
EP2308702-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	21800	21800	0.2	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 5148268)									
EP2308711-001	0960_OTH132_230628	ED093F: Calcium	7440-70-2	1	mg/L	482	480	0.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1590	1580	0.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11800	11700	0.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	611	609	0.4	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164561)									
EP2308709-007	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164561)									
EP2308709-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164561) - continued									
EP2308709-007	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164561)									
EP2308709-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.09	0.07	21.8	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit

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 Work Order : EP2308711
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP_23



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164561)									
EP2308709-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.09	0.07	25.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	0.09	0.07	25.0	No Limit
EP231P: PFAS Sums (QC Lot: 5164561)									
EP2308709-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED037P: Alkalinity by PC Titrator (QCLot: 5151276)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	99.6	87.8	118
				<1	200 mg/L	102	87.8	118
ED037P: Alkalinity by PC Titrator (QCLot: 5155950)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	95.1	87.8	118
				<1	200 mg/L	97.6	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148895)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.7	89.9	112
				<1	500 mg/L	92.6	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 5148896)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	99.5	88.6	113
				<1	1000 mg/L	95.2	88.6	113
ED093F: Dissolved Major Cations (QCLot: 5148268)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.6	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.8	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.1	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.5	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164560)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	110	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	99.9	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	99.7	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	98.5	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	99.4	53.0	142



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164561)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	98.7	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	105	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	106	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	110	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	102	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	108	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164560)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	105	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	94.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	101	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164561)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	112	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	91.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	87.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	105	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	99.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	112	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	92.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	102	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	105	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164560)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	99.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	112	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	100	60.5	138



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164560) - continued								
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.0	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	102	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	118	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	103	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164561)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	99.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	114	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	74.7	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	98.2	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	96.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	101	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164560)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	109	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	105	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	114	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	102	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164561)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	110	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	112	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	107	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	104	64.2	133
EP231P: PFAS Sums (QCLot: 5164560)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5164561)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231P: PFAS Sums (QCLot: 5164561) - continued								
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5148895)							
EP2308611-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 5148896)							
EP2308611-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164560)							
EP2308709-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	100.0	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	103	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	94.1	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	95.0	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	91.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	101	53.0	129
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164561)							
EP2308711-002	0960_OTH134_230628	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	95.8	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	99.6	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	96.3	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	104	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	106	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	94.4	53.0	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164560)							
EP2308709-006	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	97.4	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	89.7	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	94.8	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	98.6	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	90.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	102	69.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164560) - continued							
EP2308709-006	Anonymous	EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	94.6	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	95.4	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	93.2	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	93.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	100	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164561)							
EP2308711-002	0960_OTH134_230628	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	110	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	108	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	88.2	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	93.8	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	85.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	101	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	101	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	113	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	89.2	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	91.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	101	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164560)							
EP2308709-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	90.6	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	127	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	95.2	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	94.0	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	89.6	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	108	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	88.8	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164561)							
EP2308711-002	0960_OTH134_230628	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	105	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	102	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	70.6	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	73.8	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	102	70.0	130



Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164561) - continued							
EP2308711-002	0960_OTH134_230628	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	102	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	106	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164560)							
EP2308709-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	97.7	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	90.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	104	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	105	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164561)							
EP2308711-002	0960_OTH134_230628	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	100	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	99.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	112	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	118	70.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2308711	Page	: 1 of 5
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023
Site	: Learmonth SW/OTH - JS	Issue Date	: 13-Jul-2023
Sampler	: [REDACTED] [REDACTED]	No. of samples received	: 3
Order number	: pfas-omp Learmonth	No. of samples analysed	: 3

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.

Page : 2 of 5
 Work Order : EP2308711
 Client : STANTEC AUSTRALIA PTY LTD
 Project : WA_0960_PFASOMP_23



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2308611--001	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EP2308611--001	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue	
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural 0960_OTH132_230628, 0960_OTH129_230628		0960_OTH134_230628,	----	----	----	06-Jul-2023	05-Jul-2023	1

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Method	2				
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	21	9.52	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) 0960_OTH132_230628, 0960_OTH134_230628	28-Jun-2023	----	----	----	04-Jul-2023	12-Jul-2023	✔
Clear Plastic Bottle - Natural (ED037-P) 0960_OTH129_230628	28-Jun-2023	----	----	----	06-Jul-2023	12-Jul-2023	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) 0960_OTH132_230628, 0960_OTH129_230628	0960_OTH134_230628,	28-Jun-2023	----	----	----	08-Jul-2023	26-Jul-2023	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 0960_OTH129_230628		28-Jun-2023	----	----	----	08-Jul-2023	26-Jul-2023	✓
Clear Plastic Bottle - Natural (ED045G) 0960_OTH132_230628,	0960_OTH134_230628	28-Jun-2023	----	----	----	10-Jul-2023	26-Jul-2023	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) 0960_OTH132_230628, 0960_OTH129_230628	0960_OTH134_230628,	28-Jun-2023	----	----	----	06-Jul-2023	05-Jul-2023	✗
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_OTH132_230628,	0960_OTH134_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	11-Jul-2023	25-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0960_OTH129_230628		28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	13-Jul-2023	25-Dec-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) 0960_OTH132_230628,	0960_OTH134_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	11-Jul-2023	25-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0960_OTH129_230628		28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	13-Jul-2023	25-Dec-2023	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) 0960_OTH132_230628,	0960_OTH134_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	11-Jul-2023	25-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0960_OTH129_230628		28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	13-Jul-2023	25-Dec-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_OTH132_230628,	0960_OTH134_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	11-Jul-2023	25-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0960_OTH129_230628		28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	13-Jul-2023	25-Dec-2023	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0960_OTH132_230628,	0960_OTH134_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	11-Jul-2023	25-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0960_OTH129_230628		28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	13-Jul-2023	25-Dec-2023	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	21	9.52	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



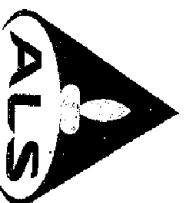
Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	* ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



Custody Document for Submissions via ALS Compass App



Environmental Division
Perth
Work Order Reference
EP2308712



Telephone : 61-8-9406 1301

Project: WA - 0960 - P4K5040-23

Client: Stantec

Stantec

Project Manager

Phone:

ALS Compass COC Reference: 54094, 54069 # Samples:

54080, 54064, 54065, 54063, 54068, 54072, 54062, 54074

Turnaround Requirements:

Standard

Special Instructions:

Custody:

Relinquished by:



Received by:



Relinquished by:

Received by:

Date / Time:

28/6/23

Date / Time:

30/6

11am

Date / Time:

Date / Time:

Right Solutions - Right Partner

alsglobal.com/als-compass

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFASOMP_23

SITE: Learmonth SW/OTH - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days

Biohazard info:

LABORATORY USE ONLY (Circle)

Custody Seal intact?

Free ice / frozen ice bricks present upon receipt?

Random Sample Temperature on Receipt:

Other comments:

Yes No N/A
Yes No N/A
°C

CONTACT PH: [REDACTED]

SAMPLER MOBILE: [REDACTED]

QUOTE NO: SY/139/19 B

/ ES2022MWHAUS0002

SAMPLE DETAILS

ANALYSIS REQUIRED

SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Rinsate WATER	WA OMP Water Suite WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0960_SW210		28/06/2023 02:02 PM	WATER	ALS: 3 Non ALS: 0	No		X		
002	0960_QC127		28/06/2023 02:03 PM	WATER	ALS: 4 Non ALS: 0	No	X			
003	0960_SW302		28/06/2023 02:19 PM	WATER	ALS: 3 Non ALS: 0	No		X		Extra PFAS bottles for lab W/C
004	0960_SW209		28/06/2023 02:30 PM	WATER	ALS: 3 Non ALS: 0	No		X		
005	0960_SW211		28/06/2023 02:44 PM	WATER	ALS: 3 Non ALS: 0	No		X		
006	0960_SW300		28/06/2023 02:56 PM	WATER	ALS: 3 Non ALS: 0	No		X		
007	0960_SW001		28/06/2023 03:07 PM	WATER	ALS: 3 Non ALS: 0	No		X		
008	0960_SW303		28/06/2023 03:23 PM	WATER	ALS: 3 Non ALS: 0	No		X		

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0960_PFA5OMP_23

SITE: Learmonth SW/OTH - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:
DATE TIME:

RECEIVED BY:
DATE TIME:

TURNAROUND REQUIREMENTS: 5 Days
Biohazard Info:

LABORATORY USE ONLY (Circle)

CONTACT PH: [REDACTED]
QUOTE NO: SY139/19 B

SAMPLER MOBILE: [REDACTED]
/ ES2022MWHAUS0002

Custody Seal intact? Yes No N/A
Free Ice / frozen ice bricks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comments:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0960_SW210	Clear Plastic Bottle - Natural	125 mL	00071121129620	Green	No	
001	0960_SW210	HDPE (no PTFE)	20 mL	00350822000464	Grey	No	
001	0960_SW210	HDPE (no PTFE)	20 mL	00350822000446	Grey	No	
002	0960_QC127	HDPE (no PTFE)	20 mL	00352005006772	Grey	No	
002	0960_QC127	HDPE (no PTFE)	20 mL	00352005020547	Grey	No	
002	0960_QC127	HDPE (no PTFE)	20 mL	00352005019741	Grey	No	
003	0960_SW302	HDPE (no PTFE)	20 mL	00352005019721	Grey	No	
003	0960_SW302	HDPE (no PTFE)	20 mL	00350822000507	Grey	No	
003	0960_SW302	HDPE (no PTFE)	20 mL	00350822000359	Grey	No	
004	0960_SW209	Clear Plastic Bottle - Natural	125 mL	00071121129648	Green	No	
004	0960_SW209	HDPE (no PTFE)	20 mL	00350822000615	Grey	No	
004	0960_SW209	HDPE (no PTFE)	20 mL	00350822000689	Grey	No	
005	0960_SW211	Clear Plastic Bottle - Natural	125 mL	00071121129743	Green	No	
005	0960_SW211	HDPE (no PTFE)	20 mL	00350822000838	Grey	No	
005	0960_SW211	HDPE (no PTFE)	20 mL	00350822000335	Grey	No	
006	0960_SW300	Clear Plastic Bottle - Natural	125 mL	00071121129680	Green	No	
006	0960_SW300	HDPE (no PTFE)	20 mL	00350822000504	Grey	No	
006	0960_SW300	HDPE (no PTFE)	20 mL	00350822000524	Grey	No	
007	0960_SW001	Clear Plastic Bottle - Natural	125 mL	00071121129737	Green	No	
007	0960_SW001	HDPE (no PTFE)	20 mL	00071121129711	Green	No	
008	0960_SW303	HDPE (no PTFE)	20 mL	00350822000349	Grey	No	
008	0960_SW303	HDPE (no PTFE)	20 mL	00350822000353	Grey	No	
008	0960_SW303	HDPE (no PTFE)	20 mL	00350822000571	Grey	No	
008	0960_SW303	Clear Plastic Bottle - Natural	125 mL	00071121129809	Green	No	

CHAIN OF CUSTODY



COC#: 54098

ALS Laboratory: EP Perth

CLIENT:

MWHHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT:

WA_0960_PFASOMP_23

SITE:

Learmonth SW/OTH - MB

ORDER NO: pfas-omp Learmonth

PROJECT MANAGER:

PRIMARY SAMPLER:

EMAIL REPORTS TO:

EMAIL INVOICES TO:

RELINQUISHED BY:

RECEIVED BY:

RELINQUISHED BY:

RECEIVED BY:

DATE TIME:

DATE TIME:

DATE TIME:

DATE TIME:

TURNAROUND REQUIREMENTS : 5 Days

LABORATORY USE ONLY (Circle)

Biohazard Info:

Custody Seal intact?

Yes No N/A

Free ice / frozen ice bricks present upon receipt?

Yes No N/A

Random Sample Temperature on Receipt:

°C

Other comments:

CONTACT PH:

SAMPLER MOBILE

QUOTE NO: SY/139/19 B

/ ES2022MWHHAUS0002

Total Bottle Count: ALS: 25, Non ALS: 0



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2308712

Amendment : 1

Client : STANTEC AUSTRALIA PTY LTD
Contact :
Address : GROUND FLOOR 226 ADELAIDE
TERRACE
PERTH 6000

Laboratory : Environmental Division Perth
Contact : Customer Services EP
Address : 26 Rigali Way Wangara WA Australia
6065

E-mail :
Telephone :
Facsimile :

E-mail : ALSEnviro.Perth@alsglobal.com
Telephone :
Facsimile :

Project : WA_0960_PFASOMP_23
Order number : pfas-omp Learmonth
C-O-C number : 54098
Site : Learmonth SW/OTH - MB
Sampler :

Page : 1 of 2
Quote number : ES2022MWHAUS0002 (SY/139/19 B)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 30-Jun-2023 11:00
Client Requested Due : 12-Jul-2023
Date

Issue Date : 13-Jul-2023
Scheduled Reporting Date : **12-Jul-2023**

Delivery Details

Mode of Delivery : Carrier
No. of coolers/boxes : 4
Receipt Detail :

Security Seal : Not Available
Temperature : 8.0 - Ice present
No. of samples received / analysed : 8 / 8

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- Please see scanned COC for sample discrepancies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- **pH analysis should be conducted within 6 hours of sampling.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X PFAS - Full Suite (28 analytes)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EP2308712-001	28-Jun-2023 14:02	0960_SW210_230628	✓	✓
EP2308712-002	28-Jun-2023 14:03	0960_QC127_230628	✓	
EP2308712-003	28-Jun-2023 14:19	0960_SW302_230628	✓	✓
EP2308712-004	28-Jun-2023 14:30	0960_SW209_230628	✓	✓
EP2308712-005	28-Jun-2023 14:44	0960_SW211_230628	✓	✓
EP2308712-006	28-Jun-2023 14:56	0960_SW300_230628	✓	✓
EP2308712-007	28-Jun-2023 15:07	0960_SW001_230628	✓	✓
EP2308712-008	28-Jun-2023 15:23	0960_SW303_230628	✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

- A4 - AU Tax Invoice (INV)

Email [REDACTED]@cardno.com.au

DERP LAB REPORTS

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

Email [REDACTED]
Email [REDACTED]
Email [REDACTED]
Email [REDACTED]
Email [REDACTED]
Email [REDACTED]
Email [REDACTED]

- *AU Certificate of Analysis - NATA (COA)
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)
- Chain of Custody (CoC) (COC)
- EDI Format - ESDAT (ESDAT)
- EDI Format - XTab (XTAB)

Email [REDACTED]
Email [REDACTED]
Email [REDACTED]
Email [REDACTED]
Email [REDACTED]
Email [REDACTED]
Email [REDACTED]



CERTIFICATE OF ANALYSIS

Work Order	: EP2308712	Page	: 1 of 9
Amendment	: 1		
Client	: STANTEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Perth
Contact	: [REDACTED]	Contact	: Customer Services EP
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: [REDACTED]
Project	: WA_0960_PFASOMP_23	Date Samples Received	: 30-Jun-2023 11:00
Order number	: pfas-omp Learmonth	Date Analysis Commenced	: 04-Jul-2023
C-O-C number	: 54098	Issue Date	: 13-Jul-2023 14:09
Sampler	: [REDACTED]		
Site	: Learmonth SW/OTH - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 8		
No. of samples analysed	: 8		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO₂ and Fluoride to the Anions.
- Amendment (13/07/2023): This report has been amended as a result of misinterpretation of sample identification numbers (IDs) for all samples in EP2308712. All analysis results are as per the previous report.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW210_230628	0960_QC127_230628	0960_SW302_230628	0960_SW209_230628	0960_SW211_230628
Sampling date / time				28-Jun-2023 14:02	28-Jun-2023 14:03	28-Jun-2023 14:19	28-Jun-2023 14:30	28-Jun-2023 14:44
Compound	CAS Number	LOR	Unit	EP2308712-001	EP2308712-002	EP2308712-003	EP2308712-004	EP2308712-005
				Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	----	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	----	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	224	----	209	230	230
Total Alkalinity as CaCO ₃	----	1	mg/L	224	----	209	230	230
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	3320	----	3110	2990	4570
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	23100	----	21600	20900	28000
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	606	----	574	568	757
Magnesium	7439-95-4	1	mg/L	1960	----	1840	1780	2440
Sodium	7440-23-5	1	mg/L	14600	----	13700	13200	18500
Potassium	7440-09-7	1	mg/L	758	----	704	684	894
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	725	----	678	656	890
∅ Total Cations	----	0.01	meq/L	846	----	794	766	1070
∅ Ionic Balance	----	0.01	%	7.69	----	7.86	7.74	9.03
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	0.06
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW210_230628	0960_QC127_230628	0960_SW302_230628	0960_SW209_230628	0960_SW211_230628
Sampling date / time				28-Jun-2023 14:02	28-Jun-2023 14:03	28-Jun-2023 14:19	28-Jun-2023 14:30	28-Jun-2023 14:44
Compound	CAS Number	LOR	Unit	EP2308712-001	EP2308712-002	EP2308712-003	EP2308712-004	EP2308712-005
				Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0960_SW210_230628	0960_QC127_230628	0960_SW302_230628	0960_SW209_230628	0960_SW211_230628
Sampling date / time					28-Jun-2023 14:02	28-Jun-2023 14:03	28-Jun-2023 14:19	28-Jun-2023 14:30	28-Jun-2023 14:44
Compound	CAS Number	LOR	Unit		EP2308712-001	EP2308712-002	EP2308712-003	EP2308712-004	EP2308712-005
				Result	Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	0.06
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	0.06
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	<0.01	0.06
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		107	123	97.9	99.0	104
13C8-PFOA	----	0.02	%		95.8	93.7	105	96.7	99.9



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW300_230628	0960_SW001_230628	0960_SW303_230628	----	----
Sampling date / time				28-Jun-2023 14:56	28-Jun-2023 15:07	28-Jun-2023 15:23	----	----
Compound	CAS Number	LOR	Unit	EP2308712-006	EP2308712-007	EP2308712-008	-----	-----
				Result	Result	Result	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	----	----
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	----	----
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	278	252	206	----	----
Total Alkalinity as CaCO ₃	----	1	mg/L	278	252	206	----	----
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	4350	3550	3000	----	----
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	29900	25000	21300	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	773	643	548	----	----
Magnesium	7439-95-4	1	mg/L	2580	2080	1750	----	----
Sodium	7440-23-5	1	mg/L	19000	15400	13100	----	----
Potassium	7440-09-7	1	mg/L	1020	796	679	----	----
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	940	784	667	----	----
∅ Total Cations	----	0.01	meq/L	1100	893	758	----	----
∅ Ionic Balance	----	0.01	%	8.02	6.52	6.39	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----



Analytical Results

Sub-Matrix: SURFACE WATER
 (Matrix: WATER)

Sample ID

				0960_SW300_230628	0960_SW001_230628	0960_SW303_230628	----	----
Sampling date / time				28-Jun-2023 14:56	28-Jun-2023 15:07	28-Jun-2023 15:23	----	----
Compound	CAS Number	LOR	Unit	EP2308712-006	EP2308712-007	EP2308712-008	-----	-----
				Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	----	----



Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0960_SW300_230628	0960_SW001_230628	0960_SW303_230628	----	----
Sampling date / time					28-Jun-2023 14:56	28-Jun-2023 15:07	28-Jun-2023 15:23	----	----
Compound	CAS Number	LOR	Unit		EP2308712-006	EP2308712-007	EP2308712-008	-----	-----
				Result	Result	Result		----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		0.01	<0.01	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		0.01	<0.01	<0.01	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		102	92.0	99.6	----	----
13C8-PFOA	----	0.02	%		99.6	102	100	----	----



Surrogate Control Limits

Sub-Matrix: SURFACE WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	65	140
13C8-PFOA	----	71	133



QUALITY CONTROL REPORT

Work Order : EP2308712

Page : 1 of 11

Amendment : 1

Client : STANTEC AUSTRALIA PTY LTD

Contact : [REDACTED]

Address : GROUND FLOOR 226 ADELAIDE TERRACE
PERTH 6000

Telephone : ----

Project : WA_0960_PFASOMP_23

Order number : pfas-omp Learmonth

C-O-C number : 54098

Sampler : [REDACTED]

Site : Learmonth SW/OTH - MB

Quote number : SY/139/19 B

No. of samples received : 8

No. of samples analysed : 8

Laboratory : Environmental Division Perth

Contact : Customer Services EP

Address : 26 Rigali Way Wangara WA Australia 6065

Telephone : [REDACTED]

Date Samples Received : 30-Jun-2023

Date Analysis Commenced : 04-Jul-2023

Issue Date : 13-Jul-2023



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
[REDACTED]	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
[REDACTED]	Inorganics Analyst	Perth Inorganics, Wangara, WA
[REDACTED]	Senior Organic Chemist	Perth Organics, Wangara, WA



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key :
 Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **WATER**

Sub-Matrix: WATER

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 5155950)									
EP2308711-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	6	7	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	113	113	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	120	120	0.0	0% - 20%
EP2308842-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	892	893	0.2	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	892	893	0.2	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5160031)									
EP2308712-001	0960_SW210_230628	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3320	3290	1.1	0% - 20%
EP2309093-007	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	56	55	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 5160032)									
EP2308712-001	0960_SW210_230628	ED045G: Chloride	16887-00-6	1	mg/L	23100	23600	1.9	0% - 20%
EP2309093-007	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	378	373	1.5	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 5148268)									
EP2308711-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	482	480	0.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1590	1580	0.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11800	11700	0.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	611	609	0.4	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164560) - continued									
EP2308709-002	Anonymous	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5164561)									
EP2308709-007	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 5164561)									
EP2308709-007	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164560) - continued									
EP2308709-002	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 5164561)									
EP2308709-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	<0.02	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	0.09	0.07	21.8	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164561)									
EP2308709-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	0.0	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 5164561) - continued									
EP2308709-007	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 5164560)									
EP2308709-002	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.09	0.07	25.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	0.09	0.07	25.0	No Limit
EP231P: PFAS Sums (QC Lot: 5164561)									
EP2308709-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	<0.01	<0.01	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit



Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
ED037P: Alkalinity by PC Titrator (QCLot: 5155950)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	95.1	87.8	118
				<1	200 mg/L	97.6	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5160031)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.6	89.9	112
				<1	500 mg/L	97.4	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 5160032)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	100	88.6	113
				<1	1000 mg/L	96.4	88.6	113
ED093F: Dissolved Major Cations (QCLot: 5148268)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.6	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.8	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.1	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.5	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164560)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	110	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	99.9	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	99.7	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	98.5	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	99.4	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164561)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.2218 µg/L	98.7	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.2352 µg/L	105	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.2373 µg/L	106	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.238 µg/L	110	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.232 µg/L	102	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.241 µg/L	108	53.0	142



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164560)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	105	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	99.4	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	99.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	108	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	97.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	106	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	101	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	94.4	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	101	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164561)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	112	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	102	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	93.6	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	91.8	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	87.0	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	105	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	99.4	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	112	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	92.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	102	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.25 µg/L	105	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164560)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	99.4	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	112	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	100	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.0	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	102	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	118	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	103	61.0	135



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164561)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	99.6	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	114	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	74.7	60.5	138
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	106	68.3	134
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	98.2	62.2	138
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	96.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	101	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164560)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	109	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	105	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	114	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	102	64.2	133
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164561)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.2343 µg/L	110	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.2378 µg/L	112	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	0.24 µg/L	107	67.0	138
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.241 µg/L	104	64.2	133
EP231P: PFAS Sums (QCLot: 5164560)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----
EP231P: PFAS Sums (QCLot: 5164561)								
EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.01	µg/L	<0.01	----	----	----	----
EP231X: Sum of PFAS (WA DER List)	----	0.01	µg/L	<0.01	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **WATER**

Matrix Spike (MS) Report



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5160031)							
EP2308712-001	0960_SW210_230628	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 5160032)							
EP2308712-001	0960_SW210_230628	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164560)							
EP2308709-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	100.0	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	103	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	94.1	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	95.0	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	91.4	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	101	53.0	129
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 5164561)							
EP2308711-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.2218 µg/L	95.8	72.0	129
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.232 µg/L	99.6	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.2352 µg/L	96.3	68.0	129
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.238 µg/L	104	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.232 µg/L	106	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.241 µg/L	94.4	53.0	129
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164560)							
EP2308709-006	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	97.4	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	89.7	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	94.8	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	98.6	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	90.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	102	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	94.6	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	95.4	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	93.2	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.25 µg/L	93.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	100	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164561)							
EP2308711-002	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	110	73.0	142
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	108	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	88.2	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	93.8	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	85.6	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	101	69.0	130



Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5164561) - continued							
EP2308711-002	Anonymous	EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	101	71.0	134
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	113	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	89.2	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	91.4	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.25 µg/L	101	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164560)							
EP2308709-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	90.6	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	127	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	95.2	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	94.0	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	89.6	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	108	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	88.8	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5164561)							
EP2308711-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	105	59.0	135
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	102	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	70.6	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	73.8	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	102	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	102	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	106	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164560)							
EP2308709-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	97.7	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	90.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	104	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	105	70.0	130
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164561)							
EP2308711-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.234 µg/L	100	63.0	143



Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5164561) - continued							
EP2308711-002	Anonymous	EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.2378 µg/L	99.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.24 µg/L	112	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.2415 µg/L	118	70.0	130



QA/QC Compliance Assessment to assist with Quality Review

Work Order : EP2308712

Page : 1 of 6

Amendment : 1

Client : STANTEC AUSTRALIA PTY LTD

Laboratory : Environmental Division Perth

Contact : [REDACTED]

Telephone : [REDACTED]

Project : WA_0960_PFASOMP_23

Date Samples Received : 30-Jun-2023

Site : Learmonth SW/OTH - MB

Issue Date : 13-Jul-2023

Sampler : [REDACTED]

No. of samples received : 8

Order number : pfas-omp Learmonth

No. of samples analysed : 8

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- Quality Control Sample Frequency Outliers exist - please see following pages for full details.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO ₄ 2- by DA	EP2308712--001	0960_SW210_230628	Sulfate as SO ₄ - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EP2308712--001	0960_SW210_230628	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
0960_SW210_230628,	0960_SW302_230628,	----	----	----	06-Jul-2023	05-Jul-2023	1
0960_SW209_230628,	0960_SW211_230628,						
0960_SW300_230628,	0960_SW001_230628,						
0960_SW303_230628							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	21	9.52	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) 0960_SW210_230628, 0960_SW209_230628, 0960_SW300_230628, 0960_SW303_230628	0960_SW302_230628, 0960_SW211_230628, 0960_SW001_230628,	28-Jun-2023	----	----	----	06-Jul-2023	12-Jul-2023	✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) 0960_SW210_230628, 0960_SW209_230628, 0960_SW300_230628, 0960_SW303_230628	0960_SW302_230628, 0960_SW211_230628, 0960_SW001_230628,	28-Jun-2023	----	----	----	11-Jul-2023	26-Jul-2023	✔
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) 0960_SW210_230628, 0960_SW209_230628, 0960_SW300_230628, 0960_SW303_230628	0960_SW302_230628, 0960_SW211_230628, 0960_SW001_230628,	28-Jun-2023	----	----	----	11-Jul-2023	26-Jul-2023	✔
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) 0960_SW210_230628, 0960_SW209_230628, 0960_SW300_230628, 0960_SW303_230628	0960_SW302_230628, 0960_SW211_230628, 0960_SW001_230628,	28-Jun-2023	----	----	----	06-Jul-2023	05-Jul-2023	✖
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_SW210_230628, 0960_SW211_230628,	0960_QC127_230628, 0960_SW303_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	11-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_SW302_230628, 0960_SW300_230628,	0960_SW209_230628, 0960_SW001_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	13-Jul-2023	25-Dec-2023	✔
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X) 0960_SW210_230628, 0960_SW211_230628,	0960_QC127_230628, 0960_SW303_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	11-Jul-2023	25-Dec-2023	✔
HDPE (no PTFE) (EP231X) 0960_SW302_230628, 0960_SW300_230628,	0960_SW209_230628, 0960_SW001_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✔	13-Jul-2023	25-Dec-2023	✔



Matrix: WATER Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X) 0960_SW210_230628, 0960_SW211_230628,	0960_QC127_230628, 0960_SW303_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	11-Jul-2023	25-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0960_SW302_230628, 0960_SW300_230628,	0960_SW209_230628, 0960_SW001_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	13-Jul-2023	25-Dec-2023	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X) 0960_SW210_230628, 0960_SW211_230628,	0960_QC127_230628, 0960_SW303_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	11-Jul-2023	25-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0960_SW302_230628, 0960_SW300_230628,	0960_SW209_230628, 0960_SW001_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	13-Jul-2023	25-Dec-2023	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X) 0960_SW210_230628, 0960_SW211_230628,	0960_QC127_230628, 0960_SW303_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	11-Jul-2023	25-Dec-2023	✓
HDPE (no PTFE) (EP231X) 0960_SW302_230628, 0960_SW300_230628,	0960_SW209_230628, 0960_SW001_230628	28-Jun-2023	11-Jul-2023	25-Dec-2023	✓	13-Jul-2023	25-Dec-2023	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	21	9.52	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	21	9.52	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by Auto Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO ₄ . Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ -2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm.
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Preparation Methods	Method	Matrix	Method Descriptions
Solid Phase Extraction (SPE) for PFAS in water	* ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



mgt

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Email: enquiries.melb@mgtlabmark.com.au

00903KBJ54

CHAIN OF CUSTODY RECORD**CLIENT DETAILS**

Page 1 of 1

Company Name : Stantec Australia	Contact Name : [REDACTED]	Purchase Order : PFAS-OMP 304700525	COC Number : AS-OMP 304700525 -02
Office Address : 226 Adelaide Tce, Perth, WA, 6000		PROJECT Number : WA_0960_PFASOMP_23	Eurofins mgt quote ID : NA
	Email for COC/SRN/Results : [REDACTED]	PROJECT Name : WA_0960_23_PFASOMP	Data output format: PDF; ESDAT

Special Directions & Comments :

Please send ESDat files to [REDACTED] with the project No in the header file

Please send email invoice to

[REDACTED]

Eurofins | mgt DI water batch number:

	Sample ID	Date	Matrix	PFAS																																		Containers:								Sample comments:																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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Relinquished By: Stantec	Received By: [REDACTED]	Turn around time	Method Of Shipment	Temperature on arrival:
Date & Time : 29/06/2023	Date & Time : 30/6/23 09:15 S-SC	1 DAY ☐ 2 DAY ☐ 3 DAY ☐	☒ Courier ☐ Hand Delivered ☐ Postal	Report number:
Signature:	Signature:	STANDARD ☒ Other:	Courier Consignment # : 00903KBJ54	1004396

Eurofins ARL Pty Ltd
Eurofins Environment Testing Australia Pty Ltd
Eurofins Environment Testing NZ Ltd

ABN: 91 05 0159 898

ABN: 50 005 085 521

NZBN: 9429046024954

Perth	Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
46-48 Banksia Road Welshpool WA 6106 Tel: +61 8 6253 4444 NATA# 2377 Site# 2370	6 Monterey Road Dandenong South VIC 3175 Tel: +61 3 8564 5000 NATA# 1261 Site# 1254	19/8 Lewalan Street Grovedale VIC 3216 Tel: +61 3 8564 5000 NATA# 1261 Site# 25403	179 Magowar Road Girraween NSW 2145 Tel: +61 2 9900 8400 NATA# 1261 Site# 18217	Unit 1,2 Dacre Street Mitchell ACT 2911 Tel: +61 2 6113 8091 NATA# 1261 Site# 25466	1/21 Smallwood Place Murarrie QLD 4172 Tel: +61 7 3902 4600 NATA# 1261 Site# 20794	1/2 Frost Drive Mayfield West NSW 2304 Tel: +61 2 4968 8448 NATA# 1261 Site# 25079 & 25289

Auckland	Christchurch
35 O'Rourke Road Penrose, Auckland 1061 Tel: +64 9 526 4551 IANZ# 1327	43 Detroit Drive Rolleston, Christchurch 7675 Tel: +64 3 343 5201 IANZ# 1290

Sample Receipt Advice

Company name: Stantec Australia Pty Ltd (WA)
Contact name: [REDACTED]
Project name: WA_0960_23_PFASOMP
Project ID: WA_0960_PFASOMP_23
Turnaround time: 5 Day
Date/Time received: Jun 30, 2023 9:15 AM
Eurofins reference: 1004396

Sample Information

- ✓ A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- ✓ All samples have been received as described on the above COC.
- ✓ COC has been completed correctly.
- ✓ Attempt to chill was evident.
- ✓ Appropriately preserved sample containers have been used.
- ✓ All samples were received in good condition.
- ✓ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ✓ Appropriate sample containers have been used.
- N/A Sample containers for volatile analysis received with zero headspace.
- ✗ Split sample sent to requested external lab.
- ✗ Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Notes

Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager:

[REDACTED] on phone : or by email: [REDACTED]

Results will be delivered electronically via email to [REDACTED] - [REDACTED]

Note: A copy of these results will also be delivered to the general Stantec Australia Pty Ltd (WA) email address.

**Eurofins ARL Pty Ltd**

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NATA# 2377 Site# 2370

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Girraween
NSW 2145
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NATA# 1261 Site# 18217

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Newcastle
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NATA# 1261
Site# 25079 & 25289

Eurofins Environment Testing NZ Ltd

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Christchurch 7675
Tel: +64 3 343 5201
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email: EnviroSales@eurofins.com

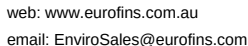
Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226, Adelaide Terrace
Perth
WA 6000
Project Name: WA_0960_23_PFASOMP
Project ID: WA_0960_PFASOMP_23

Order No.: PFAS-OMP 304700525
Report #: 1004396
Phone: [REDACTED]
Fax: [REDACTED]

Received: Jun 30, 2023 9:15 AM
Due: Jul 7, 2023
Priority: 5 Day
Contact Name: [REDACTED]

Eurofins Analytical Services Manager : [REDACTED]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)	PFAS (Full Suite) Soil
Perth Laboratory - NATA # 2377 Site # 2370						X		X
Melbourne Laboratory - NATA # 1261 Site # 1254							X	
External Laboratory								
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	0960_QC215_230628	Jun 28, 2023		Water	L23-JI0002351		X	
2	0960_QC216_230628	Jun 28, 2023		Water	L23-JI0002352		X	
3	0960_QC217_230628	Jun 28, 2023		Water	L23-JI0002353		X	
4	0960_QC218_230628	Jun 28, 2023		Soil	L23-JI0002354	X		X
5	0960_QC219_230628	Jun 28, 2023		Soil	L23-JI0002355	X		X
6	0960_QC220_230628	Jun 28, 2023		Water	L23-JI0002356		X	
7	0960_QC221_230628	Jun 28, 2023		Soil	L23-JI0002357	X		X



ABN: 91 05 0159 898

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Mayfield West NSW 2304
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Site# 25079 & 25289

NATA# 1261

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IANZ# 1327

Christchurch
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Rolleston,
Christchurch 7675
Tel: +64 3 343 5201
IANZ# 1290

Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226, Adelaide Terrace
Perth
WA 6000

Project Name: WA_0960_23_PFASOMP
Project ID: WA 0960 PFASOMP 23

Order No.: PFAS-OMP 304700525
Report #: 1004396
Phone: [REDACTED]
Fax: [REDACTED]

Received: Jun 30, 2023 9:15 AM
Due: Jul 7, 2023
Priority: 5 Day
Contact Name: [REDACTED]

Eurofins Analytical Services Manager : [REDACTED]

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)	PFAS (Full Suite) Soil
Perth Laboratory - NATA # 2377 Site # 2370						X		X
Melbourne Laboratory - NATA # 1261 Site # 1254							X	
External Laboratory								
8	0960_QC222_230628	Jun 28, 2023		Water	L23-JI0002358		X	
9	0960_QC223_230628	Jun 28, 2023		Water	L23-JI0002359		X	
10	0960_QC224_230628	Jun 28, 2023		Soil	L23-JI0002360	X		X
11	0960_QC225_230628	Jun 28, 2023		Water	L23-JI0002361		X	
12	0960_QC226_230628	Jun 28, 2023		Soil	L23-JI0002362	X		X
13	0960_QC227_230628	Jun 28, 2023		Water	L23-JI0002363		X	
Test Counts						5	8	5

Stantec Australia Pty Limited
6F 226, Adelaide Terrace
Perth
WA 6000



NATA Accredited
Accreditation Number 2377
Site Number 2370

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition
Arrangement for the mutual recognition of the
equivalence of testing, medical testing, calibration,
inspection, proficiency testing scheme providers and
reference materials producers reports and certificates.

Attention:

Report **1004396-S**
Project name **WA_0960_23_PFASOMP**
Project ID **WA_0960_PFASOMP_23**
Received Date **Jun 30, 2023**

Client Sample ID			0960_QC218_2 30628	0960_QC219_2 30628	0960_QC221_2 30628	0960_QC224_2 30628
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L23-JI0002354	L23-JI0002355	L23-JI0002357	L23-JI0002360
Date Sampled			Jun 28, 2023	Jun 28, 2023	Jun 28, 2023	Jun 28, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	3.9	3.9	5.3	32
Perfluoroalkyl carboxylic acids (PFCA's)						
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTeDA) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	93	108	90	69
13C5-PFPeA (surr.)	1	%	101	117	101	87
13C5-PFHxA (surr.)	1	%	105	125	107	93
13C4-PFHpA (surr.)	1	%	102	121	104	97
13C8-PFOA (surr.)	1	%	102	121	103	97
13C5-PFNA (surr.)	1	%	109	128	109	100
13C6-PFDA (surr.)	1	%	128	154	129	113
13C2-PFUnDA (surr.)	1	%	126	149	122	108
13C2-PFDoDA (surr.)	1	%	134	155	138	119
13C2-PFTeDA (surr.)	1	%	106	134	110	103
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10

Client Sample ID			0960_QC218_2 30628	0960_QC219_2 30628	0960_QC221_2 30628	0960_QC224_2 30628
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			L23-JI0002354	L23-JI0002355	L23-JI0002357	L23-JI0002360
Date Sampled			Jun 28, 2023	Jun 28, 2023	Jun 28, 2023	Jun 28, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
13C8-FOSA (surr.)	1	%	94	114	95	84
D3-N-MeFOSA (surr.)	1	%	100	116	100	89
D5-N-EtFOSA (surr.)	1	%	108	129	110	98
D7-N-MeFOSE (surr.)	1	%	110	129	105	90
D9-N-EtFOSE (surr.)	1	%	104	118	104	86
D5-N-EtFOSAA (surr.)	1	%	109	125	103	79
D3-N-MeFOSAA (surr.)	1	%	101	111	97	73
Perfluoroalkyl sulfonic acids (PFSA's)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	< 5	^{N09} 39	^{N09} 6.2	< 5
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	111	131	111	102
18O2-PFHxS (surr.)	1	%	108	131	108	109
13C8-PFOS (surr.)	1	%	102	116	104	95
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5	< 5	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	102	127	108	76
13C2-6:2 FTSA (surr.)	1	%	97	121	99	96
13C2-8:2 FTSA (surr.)	1	%	100	123	101	95
13C2-10:2 FTSA (surr.)	1	%	133	163	131	128
PFASs Summations						
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	39	6.2	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	39	6.2	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	39	6.2	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	39	< 10	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50	< 50	< 50

Client Sample ID			0960_QC226_2 30628
Sample Matrix			Soil
Eurofins Sample No.			L23-JI0002362
Date Sampled			Jun 28, 2023
Test/Reference	LOR	Unit	
Sample Properties			
% Moisture	1	%	20
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) ^{N11}	5	ug/kg	< 5
Perfluoropentanoic acid (PFPeA) ^{N11}	5	ug/kg	< 5
Perfluorohexanoic acid (PFHxA) ^{N11}	5	ug/kg	< 5
Perfluoroheptanoic acid (PFHpA) ^{N11}	5	ug/kg	< 5
Perfluorooctanoic acid (PFOA) ^{N11}	5	ug/kg	< 5
Perfluorononanoic acid (PFNA) ^{N11}	5	ug/kg	< 5
Perfluorodecanoic acid (PFDA) ^{N11}	5	ug/kg	< 5
Perfluoroundecanoic acid (PFUnDA) ^{N11}	5	ug/kg	< 5
Perfluorododecanoic acid (PFDoDA) ^{N11}	5	ug/kg	< 5
Perfluorotridecanoic acid (PFTeDA) ^{N15}	5	ug/kg	< 5
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	5	ug/kg	< 5
13C4-PFBA (surr.)	1	%	73
13C5-PFPeA (surr.)	1	%	93
13C5-PFHxA (surr.)	1	%	101
13C4-PFHpA (surr.)	1	%	103
13C8-PFOA (surr.)	1	%	106
13C5-PFNA (surr.)	1	%	112
13C6-PFDA (surr.)	1	%	125
13C2-PFUnDA (surr.)	1	%	124
13C2-PFDoDA (surr.)	1	%	130
13C2-PFTeDA (surr.)	1	%	115
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA) ^{N11}	5	ug/kg	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	5	ug/kg	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	5	ug/kg	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	5	ug/kg	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	5	ug/kg	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	10	ug/kg	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	10	ug/kg	< 10
13C8-FOSA (surr.)	1	%	101
D3-N-MeFOSA (surr.)	1	%	102
D5-N-EtFOSA (surr.)	1	%	114
D7-N-MeFOSE (surr.)	1	%	100
D9-N-EtFOSE (surr.)	1	%	92
D5-N-EtFOSAA (surr.)	1	%	84
D3-N-MeFOSAA (surr.)	1	%	77
Perfluoroalkyl sulfonic acids (PFSAAs)			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	5	ug/kg	< 5
Perfluorononanesulfonic acid (PFNS) ^{N15}	5	ug/kg	< 5
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	5	ug/kg	< 5
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	5	ug/kg	< 5
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	5	ug/kg	< 5
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	5	ug/kg	< 5

Client Sample ID			0960_QC226_2
Sample Matrix			Soil
Eurofins Sample No.			L23-JI0002362
Date Sampled			Jun 28, 2023
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonic acids (PFASs)			
Perfluorooctanesulfonic acid (PFOS) ^{N11}	5	ug/kg	< 5
Perfluorodecanesulfonic acid (PFDS) ^{N15}	5	ug/kg	< 5
13C3-PFBS (surr.)	1	%	123
18O2-PFHxS (surr.)	1	%	122
13C8-PFOS (surr.)	1	%	109
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	5	ug/kg	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	10	ug/kg	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	5	ug/kg	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	5	ug/kg	< 5
13C2-4:2 FTSA (surr.)	1	%	80
13C2-6:2 FTSA (surr.)	1	%	104
13C2-8:2 FTSA (surr.)	1	%	111
13C2-10:2 FTSA (surr.)	1	%	139
PFASs Summations			
Sum (PFHxS + PFOS)*	5	ug/kg	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
% Moisture - Method: LTM-GEN-7080 Moisture	Melbourne	Jul 03, 2023	14 Days
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Melbourne	Jul 06, 2023	28 Days
Perfluoroalkyl sulfonamido substances - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Melbourne	Jul 06, 2023	28 Days
Perfluoroalkyl sulfonic acids (PFSAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Melbourne	Jul 06, 2023	28 Days
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Melbourne	Jul 06, 2023	28 Days
PFASs Summations - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Melbourne	Jul 04, 2023	



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WA 6000
Project Name: WA_0960_23_PFASOMP
Project ID: WA_0960_PFASOMP_23

Order No.: PFAS-OMP 304700525
Report #: 1004396
Phone: [REDACTED]
Fax: [REDACTED]

Received: Jun 30, 2023 9:15 AM
Due: Jul 7, 2023
Priority: 5 Day
Contact Name: [REDACTED]

Eurofins Analytical Services Manager : [REDACTED]

Sample Detail

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA # 1261 Site # 1254

External Laboratory

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	0960_QC215_230628	Jun 28, 2023		Water	L23-JI0002351		X
2	0960_QC216_230628	Jun 28, 2023		Water	L23-JI0002352		X
3	0960_QC217_230628	Jun 28, 2023		Water	L23-JI0002353		X
4	0960_QC218_230628	Jun 28, 2023		Soil	L23-JI0002354	X	X
5	0960_QC219_230628	Jun 28, 2023		Soil	L23-JI0002355	X	X
6	0960_QC220_230628	Jun 28, 2023		Water	L23-JI0002356		X
7	0960_QC221_230628	Jun 28, 2023		Soil	L23-JI0002357	X	X
8	0960_QC222_230628	Jun 28, 2023		Water	L23-JI0002358		X



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Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226, Adelaide Terrace
Perth
WA 6000

Project Name: WA_0960_23_PFASOMP
Project ID: WA_0960_PFASOMP_23

Order No.: PFAS-OMP 304700525
Report #: 1004396
Phone: [REDACTED]
Fax: [REDACTED]

Received: Jun 30, 2023 9:15 AM
Due: Jul 7, 2023
Priority: 5 Day
Contact Name: [REDACTED]

Eurofins Analytical Services Manager : [REDACTED]

Sample Detail

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA # 1261 Site # 1254

9	0960_QC223_230628	Jun 28, 2023		Water	L23-JI0002359		X
10	0960_QC224_230628	Jun 28, 2023		Soil	L23-JI0002360	X	X
11	0960_QC225_230628	Jun 28, 2023		Water	L23-JI0002361		X
12	0960_QC226_230628	Jun 28, 2023		Soil	L23-JI0002362	X	X
13	0960_QC227_230628	Jun 28, 2023		Water	L23-JI0002363		X

Test Counts

5 13

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	µg/L: micrograms per litre
ppm: parts per million	ppb: parts per billion	%: Percentage
org/100 mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (<i>bis</i> -tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR: RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 5			5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5			5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5			5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5			5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5			5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5			5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5			5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5			5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5			5	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/kg	< 5			5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5			5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5			5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5			5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5			5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/kg	< 5			5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/kg	< 5			5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 10			10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 10			10	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSA's)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 5			5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 5			5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5			5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 5			5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 5			5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 5			5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 5			5	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 5			5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/kg	< 10			10	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 5			5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5			5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	76			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	64			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	75			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	73			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	78			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	77			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	79			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	85			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	81			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	91			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	71			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Perfluoroalkyl sulfonamido substances									
Perfluorooctane sulfonamide (FOSA)			%	76			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)			%	80			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)			%	70			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)			%	75			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)			%	72			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	70			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	72			50-150	Pass	
LCS - % Recovery									
Perfluoroalkyl sulfonic acids (PFASs)									
Perfluorobutanesulfonic acid (PFBS)			%	64			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)			%	82			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)			%	60			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)			%	60			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	67			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	70			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	70			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	81			50-150	Pass	
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	72			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)			%	66			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	77			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	67			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)									
				Result 1					
Perfluorobutanoic acid (PFBA)	L23-JI0002362	CP	%	93			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	L23-JI0002362	CP	%	82			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	L23-JI0002362	CP	%	96			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	L23-JI0002362	CP	%	90			50-150	Pass	
Perfluorooctanoic acid (PFOA)	L23-JI0002362	CP	%	96			50-150	Pass	
Perfluorononanoic acid (PFNA)	L23-JI0002362	CP	%	97			50-150	Pass	
Perfluorodecanoic acid (PFDA)	L23-JI0002362	CP	%	98			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	L23-JI0002362	CP	%	106			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	L23-JI0002362	CP	%	99			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	L23-JI0002362	CP	%	108			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L23-JI0002362	CP	%	93			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances									
				Result 1					
Perfluorooctane sulfonamide (FOSA)	L23-JI0002362	CP	%	91			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	L23-JI0002362	CP	%	95			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	L23-JI0002362	CP	%	86			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	L23-JI0002362	CP	%	91			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	L23-JI0002362	CP	%	89			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	L23-JI0002362	CP	%	88			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	L23-JI0002362	CP	%	93			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	L23-JI0002362	CP	%	77			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	L23-JI0002362	CP	%	95			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	L23-JI0002362	CP	%	70			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	L23-JI0002362	CP	%	74			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	L23-JI0002362	CP	%	80			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	L23-JI0002362	CP	%	89			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	L23-JI0002362	CP	%	85			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	L23-JI0002362	CP	%	96			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	L23-JI0002362	CP	%	83			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	L23-JI0002362	CP	%	87			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	L23-JI0002362	CP	%	91			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	L23-JI0002362	CP	%	91			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	L23-JI0002354	CP	%	3.9	3.7	5.2	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTeDA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	L23-JI0002360	CP	ug/kg	< 10	< 10	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	L23-JI0002360	CP	ug/kg	< 10	< 10	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	L23-JI0002360	CP	ug/kg	< 10	< 10	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	L23-JI0002360	CP	ug/kg	< 5	< 5	<1	30%	Pass

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

	Analytical Services Manager
	Senior Analyst-PFAS
	Senior Analyst-Sample Properties



General Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request

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Stantec Australia Pty Limited
6F 226, Adelaide Terrace
Perth
WA 6000



NATA Accredited
Accreditation Number 2377
Site Number 2370

Accredited for compliance with ISO/IEC 17025 – Testing
NATA is a signatory to the ILAC Mutual Recognition
Arrangement for the mutual recognition of the
equivalence of testing, medical testing, calibration,
inspection, proficiency testing scheme providers and
reference materials producers reports and certificates.

Attention:

Report **1004396-W**
Project name **WA_0960_23_PFASOMP**
Project ID **WA_0960_PFASOMP_23**
Received Date **Jun 30, 2023**

Client Sample ID			0960_QC215_2 30628	0960_QC216_2 30628	0960_QC217_2 30628	0960_QC220_2 30628
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L23-JI0002351	L23-JI0002352	L23-JI0002353	L23-JI0002356
Date Sampled			Jun 28, 2023	Jun 28, 2023	Jun 28, 2023	Jun 28, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	0.09	0.51	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	0.08	0.87	0.04	0.06
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	0.17	4.5	0.15	0.28
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	^{N09} 0.04	^{N09} 0.33	^{N09} 0.03	^{N09} 0.03
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	^{N09} 0.05	^{N09} 0.74	^{N09} 0.02	^{N09} 0.06
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	53	57	58	70
13C5-PFPeA (surr.)	1	%	110	80	106	114
13C5-PFHxA (surr.)	1	%	89	110	84	84
13C4-PFHpA (surr.)	1	%	86	69	82	86
13C8-PFOA (surr.)	1	%	99	63	88	90
13C5-PFNA (surr.)	1	%	120	120	113	123
13C6-PFDA (surr.)	1	%	97	100	90	101
13C2-PFUnDA (surr.)	1	%	79	76	77	89
13C2-PFDoDA (surr.)	1	%	77	92	78	93
13C2-PFTeDA (surr.)	1	%	65	101	74	81
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	113	132	124	97
D3-N-MeFOSA (surr.)	1	%	119	183	191	97

Client Sample ID			0960_QC215_2 30628	0960_QC216_2 30628	0960_QC217_2 30628	0960_QC220_2 30628
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L23-JI0002351	L23-JI0002352	L23-JI0002353	L23-JI0002356
Date Sampled			Jun 28, 2023	Jun 28, 2023	Jun 28, 2023	Jun 28, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
D5-N-EtFOSA (surr.)	1	%	95	137	139	78
D7-N-MeFOSE (surr.)	1	%	69	102	97	89
D9-N-EtFOSE (surr.)	1	%	71	108	101	92
D5-N-EtFOSAA (surr.)	1	%	72	85	70	82
D3-N-MeFOSAA (surr.)	1	%	106	118	95	113
Perfluoroalkyl sulfonic acids (PFSA's)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	^{N09} 0.06	^{N09} 1.0	^{N09} 0.05	0.09
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 0.01	< 0.02	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	0.03	0.57	0.02	0.04
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	^{N09} 0.07	^{N09} 1.6	^{N09} 0.08	^{N09} 0.16
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	^{N09} 0.55	^{N09} 11	^{N09} 0.58	^{N09} 1.2
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	^{N09} 0.07	^{N09} 0.98	^{N09} 0.03	^{N09} 0.08
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	^{N09} 5.0	^{N09} 9.9	^{N09} 1.0	^{N09} 0.70
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	98	50	93	93
18O2-PFHxS (surr.)	1	%	77	92	73	67
13C8-PFOS (surr.)	1	%	78	132	74	93
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	89	78	74	85
13C2-6:2 FTSA (surr.)	1	%	84	77	69	81
13C2-8:2 FTSA (surr.)	1	%	94	68	81	91
13C2-10:2 FTSA (surr.)	1	%	90	98	70	104
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	5.55	20.9	1.58	1.9
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	5.05	10.64	1.02	0.76
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	5.6	21.64	1.6	1.96
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	6.04	28.85	1.87	2.42
Sum of PFASs (n=30)*	0.1	ug/L	6.21	32	2	2.7

Client Sample ID			0960_QC222_2 30628	0960_QC223_2 30628	0960_QC225_2 30628	0960_QC227_2 30628
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L23-JI0002358	L23-JI0002359	L23-JI0002361	L23-JI0002363
Date Sampled			Jun 28, 2023	Jun 28, 2023	Jun 28, 2023	Jun 28, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	0.29	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	0.65	< 0.01	0.02	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	2.6	< 0.01	0.11	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	^{N09} 0.43	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	^{N09} 1.2	< 0.01	< 0.01	< 0.01

Client Sample ID			0960_QC222_2 30628	0960_QC223_2 30628	0960_QC225_2 30628	0960_QC227_2 30628
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L23-JI0002358	L23-JI0002359	L23-JI0002361	L23-JI0002363
Date Sampled			Jun 28, 2023	Jun 28, 2023	Jun 28, 2023	Jun 28, 2023
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	65	59	70	59
13C5-PFPeA (surr.)	1	%	88	122	119	115
13C5-PFHxA (surr.)	1	%	120	113	110	113
13C4-PFHpA (surr.)	1	%	72	93	87	91
13C8-PFOA (surr.)	1	%	52	99	91	97
13C5-PFNA (surr.)	1	%	118	113	117	95
13C6-PFDA (surr.)	1	%	107	72	82	56
13C2-PFUnDA (surr.)	1	%	99	51	64	39
13C2-PFDoDA (surr.)	1	%	102	50	65	38
13C2-PFTeDA (surr.)	1	%	90	47	65	39
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	127	68	86	83
D3-N-MeFOSA (surr.)	1	%	77	23	171	112
D5-N-EtFOSA (surr.)	1	%	75	22	144	77
D7-N-MeFOSE (surr.)	1	%	109	24	84	38
D9-N-EtFOSE (surr.)	1	%	113	25	93	39
D5-N-EtFOSAA (surr.)	1	%	92	45	54	35
D3-N-MeFOSAA (surr.)	1	%	134	65	75	51
Perfluoroalkyl sulfonic acids (PFSA's)						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	^{N09} 1.1	< 0.01	^{N09} 0.10	< 0.01
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	0.47	< 0.01	0.03	< 0.01
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	^{N09} 2.0	< 0.01	^{N09} 0.16	< 0.01
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	^{N09} 20	< 0.01	^{N09} 0.68	< 0.01
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	^{N09} 0.81	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	^{N09} 6.3	< 0.01	^{G01} < 0.04	< 0.01
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	58	111	92	106
18O2-PFHxS (surr.)	1	%	97	103	74	104
13C8-PFOS (surr.)	1	%	146	90	110	73

Client Sample ID			0960_QC222_2 30628	0960_QC223_2 30628	0960_QC225_2 30628	0960_QC227_2 30628
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L23-JI0002358	L23-JI0002359	L23-JI0002361	L23-JI0002363
Date Sampled			Jun 28, 2023	Jun 28, 2023	Jun 28, 2023	Jun 28, 2023
Test/Reference	LOR	Unit				
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	0.05	ug/L	0.50	< 0.05	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	82	97	75	93
13C2-6:2 FTSA (surr.)	1	%	77	78	75	78
13C2-8:2 FTSA (surr.)	1	%	86	65	73	55
13C2-10:2 FTSA (surr.)	1	%	108	49	68	40
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	26.3	< 0.01	0.68	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	7.5	< 0.01	< 0.04	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	27.5	< 0.01	0.68	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	33.07	< 0.05	0.91	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	36.35	< 0.1	1.1	< 0.1

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	Jul 06, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	Jul 06, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAAs)	Melbourne	Jul 06, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	Jul 06, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	Jul 03, 2023	
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			



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WA 6000
Project Name: WA_0960_23_PFASOMP
Project ID: WA_0960_PFASOMP_23

Order No.: PFAS-OMP 304700525
Report #: 1004396
Phone: [REDACTED]
Fax: [REDACTED]

Received: Jun 30, 2023 9:15 AM
Due: Jul 7, 2023
Priority: 5 Day
Contact Name: [REDACTED]

Eurofins Analytical Services Manager : [REDACTED]

Sample Detail

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA # 1261 Site # 1254

External Laboratory

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	0960_QC215_230628	Jun 28, 2023		Water	L23-JI0002351		X
2	0960_QC216_230628	Jun 28, 2023		Water	L23-JI0002352		X
3	0960_QC217_230628	Jun 28, 2023		Water	L23-JI0002353		X
4	0960_QC218_230628	Jun 28, 2023		Soil	L23-JI0002354	X	X
5	0960_QC219_230628	Jun 28, 2023		Soil	L23-JI0002355	X	X
6	0960_QC220_230628	Jun 28, 2023		Water	L23-JI0002356		X
7	0960_QC221_230628	Jun 28, 2023		Soil	L23-JI0002357	X	X
8	0960_QC222_230628	Jun 28, 2023		Water	L23-JI0002358		X



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Company Name: Stantec Australia Pty Ltd (WA)
Address: 6F 226, Adelaide Terrace
Perth
WA 6000

Project Name: WA_0960_23_PFASOMP
Project ID: WA_0960_PFASOMP_23

Order No.: PFAS-OMP 304700525
Report #: 1004396
Phone: [REDACTED]
Fax: [REDACTED]

Received: Jun 30, 2023 9:15 AM
Due: Jul 7, 2023
Priority: 5 Day
Contact Name: [REDACTED]

Eurofins Analytical Services Manager : [REDACTED]

Sample Detail

Moisture Set

Per- and Polyfluoroalkyl Substances (PFASs)

Melbourne Laboratory - NATA # 1261 Site # 1254

9	0960_QC223_230628	Jun 28, 2023		Water	L23-JI0002359		X
10	0960_QC224_230628	Jun 28, 2023		Soil	L23-JI0002360	X	X
11	0960_QC225_230628	Jun 28, 2023		Water	L23-JI0002361		X
12	0960_QC226_230628	Jun 28, 2023		Soil	L23-JI0002362	X	X
13	0960_QC227_230628	Jun 28, 2023		Water	L23-JI0002363		X

Test Counts

5

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Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	µg/L: micrograms per litre
ppm: parts per million	ppb: parts per billion	%: Percentage
org/100 mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (<i>bis</i> -tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR: RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSA)s							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)s							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	84			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	79			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	87			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	85			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	87			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	88			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	75			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	89			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	90			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	138			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	91			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Perfluoroalkyl sulfonamido substances									
Perfluorooctane sulfonamide (FOSA)			%	73			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)			%	86			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)			%	75			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)			%	81			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)			%	85			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	88			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	92			50-150	Pass	
LCS - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)									
Perfluorobutanesulfonic acid (PFBS)			%	72			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)			%	78			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)			%	69			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)			%	77			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	77			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	86			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	82			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	61			50-150	Pass	
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	78			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)			%	86			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	82			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	92			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)									
				Result 1					
Perfluorobutanoic acid (PFBA)	L23-JI0002187	NCP	%	88			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	L23-JI0002187	NCP	%	135			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	L23-JI0002187	NCP	%	147			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	L23-JI0002187	NCP	%	107			50-150	Pass	
Perfluorooctanoic acid (PFOA)	L23-JI0002187	NCP	%	100			50-150	Pass	
Perfluorononanoic acid (PFNA)	L23-JI0002187	NCP	%	85			50-150	Pass	
Perfluorodecanoic acid (PFDA)	L23-JI0002187	NCP	%	65			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	L23-JI0002187	NCP	%	78			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	L23-JI0002187	NCP	%	78			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	L23-JI0002187	NCP	%	120			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L23-JI0002187	NCP	%	76			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances									
				Result 1					
Perfluorooctane sulfonamide (FOSA)	L23-JI0002187	NCP	%	67			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	L23-JI0002187	NCP	%	64			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	L23-JI0002187	NCP	%	56			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	L23-JI0002187	NCP	%	72			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	L23-JI0002187	NCP	%	71			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	L23-JI0002187	NCP	%	75			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	L23-JI0002187	NCP	%	81			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	L23-JI0002187	NCP	%	71			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	L23-JI0002187	NCP	%	123			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	L23-JI0002187	NCP	%	71			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	L23-JI0002187	NCP	%	92			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	L23-JI0002187	NCP	%	136			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M23-JI0003901	NCP	%	96			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M23-JI0003901	NCP	%	88			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	L23-JI0002187	NCP	%	98			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	L23-JI0002187	NCP	%	71			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-JI0003901	NCP	%	89			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	L23-JI0002187	NCP	%	72			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	L23-JI0002187	NCP	%	78			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	M23-JI0011013	NCP	ug/L	0.02	0.02	7.5	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	M23-JI0011013	NCP	ug/L	0.19	0.23	21	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	M23-JI0011013	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M23-JI0011013	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised by:

[Redacted Signature]

Analytical Services Manager
Senior Analyst-PFAS

[Redacted Signature]

General Manager

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request

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APPENDIX

D

FIELD RECORDS & CALIBRATION CERTIFICATES



now



Monitoring Date	Monitoring Location	Sample_ID	Screen Interval	Screen Level	TOC (mAHD)	Well	SWL	RWL (mAHD)	Other Observations on Bore/Site	Purge Method	R1 - Temp (°C)	R1 - DO (mg/L)
						Depth (m)	(mbTOC)					
28/06/2023	MW018	0960_MW018_230628	5.5-8.5_	Single_Level	6.403	8.5	5.458	0.945		HydraSleeve	25.8	1.66
28/06/2023	MW021	0960_MW021_230628	5.6-8.6_	Single_Level	6.745	8.6	5.847	0.898		HydraSleeve	27.3	2.09
28/06/2023	MW102	0960_MW102_230628	2.5-8.5_	Single_Level	4.6266	8.5	4.19	0.437		HydraSleeve	26.1	2.3
28/06/2023	MW103	0960_MW103_230628	1-5.8_	Single_Level	2.2785	5.8	2.03	0.249		HydraSleeve	24.7	1.3
28/06/2023	MW104	0960_MW104_230628	1-6.5_	Single_Level	2.7256	6.5	2.585	0.141		HydraSleeve	26.4	1.07
28/06/2023	MW105	0960_MW105_230628	2-8_	Single_Level	3.7272	8.0	3.31	0.417		HydraSleeve	27.4	1.23
28/06/2023	MW112	0960_MW112_230628	3-8_	Single_Level	5.1191	8.0	4.34	0.779		HydraSleeve	28.8	1.85
28/06/2023	MW113	0960_MW113_230628	4-10_	Single_Level	7.3165	10.0	6.264	1.052		HydraSleeve	27	1.95
28/06/2023	MW114	0960_MW114_230628	4-10_	Single_Level	7.7467	10.0	6.81	0.937		HydraSleeve	27.6	2.26
28/06/2023	MW115	0960_MW115_230628	3-8_	Single_Level	4.9133	8.0	4.269	0.644		HydraSleeve	28.4	1.5
28/06/2023	MW122	0960_MW122_230628	1.7-7.7_	Single_Level	3.9702	7.7	3.85	0.12		HydraSleeve	28.5	1.34
28/06/2023	MW124	0960_MW124_230628	1-6_	Single_Level	2.9183	6.0	2.825	0.093		HydraSleeve	26.7	1.66
28/06/2023	MW126	0960_MW126_230628	2-8_	Single_Level	4.5088	8.0	4.2	0.309		HydraSleeve	25.6	2.27
28/06/2023	MW127	0960_MW127_230628	2.5-8.5_	Single_Level	5.6238	8.5	5.915	-0.291		HydraSleeve	27.7	1.37
28/06/2023	MW134	0960_MW134_230628	1-5.7_	Single_Level	2.5155	5.7	2.3	0.216		HydraSleeve	25.1	1.5
28/06/2023	MW135	0960_MW135_2.5-3_230628	2.5-3_	Multi_level	2.7781	3.0	2.42	0.358		Peristaltic pump	27.4	1.33
28/06/2023	MW137	0960_MW137_2.5-3.0_230628	2.5-3_	Multi_level	2.1691	3.0	1.46	0.709		Peristaltic pump	24	2.7
28/06/2023	MW138								Damaged. Casings blocked at 0.9mbtoc			
28/06/2023	MW139	0960_MW139_230628	2-7_	Single_Level	4.1386	7.0	3.87	0.269		HydraSleeve	27	2.65
28/06/2023	MW140	0960_MW140_1.5-2_230628	1.5-2_	Multi_level	2.4916		-1.9			Peristaltic pump	25	2.08
28/06/2023	MW141	0960_MW141_3-3.5_230628	3-3.5_	Multi_level	2.8073	3.5	2.24	0.567		Peristaltic pump	24	1.04
28/06/2023	MW143	0960_MW143_3-3.5_230628	3-3.5_	Multi_level	2.8174	3.5	2.739	0.078		Peristaltic pump	27.6	2.69
28/06/2023	MW144	0960_MW144_3-3.5_230628	3-3.5_	Multi_level	3.0481	3.5	2.845	0.203		Peristaltic pump	26.7	3.44
28/06/2023	MW145	0960_MW145_3-3.5_230628	3-3.5_	Multi_level	3.1416	3.5	2.94	0.202		Peristaltic pump	27.2	2.97
28/06/2023	MW146	0960_MW146_3-3.5_230628	3-3.5_	Multi_level	2.7937	3.5	2.478	0.316		Peristaltic pump	26.4	2.93
28/06/2023	MW147	0960_MW147_3-3.5_230628	3-3.5_	Multi_level	2.9123	3.5	2.6	0.312		Peristaltic pump	27.2	2.6
28/06/2023	MW148D	0960_MW148D_230628	14-20_	Single_Level	3.5778	20.0	3.46	0.118		HydraSleeve	25	1.87
28/06/2023	MW148S	0960_MW148S_230628	2-8_	Single_Level	3.6851	8.0	3.43	0.255		HydraSleeve	24.7	3.54
28/06/2023	MW151	0960_MW151_230628	2-8_	Single_Level	4.0631	8.0	3.725	0.338		HydraSleeve	24.7	1.18
28/06/2023	MW159	0960_MW159_230628	3-9_	Single_Level	4.1895	9.0	3.33	0.859		HydraSleeve	26.3	1.34
28/06/2023	MW162	0960_MW162_230628	17-20_	Single_Level	6.856	20.0	5.91	0.946		HydraSleeve	26.2	3.38
28/06/2023	MW163	0960_MW163_230628	17-20_	Single_Level	6.7808	20.0	5.797	0.984		HydraSleeve	26.8	4.65
28/06/2023	MW164	0960_MW164_230628	17-20_	Single_Level	6.7893	20.0	5.806	0.983		HydraSleeve	21.8	4.06
28/06/2023	MW165	0960_MW165_230628	3-9_	Single_Level	6.1043	9.0	5.14	0.964		HydraSleeve	24.5	2.59
28/06/2023	MW166	0960_MW166_230628	2.5-8.5_	Single_Level	5.7441	8.5	4.818	0.926		HydraSleeve	26.4	1.74
28/06/2023	MW167	0960_MW167_230628	2.5-8.5_	Single_Level	6.2094	8.5	5.329	0.88		HydraSleeve	28.1	2.21
28/06/2023	MW168	0960_MW168_230628	2.5-8.5_	Single_Level	6.1713	8.5	5.21	0.961		HydraSleeve	27.7	0.78
28/06/2023	MW170	0960_MW170_230628	2.5-8.5_	Single_Level	5.639	8.5	5.15	0.489		HydraSleeve	26	3.97
28/06/2023	MW172	0960_MW172_230628	2.5-8.5_	Single_Level	5.6193	8.5	5.05	0.569		HydraSleeve	26.3	4.35
28/06/2023	MW175	0960_MW175_5.5-6_230628	5.5-6_	Multi_level	4.7982	6.0	4.75	0.048		Peristaltic pump	27.2	3.54
28/06/2023	MW176	0960_MW176_3.5-4_230628	1.5-2_	Multi_level			1.882			Peristaltic pump	25.7	3.81
28/06/2023	MW177	0960_MW177_1.5-2_230628	1.5-2_	Multi_level	2.2299		1.662	0.568		Peristaltic pump	25.5	2.94
28/06/2023	MW178	0960_MW178_4-4.5_230628	2-2.5_	Multi_level			2.045			Peristaltic pump	26.3	2.31
28/06/2023	MW179	0960_MW179_1-1.5_230628	1-1.5_	Multi_level	2.222	1.5	1.44	0.782		Peristaltic pump	24.3	1.84
28/06/2023	MW180	0960_MW180_3.5-4_230628	3.5-4_	Multi_level	1.9226	4.0	1.51	0.413		Peristaltic pump	24.1	2.22
28/06/2023	MW181	0960_MW181_1.5-2_230628	1.5-2_	Multi_level	2.2333	2.0	1.85	0.383		Peristaltic pump	23.5	2.06
28/06/2023	MW211	0960_MW211_230628	NA	Single_Level	6.3409	NA	5.374	0.967		HydraSleeve	22.6	4.15
28/06/2023	MW233	0960_MW233_230628	4-7_	Single_Level	6.262	7.0	5.346	0.916		HydraSleeve	28.8	3.06
28/06/2023	MW238	0960_MW238_230628	3-6_	Single_Level	3.98	6.0	3.65	0.33		HydraSleeve	26.6	3.87
28/06/2023	OTH103	0960_OTH103_230628								Direct into bottle	21	3.05
28/06/2023	OTH106	0960_OTH106_230628								Direct into bottle	15	6.58
28/06/2023	OTH107	0960_OTH107_230628								Direct into bottle	14.2	7.56
28/06/2023	OTH129	0960_OTH129_230628								Direct into bottle	23.8	5.42
28/06/2023	OTH132	0960_OTH132_230628								Direct into bottle	19.3	2.81
28/06/2023	OTH134	0960_OTH134_230628								Direct into bottle	18.6	3.25

Monitoring Location	QC Dup Sample #	Odour Comments	Colour
MW018			
MW021			
MW102			Brown
MW103		Hydrogen sulfide smell	Brown
MW104			Cloudy
MW105	QC125/225		Cloudy
MW112			Clear
MW113			
MW114			
MW115			
MW122			
MW124			Cloudy
MW126			Clear
MW127			
MW134			Clear
MW135			Brown
MW137			Cloudy
MW138			
MW139			Cloudy,Brown
MW140			Cloudy,Brown
MW141			Cloudy,Brown
MW143			
MW144			
MW145			Cloudy,Brown
MW146			
MW147			Cloudy,Brown
MW148D			Clear
MW148S			Clear
MW151			Cloudy,Brown
MW159		Hydrogen sulfide	Brown
MW162			
MW163	QC120/220		
MW164	QC117/217		
MW165			Clear
MW166			
MW167			
MW168			Cloudy
MW170			Brown
MW172			Brown
MW175		Fuel odour	Black
MW176			
MW177			
MW178			
MW179			Cloudy,Brown
MW180			Cloudy,Brown
MW181			Cloudy,Brown
MW211	QC115/215		
MW233	QC122/222		
MW238	QC116/216		Cloudy
OTH103		Saltwater smell	Cloudy,Black
OTH106			Cloudy
OTH107			Cloudy
OTH129			Clear
OTH132			Clear
OTH134			Clear

Monitoring Location	Date	Sample ID	Depth of Sediment Sampling (m)	Sampling Method	Sample Condition	Sample Description	QC Dup #
SD199	28/06/2023	0960_SD199_230628	0.1	Shovel, Trowel	Dry	SAND, red/brown, fine med grain, dry	
SD199	28/06/2023	0960_SD199_230628	0.1	Shovel, Trowel	Dry	Orange clay fine	
SD200	28/06/2023	0960_SD200_230628	0.1	Shovel, Trowel	Dry	Orange clay fine	
SD205	28/06/2023	0960_SD205_230628	0.1	Shovel, Trowel	Dry	CLAY, brown, slightly moist, med plasticity	
SD207	28/06/2023	0960_SD207_230628	0.15	Shovel, Trowel	Wet	clayey SAND, brown and grey, wet	QC124, QC224
SD208	28/06/2023	0960_SD208_230628	0.1	Shovel, Trowel	Wet	SAND, brown/yellow, med grained, wet	
SD209	28/06/2023	0960_SD209_230628	0.1	Shovel, Trowel	Wet	Brown sandy clay	
SD210	28/06/2023	0960_SD210_230628	0.1	Shovel, Trowel	Wet	Brown clay	
SD211	28/06/2023	0960_SD211_230628	0.1	Shovel, Trowel	Wet	Brown stiff clay	
SD219	28/06/2023	0960_SD219_230628	0.1	Shovel, Trowel	Dry	Sand, fine to med grained, brown, trace gravels	
SD300	28/06/2023	0960_SD300_230628	0.1	Shovel, Trowel	Wet	Brown clay stiff	
SD301	28/06/2023	0960_SD301_230628	0.1	Shovel, Trowel	Wet	Brown stiff clay	
SD302	28/06/2023	0960_SD302_230628	0.1	Shovel, Trowel	Wet	Brown sandy clay	
SD303	28/06/2023	0960_SD303_230628	0.1	Shovel, Trowel	Wet	Brown clayey sand	
SD304	28/06/2023	0960_SD304_230628	0.1	Shovel, Trowel	Wet	sandy CLAY, dark brown and grey, wet	
SD305	28/06/2023	0960_SD305_230628	0.2	Shovel, Trowel	Wet	sandy CLAY, dark brown and grey, wet	
SS108	28/06/2023	0960_SS108_230628	0.1	Shovel, Trowel	Dry	Orange clay fine	
SS113	28/06/2023	0960_SS113_230628	0.1	Shovel, Trowel	Dry	Fine orange clay	
SS114	28/06/2023	0960_SS114_230628	0.1	Shovel, Trowel	Dry	Orange fine clay	
SS121	28/06/2023	0960_SS121_230628	0.1	Shovel, Trowel	Dry	Orange clay fine	
SS122	28/06/2023	0960_SS122_230628	0.1	Shovel, Trowel	Dry	Brown clay	
SS123	28/06/2023	0960_SS123_230628	0.1	Shovel, Trowel	Dry	Orange clay fine	
SS124	28/06/2023	0960_SS124_230628	0.1	Shovel, Trowel	Dry	Brown clay	
SS125	28/06/2023	0960_SS125_230628	0.1	Shovel, Trowel	Dry	Orange clay fine	
SS157	28/06/2023	0960_SS157_230628	0.1	Shovel, Trowel	Dry	Sandy clay, fine to med grained, brown, trace organics	
SS166	28/06/2023	0960_SS166_230628	0.1	Shovel, Trowel	Dry	Sandy clay, fine to med grained, brown, trace organics	
SS168	28/06/2023	0960_SS168_230628	0.1	Shovel, Trowel	Dry	Sandy clay, fine to med grained, brown, trace organics, trace gravels	
SS170	28/06/2023	0960_SS170_230628	0.1	Shovel, Trowel	Dry	Sandy clay, fine to med grained, brown, trace organics	QC118/218
SS174	28/06/2023	0960_SS174_230628	0.1	Shovel, Trowel	Dry	Sand, fine to med grained, brown, trace gravels	
SS176	28/06/2023	0960_SS176_230628	0.1	Shovel, Trowel	Dry	Sand, fine to med grained, brown, trace gravels	
SS189	28/06/2023	0960_SS189_230628	0.1	Shovel, Trowel	Dry	Sandy clay, fine to med grained, brown, trace gravels	
SS190	28/06/2023	0960_SS190_230628	0.1	Shovel, Trowel	Dry	Sandy clay, fine to med grained, brown, trace organics, trace gravels	
SS192	28/06/2023	0960_SS192_230628	0.1	Shovel, Trowel	Dry	Sand, fine to medium, well graded, beige, trace shells	
SS193	28/06/2023	0960_SS193_230628	0.1	Shovel, Trowel	Wet	Clay, fine grained, brown, moist, trace organics, trace shells	
SS198	28/06/2023	0960_SS198_230628	0.1	Shovel, Trowel	Dry	Brown fine clay	
SS227	28/06/2023	0960_SS227_230628	0.1	Shovel, Trowel	Dry	Orange clay fine	
SS231	28/06/2023	0960_SS231_230628	0.1	Shovel, Trowel	Dry	Fine orange clay, gravels	
SS234	28/06/2023	0960_SS234_230628	0.1	Shovel, Trowel	Dry	Orange fine clay	QC119/219
SS235	28/06/2023	0960_SS235_230628	0.1	Shovel, Trowel	Dry	Sand, fine to medium grained, brown, trace gravels	
SS243	28/06/2023	0960_SS243_230628	0.1	Shovel, Trowel	Dry	Sandy clay, fine to med grained, brown, trace gravels	
SS265	28/06/2023	0960_SS265_230628	0.1	Shovel, Trowel	Dry	Orange clay	QC121/221
SS277	28/06/2023	0960_SS277_230628	0.1	Shovel, Trowel	Dry	Brown fine clay	
SS278	28/06/2023	0960_SS278_230628	0.1	Shovel, Trowel	Dry	Brown fine clay	
SS279	28/06/2023	0960_SS279_230628	0.1	Shovel, Trowel	Dry	Sandy clay, fine to med grained, brown, trace organics	
SS288	28/06/2023	0960_SS288_230628	0.1	Shovel, Trowel	Dry	Sandy clay, fine to med grained, brown, trace shells, trace gravels	
SS291	28/06/2023	0960_SS291_230628	0.1	Shovel, Trowel	Dry	Brown clay	
SS292	28/06/2023	0960_SS292_230628	0.1	Shovel, Trowel	Dry	Brown clay fine	
SS293	28/06/2023	0960_SS293_230628	0.1	Shovel, Trowel	Dry	Brown fine clay	
SS298	28/06/2023	0960_SS298_230628	0.1	Shovel, Trowel	Dry	SAND, brown/red, fine to med grain, slightly moist under surface	
SS301	28/06/2023	0960_SS301_230628	0.1	Shovel, Trowel	Dry	CLAY, brown, high plasticity, slightly moist	QC126, QC226

Monitoring																
Location	Date	Sample ID	Sampling Method	Sample Depth (m)	WaterBody Depth (m)	Flow Rate	Comments	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH +/- 0.1	Eh (mV)+-10mV	Water Colour	Turbidity	
SW001	28/06/2023	0960_SW001_230628	Direct_into_Bottle	0.1		0.1 Slow		22.7	3.36	72706	47255	8.07	38.1	Cloudy	Medium	
SW108	28/06/2023						Dry									
SW113	28/06/2023						Dry									
SW114	28/06/2023						Dry									
SW121	28/06/2023						dry no sample									
SW122	28/06/2023						Dry									
SW123	28/06/2023						dry no sample									
SW124	28/06/2023						Dry									
SW125	28/06/2023						Dry									
SW157	28/06/2023		Direct_into_Bottle				Dry									
SW166	28/06/2023						Dry									
SW168	28/06/2023						Dry									
SW170	28/06/2023		Direct_into_Bottle				Dry									
SW174	28/06/2023						Dry									
SW176	28/06/2023						Dry									
SW189	28/06/2023						Dry									
SW190	28/06/2023						Dry									
SW192	28/06/2023						Dry									
SW193	28/06/2023						Dry									
SW198	28/06/2023						Dry									
SW199	28/06/2023						DRY									
SW200	28/06/2023						dry no sample									
SW205	28/06/2023						DRY									
SW207	28/06/2023	0960_SW207_230628	Direct_into_Bottle	0.15		1.2 Slow	QC123, QC223	17.7	4.84	47946	31174	7.91	123.2	Clear	Low	
SW208	28/06/2023	0960_SW208_230628	Direct_into_Bottle	0.1		0.5 Medium		15.7	6.11	43088	28011	8.04	155.2	Clear	Low	
SW209	28/06/2023	0960_SW209_230628	Direct_into_Bottle	0.1		0.3 Slow		22.6	5.47	62938	40950	7.89	46.6	Clear	Low	
SW210	28/06/2023	0960_SW210_230628	Direct_into_Bottle	0.1		0.5 Slow	QC127/227	15.9	3.87	68949	44785	7.96	42.3	Cloudy	Medium	
SW211	28/06/2023	0960_SW211_230628	Direct_into_Bottle	0.1		0.3 Slow		22.7	4.93	84363	54860	8.03	48.1	Clear	Low	
SW219	28/06/2023						Dry									
SW227	28/06/2023						Dry									
SW231	28/06/2023						Dry									
SW234	28/06/2023						Dry									
SW235	28/06/2023						Dry									
SW243	28/06/2023						Dry									
SW265	28/06/2023						Dry									
SW277	28/06/2023						Dry									
SW278	28/06/2023						Dry									
SW279	28/06/2023						Dry									
SW288	28/06/2023						Dry									
SW291	28/06/2023						Dry									
SW292	28/06/2023						Dry									
SW293	28/06/2023						Dry									
SW298	28/06/2023						DRY									
SW300	28/06/2023	0960_SW300_230628	Direct_into_Bottle	0.1		0.2 Slow		21	3.13	85075	55315	7.86	40.5	Clear	Low	
SW301	28/06/2023						DRY									
SW302	28/06/2023	0960_SW302_230628	Direct_into_Bottle	0.1		0.5 Slow		18.2	4.38	64491	41925	7.87	44.4	Clear	Low	
SW303	28/06/2023	0960_SW303_230628	Direct_into_Bottle	0.1		0.2 Slow		16.7	4.63	64147	41665	7.9	33.1	Cloudy	Medium	
SW304	28/06/2023	0960_SW304_230628	Direct_into_Bottle	0.1		0.4 Slow		19.5	6.29	58217	37847	7.9	106.2	Clear	Medium	
SW305	28/06/2023	0960_SW305_230628	Direct_into_Bottle	0.2		0.3 Slow		18.5	3.57	58046	37734	7.79	103.6	Clear	Medium	



Calibration Report

Multi-Parameter Water Quality Instrument

Customer:

Contact:

Manufacturer: YSI

Instrument: Professional Plus with Quatro cable

Serial #: 20K104050

Cable length: 1m 20K100096

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range	0 mV ± 50 mV	✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	173.30 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.42
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 2 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant 5.0 ± 1.0 in GLP file		✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µS/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	Galvanic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

Parameter	Standards	Reference	Calibration Point	Span	Units	Instrument Readings		
						Before	After	Units
Temperature (17F100079)	Check Temp NATA	Room Temp	19.4	-0.1	°C	NA	19.3	°C
pH (22F)	pH 7.00	392512	7.01	-9.50	mV	7.06	7.01	pH
pH (22F)	pH 4.00	394799	4.00	163.80	mV	4.03	4.00	pH
Conductivity (17F100079)	2764 µS/cm at 25°C	21/1012	2764	GLP	5.08	2784	2764	µS/cm
ORP (201005SIA605102)	Zobell A & B	23/2504	242	242	mV	209.7	239.4	mV
Zero DO (20H100139)	NaSO3 in distilled water	10175	0.0	NA	NA	0.4	0.0	%
100% DO (20H100139)	100% Air Saturation	Air	100.0	5.93	uA	108.4	100.0	%

Calibrated by:

Calibration Date: 16-Jun-23

Next Due: 13-Dec-23



Calibration Report

Multi-Parameter Water Quality Instrument

Customer:

Contact:

Manufacturer: YSI

Instrument: Professional Plus with Quatro cable

Serial #: 22B104437

Cable length: 1m (22B100428)

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range	0 mV ± 50 mV	✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	171.90 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.25
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 12 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant	5.0 ± 1.0 in GLP file	✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µS/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	polarographic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

Parameter	Standards	Reference	Calibration Point	Span	Units	Instrument Readings		
						Before	After	Units
Temperature (22B100315)	Check Temp NATA	Room Temp	17.1	0	°C	NA	17.1	°C
pH (22B)	pH 7.00	392512	7.01	-24.20	mV	7.05	7.01	pH
pH (22B)	pH 4.00	394799	4.00	147.70	mV	3.94	4.00	pH
Conductivity (22B100315)	2764 µS/cm at 25°C	21/1012	2764	GLP	5.09	2791	2764	µS/cm
ORP (22A)	Zobell A & B	23/2404	246	246	mV	236.5	234.6	mV
Zero DO (22B100173)	NaSO3 in distilled water	10175	0.0	NA	NA	0.6	0.0	%
100% DO (22B100173)	100% Air Saturation	Air	100.0	4.8	uA	103.7	100.0	%

Calibrated by:

Calibration Date: 21-Jun-23

Next Due: 18-Dec-23



Calibration Report

Multi-Parameter Water Quality Instrument

Customer:

Contact:

Manufacturer: YSI

Instrument: Professional Plus with Quatro cable

Serial #: 22C103026

Cable length: 1m (22B100428)

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range	0 mV ± 50 mV	✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	174.10 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.87
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 11 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant	5.0 ± 1.0 in GLP file	✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µS/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	polarographic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

Parameter	Standards	Reference	Calibration Point	Span	Units	Instrument Readings		
						Before	After	Units
Temperature (22B100315)	Check Temp NATA	Room Temp	17.6	0	°C	NA	17.6	°C
pH (22D)	pH 7.00	392512	7.01	-15.00	mV	7.06	7.01	pH
pH (22D)	pH 4.00	394799	4.00	159.10	mV	3.98	4.00	pH
Conductivity (22B100315)	2764 µS/cm at 25°C	21/1012	2764	GLP	4.99	2773	2764	µS/cm
ORP (22B)	Zobell A & B	23/2504	245	245	mV	200.9	233.9	mV
Zero DO (22E100254)	NaSO3 in distilled water	10175	0.0	NA	NA	-0.3	0.0	%
100% DO (22E100254)	100% Air Saturation	Air	100.0	4.1	uA	87.3	100.0	%

Calibrated by:

Calibration Date: 15-Jun-23

Next Due: 12-Dec-23



Calibration Report

Multi-Parameter Water Quality Instrument

Customer:

Contact:

Manufacturer: YSI

Instrument: Professional Plus with Quatro cable

Serial #: 22F101914

Cable length: 1m (22B100428)

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	✓	Voltage reading above 2.9V
	Battery Saver	✓	Automatically turns off after 30 minutes if not used
Connections	Condition	✓	Good, clean
Cable	Condition	✓	Clean, no tears
Display	Operation	✓	
Firmware	Version	✓	4.0.0
Keypad	Operational	✓	
Display	Screen	✓	
Unit	Condition, seals and O-rings	✓	
Monitor housing	Condition	✓	
pH			
Condition		✓	Good, clean
pH millivolts for pH7 calibration range	0 mV ± 50 mV	✓	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		✓	173.20 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.61
Response time < 90 seconds		✓	
Calibrated and conforms to manufacturer's specifications		✓	
ORP			
Condition		✓	Good, clean
Response time < 90 seconds		✓	
within ± 80mv of reference Zobell Reading		✓	
Calibrated and conforms to manufacturer's specifications		✓	variance range ± 20mV 11 mV
Conductivity			
Condition		✓	Good, clean
Temperature		✓	°C
Conductivity cell constant	5.0 ± 1.0 in GLP file	✓	
Clean sensor reads less than 3 uS/cm in dry air		✓	
Calibrated and conforms to manufacturer's specifications		✓	µS/cm
Dissolved Oxygen			
Condition		✓	Good, clean
DO sensor in use		✓	polarographic
1.25 mil PE membrane (yellow membrane):		✓	
DO Sensor Value		✓	(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
Calibrated and conforms to manufacturer's specifications		✓	ppm

This is to certify that the above instrument has been calibrated to the following specifications:

Parameter	Standards	Reference	Calibration Point	Span	Units	Instrument Readings		
						Before	After	Units
Temperature (22B100314)	Check Temp NATA	Room Temp	17.2	0	°C	NA	17.2	°C
pH (22D)	pH 7.00	392512	7.01	-10.30	mV	7	7.01	pH
pH (22D)	pH 4.00	394799	4.00	162.90	mV	3.95	4.00	pH
Conductivity (22B100314)	2764 µS/cm at 25°C	21/1012	2764	GLP	5.28	2880	2764	µS/cm
ORP (22B)	Zobell A & B	23/2504	246	246	mV	237.1	234.7	mV
Zero DO (22A100300)	NaSO3 in distilled water	10175	0.0	NA	NA	-0.9	0.0	%
100% DO (22A100300)	100% Air Saturation	Air	100.0	4.3	uA	96	100.0	%

Calibrated by:

Calibration Date: 21-Jun-23

Next Due: 18-Dec-23

Date of Bump Test	Site ID	Unit Brand/ Model	Ambient Air Oxygen Calibration	Zero Oxygen Solution Calibration	%	Standard Concentrations	Ambient Temperature (°C)	Bump Test Reading	Bump Test Readings within ±5%?	Comment	Test by (Name)	(Signature)
28/6/23	0960	YSI #22103026	100% Saturation? ☒ N	0% Calibration? ☒ N	NA	pH 4.00 ☒ / N pH 7.00 ☒ / N EC: 2,764µS/cm ☒ / N	16.2	pH 4.00: 6.12 pH 7.00: 7.13 EC: 2,810	pH 4.00: (± pH 0.2) ☒ / N pH 7.00: (± pH 0.2) ☒ / N EC: (± 150µS/cm) ☒ / N	N.I.		
28/6/23	0960	YSI #22101914	100% Saturation? ☒ N	0% Calibration? ☒ N	NA	pH 4.00 ☒ / N pH 7.00 ☒ / N EC: 2,764µS/cm ☒ / N	16.5	pH 4.00: 6.08 pH 7.00: 7.02 EC: 2,755	pH 4.00: (± pH 0.2) ☒ / N pH 7.00: (± pH 0.2) ☒ / N EC: (± 150µS/cm) ☒ / N	N.I.		
28/6/23	0960	YSI #2210437	100% Saturation? ☒ N	0% Calibration? ☒ N	NA	pH 4.00 ☒ / N pH 7.00 ☒ / N EC: 2,764µS/cm ☒ / N	17.1	pH 4.00: 6.07 pH 7.00: 7.12 EC: 2,860	pH 4.00: (± pH 0.2) ☒ / N pH 7.00: (± pH 0.2) ☒ / N EC: (± 150µS/cm) ☒ / N	N.I.		
28/6/23	0960	YSI #2210450	100% Saturation? ☒ N	0% Calibration? ☒ N	NA	pH 4.00 ☒ / N pH 7.00 ☒ / N EC: 2,764µS/cm ☒ / N	16.9	pH 4.00: 6.03 pH 7.00: 7.04 Temp: EC: 2,860	pH 4.00: (± pH 0.2) ☒ / N pH 7.00: (± pH 0.2) ☒ / N EC: (± 150µS/cm) ☒ / N	N.I.		
		YSI #	100% Saturation? ☐ Y ☒ N	0% Calibration? ☐ Y ☒ N	NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,764µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			
		YSI #	100% Saturation? ☐ Y ☒ N	0% Calibration? ☐ Y ☒ N	NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,764µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			
		YSI #	100% Saturation? ☐ Y ☒ N	0% Calibration? ☐ Y ☒ N	NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,764µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			
		YSI #	100% Saturation? ☐ Y ☒ N	0% Calibration? ☐ Y ☒ N	NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,764µS/cm Y / N		pH 4.00: pH 7.00: Temp: EC:	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N			

APPENDIX

E

DATA QUALITY REVIEW



now



Data Quality Review PFAS Ongoing Monitoring Plan June 2023 Monitoring Event

This appendix reviews the Quality Assurance (QA) and Quality Control (QC) documentation. Quality assurance encompasses the actions, procedures, checks and decisions undertaken to ensure sample integrity and representativeness, and the reliability and accuracy of analysis results. The QA documentation should also include an indication of the Data Quality Objectives sought in relation to each significant action, test or process involved in the assessment.

QC activities measure the effectiveness of the QA procedures by undertaking testing, and then comparing results to previously established objectives. QC work will include the internal laboratory testing as well as results of QC samples submitted such as trip blanks and duplicates. The quality of the information and/or data is deemed satisfactory when the QC results demonstrate that agreed objectives have been met.

QA/QC Aspects	Evidence & Evaluation
QA Documentation	
Project Quality Plan/Work Plan and Data Quality Objectives	The field investigation was carried out on the 27 June 2023 and is generally in accordance with the proposed scope of work, as documented in the SAQP (PFAS OMP SAQP RAAF Base Learmonth, Rev.8, Cardno, June 2023) issued to the client and in general compliance with Standards Australia 1998. AS/NZ 5667:1998 <i>Water quality – sampling</i>, NEPM <i>National Environment Protection (Assessment of Site Contamination) Measure</i> and PFAS NEMP 2.0. A quality control program was implemented during the Investigation and the quality assurance procedures used have been reiterated in the report (PFAS OMP June 2023 Factual Report). In addition, a safety, health and environment work method statement (SHEWMS) was also prepared. The Data Quality Objectives were expressed in terms of the purpose of the assessment and the relevant assessment criteria.
Data Representativeness	
Use of Composites	No Composites were used during the investigation
Holding Times	Chain of custody and laboratory reports provide evidence of holding times. Holding times were generally in compliance with required timeframes, with the following exception: Dissolved Major Cations (EP2308704, EP2308707, EP2308708, EP2308709, EP2308711, EP2308712) – 1 to 2 days overdue. The holding time exceedance for a minority of results are likely due to the remoteness of the site or laboratory workload. They are not considered to have adversely impacted the reliability of the results obtained, or the conclusions drawn from this assessment. The samples were chilled in eskies with ice and placed into fridges upon receipt by the laboratory.
Verification of field procedures	The methodology conducted during this investigation is documented in the body of the report and was in general conformance with the SAQP. Experienced field scientists familiar with the sampling procedures were involved in the field works. Non-disposable equipment was decontaminated between sample locations.
Laboratory Reports	The following laboratory reports were considered for this data quality review: - ALS reports: EP2308702, EP2308703, EP2308704, EP2308705, EP2308706, EP2308707, EP2308708, EP2308709, EP2308710, EP2308711, EP2308712. - Eurofins ARL report: 1004396

QA/QC Aspects

Evidence & Evaluation

Data Precision & Accuracy

QC sample Frequency

QC sample type	SAQP required frequency	Sample Collected
Blind duplicate	1 in 10 primary samples (10%)	6 for 48 groundwater samples (12.5%) 2 in 11 surface water samples (18.2%) 5 in 49 sediment samples (10.2%)
Interlab duplicate	1 in 10 primary samples (10%)	6 for 48 groundwater samples (12.5%) 2 in 11 surface water samples (18.2%) 5 in 49 sediment samples (10.2%)
Rinsate	1 per field personnel per day	4 for 1 day (4 field personnel) (100%)
Field Blank	1 per field personnel per day	4 for 1 day (4 field personnel) (100%)

The required QC frequency was achieved for all sample types.

RPD Acceptance criteria

Magnitude of Results	Acceptable RPD range
< 10 x LOR	No limits
10 – 20 LOR	0% - 50%
> 20 x LOR	0% - 20%

QC Testing – Blind Duplicates (Primary Lab)

Groundwater

- Primary Groundwater Samples Analysed: 48
- Blind Duplicate Samples Analysed: 6

All RPDs were within acceptance criteria

Surface water

- Primary surface water Samples Analysed: 11
- Blind Duplicate Samples Analysed: 2

All RPDs were within acceptance criteria.

Sediment

- Primary Sediment Samples Analysed: 49
- Blind Duplicate Samples Analysed: 5

All RPDs were within acceptance criteria.

QC Testing – Interlab Duplicates (Secondary Lab)

Groundwater

- Primary Groundwater Samples Analysed: 48
- Interlab Duplicate Samples Analysed: 6

All RPDs were within acceptance criteria with the following exceptions:

- QC216 (PFBS – 27%, PFPeS – 25%).
- QC217 (PFHxS – 27%, PFOS – 24%)
- QC222 (PFBS – 23%, PFHxS – 21%, PFHpS – 55%, PFOS – 26%, PFHxA – 23%)

These exceedances are likely due the difference of methodologies and detection levels between the primary and secondary laboratories and the low concentrations

QA/QC Aspects	Evidence & Evaluation
	of analytes under review. In all cases the primary sample reported higher concentrations than the duplicate sample therefore the results reported on are considered conservative. This is not considered to have impacted the validity of the interpretation drawn upon this dataset. Surface water - Primary surface water Samples Analysed: 11 - Interlab Duplicate Samples Analysed: 2 All RPDs were within acceptance criteria. Sediment - Primary sediment Samples Analysed: 49 - Interlab Duplicate Samples Analysed: 5 All RPDs were within acceptance criteria.
Field Blanks	Field Blanks were collected at a rate of one per fieldwork day. All field blank samples tested reported analytes below the laboratory limit of reporting.
Laboratory Internal QC	Evidence of the laboratories internal QC testing is present and complete in the reports. ALS (Primary) performed internal QC with adequate testing and satisfactory results for method blank, matrix spikes, laboratory control samples and laboratory duplicates. All Method Blank results were within acceptable range. All Matrix Spikes generally reported recoveries within the acceptance range with the exception of the following: - EP2308703, EP2308705, EP2308706: - Samples ID: SS166, Anonymous: PFPeS matrix spike recovery greater than the upper data quality objective (73 – 123%). - EP2308704, EP2308707, EP2308708, EP2308709, EP2308711, EP2308712: - Samples ID: MW177, Anonymous: Sulfate and Chloride matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. - Samples ID: MW115, Anonymous: PFHxS matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. All laboratory duplicates reported RPD within the acceptance range of 0 – 20% with exception of the following: - EP2308704: - Sample MW018: PFPeA, PFHxA, PFHpA, Sum of PFAS RPDs exceed LOR based limits. The following quality control frequency outlier was reported: - EP2308708, EP2308709, EP2308711, EP2308712: - Laboratory Duplicates: PFAS by LCMSMS, expected frequency 10% not achieved. The above outliers/exceptions are not considered to affect the reliability of the dataset.
Laboratory Method Detection Limit	Laboratory reports indicate the method detection limits were generally lower than the respective assessment criteria.
NATA endorsement of laboratory reports	Laboratory reports were stamped with the NATA endorsement stamp and signature. ALS Accreditation No. 825 Eurofins ARL Accreditation No. 1261
Calibration of Field Equipment	All equipment used during the investigation was calibrated by the supplier prior to use and daily readings of reference solutions (bump tests) were completed. The equipment calibration certificates, and daily field bump test records are provided in Appendix D.

QA/QC Aspects	Evidence & Evaluation
Decontamination and Equipment Blanks	Rinsate blanks were collected at a rate of one per day per sampler when reusable equipment was used. All rinsate samples tested reported analytes concentrations below the laboratory LORs.
Data Comparability	
Standard Procedures	Fieldwork procedures are detailed in the SAQP and reports and are comparable for each phase of Investigation.
Qualified Personnel	Staff involved in managing and reviewing the project and those involved in fieldwork are qualified personnel.
Sample Integrity	Field Chain of Custody/Laboratory request forms can be found in Appendix C.
Data Completeness	
Completeness of test program	The scope of work undertaken was generally consistent with the SAQP.
Validity of Data Set	The data quality review indicates no significant systematic errors in the data collection process and therefore, the data set used as the basis for groundwater, surface water, porewater and sediment investigation is considered valid and complete.

APPENDIX

D

DATA ASSESSMENT



now



Table 1 - Water Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids						PFAS - (n:2) Fluorotelomer Sulfonic				PFAS - Perfluoroalkyl Sulfonamides							PFAS								
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFDS	Sum of PFAS (WA DER list)	Sum of PFAS	
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
LOR - Limit of Reporting						0.0005	0.0005	0.0005	0.0005	0.0002	0.0005	0.002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.001	0.0005	0.001	0.0005	0.001	0.001	0.0005	0.001	0.0002	0.0002	0.0002	
PFAS NEMP 2020 Freshwater 99%										0.00023						19																					
PFAS NEMP 2020 Recreational Water																10																		2			

Monitoring Area	Location Code	Date	Field ID	Sample Type	Lab Report Number																															
Source Area 1	MW018	18/09/2010	MW18	Normal	ES1019112						1.17						0.08																			
Source Area 1	MW018	11/03/2011	MW018	Normal	EP1101571						0.22						<0.02																			
Source Area 1	MW018	6/11/2013	WA0043_MW018	Normal	EP1308516						0.07						<0.02																			
Source Area 1	MW018	23/03/2014	WA0043-MW018-230314	Normal	EP1402252						0.05						<0.02																			
Source Area 1	MW018	9/06/2015	WA0043-MW18	Normal	EP1511012						0.18						0.03																			
Source Area 1	MW018	6/10/2015	WA0043-MW018	Normal	EP1514597						0.29						<0.02																			
Source Area 1	MW018	15/03/2016	WA0043_MW18_150316	Normal	EP1602318						1.16						0.04																			
Source Area 1	MW018	3/12/2016	MW018	Normal	527022						2.5																									
Source Area 1	MW018	6/03/2018	0960_MW018_180306	Normal	207817	0.46	0.40	1.6	0.10	0.84	<0.002	0.19	0.21	0.83	0.079	0.068	0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
Source Area 1	MW018	10/06/2018	0960_MW018_180610	Normal	211878	0.57	0.4	2.1	0.08	0.83	<0.002	0.19	0.32	1.3	0.1	0.08	0.003	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05			
Source Area 1	MW018	26/11/2019	0960_MW018_191126	Normal	EP1912481	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.005	<0.005	<0.005	<0.02	<0.05	<0.002	<0.005	<0.01	<0.002	<0.05	<0.01	<0.01	<0.01	
Source Area 1	MW018	24/06/2020	0960_MW018_200624	Normal	EP2006512	0.14	0.19	1.24	0.04	0.66	<0.02	<0.1	0.12	0.39	0.04	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.90	2.64	2.87	
Source Area 1	MW018	19/11/2020	0960_MW018_201119	Normal	EP2012892	0.15	0.17	1.32	0.05	0.78	<0.02	<0.1	0.10	0.42	0.06	0.07	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	2.10	2.90	3.12	
Source Area 1	MW018	23/06/2021	0960_MW018_210623	Normal	EP2107193	0.06	0.10	1.02	0.03	0.33	<0.02	<0.1	0.12	0.29	0.06	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.35	1.94	2.07	
Source Area 1	MW018	25/11/2021	0960_MW018_211125	Normal	EP2114474	0.20	0.20	1.58	0.05	0.88	<0.02	0.1	0.15	0.54	0.04	0.07	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	2.46	3.56	3.81	
Source Area 1	MW018	22/06/2022	0960_MW018_220622	Normal	EP2207731	0.06	0.08	1.14	0.05	0.55	<0.02	0.8	1.92	1.89	0.79	0.09	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.69	7.24	7.37	
Source Area 1	MW018	22/11/2022	0960_MW018_221122	Normal	EP2215711	0.03	0.05	0.77	0.06	0.40	<0.02	2.9	7.07	6.80	6.17	0.54	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.17	24.7	24.8	
Source Area 1	MW018	28/06/2023	0960_MW018_230628	Normal	EP2308704	0.08	0.10	1.07	0.05	0.82	<0.02	0.4	0.63	0.79	0.44	0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.89	4.29	4.44	
Source Area 1	MW021	18/09/2010	MW21	Normal	ES1019112						<0.02						<0.02																			
Source Area 1	MW021	11/03/2011	MW021	Normal	EP1101571						<0.02						<0.02																			
Source Area 1	MW021	8/11/2013	WA0043_MW021	Normal	EP1308516						0.08						<0.02																			
Source Area 1	MW021	23/03/2014	WA0043_MW021_230314	Normal	EP1																															

Table 1 - Water Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids								PFAS - Perfluoroalkyl Carboxylic Acids								PFAS - (n:2) Fluorotelomer Sulfonic				PFAS - Perfluoroalkyl Sulfonamides										PFAS					
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFSE)	Sum of PFHxS and PFDS	Sum of PFAS (WA DER list)	Sum of PFAS					
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		
Source Area 1	MW113	23/06/2021	0960_MW113_210623	Normal	EP2107193	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01			
Source Area 1	MW113	24/11/2021	0960_MW113_211124	Normal	EP2114395	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01						
Source Area 1	MW113	22/06/2022	0960_MW113_220622	Normal	EP2207731	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01						
Source Area 1	MW113	22/11/2022	0960_MW113_221122	Normal	EP2215722	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01						
Source Area 1	MW113	28/06/2023	0960_MW113_230628	Normal	EP2308704	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01						
Source Area 1	MW114	6/03/2018	0960_MW114_180306	Normal	207817	<0.001	<0.001	0.001	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.002	<0.005	<0.01	<0.002	<0.005								
Source Area 1	MW114	10/06/2018	0960_MW114_180610	Normal	211878	<0.001	<0.001	0.002	<0.001	0.002	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.002	<0.005	<0.01	<0.002	<0.005								
Source Area 1	MW114	26/11/2019	0960_MW114_191126	Normal	EP1912480	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01						
Source Area 1	MW114	24/06/2020	0960_MW114_200624	Normal	EP2006512	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01						
Source Area 1	MW114	19/11/2020	0960_MW114_201119	Normal	EP2012892	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01						
Source Area 1	MW114	23/06/2021	0960_MW114_210623	Normal	EP2107193	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01						
Source Area 1	MW114	24/11/2021	0960_MW114_211124	Normal	EP2114395	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01						
Source Area 1	MW114	22/06/2022	0960_MW114_220622	Normal	EP2207731	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01						
Source Area 1	MW114	22/11/2022	0960_MW114_221122	Normal	EP2215711	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01						
Source Area 1	MW114	28/06/2023	0960_MW114_230628	Normal	EP2308704	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01						
Source Area 1	MW115	7/03/2018	0960_MW115_180307	Normal	207857	0.031	0.030	0.16	0.003	0.020	<0.002	0.006	0.008	0.043	0.002	0.002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.005	<0.001	<0.001	<0.001	<0.001	<0.005	<0.002	<0.005	<0.01	<0.002	<0.005									
Source Area 1	MW115	8/																																							

Table 1 - Water Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids								PFAS - Perfluoroalkyl Carboxylic Acids								PFAS - (n:2) Fluorotelomer Sulfonic				PFAS - Perfluoroalkyl Sulfonamides								PFAS				
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSL)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSL)	Sum of PFHxS and PFDS	Sum of PFAS (WA DER list)	Sum of PFAS		
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Offsite Receptor	MW137	20/11/2020	0960_MW137_201120	Normal	EP2012943	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	
Offsite Receptor	MW137	24/06/2021	0960_MW137_210624	Normal	EP2107276	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	
Offsite Receptor	MW137	24/11/2021	0960_MW137_2.5-3.2_211124	Normal	EP2114394	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	
Offsite Receptor	MW137	22/06/2022	0960_MW137_0.8-1.3_220622	Normal	EP2207737	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	
Offsite Receptor	MW137	22/11/2022	0960_MW137_2.5-3.0_221122	Normal	EP2215710	<0.02	<0.02	0.01	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	
Offsite Receptor	MW137	28/06/2023	0960_MW137_2.5-3.0_230628	Normal	EP2308708	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	
Central Drainage Channel	MW138	12/03/2018	0960_MW138_3.0-3.5_180312	Normal	208042	<0.01	<0.01	0.03	<0.01	<0.01	<0.02	<0.02	<0.02	0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.05	<0.1	<0.5	<0.01	<0.01	<0.01	<0.1	<0.05	<0.02	<0.1	<0.05	<0.02	<0.5	<0.01					
Central Drainage Channel	MW138	12/03/2018	0960_MW138_5.0-5.5_180312	Normal	208042	0.003	0.002	0.031	0.003	0.083	<0.002	<0.02	<0.02	<0.01	0.004	0.004	0.003	<0.002	<0.002	<0.005	<0.01	<0.001	<0.001	0.006	<0.001	<0.001	<0.001	<0.01	<0.02	<0.002	<0.005	<0.05	<0.002	<0.05	0.1			
Central Drainage Channel	MW138	12/03/2018	0960_MW138_7.0-7.5_180312	Normal	208042	0.002	<0.001	0.011	<0.001	0.029	<0.002	0.009	<0.002	0.003	0.001	0.002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.001	0.001	<0.001	<0.001	<0.01	<0.02	<0.002	<0.005	<0.05	<0.002	<0.05	<0.001					
Central Drainage Channel	MW138	12/03/2018	0960_MW138_9.0-9.5_180312	Normal	208042	0.002	0.003	0.02	0.002	0.04	<0.002	0.004	0.003	0.006	0.004	0.004	0.001	<0.002	<0.002	<0.005	<0.01	<0.001	0.002	<0.001	<0.001	<0.01	<0.02	<0.002	<0.005	<0.05	<0.002	<0.05	0.1					
Central Drainage Channel	MW138	16/06/2018	0960_MW138_5.5_180616	Normal	212372	0.001	0.001	0.019	<0.001	0.034	<0.002	0.009	<0.002	0.004	0.003	0.002	0.001	<0.002	<0.002	<0.005	<0.01	<0.001	0.002	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	0.053					
Central Drainage Channel	MW138	16/06/2018	0960_MW138_7.5_180616	Normal	212372	<0.001	<0.001	0.001	<0.001	0.005	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	0.006					
Central Drainage Channel	MW138	16/06/2018	0960_MW138_9.5_180616	Normal	212372	<0.001	<0.001	0.004	<0.001	0.012	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	0.016					
Central Drainage Channel	MW138	29/11/2019	0960_MW138_5.0-5.5_191129	Normal	EP1912678	<0.02	<0.02	0.05	<0.02	0.07	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.12	0.12	0.12			
Central Drainage Channel	MW138	24/06/2020	0960_MW138_200624	Normal	EP2006516	<0.02	<0.02	0.14	<0.02	0.87	<0.02	<0.1	<0.02	0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	1.01	1.05	1.05			
Central Drainage Channel	MW138	20/11/2020	0960_MW138_201120	Normal	EP2012943	<0.02	<0.02	0.05	<0.02	0.22	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.27	0.27	0.27			
Central Drainage Channel	MW138	24/06/2021	0960_MW138_210624	Normal	EP2107276	<0.02	<0.02	0.03	<0.02																													

Table 1 - Water Analytical Results

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					PFAS - Perfluoroalkyl Sulfonic Acids							PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - (n:2) Fluorotelomer Sulfonic				PFAS - Perfluoroalkyl Sulfonamides									PFAS		
					Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PPFAs)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanedioic acid (PFBA)	Perfluoropentanoic acid (PFPA)	Perfluoroheptanoic acid (PFHA)	Perfluorooctanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTEdA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PPOS	Sum of PFAS (N/A DER list)	Sum of PFAS		
					µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		
Offsite Receptor	MW177	29/11/2019	0960_MW177_1.5-2.0_191129	Normal	EP1912673	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW177	24/06/2020	0960_MW177_200624	Normal	EP2006524	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW177	20/11/2020	0960_MW177_201120	Normal	EP2012946	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW177	23/06/2021	0960_MW177_3.5-4.0_210623	Normal	EP2107272	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW177	24/11/2021	0960_MW177_3.5-4.0_211124	Normal	EP2114392	<0.02	<0.02	<0.01	<0.02	0.01	<0.02	<0.1	<0.02	0.02	0.15	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.01	0.18	0.18	0.18	
Offsite Receptor	MW177	23/06/2022	0960_MW177_1.5-2.0_220623	Normal	EP2207814	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW177	22/11/2022	0960_MW177_1.5-2.0_221122	Normal	EP2215722	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW177	28/06/2023	0960_MW177_1.5-2.0_230628	Normal	EP2308704	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW178	17/06/2018	0960_MW178_2.5_180617	Normal	212372	<0.001	<0.001	0.004	<0.001	0.004	<0.002	<0.002	<0.002	0.002	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.005	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	0.008			
Offsite Receptor	MW178	17/06/2018	0960_MW178_4.5_180617	Normal	212372	<0.001	<0.001	0.004	<0.001	0.011	<0.002	<0.001	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.05	<0.001	0.004	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	0.013			
Offsite Receptor	MW178	17/06/2018	0960_MW178_7.5_180617	Normal	212372	<0.001	<0.001	0.002	<0.001	0.003	<0.002	<0.001	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	0.005				
Offsite Receptor	MW178	17/06/2018	0960_MW178_9.5_180617	Normal	212372	<0.001	<0.001	0.002	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	0.003				
Offsite Receptor	MW178	29/11/2019	0960_MW178_4.0-4.5_191129	Normal	EP1912673	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.22	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	0.22	0.22		
Offsite Receptor	MW178	24/06/2020	0960_MW178_200624	Normal	EP2006524	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW178	20/11/2020	0960_MW178_201120	Normal	EP2012943	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW178	24/06/2021	0960_MW178_210624	Normal	EP2107273	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW178	24/11/2021	0960_MW178_9-9.5_211124	Normal	EP2114392	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	0.04	0.29	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	0.33	0.33		
Offsite Receptor	MW178	23/06/2022	0960_MW178_2-2.5_220623	Normal	EP2207814	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW178	22/11/2022	0960_MW178_2.0-2.5_221122	Normal	EP2215722	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW178	28/06/2023	0960_MW178_4.0-4.5_230628	Normal	EP2308704	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW179	16/06/2018	0960_MW179_1.5_180616	Normal	212372	<0.001	<0.001	0.009	<0.001	0.010	<0.001	0.009	<0.002	0.002	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.003	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	0.019			
Offsite Receptor	MW179	16/06/2018	0960_MW179_3.7_180616	Normal	212372	<0.001	<0.001	0.002	<0.001	0.005	<0.001	0.005	<0.002	0.003	<0.001	0.002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.004	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	0.007			
Offsite Receptor	MW179	16/06/2018	0960_MW179_6.4_180616	Normal	212372	<0.001	<0.001	0.003	<0.001	0.003	<0.001	0.004	<0.002	0.003	<0.001	0.003	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.004	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	0.006			
Offsite Receptor	MW179	16/06/2018	0960_MW179_9.0_180616	Normal	212372	<0.001	<0.001	0.002	<0.001	0.002	<0.001	0.002	<0.002	<0.002	<0.001	0.002	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.01	<0.005	<0.002	<0.005	<0.01	<0.002	<0.05	0.004			
Offsite Receptor	MW179	29/11/2019	0960_MW179_3.2-3.7_191129	Normal	EP1912678	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW179	24/06/2020	0960_MW179_200624	Normal	EP2006523	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW179	20/11/2020	0960_MW179_201120	Normal	EP2012943	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<0.01	
Offsite Receptor	MW179	24/06/2021	0960_MW179_210624	Normal	EP2107273	<0.02	<0.02	<0.02	<0.02	<0.01	<0																										

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - (n-2) Fluorotelomer Sulfonic				PFAS - Perfluoroalkyl Sulfonamides							PFAS				
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)		Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	N-methyl perfluorodecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)		4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidocetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (N-EFOSE)	N-Ethyl perfluorooctane sulfonamidocetic acid (EFOSEA)	N-Ethyl perfluorooctane sulfonamidoethanol (EFOSEE)	Sum of PFHxS and PFOs	Sum of PFAS (WA DER List)	Sum of PFAS		
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
Seepage		OTH106	9/06/2018	0960_OTH106_180609_B	Normal	211878	<-0.001	<-0.001	<-0.001	<-0.001	<-0.001	<-0.002	<-0.002	<-0.001	<-0.001	<-0.001	<-0.001	<-0.002	<-0.002	<-0.005	<-0.01	<-0.05	<-0.001	<-0.001	<-0.001	<-0.001	<-0.001	<-0.005	<-0.002	<-0.005	<-0.01	<-0.002	<-0.05	<-0.01	<-0.01	<-0.01	
Seepage		OTH106	29/11/2019	0960_OTH106_191129	Normal	EP1912678	<-0.02	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01	
Seepage		OTH106	26/06/2020	0960_OTH106_200626	Normal	EP2006688	<-0.02	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01	
Seepage		OTH106	20/11/2020	0960_OTH106_201120	Normal	EP2012957	<-0.02	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01	
Seepage		OTH106	24/06/2021	0960_OTH106_210624	Normal	EP2107277	<-0.02	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01	
Seepage		OTH106	25/11/2021	0960_OTH106_211125	Normal	EP2114471	<-0.02	<-0.02	<-0.01	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01		
Seepage		OTH106	23/06/2022	0960_OTH106_220623	Normal	EP2207812	<-0.02	<-0.02	<-0.01	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01	
Seepage		OTH106	23/11/2022	0960_OTH106_221123	Normal	EP2215813	<-0.02	<-0.02	<-0.01	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01		
Seepage		OTH106	28/06/2023	0960_OTH106_230628	Normal	EP2308709	<-0.02	<-0.02	<-0.01	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01		
Seepage		OTH107	28/02/2018	0960_OTH107_180228	Normal	207735	<-0.001	<-0.001	<-0.001	<-0.001	<-0.001	<-0.002	<-0.002	<-0.001	<-0.001	<-0.001	<-0.001	<-0.002	<-0.002	<-0.005	<-0.01	<-0.05	<-0.001	<-0.001	<-0.001	<-0.001	<-0.001	<-0.005	<-0.002	<-0.005	<-0.01	<-0.002	<-0.05				
Seepage		OTH107	9/06/2018	0960_OTH107_180609_A	Normal	211878	<-0.001	<-0.001	<-0.001	<-0.001	<-0.001	<-0.002	<-0.002	<-0.001	<-0.001	<-0.001	<-0.001	<-0.002	<-0.002	<-0.005	<-0.01	<-0.05	<-0.001	<-0.001	<-0.001	<-0.001	<-0.001	<-0.005	<-0.002	<-0.005	<-0.01	<-0.002	<-0.05				
Seepage		OTH107	9/06/2018	0960_OTH107_180609_B	Normal	211878	<-0.001	<-0.001	<-0.001	<-0.001	<-0.001	<-0.002	<-0.002	<-0.001	<-0.001	<-0.001	<-0.001	<-0.002	<-0.002	<-0.005	<-0.01	<-0.05	<-0.001	<-0.001	<-0.001	<-0.001	<-0.001	<-0.005	<-0.002	<-0.005	<-0.01	<-0.002	<-0.05				
Seepage		OTH107	29/11/2019	0960_OTH107_191129	Normal	EP1912678	<-0.02	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05		<-0.01	<-0.01	
Seepage		OTH107	26/06/2020	0960_OTH107_200626	Normal	EP2006688	<-0.02	<-0.02	<-0.02	<-0.02	0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	0.01	0.01	0.01	
Seepage		OTH107	20/11/2020	0960_OTH107_201120	Normal	EP2012957	<-0.02	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01	
Seepage		OTH107	24/06/2021	0960_OTH107_210624	Normal	EP2107277	<-0.02	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01		
Seepage		OTH107	25/11/2021	0960_OTH107_211125	Normal	EP2114471	<-0.02	<-0.02	<-0.01	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01		
Seepage		OTH107	23/06/2022	0960_OTH107_220623	Normal	EP2207812	<-0.02	<-0.02	<-0.01	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01		
Seepage		OTH107	23/11/2022	0960_OTH107_221123	Normal	EP2215813	<-0.02	<-0.02	<-0.01	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01		
Seepage		OTH107	28/06/2023	0960_OTH107_230628	Normal	EP2308709	<-0.02	<-0.02	<-0.01	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01		
Seepage		OTH129	10/06/2018	0960_OTH129_180610_A	Normal	211878	<-0.001	<-0.001	<-0.001	<-0.001	<-0.001	<-0.002	<-0.002	<-0.001	<-0.001	<-0.001	<-0.001	<-0.002	<-0.002	<-0.005	<-0.01	<-0.05	<-0.001	<-0.001	<-0.001	<-0.001	<-0.001	<-0.005	<-0.002	<-0.005	<-0.01	<-0.002	<-0.05				
Seepage		OTH129	10/06/2018	0960_OTH129_180610_B	Normal	211878	<-0.001	<-0.001	<-0.001	<-0.001	<-0.001	<-0.002	<-0.002	<-0.001	<-0.001	<-0.001	<-0.001	<-0.001	<-0.002	<-0.002	<-0.005	<-0.01	<-0.05	<-0.001	<-0.001	<-0.001	<-0.001	<-0.001	<-0.005	<-0.002	<-0.005	<-0.01	<-0.002	<-0.05			
Seepage		OTH129	1/12/2019	0960_OTH129_191201	Normal	EP1912685	<-0.02	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01	
Seepage		OTH129	25/06/2020	0960_OTH129_200625	Normal	EP2006595	<-0.02	<-0.02	<-0.02	<-0.02	0.15	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	0.15	0.15	0.15		
Seepage		OTH129	20/11/2020	0960_OTH129_201120	Normal	EP2012946	<-0.02	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01		
Seepage		OTH129	23/06/2021	0960_OTH129_210623	Normal	EP2107272	<-0.02	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01		
Seepage		OTH129	24/11/2021	0960_OTH129_211124	Normal	EP2114392	<-0.02	<-0.02	<-0.01	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01		
Seepage		OTH129	23/06/2022	0960_OTH129_220623	Normal	EP2207816	<-0.02	<-0.02	<-0.01	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02	<-0.02	<-0.02	<-0.05	<-0.05	<-0.05	<-0.05	<-0.05	<-0.02	<-0.05	<-0.02	<-0.05	<-0.05	<-0.02	<-0.05	<-0.01	<-0.01	<-0.01		
Seepage		OTH129	23/11/2022	0960_OTH129_221123	Normal	EP2215791	<-0.02	<-0.02	<-0.01	<-0.02	<-0.01	<-0.02	<-0.02	<-0.02																							

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids						PFAS - (n:2) Fluorotelomer Sulfonic				PFAS - Perfluoroalkyl Sulfonamides						PFAS										
						Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PPFAs)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecane sulfonic acid (PFDS)	Perfluorobutanolic acid (PFBA)	Perfluoropentanolic acid (PPFAA)	Perfluoroheptanolic acid (PFHA)	Perfluorooctanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTEdA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer sulfonic acid (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PPOS	Sum of PFAS (N/A DER list)	Sum of PFAS		
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	
Surface Water	SW205	19/02/2018	0960_SW205_180219		Normal	207115	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Surface Water	SW205	14/06/2018	0960_QC650_180614		Normal	212372	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Surface Water	SW205	14/06/2018	0960_SW205_180614		Normal	212372	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Surface Water	SW205	27/05/2020	0960_SW205_200527		Normal	EP2005487	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW205	24/06/2020	0960_SW205_200624		Normal	EP2006551	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW205	20/11/2020	0960_SW205_201120		Normal	EP2013114	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW205	4/03/2021	0960_SW205_210304		Normal	EP2102258	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW205	24/06/2021	0960_SW205_210624		Normal	EP2107278	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW205	25/11/2021	0960_SW205_211125		Normal	EP2114473	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW205	17/05/2022	0960_SW205_220517		Normal	EP2205925	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW205	23/06/2022	0960_SW205_220623		Normal	EP2207812	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW205	23/11/2022	0960_SW205_221123		Normal	EP2215813	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW207	28/02/2018	0960_SW207_180228		Normal	207735	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Surface Water	SW207	13/06/2018	0960_SW207_180613		Normal	212151	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Surface Water	SW207	2/12/2019	0960_SW207_191202		Normal	EP1912748	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW207	27/05/2020	0960_SW207_200527		Normal	EP2005487	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW207	24/06/2020	0960_SW207_200624		Normal	EP2006531	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	0.05	0.05	0.05
Surface Water	SW207	20/11/2020	0960_SW207_201120		Normal	EP2012942	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW207	4/03/2021	0960_SW207_210304		Normal	EP2102262	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW207	24/06/2021	0960_SW207_210624		Normal	EP2107278	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW207	24/11/2021	0960_SW207_211124		Normal	EP2114399	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW207	25/11/2021	0960_SW207_211125		Normal	EP2114473	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW207	18/05/2022	0960_SW207_220518		Normal	EP2205970	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW207	23/06/2022	0960_SW207_220623		Normal	EP2207812	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW207	23/11/2022	0960_SW207_221123		Normal	EP2215813	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW207	28/06/2023	0960_SW207_230628		Normal	EP2308709	<0.02	<0.02	<0.01	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01
Surface Water	SW208	1/03/2018	0960_SW208_180301		Normal	207735	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0																										

First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value

Table 1 - Water Analytical Results

						Inorganics										Metals									
						Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)			
						mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L				
LOR - Limit of Reporting						1	1	1	1	0.01	0.01	1	0.01	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5				
PFAS NEMP 2020 Freshwater 99%																									
PFAS NEMP 2020 Recreational Water																									
Monitoring Area	Location Code	Date	Field ID	Sample Type	Lab Report Number																				
Source Area 1	MW018	18/09/2010	MW18	Normal	ES1019112																				
Source Area 1	MW018	11/03/2011	MW018	Normal	EP1101571																				
Source Area 1	MW018	6/11/2013	WA0043_MW018	Normal	EP1308516																				
Source Area 1	MW018	23/03/2014	WA0043-MW018-230314	Normal	EP1402252																				
Source Area 1	MW018	9/06/2015	WA0043-MW18	Normal	EP1511012																				
Source Area 1	MW018	6/10/2015	WA0043-MW018	Normal	EP1514597																				
Source Area 1	MW018	15/03/2016	WA0043_MW18_150316	Normal	EP1602318																				
Source Area 1	MW018	3/12/2016	MW018	Normal	527022																				
Source Area 1	MW018	6/03/2018	0960_MW018_180306	Normal	207817		730					960	-5.9		31		35		23		940				
Source Area 1	MW018	10/06/2018	0960_MW018_180610	Normal	211878		770					970	4.2		41		47		27		1,200				
Source Area 1	MW018	26/11/2019	0960_MW018_191126	Normal	EP1912481	<1	323	<1	323	10.3	10.6	128	1.41	12	110		9		8		96				
Source Area 1	MW018	24/06/2020	0960_MW018_200624	Normal	EP2006512	<1	968	<1	968	42.1	35.9	571	7.99	320	16		20		30		751				
Source Area 1	MW018	19/11/2020	0960_MW018_201119	Normal	EP2012892	<1	857	<1	857	36.6	35.1	475	2.09	294	12		16		27		748				
Source Area 1	MW018	23/06/2021	0960_MW018_210623	Normal	EP2107193	24	933	<1	956	31.4	29.3	307	3.49	174	6		9		22		636				
Source Area 1	MW018	25/11/2021	0960_MW018_211125	Normal	EP2114474	<1	938	<1	938	33.3	28.0	361	8.76	211	5		8		20		610				
Source Area 1	MW018	22/06/2022	0960_MW018_220622	Normal	EP2207731	<1	996	<1	996	29.4	25.1	214	7.93	166	8		10		21		536				
Source Area 1	MW018	22/11/2022	0960_MW018_221122	Normal	EP2215711	<1	1,050	<1	1,050	27.0	23.4	130	7.21	114	4		5		18		513				
Source Area 1	MW018	28/06/2023	0960_MW018_230628	Normal	EP2308704	<1	898	<1	898	34.2	29.9	393	6.81	251	7		10		24		646				
Source Area 1	MW021	18/09/2010	MW21	Normal	ES1019112																				
Source Area 1	MW021	11/03/2011	MW021	Normal	EP1101571																				
Source Area 1	MW021	8/11/2013	WA0043_MW021	Normal	EP1308516																				
Source Area 1	MW021	23/03/2014	WA0043_MW021_230314	Normal	EP1402252																				
Source Area 1	MW021	9/06/2015	WA0043-MW021	Normal	EP1511012																				
Source Area 1	MW021	6/10/2015	WA043-MW021	Normal	EP1514597																				
Source Area 1	MW021	15/03/2016	WA0043_MW021_150316	Normal	EP1602318																				
Source Area 1	MW021	3/12/2016	MW021	Normal	527022																				
Source Area 1	MW021	6/03/2018	0960_MW021_180306	Normal	207817		520					2,900	0.49		160		170		51		1,900				
Source Area 1	MW021	10/06/2018	0960_MW021_180610	Normal	211878		670					2,400	3.6		120		130		42		1,800				
Source Area 1	MW021	26/11/2019	0960_MW021_191126	Normal	EP1912480	5	1,130	<1	1,140	46.7	46.0	720	0.74	173	19		27		32		966				
Source Area 1	MW021	24/06/2020	0960_MW021_200624	Normal	EP2006512	<1	1,100	<1	1,100	42.0	34.8	597	9.46	155	10		16		27		742				
Source Area 1	MW021	23/06/2021	0960_MW021_210623	Normal	EP2107193	<1	702	<1	702	82.0	73.8	2,180	5.25	312	82		91		53		1,400				
Source Area 1	MW021	24/11/2021	0960_MW021_211124	Normal	EP2114395	<1	999	<1	999	41.1	34.2	659	9.16	121	4		8		22		753				
Source Area 1	MW021	22/06/2022	0960_MW021_220622	Normal	EP2207731	<1	1,150	<1	1,150	31.4	27.9	234	5.79	86	4		7		21		612				
Source Area 1	MW021	22/11/2022	0960_MW021_221122	Normal	EP2215711	<1	1,210	<1	1,210	35.0	29.6	320	8.34	88	4		8		20		650				
Source Area 1	MW021	28/06/2023	0960_MW021_230628	Normal	EP2308708	36	1,100	<1	1,140	31.4	26.7	250	8.17	76	3		5		19		589				
On site pathway	MW102	7/03/2018	0960_MW102_180307	Normal	207857		150					39,000	-1.3		1,300		2,100		430		21,000				
On site pathway	MW102	9/06/2018	0960_MW102_180609	Normal	211878		140					37,000	0.87		1,200		2,000		390		21,000				
On site pathway	MW102	2/12/2019	0960_MW102_191202	Normal	EP1912744	<1	125	<1	125	1,050	1,360	34,400	12.6	3,790	1,470		2,660		798		24,000				
On site pathway	MW102	24/06/2020	0960_MW102_200624	Normal	EP2006532	<1	167	<1	167	889	1,020	28,300	6.85	4,190	1,020		1,870		566		18,400				
On site pathway	MW102	19/11/2020	0960_MW102_201119	Normal	EP2012894	<1	160	<1	160	1,030	1,100	33,200	3.57	4,220	1,310		2,250		702		19,200				
On site pathway	MW102	23/06/2021	0960_MW102_210623	Normal	EP2107189	<1	137	<1	137	1,070	1,240	35,000	7.32	3,820	1,450		2,410		765		21,800				
On site pathway	MW102	25/11/2021	0960_MW102_211125	Normal	EP2114471	<1	115	<1	115	1,110	1,140	36,200	1.10	4,200	1,330		2,230		614		20,000				
On site pathway	MW102	22/06/2022	0960_MW102_220622	Normal	EP2207727	<1	139	<1	139	1,140	1,110	37,300	1.72	4,320	1,380		2,240		696		19,200				
On site pathway	MW102	22/11/2022	0960_MW102_221122	Normal	EP2215722	<1	127	<1	127	918	1,090	29,700	8.70	3,710	1,280		2,150		647		19,200				
On site pathway	MW102	28/06/2023	0960_MW102_230628	Normal	EP2308702	<1	134	<1	134	959	1,120	31,100	7.86	3,780	1,400		2,330		657		19,400				
On site pathway	MW103	7/03/2018	0960_MW103_180307	Normal	207857		180					29,000	1.5		1,200		1,800		470		16,000				
On site pathway	MW103	15/06/2018	0960_MW103_180615	Normal	212372		190					27,000	1.7		1,100		1,700		430		15,000				
On site pathway	MW103	30/11/2019	0960_MW103_191130	Normal	EP1912682	<1	185	<1	185	786	984	26,000	11.2	2,350	1,430		2,300		740		16,200				
On site pathway	MW103	24/06/2020	0960_MW103_200624	Normal	EP2006515	<1	174	<1	174	837	886	27,400	2.82	2,920	1,330		2,040		646		14,600				

Table 1 - Water Analytical Results

						Inorganics										Metals									
						Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)			
						mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L				
Source Area 1	MW113	23/06/2021	0960_MW113_210623	Normal	EP2107193	<1	379	<1	379	104	105	3,240	0.57	254		197		176		77		1,820			
Source Area 1	MW113	24/11/2021	0960_MW113_211124	Normal	EP2114395	<1	386	<1	386	100	101	3,070	0.61	272		210		178		66		1,710			
Source Area 1	MW113	22/06/2022	0960_MW113_220622	Normal	EP2207731	<1	396	<1	396	110	96.4	3,410	6.36	261		188		169		71		1,640			
Source Area 1	MW113	22/11/2022	0960_MW113_221122	Normal	EP2215722	<1	394	<1	394	98.8	98.3	3,010	0.24	290		245		189		55		1,590			
Source Area 1	MW113	28/06/2023	0960_MW113_230628	Normal	EP2308704	<1	455	<1	455	118	118	3,630	0.13	312		226		224		79		1,990			
Source Area 1	MW114	6/03/2018	0960_MW114_180306	Normal	207817		520					2,600	-2.3			130		120		38		1,700			
Source Area 1	MW114	10/06/2018	0960_MW114_180610	Normal	211878		520					2,400	4.1			140		120		39		1,700			
Source Area 1	MW114	26/11/2019	0960_MW114_191126	Normal	EP1912480	<1	489	<1	489	86.2	89.6	2,500	1.91	284		157		134		60		1,590			
Source Area 1	MW114	24/06/2020	0960_MW114_200624	Normal	EP2006512	<1	549	<1	549	86.0	78.2	2,450	4.74	282		147		114		56		1,380			
Source Area 1	MW114	19/11/2020	0960_MW114_201119	Normal	EP2012892	<1	464	<1	464	81.3	84.5	2,340	1.92	290		152		124		57		1,500			
Source Area 1	MW114	23/06/2021	0960_MW114_210623	Normal	EP2107193	<1	456	<1	456	89.3	87.8	2,650	0.81	260		116		111		62		1,640			
Source Area 1	MW114	24/11/2021	0960_MW114_211124	Normal	EP2114395	<1	469	<1	469	85.6	86.4	2,500	0.48	275		116		112		55		1,610			
Source Area 1	MW114	22/06/2022	0960_MW114_220622	Normal	EP2207731	<1	460	<1	460	90.0	83.4	2,670	3.82	264		123		116		62		1,520			
Source Area 1	MW114	22/11/2022	0960_MW114_221122	Normal	EP2215711	<1	468	<1	468	78.1	83.4	2,240	3.30	268		114		108		57		1,550			
Source Area 1	MW114	28/06/2023	0960_MW114_230628	Normal	EP2308704	<1	461	<1	461	77.1	82.4	2,230	3.35	238		127		125		55		1,480			
Source Area 1	MW115	7/03/2018	0960_MW115_180307	Normal	207857		340					14,000	-0.51			590		810		210		7,500			
Source Area 1	MW115	8/06/2018	0960_MW115_180608	Normal	211878		380					13,000	1.8			600		810		210		7,400			
Source Area 1	MW115	29/11/2019	0960_MW115_191129	Normal	EP1912676	<1	391	<1	391	392	471	12,600	9.18	1,390		699		1,000		347		7,940			
Source Area 1	MW115	25/06/2020	0960_MW115_200625	Normal	EP2006591	<1	330	<1	330	408	411	13,100	0.40	1,530		607		821		316		7,020			
Source Area 1	MW115	19/11/2020	0960_MW115_201119	Normal	EP2012917	<1	340	<1	340	399	427	12,800	3.37	1,490		637		886		345		7,200			
Source Area 1	MW115	24/06/2021	0960_MW115_210624	Normal	EP2107276	<1	328	<1	328	397	429	12,900	3.88	1,260		623		903		310		7,250			
Source Area 1	MW115	25/11/2021	0960_MW115_211125	Normal	EP2114477	<1	339	<1	339	374	376	11,900	0.23	1,520		544		780		255		6,390			
Source Area 1	MW115	22/06/2022	0960_MW115_220622	Normal	EP2207737	<1	349	<1	349	375	340	11,900	4.91	1,550		494		715		294		5,720			
Source Area 1	MW115	22/11/2022	0960_MW115_221122	Normal	EP2215722	<1	346	<1	346	355	354	11,200	0.20	1,560		497		692		249		6,110			
Source Area 1	MW115	28/06/2023	0960_MW115_230628	Normal	EP2308704	<1	375	<1	375	331	359	10,300	4.06	1,580		516		730		255		6,130			
On site pathway	MW122	15/06/2018	0960_MW122_180615	Normal	212372		420					14,000	3.5			300		760		310		9,100			
On site pathway	MW122	30/11/2019	0960_MW122_191130	Normal	EP1912680	<1	478	<1	478	326	341	9,790	2.35	1,920		175		520		362		6,450			
On site pathway	MW122	25/06/2020	0960_MW122_200625	Normal	EP2006590	<1	433	<1	433	408	412	12,600	0.53	2,100		253		659		440		7,680			
On site pathway	MW122	21/11/2020	0960_MW122_201121	Normal	EP2012956	<1	376	<1	376	435	461	13,700	2.91	1,980		309		827		469		8,410			
On site pathway	MW122	24/06/2021	0960_MW122_210624	Normal	EP2107276	<1	394	<1	394	441	499	14,100	6.11	1,720		319		893		482		9,130			
On site pathway	MW122	25/11/2021	0960_MW122_211125	Normal	EP2114474	<1	384	<1	384	410	426	12,800	1.91	2,000		294		762		396		7,790			
On site pathway	MW122	22/06/2022	0960_MW122_220622	Normal	EP2207731	<1	350	<1	350	521	573	16,600	4.68	2,220		428		1,130		575		10,200			
On site pathway	MW122	22/11/2022	0960_MW122_221122	Normal	EP2215710	<1	375	<1	375	433	471	13,600	4.23	2,020		317		845		486		8,590			
On site pathway	MW122	28/06/2023	0960_MW122_230628	Normal	EP2308704	<1	374	<1	374	416	481	13,000	7.28	2,010		350		930		450		8,640			
On site pathway	MW124	7/03/2018	0960_MW124_180307	Normal	207857		160					35,000	-1.4			900		2,100		680		19,000			
On site pathway	MW124	9/06/2018	0960_MW124_180609	Normal	211878		260					34,000	2.1			870		2,100		680		20,000			
On site pathway	MW124	2/12/2019	0960_MW124_191202	Normal	EP1912744	<1	164	<1	164	1,010	1,320	32,300	13.2	4,720		1,040		2,820		1,040		23,200			
On site pathway	MW124	29/06/2020	0960_MW124_200629	Normal	EP2006749	<1	175	<1	175	973	1,130	30,900	7.44	4,690		962		2,420		978		19,700			
On site pathway	MW124	19/11/2020	0960_MW124_201119	Normal	EP2012894	<1	162	<1	162	966	1,180	30,600	10.2	4,810		1,020		2,650		1,150		20,400			
On site pathway	MW124	23/06/2021	0960_MW124_210623	Normal	EP2107189	<1	144	<1	144	1,020	1,180	32,900	6.93	4,530		962		2,480		998		20,700			
On site pathway	MW124	25/11/2021	0960_MW124_211125	Normal	EP2114474	<1	153	<1	153	984	1,130	31,400	6.93	4,600		926		2,320		946		20,000			
On site pathway	MW124	22/06/2022	0960_MW124_220622	Normal	EP2207727	<1	159	<1	159	1,050	1,010	33,400	1.73	4,920		869		2,190		901		17,600			
On site pathway	MW124	22/11/2022	0960_MW124_221122	Normal	EP2215722	<1	169	<1	169	920	1,070	29,200	7.66	4,470		897		2,280		1,060		18,700			
On site pathway	MW124	28/06/2023	0960_MW124_230628	Normal	EP2308708	<1	224	<1	224	889	1,080	28,200	9.66	4,270		887		2,200</							

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						Inorganics										Metals									
						Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)			
						mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
Offsite Receptor	MW137	20/11/2020	0960_MW137_201120	Normal	EP2012943	<1	200	<1	200	956	1,050	30,300	4.86	4,690		728		2,310		1,070		18,400			
Offsite Receptor	MW137	24/06/2021	0960_MW137_210624	Normal	EP2107276	<1	195	<1	195	942	1,010	30,500	3.57	3,730		720		2,240		1,010		17,600			
Offsite Receptor	MW137	24/11/2021	0960_MW137_2.5-3_211124	Normal	EP2114394	<1	200	<1	200	865	986	27,500	6.54	4,090		666		2,150		908		17,300			
Offsite Receptor	MW137	22/06/2022	0960_MW137_0.8-1.3_220622	Normal	EP2207737	<1	252	<1	252	1,100	1,200	35,700	4.47	4,200		752		2,720		1,080		21,000			
Offsite Receptor	MW137	22/11/2022	0960_MW137_2.5-3.0_221122	Normal	EP2215710	<1	197	<1	197	836	974	26,400	7.63	4,190		649		2,160		955		17,000			
Offsite Receptor	MW137	28/06/2023	0960_MW137_2.5-3.0_230628	Normal	EP2308708	<1	259	<1	259	815	969	26,000	8.63	3,680		634		2,220		944		16,800			
Central Drainage Channel	MW138	12/03/2018	0960_MW138_3.0-3.5_180312	Normal	208042																				
Central Drainage Channel	MW138	12/03/2018	0960_MW138_5.0-5.5_180312	Normal	208042		180					28,000	4.8			910		1,800		560		18,000			
Central Drainage Channel	MW138	12/03/2018	0960_MW138_7.0-7.5_180312	Normal	208042		160					33,000	10			1,100		2,300		710		23,000			
Central Drainage Channel	MW138	12/03/2018	0960_MW138_9.0-9.5_180312	Normal	208042		170					31,000	7.3			930		2,100		650		20,000			
Central Drainage Channel	MW138	16/06/2018	0960_MW138_5.5_180616	Normal	212372		160									780		1,700		530		17,000			
Central Drainage Channel	MW138	16/06/2018	0960_MW138_7.5_180616	Normal	212372		220					35,000	0.95			910		2,000		600		20,000			
Central Drainage Channel	MW138	16/06/2018	0960_MW138_9.5_180616	Normal	212372		140					37,000	1.4			860		2,100		710		22,000			
Central Drainage Channel	MW138	29/11/2019	0960_MW138_5.0-5.5_191129	Normal	EP1912678	<1	142	<1	142	774	922	24,500	8.70	3,860		984		1,940		839		15,900			
Central Drainage Channel	MW138	24/06/2020	0960_MW138_200624	Normal	EP2006516	<1	264	<1	264	463	462	14,700	0.08	2,080		440		962		522		8,000			
Central Drainage Channel	MW138	20/11/2020	0960_MW138_201120	Normal	EP2012943	<1	156	<1	156	782	815	24,800	2.06	3,810		732		1,700		644		14,300			
Central Drainage Channel	MW138	24/06/2021	0960_MW138_210624	Normal	EP2107276	<1	144	<1	144	897	1,070	29,000	8.69	3,670		905		2,130		997		18,900			
Central Drainage Channel	MW138	24/11/2021	0960_MW138_3.3-3.5_211124	Normal	EP2114394	<1	165	<1	165	926	1,130	29,400	9.81	4,510		974		2,270		890		20,000			
Central Drainage Channel	MW138	22/06/2022	0960_MW138_3.3-5_220622	Normal	EP2207731	<1	268	<1	268	508	499	16,200	0.89	2,200		485		1,070		502		8,600			
Central Drainage Channel	MW138	22/11/2022	0960_MW138_3.0-3.5_221122	Normal	EP2215710	<1	313	<1	313	418	453	13,200	4.04	1,880		446		965		434		7,820			
Offsite Southern Drainage Channel	MW139	7/03/2018	0960_MW139_180307	Normal	207857		200					29,000	-0.63			810		2,000		550		16,000			
Offsite Southern Drainage Channel	MW139	10/06/2018	0960_MW139_180610	Normal	211878		240					32,000	2.4			910		2,300		620		18,000			
Offsite Southern Drainage Channel	MW139	29/11/2019	0960_MW139_191129	Normal	EP1912678	<1	194	<1	194	847	944	26,900	5.42	4,060		970		2,260		889		15,800			
Offsite Southern Drainage Channel	MW139	24/06/2020	0960_MW139_200624	Normal	EP2006516	<1	201	<1	201	792	844	25,000	3.17	4,000		834		2,030		707		14,200			
Offsite Southern Drainage Channel	MW139	21/11/2020	0960_MW139_201121	Normal	EP2012956	<1	197	<1	197	736	691	23,500	3.16	3,340		676		1,540		682		11,800			
Offsite Southern Drainage Channel	MW139	24/06/2021	0960_MW139_210624	Normal	EP2107276	<1	198	<1	198	756	905	24,000	8.94	3,620		844		2,080		849		15,400			
Offsite Southern Drainage Channel	MW139	25/11/2021	0960_MW139_211125	Normal	EP2114474	<1	192	<1	192	672	698	21,100	1.89	3,530		693		1,530		627		12,000			
Offsite Southern Drainage Channel	MW139	22/06/2022	0960_MW139_220622	Normal	EP2207731	<1	194	<1	194	698	749	21,800	3.53	3,800		739		1,760		754		12,600			
Offsite Southern Drainage Channel	MW139	22/11/2022	0960_MW139_221122	Normal	EP2215710	<1	200	<1	200	672	791	20,800	8.13	3,920		788		1,830		727		13,400			
Offsite Southern Drainage Channel	MW139	28/06/2023	0960_MW139_230628	Normal	EP2308707	<1	207	<1	207	674	780	21,100	7.30	3,600		788		1,860		716		13,100			
Offsite Southern Drainage Channel	MW140	16/06/2018	0960_MW140_2.0_180616	Normal	212372		210					42,000	-6.1			890		2,200		680		21,000			
Offsite Southern Drainage Channel	MW140	16/06/2018	0960_MW140_4.0_180616	Normal	212372		260					44,000	-4.6			870		2,500		770		22,000			
Offsite Southern Drainage Channel	MW140	16/06/2018	0960_MW140_6.5_180616	Normal	212372		270					40,000	-0.62			1,100		2,200		580		22,000			
Offsite Southern Drainage Channel	MW140	16/06/2018	0960_MW140_9.0_180616	Normal	212372		240					41,000	-3.2			740		2,400		760		22,000			
Offsite Southern Drainage Channel	MW140	29/11/2019	0960_MW140_3.5-4.0_191129	Normal	EP1912678	<1	214	<1	214	1,190	1,440	38,200	9.72	5,020		998		3,160		1,400		25,200			
Offsite Southern Drainage Channel	MW140	24/06/2020	0960_MW140_200624	Normal	EP2006523	<1	226	<1	226	1,180	1,440	38,100	9.82	5,000		1,050		3,160		1,270		25,200			
Offsite Southern Drainage Channel	MW140	20/11/2020	0960_MW140_4.5_201120	Normal	EP2012957	<1	210	<1	210	1,310	1,480	42,600	6.15	4,930		977		3,180		1,170		26,200			
Offsite Southern Drainage Channel	MW140	24/06/2021	0960_MW140_6.0-6.5_210624	Normal	EP2107277	<1	216	<1	216	1,140	1,360	36,600	8.69	4,910		884		2,810		1,090		24,200			
Offsite Southern Drainage Channel	MW140	25/11/2021	0960_MW140_3.5-4_211125	Normal	EP2114471	<1	198	<1	198	1,240	1,260	39,900	0.52	5,520		806		2,710		1,120		22,200			
Offsite Southern Drainage Channel	MW140	23/06/2022	0960_MW140_1.5-2_230623	Normal	EP2207810	<1	180	<1	180	1,270	1,160	41,300	4.83	5,090		781		2,620		1,100		20,100			
Offsite Southern Drainage Channel	MW140	23/11/2022	0960_MW140_1.5-2.0_221123	Normal	EP2215815	<1	153	<1	153	1,200	1,310	38,400	4.31	5,500		829		2,780		1,160		23,200			
Offsite Southern Drainage Channel	MW140	28/06/2023	0960_MW140_1.5-2.0_230628	Normal	EP2308707	<1	149	<1	149	1,110	1,330	35,500	9.04	5,180		829		2,990		1,100		23,400			
Offsite Receptor	MW141	8/03/2018	0960_MW141_1.5-2.0_180308	Normal	208042		320					12,000	0.81			450		680		200		6,900			
Offsite Receptor	MW141																								

Table 1 - Water Analytical Results

						Inorganics										Metals									
						Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)			
						mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
Area West of WAPET	MW145	16/06/2018	0960_MW145_5.5_180616	Normal	212372		160					42,000	7.1			1,100		2,800		940		27,000			
Area West of WAPET	MW145	16/06/2018	0960_MW145_7.5_180616	Normal	212372		160					43,000	3.8			1,100		2,600		910		26,000			
Area West of WAPET	MW145	16/06/2018	0960_MW145_9.5_180616	Normal	212372		170					43,000	5.4			1,100		2,800		960		27,000			
Area West of WAPET	MW145	29/11/2019	0960_MW145_5.0-5.5_191129	Normal	EP1912678	<1	205	<1	205	1,200	1,410	38,300	8.12	5,320		1,260		3,000		1,390		24,400			
Area West of WAPET	MW145	24/06/2020	0960_MW145_200624	Normal	EP2006516	<1	123	<1	123	1,080	1,270	34,600	8.04	4,940		1,040		2,690		1,060		22,300			
Area West of WAPET	MW145	20/11/2020	0960_MW145_201120	Normal	EP2012943	<1	118	<1	118	1,230	1,490	39,000	9.77	5,980		1,260		3,150		1,210		26,200			
Area West of WAPET	MW145	24/06/2021	0960_MW145_210624	Normal	EP2107273	<1	126	<1	126	1,290	1,430	41,700	5.24	5,300		1,180		3,000		1,170		25,200			
Area West of WAPET	MW145	24/11/2021	0960_MW145_5.5-5.5_211124	Normal	EP2114394	<1	123	<1	123	1,140	1,310	36,400	7.00	5,390		1,080		2,780		1,180		23,000			
Area West of WAPET	MW145	22/06/2022	0960_MW145_3-3.5_220622	Normal	EP2207731	<1	130	<1	130	1,350	1,340	43,300	0.17	5,950		1,100		2,940		1,120		23,400			
Area West of WAPET	MW145	23/11/2022	0960_MW145_3.0-3.5_221123	Normal	EP2215797	<1	125	<1	125	1,020	1,170	32,600	6.90	4,570		999		2,500		982		20,400			
Area West of WAPET	MW145	28/06/2023	0960_MW145_3-3.5_230628	Normal	EP2308707	<1	126	<1	126	1,060	1,260	33,900	8.56	5,030		1,040		2,810		1,050		21,900			
Area West of WAPET	MW146	8/03/2018	0960_MW146_3.0-3.5_180308	Normal	208042		140					34,000	4			1,100		2,300		740		21,000			
Area West of WAPET	MW146	8/03/2018	0960_MW146_5.0-5.5_180308	Normal	208042		160					36,000	5.2			1,200		2,400		740		23,000			
Area West of WAPET	MW146	8/03/2018	0960_MW146_7.0-7.5_180308	Normal	208042		170					38,000	8.8			1,300		2,700		850		25,000			
Area West of WAPET	MW146	8/03/2018	0960_MW146_9.0-9.5_180308	Normal	208042		160					42,000	4.7			1,200		2,800		930		26,000			
Area West of WAPET	MW146	16/06/2018	0960_MW146_3.5_180616	Normal	212372		180					36,000	3.0			960		2,300		720		22,000			
Area West of WAPET	MW146	16/06/2018	0960_MW146_5.5_180616	Normal	212372		160					38,000	3.4			990		2,400		770		23,000			
Area West of WAPET	MW146	16/06/2018	0960_MW146_7.5_180616	Normal	212372		240					44,000	4.4			1,200		2,800		900		27,000			
Area West of WAPET	MW146	16/06/2018	0960_MW146_9.5_180616	Normal	212372		160					46,000	2.1			1,100		2,800		940		27,000			
Area West of WAPET	MW146	29/11/2019	0960_MW146_5.0-5.5_191129	Normal	EP1912678	<1	140	<1	140	1,160	1,400	36,700	9.09	5,990		1,200		3,010		1,370		24,200			
Area West of WAPET	MW146	24/06/2020	0960_MW146_200624	Normal	EP2006516	<1	142	<1	142	1,120	1,290	35,700	6.82	5,520		1,050		2,760		1,050		22,600			
Area West of WAPET	MW146	21/11/2020	0960_MW146_5.0_201121	Normal	EP2013115	<1	128	<1	128	1,200	1,380	37,800	7.06	6,130		1,130		3,020		1,150		24,000			
Area West of WAPET	MW146	24/06/2021	0960_MW146_210624	Normal	EP2107276	<1	128	<1	128	1,190	1,280	38,400	3.69	4,900		1,080		2,750		1,290		22,200			
Area West of WAPET	MW146	24/11/2021	0960_MW146_3-3.5_211124	Normal	EP2114394	<1	128	<1	128	1,110	1,330	35,100	8.83	5,800		1,060		2,810		1,060		23,400			
Area West of WAPET	MW146	22/06/2022	0960_MW146_3-3.5_220622	Normal	EP2207731	<1	133	<1	133	1,310	1,340	41,800	1.32	6,000		1,110		2,910		1,130		23,400			
Area West of WAPET	MW146	23/11/2022	0960_MW146_3.0-3.5_221123	Normal	EP2215815	<1	113	<1	113	1,070	1,170	34,100	4.41	5,120		970		2,430		984		20,600			
Area West of WAPET	MW146	28/06/2023	0960_MW146_3.0-3.5_230628	Normal	EP2308704	<1	124	<1	124	997	1,190	31,600	8.78	4,960		1,020		2,580		1,000		20,700			
Area West of WAPET	MW147	8/03/2018	0960_MW147_3.0-3.5_180308	Normal	208042		150					39,000	4.9			1,400		2,800		870		24,000			
Area West of WAPET	MW147	8/03/2018	0960_MW147_5.0-5.5_180308	Normal	208042		180					40,000	1.9			1,100		2,600		800		23,000			
Area West of WAPET	MW147	8/03/2018	0960_MW147_7.0-7.5_180308	Normal	208042		190					40,000	1.8			1,000		2,700		820		23,000			
Area West of WAPET	MW147	8/03/2018	0960_MW147_9.0-9.5_180308	Normal	208042		200					41,000	2.4			970		2,800		880		24,000			
Area West of WAPET	MW147	16/06/2018	0960_MW147_3.5_180616	Normal	212372		150					41,000	6.5			1,200		2,800		920		27,000			
Area West of WAPET	MW147	16/06/2018	0960_MW147_5.5_180616	Normal	212372		200					42,000	3.7			1,000		2,800		860		26,000			
Area West of WAPET	MW147	16/06/2018	0960_MW147_7.5_180616	Normal	212372		220					41,000	5.4			940		2,800		880		26,000			
Area West of WAPET	MW147	16/06/2018	0960_MW147_9.5_180616	Normal	212372		180					44,000	4.6			1,100		2,900		900		27,000			
Area West of WAPET	MW147	29/11/2019	0960_MW147_3.0-3.5_191129	Normal	EP1912678	<1	142	<1	142	1,200	1,440	38,600	9.07	5,410		1,240		3,140		1,440		25,000			
Area West of WAPET	MW147	24/06/2020	0960_MW147_200624	Normal	EP2006516	<1	139	<1	139	1,150	1,310	36,800	6.33	5,460		1,010		2,820		1,080		23,000			
Area West of WAPET	MW147	20/11/2020	0960_MW147_5.5_201120	Normal	EP2012957	<1	124	<1	124	1,350	1,460	43,500	3.75	5,830		1,120		3,170		1,180		25,500			
Area West of WAPET	MW147	24/06/2021	0960_MW147_4.0-4.5_210624	Normal	EP2107277	<1	154	<1	154	1,230	1,500	39,400	9.88	5,620		1,200		3,090		1,190		26,600			
Area West of WAPET	MW147	25/11/2021	0960_MW147_211125	Normal	EP2114474	<1	159	<1	159	1,220	1,400	38,700	7.14	5,810		1,090		2,930		1,110		24,800			
Area West of WAPET	MW147	23/06/2022	0960_MW147_3-3.5_230623	Normal	EP2207810	<1	164	<1	164	1,340	1,190	43,400	5.93	5,470		909		2,730		1,150		20,500			
Area West of WAPET	MW147	23/11/2022	0960_MW147_3.0-3.5_221123	Normal	EP2215815	<1	135	<1	135	1,160	1,300	37,000	5.87	5,430		1,050		2,820		1,090		22,800			
Area West of WAPET	MW147	28/06/2023	0960_MW147_3.0-3.5_230628	Normal	EP2308707	<1	129	<1																	

Table 1 - Water Analytical Results

						Inorganics										Metals									
						Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)			
						mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L				
Source Area 1	MW163	22/06/2022	0960_MW163_220622	Normal	EP2207737	<1	437	<1	437	120	123	3,540	1.44	539		171		205		104		2,190			
Source Area 1	MW163	22/11/2022	0960_MW163_221122	Normal	EP2215711	<1	496	<1	496	122	122	3,550	0.14	570		184		210		106		2,140			
Source Area 1	MW163	28/06/2023	0960_MW163_230628	Normal	EP2308704	<1	412	<1	412	96.1	109	2,760	6.26	481		125		181		100		1,960			
Source Area 1	MW164	15/06/2018	0960_MW164_180615	Normal	212372		620					3,800	4.1			180		200		83		2,800			
Source Area 1	MW164	26/11/2019	0960_MW164_191126	Normal	EP1912479	<1	640	<1	640	134	146	3,670	4.56	840		191		230		112		2,650			
Source Area 1	MW164	24/06/2020	0960_MW164_200624	Normal	EP2006512	<1	640	<1	640	144	129	4,040	5.39	810		176		196		104		2,330			
Source Area 1	MW164	19/11/2020	0960_MW164_201119	Normal	EP2012892	<1	766	<1	766	75.6	80.4	1,820	3.06	432		44		93		72		1,580			
Source Area 1	MW164	23/06/2021	0960_MW164_210623	Normal	EP2107193	<1	978	<1	978	67.4	66.6	1,480	0.62	293		23		53		57		1,370			
Source Area 1	MW164	25/11/2021	0960_MW164_211125	Normal	EP2114474	<1	624	<1	624	131	130	3,620	0.29	785		154		179		97		2,420			
Source Area 1	MW164	22/06/2022	0960_MW164_220622	Normal	EP2207737	<1	858	<1	858	83.0	71.0	2,040	7.75	397		48		78		68		1,390			
Source Area 1	MW164	22/11/2022	0960_MW164_221122	Normal	EP2215711	16	1,050	<1	1,070	60.9	56.3	1,240	3.95	220		13		38		47		1,180			
Source Area 1	MW164	28/06/2023	0960_MW164_230628	Normal	EP2308704	34	955	<1	990	60.1	56.1	1,270	3.40	215		8		34		46		1,190			
Source Area 1	MW165	10/06/2018	0960_MW165_180610	Normal	211878		950					210	-2			9.3		9		15		540			
Source Area 1	MW165	26/11/2019	0960_MW165_191126	Normal	EP1912483	26	838	<1	864	24.1	23.6	219	0.99	33		5		6		20		515			
Source Area 1	MW165	24/06/2020	0960_MW165_200624	Normal	EP2006512	8	833	<1	842	27.0	22.3	327	9.52	47		3		5		21		488			
Source Area 1	MW165	19/11/2020	0960_MW165_201119	Normal	EP2012917	123	668	<1	791	24.3	22.8	275	3.21	34		3		5		21		498			
Source Area 1	MW165	23/06/2021	0960_MW165_210623	Normal	EP2107193	<1	745	<1	745	35.5	33.1	641	3.43	120		7		12		28		714			
Source Area 1	MW165	24/11/2021	0960_MW165_211124	Normal	EP2114395	<1	867	<1	867	29.3	24.5	384	8.82	54		2		4		19		543			
Source Area 1	MW165	22/06/2022	0960_MW165_220622	Normal	EP2207737	<1	866	<1	866	33.0	27.5	503	9.10	73		6		9		28		592			
Source Area 1	MW165	22/11/2022	0960_MW165_221122	Normal	EP2215711	<1	924	<1	925	31.7	26.8	421	8.26	64		3		5		23		591			
Source Area 1	MW165	28/06/2023	0960_MW165_230628	Normal	EP2308702	6	813	<1	819	28.4	24.6	382	7.20	62		3		4		20		543			
Source Area 1	MW166	10/06/2018	0960_MW166_180610	Normal	211878		1,000					350	0.18			15		15		22		740			
Source Area 1	MW166	26/11/2019	0960_MW166_191126	Normal	EP1912481	14	996	<1	1,010	31.9	32.1	319	0.30	130		7		10		28		694			
Source Area 1	MW166	24/06/2020	0960_MW166_200624	Normal	EP2006512	<1	1,080	<1	1,080	34.6	30.0	357	7.22	144		6		8		26		652			
Source Area 1	MW166	19/11/2020	0960_MW166_201119	Normal	EP2012917	51	920	<1	970	31.8	28.1	344	6.19	130		4		7		27		612			
Source Area 1	MW166	23/06/2021	0960_MW166_210623	Normal	EP2107193	26	911	<1	938	31.5	28.5	376	4.98	105		4		6		26		625			
Source Area 1	MW166	24/11/2021	0960_MW166_211124	Normal	EP2114395	<1	964	<1	964	32.2	27.2	378	8.51	110		4		6		23		595			
Source Area 1	MW166	22/06/2022	0960_MW166_220622	Normal	EP2207737	<1	942	<1	942	30.4	26.0	342	7.93	95		8		9		27		555			
Source Area 1	MW166	22/11/2022	0960_MW166_221122	Normal	EP2215711	16	912	<1	927	28.3	25.0	285	6.24	83		3		4		22		550			
Source Area 1	MW166	28/06/2023	0960_MW166_230628	Normal	EP2308704	<1	993	<1	993	30.0	25.6	295	8.02	89		3		4		23		563			
Source Area 1	MW167	10/06/2018	0960_MW167_180610	Normal	211878		870					1,400	2.4			26		47		36		1,400			
Source Area 1	MW167	26/11/2019	0960_MW167_191126	Normal	EP1912481	<1	857	<1	857	56.4	60.5	1,120	3.50	369		36		42		51		1,240			
Source Area 1	MW167	25/06/2020	0960_MW167_200625	Normal	EP2006591	<1	958	<1	958	58.0	51.6	1,110	5.78	362		38		36		44		1,050			
Source Area 1	MW167	19/11/2020	0960_MW167_201119	Normal	EP2012917	<1	859	<1	859	55.5	55.4	1,090	0.16	366		30		36		51		1,140			
Source Area 1	MW167	23/06/2021	0960_MW167_210623	Normal	EP2107193	<1	877	<1	877	60.2	55.3	1,290	4.29	303		24		33		52		1,150			
Source Area 1	MW167	24/11/2021	0960_MW167_211124	Normal	EP2114395	<1	889	<1	889	53.8	49.9	1,050	3.70	306		20		27		40		1,050			
Source Area 1	MW167	22/06/2022	0960_MW167_220622	Normal	EP2207737	<1	917	<1	917	51.9	47.5	950	4.40	324		26		30		48		977			
Source Area 1	MW167	22/11/2022	0960_MW167_221122	Normal	EP2215711	<1	928	<1	928	50.7	49.7	945	0.93	263		22		28		43		1,040			
Source Area 1	MW167	28/06/2023	0960_MW167_230628	Normal	EP2308704	<1	937	<1	937	56.0	51.6	1,070	4.06	342		14		30		42		1,090			
Source Area 1	MW168	10/06/2018	0960_MW168_180610	Normal	211878		610					3,900	3.2			230		240		78		2,600			
Source Area 1	MW168	26/11/2019	0960_MW168_191126	Normal	EP1912481	<1	630	<1	630	132	141	3,700	3.49	703		204		242		106		2,490			
Source Area 1	MW168	25/06/2020	0960_MW168_200625	Normal	EP2006591	<1	573	<1	573	136	134	3,900	1.08	719		207		217		105		2,360			
Source Area 1	MW168	19/11/2020	0960_MW168_201119	Normal	EP2012917	<1	545	<1	545	143	134	4,150	3.37	716		218		231		107		2,320			
Source Area 1	MW168	23/06/2021	0960_MW168_210623	Normal	EP2107193	<1	561	<1	561	130	134	3,680	1.58	734		191		217		106		2,400			
Source Area 1	MW168	24/11/2021	0960_MW168_211124	Normal	EP2114395	<1	579	<1	579	128	128	3,620	0.28	703		179		201		98		2,290			
Source Area 1	MW168	22/06/2022	0960_MW168_220622	Normal	EP22077																				

Table 1 - Water Analytical Results

					Inorganics										Metals									
					Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)			
					mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L				
Offsite Receptor	MW177	29/11/2019	0960_MW177_1.5-2.0_191129	Normal	EP1912673	<1	240	<1	240	790	943	25,100	8.81	3,730	783		2,140		912		16,200			
Offsite Receptor	MW177	24/06/2020	0960_MW177_200624	Normal	EP2006524	<1	270	<1	270	893	932	28,700	2.16	3,740	761		2,110		795		16,100			
Offsite Receptor	MW177	20/11/2020	0960_MW177_201120	Normal	EP2012946	<1	204	<1	204	1,050	1,120	34,200	3.30	4,010	890		2,460		1,140		19,500			
Offsite Receptor	MW177	23/06/2021	0960_MW177_3.5-4.0_210623	Normal	EP2107272	<1	193	<1	193	938	1,100	30,200	8.11	3,930	872		2,440		925		19,200			
Offsite Receptor	MW177	24/11/2021	0960_MW177_3.5-4_211124	Normal	EP2114392	<1	136	<1	136	1,080	1,220	34,600	6.22	4,900	838		2,640		995		21,600			
Offsite Receptor	MW177	23/06/2022	0960_MW177_1.5-2_220623	Normal	EP2207814	<1	162	<1	162	1,220	1,240	39,800	0.91	4,610	982		2,840		1,030		21,500			
Offsite Receptor	MW177	22/11/2022	0960_MW177_1.5-2.0_221122	Normal	EP2215722	<1	193	<1	193	978	1,190	31,100	9.78	4,670	939		2,650		979		20,700			
Offsite Receptor	MW177	28/06/2023	0960_MW177_1.5-2.0_230628	Normal	EP2308704	<1	186	<1	186	1,020	1,180	32,400	7.34	4,880	958		2,720		1,190		20,200			
Offsite Receptor	MW178	17/06/2018	0960_MW178_2.5_180617	Normal	212372		160					38,000	4.5		1,100		2,400		780		23,000			
Offsite Receptor	MW178	17/06/2018	0960_MW178_4.5_180617	Normal	212372		170					37,000	3.7		1,200		2,300		680		23,000			
Offsite Receptor	MW178	17/06/2018	0960_MW178_7.5_180617	Normal	212372		150					37,000	0.16		1,100		2,100		670		21,000			
Offsite Receptor	MW178	17/06/2018	0960_MW178_9.5_180617	Normal	212372		170					38,000	3.5		1,000		2,400		780		23,000			
Offsite Receptor	MW178	29/11/2019	0960_MW178_4.0-4.5_191129	Normal	EP1912673	<1	149	<1	149	1,010	1,140	32,000	5.98	5,220	1,140		2,500		1,100		19,600			
Offsite Receptor	MW178	24/06/2020	0960_MW178_200624	Normal	EP2006524	<1	157	<1	157	1,030	1,090	32,500	2.98	5,120	1,040		2,440		920		18,700			
Offsite Receptor	MW178	20/11/2020	0960_MW178_201120	Normal	EP2012943	<1	128	<1	128	1,050	1,300	33,000	10.6	5,730	1,230		2,800		1,060		22,600			
Offsite Receptor	MW178	24/06/2021	0960_MW178_210624	Normal	EP2107273	<1	121	<1	121	1,050	1,260	33,400	9.10	4,960	1,160		2,680		1,040		21,900			
Offsite Receptor	MW178	24/11/2021	0960_MW178_9-9.5_211124	Normal	EP2114392	<1	128	<1	128	1,050	1,240	33,500	8.04	5,080	1,140		2,620		996		21,600			
Offsite Receptor	MW178	23/06/2022	0960_MW178_2-2.5_220623	Normal	EP2207814	<1	147	<1	147	1,300	1,340	41,600	1.56	6,010	1,240		2,960		1,100		23,200			
Offsite Receptor	MW178	22/11/2022	0960_MW178_2.0-2.5_221122	Normal	EP2215722	<1	138	<1	138	1,050	1,240	32,800	8.32	5,780	1,140		2,680		1,020		21,500			
Offsite Receptor	MW178	28/06/2023	0960_MW178_4.0-4.5_230628	Normal	EP2308704	<1	105	<1	105	1,020	1,220	32,200	8.88	5,250	1,120		2,710		1,020		21,000			
Offsite Receptor	MW179	16/06/2018	0960_MW179_1.5_180616	Normal	212372		170					31,000	6.7		890		2,100		630		20,000			
Offsite Receptor	MW179	16/06/2018	0960_MW179_3.7_180616	Normal	212372		200					30,000	3.2		630		1,900		620		18,000			
Offsite Receptor	MW179	16/06/2018	0960_MW179_6.4_180616	Normal	212372		210					30,000	5.4		650		2,000		650		19,000			
Offsite Receptor	MW179	16/06/2018	0960_MW179_9.0_180616	Normal	212372		280								690		2,000		650		19,000			
Offsite Receptor	MW179	29/11/2019	0960_MW179_3.2-3.7_191129	Normal	EP1912678	<1	144	<1	144	877	1,010	27,900	6.95	4,170	826		2,300		965		17,300			
Offsite Receptor	MW179	24/06/2020	0960_MW179_200624	Normal	EP2006523	<1	200	<1	200	918	969	29,600	2.72	3,780	674		2,240		789		16,800			
Offsite Receptor	MW179	20/11/2020	0960_MW179_201120	Normal	EP2012943	<1	169	<1	169	940	1,070	29,900	6.64	4,500	745		2,390		1,060		18,700			
Offsite Receptor	MW179	24/06/2021	0960_MW179_210624	Normal	EP2107273	<1	171	<1	171	891	1,040	28,800	7.59	3,600	695		2,290		871		18,200			
Offsite Receptor	MW179	24/11/2021	0960_MW179_3.2-3.7_211124	Normal	EP2114394	<1	176	<1	176	877	1,020	28,000	7.75	4,000	662		2,240		922		18,000			
Offsite Receptor	MW179	22/06/2022	0960_MW179_1-1.5_220622	Normal	EP2207737	<1	184	<1	184	1,080	1,090	35,300	0.20	4,140	676		2,430		994		19,100			
Offsite Receptor	MW179	23/11/2022	0960_MW179_1.0-1.5_221123	Normal	EP2215797	<1	173	<1	173	839	962	26,700	6.81	3,960	641		2,130		926		16,800			
Offsite Receptor	MW179	28/06/2023	0960_MW179_1.0-1.5_230628	Normal	EP2308707	<1	213	<1	213	862	1,030	27,600	9.01	3,810	655		2,390		972		17,900			
Area West of WAPET	MW180	17/06/2018	0960_MW180_1.5_180617	Normal	212372		180					36,000	-1.9		760		2,100		640		19,000			
Area West of WAPET	MW180	17/06/2018	0960_MW180_4.0_180617	Normal	212372		220					36,000	-1.8		760		2,100		640		19,000			
Area West of WAPET	MW180	17/06/2018	0960_MW180_6.5_180617	Normal	212372		230					36,000	-0.14		790		2,100		640		21,000			
Area West of WAPET	MW180	17/06/2018	0960_MW180_9.0_180617	Normal	212372		260					37,000	4.1		780		2,400		760		23,000			
Area West of WAPET	MW180	29/11/2019	0960_MW180_6.0-6.5_191129	Normal	EP1912678	<1	221	<1	221	1,050	1,240	33,500	8.43	4,720	1,060		2,660		1,140		21,600			
Area West of WAPET	MW180	24/06/2020	0960_MW180_200624	Normal	EP2006523	<1	247	<1	247	1,050	1,120	33,900	2.92	4,480	791		2,550		966		19,400			
Area West of WAPET	MW180	21/11/2020	0960_MW180_4.0_201121	Normal	EP2013115	<1	202	<1	202	1,090	1,300	34,600	8.78	5,160	886		2,880		1,100		22,700			
Area West of WAPET	MW180	24/06/2021	0960_MW180_1.0-1.5_210624	Normal	EP2107277	<1	139	<1	139	1,010	1,160	32,400	7.19	4,420	859		2,390		979		20,700			
Area West of WAPET	MW180	24/11/2021	0960_MW180_3.5-4_211124	Normal	EP2114394	<1	219	<1	219	994	1,190	31,600	9.06	4,730	784		2,560		967		21,100			
Area West of WAPET	MW180	23/06/2022	0960_MW180_1-1.5_230623	Normal	EP2207810	<1	230	<1	230	996	1,140	32,000	6.54	4,290	755		2,500		1,230		19,800			
Area West of WAPET	MW180	23/11/2022	0960_MW180_3.5-4.0_221123	Normal	EP2215815	<1	241	<1	241	1,010	1,120	32,200	5.20	4,600	779		2,430		936		19,700			
Area West of WAPET																								

Table 1 - Water Analytical Results

						Inorganics										Metals									
						Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)			
						mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L				
Seepage	OTH106	9/06/2018	0960_OTH106_180609_B	Normal	211878		230					20,000	0.49			420		1,300		390		11,000			
Seepage	OTH106	29/11/2019	0960_OTH106_191129	Normal	EP1912678	<1	134	<1	134	652	726	20,900	5.35	2,870		553		1,660		697		12,500			
Seepage	OTH106	26/06/2020	0960_OTH106_200626	Normal	EP2006688	<1	123	<1	123	626	723	20,000	7.15	2,880		531		1,620		596		12,600			
Seepage	OTH106	20/11/2020	0960_OTH106_201120	Normal	EP2012957	<1	113	<1	113	674	697	21,700	1.65	2,880		490		1,600		566		12,100			
Seepage	OTH106	24/06/2021	0960_OTH106_210624	Normal	EP2107277	<1	126	<1	126	606	699	19,500	7.12	2,560		502		1,530		669		12,200			
Seepage	OTH106	25/11/2021	0960_OTH106_211125	Normal	EP2114471	<1	117	<1	117	599	694	19,200	7.35	2,640		470		1,560		615		12,100			
Seepage	OTH106	23/06/2022	0960_OTH106_220623	Normal	EP2207812	<1	121	<1	121	579	570	18,400	0.75	2,750		414		1,340		553		9,770			
Seepage	OTH106	23/11/2022	0960_OTH106_221123	Normal	EP2215813	<1	133	<1	133	700	709	22,700	0.60	2,760		498		1,560		639		12,400			
Seepage	OTH106	28/06/2023	0960_OTH106_230628	Normal	EP2308709	<1	240	<1	240	582	676	18,400	7.50	2,790		472		1,560		606		11,700			
Seepage	OTH107	28/02/2018	0960_OTH107_180228	Normal	207735		1,300					22,000	0.083			460		1,500		440		13,000			
Seepage	OTH107	9/06/2018	0960_OTH107_180609_A	Normal	211878		130					20,000	4.8			450		1,400		410		12,000			
Seepage	OTH107	9/06/2018	0960_OTH107_180609_B	Normal	211878		130					20,000	1.5			420		1,300		390		11,000			
Seepage	OTH107	29/11/2019	0960_OTH107_191129	Normal	EP1912678	<1	147	<1	147	658	746	21,100	6.26	2,860		574		1,720		726		12,800			
Seepage	OTH107	26/06/2020	0960_OTH107_200626	Normal	EP2006688	<1	125	<1	125	630	677	20,100	3.66	2,890		494		1,520		566		11,800			
Seepage	OTH107	20/11/2020	0960_OTH107_201120	Normal	EP2012957	<1	113	<1	113	644	674	20,700	2.29	2,770		471		1,550		549		11,700			
Seepage	OTH107	24/06/2021	0960_OTH107_210624	Normal	EP2107277	<1	124	<1	124	608	699	19,600	6.92	2,540		506		1,530		659		12,200			
Seepage	OTH107	25/11/2021	0960_OTH107_211125	Normal	EP2114471	<1	120	<1	120	605	666	19,400	4.80	2,650		456		1,500		588		11,600			
Seepage	OTH107	23/06/2022	0960_OTH107_220623	Normal	EP2207812	<1	118	<1	118	575	641	18,300	5.43	2,720		470		1,500		623		11,000			
Seepage	OTH107	23/11/2022	0960_OTH107_221123	Normal	EP2215813	12	121	<1	133	634	675	20,500	3.12	2,550		471		1,490		607		11,800			
Seepage	OTH107	28/06/2023	0960_OTH107_230628	Normal	EP2308709	<1	185	<1	185	575	655	18,200	6.46	2,800		462		1,520		595		11,300			
Seepage	OTH129	10/06/2018	0960_OTH129_180610_A	Normal	211878		180					19,000	3.9			430		1,300		390		11,000			
Seepage	OTH129	10/06/2018	0960_OTH129_180610_B	Normal	211878		110					20,000	-0.48			400		1,300		370		11,000			
Seepage	OTH129	1/12/2019	0960_OTH129_191201	Normal	EP1912685	<1	126	<1	126	608	745	19,500	10.2	2,640		503		1,710		701		12,900			
Seepage	OTH129	25/06/2020	0960_OTH129_200625	Normal	EP2006595	<1	127	<1	127	618	652	19,700	2.72	2,850		449		1,460		533		11,400			
Seepage	OTH129	20/11/2020	0960_OTH129_201120	Normal	EP2012946	<1	160	<1	160	769	721	24,900	3.24	3,060		516		1,660		586		12,500			
Seepage	OTH129	23/06/2021	0960_OTH129_210623	Normal	EP2107272	<1	124	<1	124	643	714	20,800	5.22	2,580		506		1,600		680		12,400			
Seepage	OTH129	24/11/2021	0960_OTH129_211124	Normal	EP2114392	<1	124	<1	124	621	689	19,900	5.18	2,740		485		1,540		620		12,000			
Seepage	OTH129	23/06/2022	0960_OTH129_220623	Normal	EP2207816	<1	146	<1	146	606	682	19,500	5.87	2,570		516		1,590		652		11,700			
Seepage	OTH129	23/11/2022	0960_OTH129_221123	Normal	EP2215791	<1	141	<1	141	556	635	17,600	6.70	2,700		446		1,400		584		11,100			
Seepage	OTH129	28/06/2023	0960_OTH129_230628	Normal	EP2308711	6	113	<1	120	622	751	19,900	9.37	2,800		524		1,720		685		13,000			
Seepage	OTH132	10/06/2018	0960_OTH132_180610_A	Normal	211878		150					20,000	2.9			440		1,400		390		12,000			
Seepage	OTH132	10/06/2018	0960_OTH132_180610_B	Normal	211878		140					20,000	1.7			420		1,300		390		11,000			
Seepage	OTH132	1/12/2019	0960_OTH132_191201	Normal	EP1912685	<1	132	<1	132	615	756	19,700	10.3	2,720		506		1,730		710		13,100			
Seepage	OTH132	25/06/2020	0960_OTH132_200625	Normal	EP2006595	<1	127	<1	127	623	653	20,000	2.38	2,700		452		1,470		541		11,400			
Seepage	OTH132	20/11/2020	0960_OTH132_201120	Normal	EP2012946	<1	142	<1	142	740	726	24,000	0.94	2,890		515		1,670		588		12,600			
Seepage	OTH132	23/06/2021	0960_OTH132_210623	Normal	EP2107272	<1	124	<1	124	631	718	20,400	6.42	2,560		506		1,600		674		12,500			
Seepage	OTH132	24/11/2021	0960_OTH132_211124	Normal	EP2114392	<1	134	<1	134	610	672	19,600	4.85	2,630		479		1,510		606		11,700			
Seepage	OTH132	23/06/2022	0960_OTH132_220623	Normal	EP2207812	<1	154	<1	154	592	677	18,800	6.73	2,810		496		1,590		672		11,600			
Seepage	OTH132	23/11/2022	0960_OTH132_221123	Normal	EP2215791	<1	134	<1	134	569	678	18,100	8.77	2,660		486		1,510		631		11,800			
Seepage	OTH132	28/06/2023	0960_OTH132_230628	Normal	EP2308711	<1	149	<1	149	563	684	17,900	9.68	2,650		482		1,590		611		11,800			
Seepage	OTH134	10/06/2018	0960_OTH134_180610_A	Normal	211878		160					20,000	0.72			430		1,300		380		11,000			
Seepage	OTH134	10/06/2018	0960_OTH134_180610_B	Normal	211878		150					20,000	-1.2			400		1,300		370		11,000			
Seepage	OTH134	1/12/2019	0960_OTH134_191201	Normal	EP1912685	<1	124	<1	124	599	784	19,200	13.4	2,620		523		1,790		737		13,600			
Seepage	OTH134	25/06/2020	0960_OTH134_200625	Normal	EP2006595	<1	126	<1	126	617	647	19,800	2.32	2,710		448		1,450		534		11,300			
Seepage	OTH134	20																							

Table 1 - Water Analytical Results

						Inorganics										Metals									
						Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)			
						mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L				
Surface Water	SW205	19/02/2018	0960_SW205_180219	Normal	207115		280					29,000	1.3			610		1,900		560		17,000			
Surface Water	SW205	14/06/2018	0960_QC650_180614	Normal	212372		310					27,000	4.6			590		1,900		550		17,000			
Surface Water	SW205	14/06/2018	0960_SW205_180614	Normal	212372		310					27,000	8.0			630		2,000		590		18,000			
Surface Water	SW205	27/05/2020	0960_SW205_200527	Normal	EP2005487	<1	157	<1	157	609	705	19,400	7.29	2,830		562		1,570		675		12,200			
Surface Water	SW205	24/06/2020	0960_SW205_200624	Normal	EP2006551	<1	279	<1	279	811	941	25,800	7.45	3,710		651		2,060		664		16,600			
Surface Water	SW205	20/11/2020	0960_SW205_201120	Normal	EP2013114	<1	190	<1	190	991	1,180	31,200	8.91	5,130		919		2,620		1,230		20,500			
Surface Water	SW205	4/03/2021	0960_SW205_210304	Normal	EP2102258	<1	106	<1	106	580	680	18,400	7.91	2,830		488		1,520		667		11,800			
Surface Water	SW205	24/06/2021	0960_SW205_210624	Normal	EP2107278	<1	206	<1	206	692	840	22,200	9.71	2,940		600		1,890		771		14,600			
Surface Water	SW205	25/11/2021	0960_SW205_211125	Normal	EP2114473																				
Surface Water	SW205	17/05/2022	0960_SW205_220517	Normal	EP2205925	<1	162	<1	162	644	644	20,600	0.03	2,850		473		1,490		585		11,100			
Surface Water	SW205	23/06/2022	0960_SW205_220623	Normal	EP2207812	<1	278	<1	278	746	781	23,600	2.32	3,570		531		1,810		719		13,500			
Surface Water	SW205	23/11/2022	0960_SW205_221123	Normal	EP2215813	<1	193	<1	193	1,150	1,230	37,500	3.24	4,440		870		2,870		989		21,300			
Surface Water	SW207	28/02/2018	0960_SW207_180228	Normal	207735		150					21,000	4.1			490		1,500		460		13,000			
Surface Water	SW207	13/06/2018	0960_SW207_180613	Normal	212151		140					23,000	2.2			480		1,500		450		13,000			
Surface Water	SW207	2/12/2019	0960_SW207_191202	Normal	EP1912748	<1	188	<1	188	735	977	23,600	14.1	3,160		684		2,190		909		17,000			
Surface Water	SW207	27/05/2020	0960_SW207_200527	Normal	EP2005487	<1	161	<1	161	660	797	21,000	9.40	3,090		606		1,780		774		13,800			
Surface Water	SW207	24/06/2020	0960_SW207_200624	Normal	EP2006531	<1	129	<1	129	643	723	20,600	5.83	2,850		486		1,550		552		12,800			
Surface Water	SW207	20/11/2020	0960_SW207_201120	Normal	EP2012942	<1	122	<1	122	610	704	19,400	7.15	2,880		499		1,620		572		12,200			
Surface Water	SW207	4/03/2021	0960_SW207_210304	Normal	EP2102262	<1	111	<1	111	623	662	19,900	3.08	2,850		475		1,480		655		11,500			
Surface Water	SW207	24/06/2021	0960_SW207_210624	Normal	EP2107278	<1	134	<1	134	672	803	21,500	8.85	3,040		585		1,780		718		14,000			
Surface Water	SW207	24/11/2021	0960_SW207_211124	Normal	EP2114399	<1	170	<1	170	671	757	21,400	6.02	3,060		542		1,680		672		13,200			
Surface Water	SW207	25/11/2021	0960_SW207_211125	Normal	EP2114473	<1	138	<1	138	607	704	19,400	7.45	2,720		487		1,570		618		12,300			
Surface Water	SW207	18/05/2022	0960_SW207_220518	Normal	EP2205970	<1	111	<1	111	616	554	19,800	5.29	2,670		408		1,300		488		9,530			
Surface Water	SW207	23/06/2022	0960_SW207_220623	Normal	EP2207812	<1	185	<1	185	573	636	18,200	5.27	2,670		481		1,490		612		10,900			
Surface Water	SW207	23/11/2022	0960_SW207_221123	Normal	EP2215813	<1	191	<1	191	720	814	23,100	6.08	3,120		576		1,790		777		14,200			
Surface Water	SW207	28/06/2023	0960_SW207_230628	Normal	EP2308709	<1	146	<1	146	594	668	19,000	5.87	2,630		500		1,390		420		11,900			
Surface Water	SW208	1/03/2018	0960_SW208_180301	Normal	207735		120					20,000	4.2			450		1,400		440		13,000			
Surface Water	SW208	14/06/2018	0960_SW208_180614	Normal	212372		130					21,000	1.7			410		1,300		410		12,000			
Surface Water	SW208	2/12/2019	0960_SW208_191202	Normal	EP1912686	<1	142	<1	142	631	784	20,200	10.8	2,800		531		1,790		745		13,600			
Surface Water	SW208	26/05/2020	0960_SW208_200526	Normal	EP2005408	<1	119	<1	119	587	656	18,700	5.62	2,730		487		1,460		635		11,400			
Surface Water	SW208	24/06/2020	0960_SW208_200624	Normal	EP2006551	<1	130	<1	130	623	695	19,900	5.48	2,820		472		1,490		535		12,300			
Surface Water	SW208	19/11/2020	0960_SW208_201119	Normal	EP2012897	<1	116	<1	116	600	661	19,100	4.85	2,830		466		1,530		630		11,400			
Surface Water	SW208	4/03/2021	0960_SW208_210304	Normal	EP2102262	<1	107	<1	107	607	686	19,300	6.04	2,920		491		1,530		683		11,900			
Surface Water	SW208	24/06/2021	0960_SW208_210624	Normal	EP2107278	<1	124	<1	124	615	692	19,800	5.90	2,590		475		1,530		631		12,100			
Surface Water	SW208	17/05/2022	0960_SW208_220517	Normal	EP2205925	<1	126	<1	126	616	614	19,700	0.19	2,790		438		1,420		555		10,600			
Surface Water	SW208	23/06/2022	0960_SW208_220623	Normal	EP2207812	<1	129	<1	129	587	617	18,700	2.53	2,720		447		1,440		599		10,600			
Surface Water	SW208	23/11/2022	0960_SW208_221123	Normal	EP2215813	<1	150	<1	150	690	658	22,600	2.36	2,380		471		1,450		594		11,500			
Surface Water	SW208	28/06/2023	0960_SW208_230628	Normal	EP2308709	<1	138	<1	138	566	672	18,000	8.52	2,690		472		1,560		609		11,600			
Surface Water	SW209	28/02/2018	0960_SW209_180228	Normal	207735		300					28,000	1.6			610		1,900		530		17,000			
Surface Water	SW209	13/06/2018	0960_SW209_180613	Normal	212151		230					23,000	4.9			520		1,600		460		14,000			
Surface Water	SW209	26/05/2020	0960_SW209_200526	Normal	EP2005408	<1	115	<1	115	501	556	16,100	5.18	2,160		427		1,240		528		9,640			
Surface Water	SW209	24/06/2020	0960_SW209_200624	Normal	EP2006531	<1	173	<1	173	675	784	21,600	7.53	2,970		532		1,680		589		13,900			
Surface Water	SW209	20/11/2020	0960_SW209_201120	Normal	EP2012942	<1	144	<1	144	699	778	22,200	5.36	3,360		557		1,790		624		13,500			
Surface Water	SW209	4/03/2021	0960_SW209_210304	Normal	EP2102262	<1	116	<1	116	412	422	13,200	1.26	1,780		328		927		436		7,320			
Surface Water	SW209	24/06/2021	0960_SW209_210624	Normal	EP2107274	<1	235	<1	235	635															

Table 1 - Water Analytical Results

						Inorganics										Metals									
						Carbonate Alkalinity (as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (Total) as CaCO3	Anions Total	Cations Total	Chloride	Ionic Balance	Sulphate as SO4 - Turbidimetric (filtered)	Calcium	Calcium (filtered)	Magnesium	Magnesium (filtered)	Potassium	Potassium (filtered)	Sodium	Sodium (filtered)			
						mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L				
Surface Water	SW300	2/12/2019	0960_SW300_191202	Normal	EP1912748	10	108	<1	119	1,210	1,640	38,600	15.0	5,820		1,290		3,620		1,330		28,600			
Surface Water	SW300	26/05/2020	0960_SW300_200526	Normal	EP2005408	<1	107	<1	107	250	248	8,000	0.34	1,060		222		543		245		4,280			
Surface Water	SW300	24/06/2020	0960_SW300_200624	Normal	EP2006550	<1	241	<1	241	726	791	23,200	4.31	3,190		542		1,700		589		14,000			
Surface Water	SW300	20/11/2020	0960_SW300_201120	Normal	EP2012947	33	70	<1	103	1,080	1,260	34,100	7.57	5,700		1,100		2,890		1,250		21,500			
Surface Water	SW300	4/03/2021	0960_SW300_210304	Normal	EP2102258	<1	85	<1	85	328	334	10,400	0.96	1,580		386		706		337		5,710			
Surface Water	SW300	23/06/2021	0960_SW300_210623	Normal	EP2107270	<1	236	<1	236	581	599	18,600	1.56	2,460		430		1,360		519		10,400			
Surface Water	SW300	24/11/2021	0960_SW300_211124	Normal	EP2114398	<1	248	<1	248	1,150	1,300	36,800	6.20	5,150		872		2,880		1,010		22,900			
Surface Water	SW300	18/05/2022	0960_SW300_220518	Normal	EP2205970	<1	211	<1	211	645	619	20,500	2.04	3,000		499		1,450		539		10,600			
Surface Water	SW300	23/06/2022	0960_SW300_220623	Normal	EP2207816	<1	220	<1	220	357	387	11,200	4.02	1,760		311		914		354		6,600			
Surface Water	SW300	23/11/2022	0960_SW300_221123	Normal	EP2215792	3	284	<1	286	1,200	1,400	38,700	7.52	5,030		1,040		3,160		1,120		24,300			
Surface Water	SW300	28/06/2023	0960_SW300_230628	Normal	EP2308712	<1	278	<1	278	940	1,100	29,900	8.02	4,350		773		2,580		1,020		19,000			
Surface Water	SW301	20/06/2018	0960_SW301_180620	Normal	212572		190					19,000	0.35			500		1,200		330		11,000			
Surface Water	SW301	24/06/2021	0960_SW301_210624	Normal	EP2107278	<1	186	<1	186	724	885	23,100	10.0	3,280		686		1,950		807		15,400			
Surface Water	SW301	25/11/2021	0960_SW301_211125	Normal	EP2114473	<1	186	<1	186	1,120	1,110	35,900	0.43	5,190		707		2,560		976		19,400			
Surface Water	SW301	17/05/2022	0960_SW301_220517	Normal	EP2205925	<1	182	<1	182	672	632	21,500	2.99	2,950		474		1,460		572		10,900			
Surface Water	SW301	23/06/2022	0960_SW301_220623	Normal	EP2207812	<1	205	<1	205	1,120	1,090	35,800	1.02	4,920		777		2,560		1,040		18,800			
Surface Water	SW301	23/11/2022	0960_SW301_221123	Normal	EP2215813	23	148	<1	171	979	1,080	32,000	4.70	3,510		797		2,420		913		18,700			
Surface Water	SW302	20/06/2018	0960_SW302_180620	Normal	212572		280					24,000	-0.41			470		1,500		450		14,000			
Surface Water	SW302	2/12/2019	0960_SW302_191202	Normal	EP1912743	<1	178	<1	178	796	966	25,600	9.67	3,360		669		2,120		901		16,900			
Surface Water	SW302	26/05/2020	0960_SW302_200526	Normal	EP2005408	<1	119	<1	119	495	539	15,900	4.25	2,120		414		1,200		519		9,340			
Surface Water	SW302	24/06/2020	0960_SW302_200624	Normal	EP2006531	<1	183	<1	183	678	745	21,700	4.69	2,990		508		1,590		561		13,200			
Surface Water	SW302	20/11/2020	0960_SW302_201120	Normal	EP2012942	<1	154	<1	154	720	796	22,900	4.99	3,410		567		1,830		644		13,800			
Surface Water	SW302	4/03/2021	0960_SW302_210304	Normal	EP2102262	<1	127	<1	127	424	438	13,600	1.63	1,840		347		970		458		7,580			
Surface Water	SW302	24/06/2021	0960_SW302_210624	Normal	EP2107274	<1	224	<1	224	596	602	19,300	0.49	2,270		450		1,380		533		10,400			
Surface Water	SW302	24/11/2021	0960_SW302_211124	Normal	EP2114399	<1	184	<1	184	789	964	25,100	9.99	3,730		648		2,120		885		16,900			
Surface Water	SW302	18/05/2022	0960_SW302_220518	Normal	EP2205970	<1	159	<1	159	625	545	20,000	6.83	2,750		409		1,280		479		9,350			
Surface Water	SW302	22/06/2022	0960_SW302_220622	Normal	EP2207739	<1	151	<1	151	354	346	11,400	1.16	1,400		274		814		359		5,880			
Surface Water	SW302	23/11/2022	0960_SW302_221123	Normal	EP2215792	<1	243	<1	243	958	920	31,200	2.03	3,530		676		2,040		890		16,000			
Surface Water	SW302	28/06/2023	0960_SW302_230628	Normal	EP2308712	<1	209	<1	209	678	794	21,600	7.86	3,110		574		1,840		704		13,700			
Surface Water	SW303	20/06/2018	0960_SW303_180620	Normal	212572		48					140	-2.2			17		11		6.0		80			
Surface Water	SW303	2/12/2019	0960_SW303_191202	Normal	EP1912743	<1	208	<1	208	751	914	23,800	9.74	3,640		630		2,050		850		15,900			
Surface Water	SW303	26/05/2020	0960_SW303_200526	Normal	EP2005408	<1	112	<1	112	479	514	15,400	3.58	2,020		398		1,150		492		8,900			
Surface Water	SW303	24/06/2020	0960_SW303_200624	Normal	EP2006531	<1	133	<1	133	639	713	20,500	5.46	2,780		477		1,540		550		12,600			
Surface Water	SW303	20/11/2020	0960_SW303_201120	Normal	EP2012947	<1	172	<1	172	659	693	21,000	2.51	3,030		493		1,600		568		12,000			
Surface Water	SW303	4/03/2021	0960_SW303_210304	Normal	EP2102258	<1	109	<1	109	578	669	18,400	7.29	2,740		485		1,500		665		11,600			
Surface Water	SW303	23/06/2021	0960_SW303_210623	Normal	EP2107270	<1	215	<1	215	571	594	18,400	1.97	2,290		441		1,340		534		10,300			
Surface Water	SW303	24/11/2021	0960_SW303_211124	Normal	EP2114399	<1	207	<1	207	730	886	23,200	9.66	3,430		620		1,950		798		15,500			
Surface Water	SW303	18/05/2022	0960_SW303_220518	Normal	EP2205970	<1	157	<1	157	624	563	20,000	5.08	2,700		420		1,330		494		9,660			
Surface Water	SW303	23/06/2022	0960_SW303_220623	Normal	EP2207816	<1	174	<1	174	332	318	10,500	2.13	1,530		266		761		304		5,380			
Surface Water	SW303	23/11/2022	0960_SW303_221123	Normal	EP2215791	<1	160	<1	160	599	724	19,000	9.47	2,870		524		1,610		686		12,600			
Surface Water	SW303	28/06/2023	0960_SW303_230628	Normal	EP2308712	<1	206	<1	206	667	758	21,300	6.39	3,000		548		1,750		679		13,100			
Surface Water	SW304	20/06/2018	0960_SW304_180620	Normal	212572		52					150	-3.4			18		10		6.2		81			
Surface Water	SW304	26/05/2020	0960_SW304_200526	Normal	EP2005408	<1	136	<1	136	585	680	18,800	7.51	2,490		509		1,510		660		11,800			
Surface Water	SW304	24/06/2020	0960_SW304_200624	Normal	EP2006551	<1	226	<1	226	676	735	21,600	4.16	3,000		516		1,570		568		13,000			
Surface Water	SW304	20/11/2020	0960_SW304_201120	Normal	EP2012947	<1	149	<1	149	705	790	22,400	5.67	3,370		568		1,810		646		13,700			
Surface Water	SW304	4/03/2021	0960_SW304_210304	Normal	EP2102258	<1	115	<1	115	579	658	18,400	6.35	2,770		485		1,470		645		11,400			
Surface Water	SW304	23/06/2021	0960_SW304_210623	Normal	EP2107270	<1	214	<1	214	571	599	18,400	2.44	2,280		442		1,350		538		10,400			
Surface Water	SW304	24/11/2021	0960_SW304_211124	Normal	EP2114398	<1	252	<1	252	752	857	24,000	6.56	3,340		629		1,870		760		15,000			
Surface Water	SW304	1																							

[illegible]

Location Code	Date	Field ID	Sample Type	Lab Report Number	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002	-0.0002
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LOR - Limit of Reporting

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Date	Location	Screen Interval	TOC (mAHD)	SWL (mbTOC)	RWL (mAHD)
16/03/2018	MW018	5.5-8.5	6.403	5.506	0.897
10/06/2018	MW018	5.5-8.5	6.403	5.49	0.913
10/10/2018	MW018	5.5-8.5	6.403	5.528	0.875
14/08/2019	MW018	5.5-8.5	6.403	5.428	0.975
24/06/2020	MW018	5.5-8.5	6.403	5.54	0.863
24/06/2020	MW018	5.5-8.5	6.403	5.54	0.863
14/10/2020	MW018	5.5-8.5	6.403	5.655	0.748
19/11/2020	MW018	5.5-8.5	6.403	5.7	0.703
23/02/2021	MW018	5.5-8.5	6.403	5.675	0.728
23/06/2021	MW018	5.5-8.5	6.403	5.2	1.203
23/11/2021	MW018	5.5-8.5	6.403	5.448	0.955
18/01/2022	MW018	5.5-8.5	6.403	5.567	0.836
22/06/2022	MW018	5.5-8.5	6.403	4.97	1.433
31/10/2022	MW018	5.5-8.5	6.403	5.16	1.243
22/11/2022	MW018	5.5-8.5	6.403	5.23	1.173
24/03/2023	MW018	5.5-8.5	6.403	5.567	0.836
28/06/2023	MW018	5.5-8.5	6.403	5.458	0.945
4/09/2023	MW018	5.5-8.5	6.403	5.58	0.823
8/01/2007	MW021	5.6-8.6	6.745	6.208	0.543
11/03/2011	MW021	5.6-8.6	6.745	5.209	1.536
2/12/2016	MW021	5.6-8.6	6.745	5.636	1.109
6/03/2018	MW021	5.6-8.6	6.745	5.844	0.901
10/06/2018	MW021	5.6-8.6	6.745	5.82	0.925
12/10/2018	MW021	5.6-8.6	6.745	5.838	0.907
14/08/2019	MW021	5.6-8.6	6.745	5.769	0.976
26/11/2019	MW021	5.6-8.6	6.745	5.9	0.845
24/06/2020	MW021	5.6-8.6	6.745	5.865	0.88
24/06/2020	MW021	5.6-8.6	6.745	5.865	0.88
23/02/2021	MW021	5.6-8.6	6.745	6.02	0.725
23/06/2021	MW021	5.6-8.6	6.745	5.521	1.224
23/11/2021	MW021	5.6-8.6	6.745	5.794	0.951
18/01/2022	MW021	5.6-8.6	6.745	5.767	0.978
22/06/2022	MW021	5.6-8.6	6.745	5.35	1.395
31/10/2022	MW021	5.6-8.6	6.745	5.499	1.246
22/11/2022	MW021	5.6-8.6	6.745	5.575	1.17
24/03/2023	MW021	5.6-8.6	6.745	5.767	0.978
28/06/2023	MW021	5.6-8.6	6.745	5.847	0.898
5/09/2023	MW021	5.6-8.6	6.745	5.421	1.324
16/03/2018	MW102	2.5-8.5	4.6266	4.521	0.106
9/06/2018	MW102	2.5-8.5	4.6266	4.512	0.115
2/12/2019	MW102	2.5-8.5	4.6266	4.12	0.507
24/06/2020	MW102	2.5-8.5	4.6266	4.506	0.121
24/06/2020	MW102	2.5-8.5	4.6266	4.506	0.121
19/11/2020	MW102	2.5-8.5	4.6266	4.66	-0.033
23/06/2021	MW102	2.5-8.5	4.6266	4.163	0.464
18/01/2022	MW102	2.5-8.5	4.6266	4.49	0.137
22/06/2022	MW102	2.5-8.5	4.6266	3.795	0.832
22/11/2022	MW102	2.5-8.5	4.6266	4.37	0.257
24/03/2023	MW102	2.5-8.5	4.6266	4.49	0.137
28/06/2023	MW102	2.5-8.5	4.6266	4.19	0.437
16/03/2018	MW103	1.0-5.8	2.2785	2.144	0.135
15/06/2018	MW103	1.0-5.8	2.2785	2.141	0.138
30/11/2019	MW103	1.0-5.8	2.2785	2.37	-0.091
24/06/2020	MW103	1.0-5.8	2.2785	2.057	0.222
24/06/2020	MW103	1.0-5.8	2.2785	2.057	0.222
20/11/2020	MW103	1.0-5.8	2.2785	2.328	-0.049
23/06/2021	MW103	1.0-5.8	2.2785	1.605	0.674
18/01/2022	MW103	1.0-5.8	2.2785	2.335	-0.056
23/11/2022	MW103	1.0-5.8	2.2785	2.14	0.139
24/03/2023	MW103	1.0-5.8	2.2785	2.335	-0.056
28/06/2023	MW103	1.0-5.8	2.2785	2.03	0.249
16/03/2018	MW104	1.0-6.5	2.7256	2.572	0.154
14/06/2018	MW104	1.0-6.5	2.7256	2.56	0.166
29/11/2019	MW104	1.0-6.5	2.7256	2.7	0.026
24/06/2020	MW104	1.0-6.5	2.7256	2.498	0.228
25/06/2020	MW104	1.0-6.5	2.7256	2.498	0.228
19/11/2020	MW104	1.0-6.5	2.7256	2.45	0.276
23/06/2021	MW104	1.0-6.5	2.7256	2.133	0.593
18/01/2022	MW104	1.0-6.5	2.7256	2.59	0.136
22/06/2022	MW104	1.0-6.5	2.7256	1.425	1.301
22/11/2022	MW104	1.0-6.5	2.7256	2.48	0.246

24/03/2023	MW104	1.0-6.5	2.7256	2.59	0.136
28/06/2023	MW104	1.0-6.5	2.7256	2.585	0.141
16/03/2018	MW105	2.0-8.0	3.7272	3.421	0.306
13/06/2018	MW105	2.0-8.0	3.7272	3.4	0.327
10/10/2018	MW105	2.0-8.0	3.7272	3.458	0.269
29/11/2019	MW105	2.0-8.0	3.7272	3.54	0.187
2/12/2019	MW105	2.0-8.0	3.7272	3.5	0.227
18/03/2020	MW105	2.0-8.0	3.7272	3.71	0.017
19/11/2020	MW105	2.0-8.0	3.7272	8	-4.273
23/06/2021	MW105	2.0-8.0	3.7272	3.05	0.677
18/01/2022	MW105	2.0-8.0	3.7272	3.24	0.487
22/06/2022	MW105	2.0-8.0	3.7272	2.71	1.017
22/11/2022	MW105	2.0-8.0	3.7272	3.18	0.547
24/03/2023	MW105	2.0-8.0	3.7272	3.24	0.487
28/06/2023	MW105	2.0-8.0	3.7272	3.31	0.417
6/09/2023	MW105	2.0-8.0	3.7272	3.528	0.199
9/03/2018	MW112	3.0-8.0	5.1191	4.403	0.716
8/06/2018	MW112	3.0-8.0	5.1191	4.382	0.737
26/11/2019	MW112	3.0-8.0	5.1191	4.53	0.589
25/06/2020	MW112	3.0-8.0	5.1191	4.39	0.729
25/06/2020	MW112	3.0-8.0	5.1191	4.39	0.729
19/11/2020	MW112	3.0-8.0	5.1191	4.55	0.569
24/06/2021	MW112	3.0-8.0	5.1191	4.054	1.065
18/01/2022	MW112	3.0-8.0	5.1191	4.316	0.803
22/06/2022	MW112	3.0-8.0	5.1191	3.88	1.239
22/11/2022	MW112	3.0-8.0	5.1191	3.69	1.429
24/03/2023	MW112	3.0-8.0	5.1191	4.316	0.803
28/06/2023	MW112	3.0-8.0	5.1191	4.34	0.779
16/03/2018	MW113	4.0-10.0	7.3165	6.421	0.895
14/06/2018	MW113	4.0-10.0	7.3165	6.39	0.926
15/10/2018	MW113	4.0-10.0	7.3165	6.441	0.876
29/11/2019	MW113	4.0-10.0	7.3165	6.56	0.757
24/06/2020	MW113	4.0-10.0	7.3165	6.46	0.856
25/06/2020	MW113	4.0-10.0	7.3165	6.46	0.856
15/10/2020	MW113	4.0-10.0	7.3165	6.585	0.731
19/11/2020	MW113	4.0-10.0	7.3165	6.6	0.716
23/02/2021	MW113	4.0-10.0	7.3165	6.593	0.723
23/06/2021	MW113	4.0-10.0	7.3165	6.1	1.216
18/01/2022	MW113	4.0-10.0	7.3165	6.351	0.965
22/06/2022	MW113	4.0-10.0	7.3165	5.915	1.401
1/11/2022	MW113	4.0-10.0	7.3165	6.097	1.219
22/11/2022	MW113	4.0-10.0	7.3165	6.16	1.156
24/03/2023	MW113	4.0-10.0	7.3165	6.351	0.965
28/06/2023	MW113	4.0-10.0	7.3165	6.264	1.052
6/09/2023	MW113	4.0-10.0	7.3165	6.507	0.809
16/03/2018	MW114	4.0-10.0	7.7467	6.8	0.947
10/06/2018	MW114	4.0-10.0	7.7467	6.791	0.956
26/11/2019	MW114	4.0-10.0	7.7467	6.95	0.797
24/06/2020	MW114	4.0-10.0	7.7467	6.835	0.912
25/06/2020	MW114	4.0-10.0	7.7467	6.835	0.912
19/11/2020	MW114	4.0-10.0	7.7467	7.04	0.707
23/06/2021	MW114	4.0-10.0	7.7467	6.53	1.217
18/01/2022	MW114	4.0-10.0	7.7467	6.542	1.205
22/06/2022	MW114	4.0-10.0	7.7467	6.32	1.427
1/11/2022	MW114	4.0-10.0	7.7467	6.485	1.262
22/11/2022	MW114	4.0-10.0	7.7467	6.56	1.187
24/03/2023	MW114	4.0-10.0	7.7467	6.542	1.205
28/06/2023	MW114	4.0-10.0	7.7467	6.81	0.937
6/09/2023	MW114	4.0-10.0	7.7467	6.895	0.852
8/03/2018	MW115	3.0-8.0	4.9133	4.33	0.583
8/06/2018	MW115	3.0-8.0	4.9133	4.311	0.602
29/11/2019	MW115	3.0-8.0	4.9133	4.38	0.533
25/06/2020	MW115	3.0-8.0	4.9133	4.312	0.601
25/06/2020	MW115	3.0-8.0	4.9133	4.312	0.601
19/11/2020	MW115	3.0-8.0	4.9133	4.475	0.438
24/06/2021	MW115	3.0-8.0	4.9133	3.997	0.916
18/01/2022	MW115	3.0-8.0	4.9133	4.227	0.686
22/06/2022	MW115	3.0-8.0	4.9133	3.82	1.093
22/11/2022	MW115	3.0-8.0	4.9133	4.05	0.863
24/03/2023	MW115	3.0-8.0	4.9133	4.227	0.686
28/06/2023	MW115	3.0-8.0	4.9133	4.269	0.644
15/06/2018	MW122	1.7-7.7	3.9702	3.68	0.29
30/11/2019	MW122	1.7-7.7	3.9702	3.81	0.16

25/06/2020	MW122	1.7-7.7	3.9702	3.93	0.04
25/06/2020	MW122	1.7-7.7	3.9702	3.93	0.04
19/11/2020	MW122	1.7-7.7	3.9702	3.87	0.1
24/06/2021	MW122	1.7-7.7	3.9702	3.35	0.62
18/01/2022	MW122	1.7-7.7	3.9702	3.535	0.435
22/06/2022	MW122	1.7-7.7	3.9702	3.05	0.92
22/11/2022	MW122	1.7-7.7	3.9702	3.405	0.565
24/03/2023	MW122	1.7-7.7	3.9702	3.535	0.435
28/06/2023	MW122	1.7-7.7	3.9702	3.85	0.12
16/03/2018	MW124	1.0-6.0	2.9183	3.125	-0.207
9/06/2018	MW124	1.0-6.0	2.9183	2.795	0.123
2/12/2019	MW124	1.0-6.0	2.9183	2.99	-0.072
19/11/2020	MW124	1.0-6.0	2.9183	2.907	0.011
23/06/2021	MW124	1.0-6.0	2.9183	2.444	0.474
18/01/2022	MW124	1.0-6.0	2.9183	2.831	0.087
22/06/2022	MW124	1.0-6.0	2.9183	1.998	0.92
22/11/2022	MW124	1.0-6.0	2.9183	2.68	0.238
24/03/2023	MW124	1.0-6.0	2.9183	2.831	0.087
28/06/2023	MW124	1.0-6.0	2.9183	2.825	0.093
16/03/2018	MW126	2.0-8.0	4.5088	4.251	0.258
8/06/2018	MW126	2.0-8.0	4.5088	4.251	0.258
29/11/2019	MW126	2.0-8.0	4.5088	5.5	-0.991
24/06/2020	MW126	2.0-8.0	4.5088	4.245	0.264
25/06/2020	MW126	2.0-8.0	4.5088	4.245	0.264
19/11/2020	MW126	2.0-8.0	4.5088	8	-3.491
23/06/2021	MW126	2.0-8.0	4.5088	3.95	0.559
18/01/2022	MW126	2.0-8.0	4.5088	4.09	0.419
22/06/2022	MW126	2.0-8.0	4.5088	3.64	0.869
22/11/2022	MW126	2.0-8.0	4.5088	3.87	0.639
24/03/2023	MW126	2.0-8.0	4.5088	4.09	0.419
28/06/2023	MW126	2.0-8.0	4.5088	4.2	0.309
16/03/2018	MW127	2.5-8.5	5.6238	5.291	0.333
8/06/2018	MW127	2.5-8.5	5.6238	5.315	0.309
29/11/2019	MW127	2.5-8.5	5.6238	3.88	1.744
25/06/2020	MW127	2.5-8.5	5.6238	5.32	0.304
26/06/2020	MW127	2.5-8.5	5.6238	5.32	0.304
19/11/2020	MW127	2.5-8.5	5.6238	5.29	0.334
23/06/2021	MW127	2.5-8.5	5.6238	4.85	0.774
18/01/2022	MW127	2.5-8.5	5.6238	4.86	0.764
22/06/2022	MW127	2.5-8.5	5.6238	4.75	0.874
22/11/2022	MW127	2.5-8.5	5.6238	4.57	1.054
24/03/2023	MW127	2.5-8.5	5.6238	4.86	0.764
28/06/2023	MW127	2.5-8.5	5.6238	5.915	-0.291
16/03/2018	MW134	1.0-5.7	2.5155	2.256	0.26
10/06/2018	MW134	1.0-5.7	2.5155	2.221	0.294
26/06/2020	MW134	1.0-5.7	2.5155	2.164	0.351
26/06/2020	MW134	1.0-5.7	2.5155	2.164	0.351
20/11/2020	MW134	1.0-5.7	2.5155	2.4	0.115
24/06/2021	MW134	1.0-5.7	2.5155	1.76	0.755
18/01/2022	MW134	1.0-5.7	2.5155	2.226	0.289
23/06/2022	MW134	1.0-5.7	2.5155	1.33	1.185
22/11/2022	MW134	1.0-5.7	2.5155	2.21	0.305
24/03/2023	MW134	1.0-5.7	2.5155	2.226	0.289
28/06/2023	MW134	1.0-5.7	2.5155	2.3	0.216
8/03/2018	MW135	9.0-9.5	2.7884	2.37	0.408
8/03/2018	MW135	9.0-9.5	2.7884	2.392	0.391
8/03/2018	MW135	9.0-9.5	2.7884	2.377	0.409
8/03/2018	MW135	9.0-9.5	2.7884	2.445	0.343
16/06/2018	MW135	9.0-9.5	2.7884	2.338	0.44
16/06/2018	MW135	9.0-9.5	2.7884	2.338	0.445
16/06/2018	MW135	9.0-9.5	2.7884	2.34	0.446
16/06/2018	MW135	9.0-9.5	2.7884	2.345	0.443
29/11/2019	MW135	9.0-9.5	2.7884	2.47	0.308
25/06/2020	MW135	9.0-9.5	2.7884	2.25	0.528
25/06/2020	MW135	9.0-9.5	2.7884	2.25	0.528
21/11/2020	MW135	9.0-9.5	2.7884	2.535	0.243
24/06/2021	MW135	9.0-9.5	2.7884	1.945	0.833
18/01/2022	MW135	9.0-9.5	2.7884	2.49	0.296
23/06/2022	MW135	9.0-9.5	2.7884	1.61	1.168
23/11/2022	MW135	9.0-9.5	2.7884	2.34	0.438
24/03/2023	MW135	9.0-9.5	2.7884	2.49	0.296
28/06/2023	MW135	9.0-9.5	2.7884	2.42	0.358
16/06/2018	MW137	6.5-7.0	2.2034	1.338	0.831

16/06/2018	MW137	6.5-7.0	2.2034	1.351	0.818
16/06/2018	MW137	6.5-7.0	2.2034	1.31	0.892
16/06/2018	MW137	6.5-7.0	2.2034	1.29	0.913
29/11/2019	MW137	6.5-7.0	2.2034	1.91	0.292
24/06/2020	MW137	6.5-7.0	2.2034	1.52	0.649
25/06/2020	MW137	6.5-7.0	2.2034	1.52	0.649
20/11/2020	MW137	6.5-7.0	2.2034	1.74	0.429
24/06/2021	MW137	6.5-7.0	2.2034	1.257	0.912
18/01/2022	MW137	6.5-7.0	2.2034	1.501	0.668
22/06/2022	MW137	6.5-7.0	2.2034	0.94	1.229
22/11/2022	MW137	6.5-7.0	2.2034	1.57	0.599
24/03/2023	MW137	6.5-7.0	2.2034	1.501	0.668
28/06/2023	MW137	6.5-7.0	2.2034	1.46	0.709
12/03/2018	MW138	9.0-9.5	3.3224	3.16	0.147
12/03/2018	MW138	9.0-9.5	3.3224	3.195	0.122
12/03/2018	MW138	9.0-9.5	3.3224	3.287	0.034
12/03/2018	MW138	9.0-9.5	3.3224	3.303	0.019
16/06/2018	MW138	9.0-9.5	3.3224	3.17	0.137
16/06/2018	MW138	9.0-9.5	3.3224	3.172	0.145
16/06/2018	MW138	9.0-9.5	3.3224	3.191	0.13
16/06/2018	MW138	9.0-9.5	3.3224	3.141	0.181
29/11/2019	MW138	9.0-9.5	3.3224	3.41	-0.093
24/06/2020	MW138	9.0-9.5	3.3224	3.3	0.007
25/06/2020	MW138	9.0-9.5	3.3224	3.3	0.007
20/11/2020	MW138	9.0-9.5	3.3224	3.38	-0.059
24/06/2021	MW138	9.0-9.5	3.3224	2.865	0.442
18/01/2022	MW138	9.0-9.5	3.3224	3.269	0.038
22/06/2022	MW138	9.0-9.5	3.3224	2.145	1.162
22/11/2022	MW138	9.0-9.5	3.3224	3.01	0.297
24/03/2023	MW138	9.0-9.5	3.3224	3.269	0.038
12/03/2018	MW139	2.0-7.0	4.1386	3.885	0.254
16/06/2018	MW139	2.0-7.0	4.1386	3.861	0.278
29/11/2019	MW139	2.0-7.0	4.1386	3.95	0.189
24/06/2020	MW139	2.0-7.0	4.1386	1.67	2.469
25/06/2020	MW139	2.0-7.0	4.1386	1.67	2.469
21/11/2020	MW139	2.0-7.0	4.1386	4.03	0.109
24/06/2021	MW139	2.0-7.0	4.1386	3.46	0.679
18/01/2022	MW139	2.0-7.0	4.1386	3.779	0.36
22/06/2022	MW139	2.0-7.0	4.1386	3	1.139
22/11/2022	MW139	2.0-7.0	4.1386	3.595	0.544
24/03/2023	MW139	2.0-7.0	4.1386	3.779	0.36
28/06/2023	MW139	2.0-7.0	4.1386	3.87	0.269
16/06/2018	MW140	3.5-4.0	2.5035	1.946	0.546
16/06/2018	MW140	3.5-4.0	2.5035	1.835	0.668
16/06/2018	MW140	3.5-4.0	2.5035	1.745	0.763
16/06/2018	MW140	3.5-4.0	2.5035	1.75	0.785
29/11/2019	MW140	3.5-4.0	2.5035	2	0.503
24/06/2020	MW140	3.5-4.0	2.5035	1.82	0.683
24/06/2020	MW140	3.5-4.0	2.5035	1.82	0.683
20/11/2020	MW140	3.5-4.0	2.5035	1.798	0.705
24/06/2021	MW140	3.5-4.0	2.5035	1.7	0.808
18/01/2022	MW140	3.5-4.0	2.5035	1.85	0.653
23/06/2022	MW140	3.5-4.0	2.5035	1.355	1.137
23/11/2022	MW140	3.5-4.0	2.5035	1.89	0.602
24/03/2023	MW140	3.5-4.0	2.5035	1.85	0.653
28/06/2023	MW140	3.5-4.0	2.5035	1.9	0.592
8/03/2018	MW141	5.0-5.5	2.8141	2.1	0.7
8/03/2018	MW141	5.0-5.5	2.8141	2.105	0.702
8/03/2018	MW141	5.0-5.5	2.8141	2.152	0.662
8/03/2018	MW141	5.0-5.5	2.8141	2.199	0.623
16/06/2018	MW141	5.0-5.5	2.8141	2.141	0.659
16/06/2018	MW141	5.0-5.5	2.8141	2.128	0.679
16/06/2018	MW141	5.0-5.5	2.8141	2.128	0.686
16/06/2018	MW141	5.0-5.5	2.8141	2.127	0.695
29/11/2019	MW141	5.0-5.5	2.8141	2.3	0.507
24/06/2020	MW141	5.0-5.5	2.8141	2.25	0.557
24/06/2020	MW141	5.0-5.5	2.8141	2.25	0.557
20/11/2020	MW141	5.0-5.5	2.8141	1.64	1.167
24/06/2021	MW141	5.0-5.5	2.8141	2.05	0.772
18/01/2022	MW141	5.0-5.5	2.8141	2.17	0.644
23/06/2022	MW141	5.0-5.5	2.8141	1.745	1.055
23/11/2022	MW141	5.0-5.5	2.8141	2.23	0.577
24/03/2023	MW141	5.0-5.5	2.8141	2.17	0.644

28/06/2023	MW141	5.0-5.5	2.8141	2.24	0.567
10/03/2018	MW143	5.0-5.5	2.8204	2.715	0.102
10/03/2018	MW143	5.0-5.5	2.8204	2.71	0.11
10/03/2018	MW143	5.0-5.5	2.8204	2.725	0.097
10/03/2018	MW143	5.0-5.5	2.8204	2.79	0.037
16/06/2018	MW143	5.0-5.5	2.8204	2.691	0.126
16/06/2018	MW143	5.0-5.5	2.8204	2.691	0.129
16/06/2018	MW143	5.0-5.5	2.8204	2.689	0.133
16/06/2018	MW143	5.0-5.5	2.8204	2.69	0.137
29/11/2019	MW143	5.0-5.5	2.8204	2.93	-0.113
24/06/2020	MW143	5.0-5.5	2.8204	2.82	-0.003
25/06/2020	MW143	5.0-5.5	2.8204	2.82	-0.003
20/11/2020	MW143	5.0-5.5	2.8204	2.86	-0.043
24/06/2021	MW143	5.0-5.5	2.8204	1.11	1.707
18/01/2022	MW143	5.0-5.5	2.8204	2.69	0.127
22/06/2022	MW143	5.0-5.5	2.8204	1.975	0.842
23/11/2022	MW143	5.0-5.5	2.8204	2.58	0.237
24/03/2023	MW143	5.0-5.5	2.8204	2.69	0.127
28/06/2023	MW143	5.0-5.5	2.8204	2.739	0.078
8/03/2018	MW144	9.0-9.5	3.0573	2.778	0.27
8/03/2018	MW144	9.0-9.5	3.0573	2.787	0.265
8/03/2018	MW144	9.0-9.5	3.0573	2.827	0.228
8/03/2018	MW144	9.0-9.5	3.0573	2.842	0.215
16/06/2018	MW144	9.0-9.5	3.0573	2.79	0.258
16/06/2018	MW144	9.0-9.5	3.0573	2.771	0.281
16/06/2018	MW144	9.0-9.5	3.0573	2.758	0.297
16/06/2018	MW144	9.0-9.5	3.0573	2.751	0.306
29/11/2019	MW144	9.0-9.5	3.0573	2.5	0.548
24/06/2020	MW144	9.0-9.5	3.0573	2.83	0.218
25/06/2020	MW144	9.0-9.5	3.0573	2.83	0.218
20/11/2020	MW144	9.0-9.5	3.0573	3.01	0.038
24/06/2021	MW144	9.0-9.5	3.0573	2.44	0.608
18/01/2022	MW144	9.0-9.5	3.0573	2.8	0.248
22/06/2022	MW144	9.0-9.5	3.0573	1.97	1.078
22/11/2022	MW144	9.0-9.5	3.0573	2.7	0.348
24/03/2023	MW144	9.0-9.5	3.0573	2.8	0.248
28/06/2023	MW144	9.0-9.5	3.0573	2.845	0.203
12/03/2018	MW145	7.0-7.5	3.1506	3.015	0.127
12/03/2018	MW145	7.0-7.5	3.1506	3.025	0.123
12/03/2018	MW145	7.0-7.5	3.1506	3.033	0.118
12/03/2018	MW145	7.0-7.5	3.1506	3.037	0.115
16/06/2018	MW145	7.0-7.5	3.1506	2.945	0.197
16/06/2018	MW145	7.0-7.5	3.1506	2.943	0.205
16/06/2018	MW145	7.0-7.5	3.1506	2.94	0.211
16/06/2018	MW145	7.0-7.5	3.1506	2.931	0.221
29/11/2019	MW145	7.0-7.5	3.1506	3.25	-0.102
24/06/2020	MW145	7.0-7.5	3.1506	2.8	0.342
24/06/2020	MW145	7.0-7.5	3.1506	2.8	0.342
20/11/2020	MW145	7.0-7.5	3.1506	3.18	-0.032
24/06/2021	MW145	7.0-7.5	3.1506	2.53	0.618
18/01/2022	MW145	7.0-7.5	3.1506	3.001	0.147
22/06/2022	MW145	7.0-7.5	3.1506	2.045	1.097
23/11/2022	MW145	7.0-7.5	3.1506	2.88	0.262
24/03/2023	MW145	7.0-7.5	3.1506	3.001	0.147
28/06/2023	MW145	7.0-7.5	3.1506	2.94	0.202
8/03/2018	MW146	4.5-5.0	2.8009	2.615	0.179
8/03/2018	MW146	4.5-5.0	2.8009	2.635	0.166
8/03/2018	MW146	4.5-5.0	2.8009	2.649	0.153
8/03/2018	MW146	4.5-5.0	2.8009	2.645	0.173
16/06/2018	MW146	4.5-5.0	2.8009	2.535	0.259
16/06/2018	MW146	4.5-5.0	2.8009	2.513	0.288
16/06/2018	MW146	4.5-5.0	2.8009	2.545	0.257
16/06/2018	MW146	4.5-5.0	2.8009	2.555	0.263
29/11/2019	MW146	4.5-5.0	2.8009	2.76	0.041
24/06/2020	MW146	4.5-5.0	2.8009	2.57	0.231
24/06/2020	MW146	4.5-5.0	2.8009	2.57	0.231
21/11/2020	MW146	4.5-5.0	2.8009	2.84	-0.039
24/06/2021	MW146	4.5-5.0	2.8009	2.2	0.601
18/01/2022	MW146	4.5-5.0	2.8009	2.561	0.233
22/06/2022	MW146	4.5-5.0	2.8009	1.77	1.024
23/11/2022	MW146	4.5-5.0	2.8009	2.43	0.364
24/03/2023	MW146	4.5-5.0	2.8009	2.561	0.233
28/06/2023	MW146	4.5-5.0	2.8009	2.478	0.316

8/03/2018	MW147	9.0-9.5	2.9209	2.685	0.227
8/03/2018	MW147	9.0-9.5	2.9209	2.681	0.234
8/03/2018	MW147	9.0-9.5	2.9209	2.682	0.236
8/03/2018	MW147	9.0-9.5	2.9209	2.808	0.113
16/06/2018	MW147	9.0-9.5	2.9209	2.622	0.29
16/06/2018	MW147	9.0-9.5	2.9209	2.597	0.318
16/06/2018	MW147	9.0-9.5	2.9209	2.598	0.32
16/06/2018	MW147	9.0-9.5	2.9209	2.595	0.326
29/11/2019	MW147	9.0-9.5	2.9209	2.8	0.112
24/06/2020	MW147	9.0-9.5	2.9209	2.6	0.312
24/06/2020	MW147	9.0-9.5	2.9209	2.6	0.312
20/11/2020	MW147	9.0-9.5	2.9209	2.87	0.045
24/06/2021	MW147	9.0-9.5	2.9209	2.33	0.585
18/01/2022	MW147	9.0-9.5	2.9209	2.817	0.095
23/06/2022	MW147	9.0-9.5	2.9209	1.89	1.022
23/11/2022	MW147	9.0-9.5	2.9209	2.48	0.432
24/03/2023	MW147	9.0-9.5	2.9209	2.817	0.095
28/06/2023	MW147	9.0-9.5	2.9209	2.6	0.312
15/06/2018	MW148D	14.0-20.0	3.5778	3.382	0.196
2/12/2019	MW148D	14.0-20.0	3.5778	3.57	0.008
18/03/2020	MW148D	14.0-20.0	3.5778	3.64	-0.062
24/06/2020	MW148D	14.0-20.0	3.5778	3.361	0.217
24/06/2020	MW148D	14.0-20.0	3.5778	3.361	0.217
19/11/2020	MW148D	14.0-20.0	3.5778	3.59	-0.012
23/06/2021	MW148D	14.0-20.0	3.5778	2.899	0.679
18/01/2022	MW148D	14.0-20.0	3.5778	3.41	0.168
22/06/2022	MW148D	14.0-20.0	3.5778	2.695	0.883
22/11/2022	MW148D	14.0-20.0	3.5778	3.27	0.308
24/03/2023	MW148D	14.0-20.0	3.5778	3.41	0.168
28/06/2023	MW148D	14.0-20.0	3.5778	3.46	0.118
15/06/2018	MW148S	2.0-8.0	3.6851	3.375	0.31
2/12/2019	MW148S	2.0-8.0	3.6851	3.57	0.115
18/03/2020	MW148S	2.0-8.0	3.6851	3.65	0.035
24/06/2020	MW148S	2.0-8.0	3.6851	3.345	0.34
24/06/2020	MW148S	2.0-8.0	3.6851	3.345	0.34
19/11/2020	MW148S	2.0-8.0	3.6851	3.504	0.181
23/06/2021	MW148S	2.0-8.0	3.6851	2.899	0.786
18/01/2022	MW148S	2.0-8.0	3.6851	3.36	0.325
22/06/2022	MW148S	2.0-8.0	3.6851	2.595	1.09
22/11/2022	MW148S	2.0-8.0	3.6851	3.24	0.445
24/03/2023	MW148S	2.0-8.0	3.6851	3.36	0.325
28/06/2023	MW148S	2.0-8.0	3.6851	3.43	0.255
18/06/2018	MW151	2.0-8.0	4.0631	3.673	0.39
4/10/2018	MW151	2.0-8.0	4.0631	3.717	0.346
18/03/2020	MW151	2.0-8.0	4.0631	3.93	0.13
24/06/2020	MW151	2.0-8.0	4.0631	3.661	0.402
24/06/2020	MW151	2.0-8.0	4.0631	3.661	0.402
19/11/2020	MW151	2.0-8.0	4.0631	3.849	0.214
23/06/2021	MW151	2.0-8.0	4.0631	3.307	0.756
18/01/2022	MW151	2.0-8.0	4.0631	3.68	0.383
22/06/2022	MW151	2.0-8.0	4.0631	3.02	1.043
22/11/2022	MW151	2.0-8.0	4.0631	3.54	0.523
24/03/2023	MW151	2.0-8.0	4.0631	3.68	0.383
28/06/2023	MW151	2.0-8.0	4.0631	3.725	0.338
15/06/2018	MW159	3.0-9.0	4.1895	3.707	0.482
12/10/2018	MW159	3.0-9.0	4.1895	3.767	0.423
20/08/2019	MW159	3.0-9.0	4.1895	3.723	0.467
29/11/2019	MW159	3.0-9.0	4.1895	4.1	0.09
18/03/2020	MW159	3.0-9.0	4.1895	3.98	0.21
24/06/2020	MW159	3.0-9.0	4.1895	3.706	0.483
24/06/2020	MW159	3.0-9.0	4.1895	3.706	0.483
20/11/2020	MW159	3.0-9.0	4.1895	3.92	0.269
23/06/2021	MW159	3.0-9.0	4.1895	3.365	0.824
23/11/2021	MW159	3.0-9.0	4.1895	3.765	0.424
18/01/2022	MW159	3.0-9.0	4.1895	3.744	0.445
22/06/2022	MW159	3.0-9.0	4.1895	3.1	1.089
1/11/2022	MW159	3.0-9.0	4.1895	3.576	0.613
23/11/2022	MW159	3.0-9.0	4.1895	3.6	0.589
24/03/2023	MW159	3.0-9.0	4.1895	3.744	0.445
28/06/2023	MW159	3.0-9.0	4.1895	3.33	0.859
5/09/2023	MW159	3.0-9.0	4.1895	3.887	0.302
15/06/2018	MW162	17.0-20.0	6.856	5.652	1.204
14/10/2018	MW162	17.0-20.0	6.856	5.998	0.858

26/11/2019	MW162	17.0-20.0	6.856	6.1	0.756
24/06/2020	MW162	17.0-20.0	6.856	6.01	0.846
24/06/2020	MW162	17.0-20.0	6.856	6.01	0.846
15/10/2020	MW162	17.0-20.0	6.856	6.129	0.727
19/11/2020	MW162	17.0-20.0	6.856	6.16	0.696
23/02/2021	MW162	17.0-20.0	6.856	6.167	0.689
23/06/2021	MW162	17.0-20.0	6.856	5.64	1.216
23/11/2021	MW162	17.0-20.0	6.856	5.938	0.918
18/01/2022	MW162	17.0-20.0	6.856	5.876	0.98
22/06/2022	MW162	17.0-20.0	6.856	5.45	1.406
1/11/2022	MW162	17.0-20.0	6.856	5.062	1.794
22/11/2022	MW162	17.0-20.0	6.856	5.685	1.171
24/03/2023	MW162	17.0-20.0	6.856	5.876	0.98
28/06/2023	MW162	17.0-20.0	6.856	5.91	0.946
6/09/2023	MW162	17.0-20.0	6.856	6.068	0.788
15/06/2018	MW163	17.0-20.0	6.7808	5.874	0.907
14/10/2018	MW163	17.0-20.0	6.7808	5.92	0.861
26/11/2019	MW163	17.0-20.0	6.7808	6.05	0.731
24/06/2020	MW163	17.0-20.0	6.7808	5.955	0.826
24/06/2020	MW163	17.0-20.0	6.7808	5.955	0.826
19/11/2020	MW163	17.0-20.0	6.7808	6.09	0.691
23/06/2021	MW163	17.0-20.0	6.7808	5.55	1.231
18/01/2022	MW163	17.0-20.0	6.7808	6.403	0.378
22/06/2022	MW163	17.0-20.0	6.7808	5.36	1.421
22/11/2022	MW163	17.0-20.0	6.7808	5.8	0.981
24/03/2023	MW163	17.0-20.0	6.7808	6.403	0.378
28/06/2023	MW163	17.0-20.0	6.7808	5.797	0.984
15/06/2018	MW164	17.0-20.0	6.7893	5.91	0.879
26/11/2019	MW164	17.0-20.0	6.7893	6.07	0.719
24/06/2020	MW164	17.0-20.0	6.7893	5.95	0.839
24/06/2020	MW164	17.0-20.0	6.7893	5.95	0.839
19/11/2020	MW164	17.0-20.0	6.7893	6.11	0.679
23/06/2021	MW164	17.0-20.0	6.7893	5.55	1.239
18/01/2022	MW164	17.0-20.0	6.7893	5.868	0.921
22/06/2022	MW164	17.0-20.0	6.7893	5.35	1.439
22/11/2022	MW164	17.0-20.0	6.7893	5.6	1.189
24/03/2023	MW164	17.0-20.0	6.7893	5.868	0.921
28/06/2023	MW164	17.0-20.0	6.7893	5.806	0.983
10/06/2018	MW165	3.0-9.0	6.1043	5.191	0.913
26/11/2019	MW165	3.0-9.0	6.1043	5.34	0.764
24/06/2020	MW165	3.0-9.0	6.1043	5.26	0.844
24/06/2020	MW165	3.0-9.0	6.1043	5.26	0.844
19/11/2020	MW165	3.0-9.0	6.1043	5.36	0.744
23/06/2021	MW165	3.0-9.0	6.1043	4.85	1.254
18/01/2022	MW165	3.0-9.0	6.1043	5.148	0.956
22/06/2022	MW165	3.0-9.0	6.1043	4.63	1.474
22/11/2022	MW165	3.0-9.0	6.1043	5.23	0.874
24/03/2023	MW165	3.0-9.0	6.1043	5.148	0.956
28/06/2023	MW165	3.0-9.0	6.1043	5.14	0.964
10/06/2018	MW166	2.5-8.5	5.7441	4.875	0.869
26/11/2019	MW166	2.5-8.5	5.7441	5.015	0.729
24/06/2020	MW166	2.5-8.5	5.7441	4.92	0.824
24/06/2020	MW166	2.5-8.5	5.7441	4.92	0.824
19/11/2020	MW166	2.5-8.5	5.7441	5.05	0.694
23/06/2021	MW166	2.5-8.5	5.7441	4.55	1.194
18/01/2022	MW166	2.5-8.5	5.7441	4.812	0.932
22/06/2022	MW166	2.5-8.5	5.7441	4.3	1.444
22/11/2022	MW166	2.5-8.5	5.7441	4.56	1.184
24/03/2023	MW166	2.5-8.5	5.7441	4.812	0.932
28/06/2023	MW166	2.5-8.5	5.7441	4.818	0.926
10/06/2018	MW167	2.5-8.5	6.2094	5.379	0.83
26/11/2019	MW167	2.5-8.5	6.2094	5.525	0.684
25/06/2020	MW167	2.5-8.5	6.2094	5.39	0.819
25/06/2020	MW167	2.5-8.5	6.2094	5.39	0.819
19/11/2020	MW167	2.5-8.5	6.2094	5.56	0.649
23/06/2021	MW167	2.5-8.5	6.2094	5.06	1.149
18/01/2022	MW167	2.5-8.5	6.2094	5.304	0.905
22/06/2022	MW167	2.5-8.5	6.2094	4.86	1.349
22/11/2022	MW167	2.5-8.5	6.2094	5.075	1.134
24/03/2023	MW167	2.5-8.5	6.2094	5.304	0.905
28/06/2023	MW167	2.5-8.5	6.2094	5.329	0.88
10/06/2018	MW168	2.5-8.5	6.1713	5.4	0.771
26/11/2019	MW168	2.5-8.5	6.1713	5.55	0.621

25/06/2020	MW168	2.5-8.5	6.1713	5.408	0.763
25/06/2020	MW168	2.5-8.5	6.1713	5.408	0.763
19/11/2020	MW168	2.5-8.5	6.1713	5.57	0.601
23/06/2021	MW168	2.5-8.5	6.1713	5.08	1.091
18/01/2022	MW168	2.5-8.5	6.1713	5.335	0.836
22/06/2022	MW168	2.5-8.5	6.1713	4.89	1.281
22/11/2022	MW168	2.5-8.5	6.1713	4.985	1.186
24/03/2023	MW168	2.5-8.5	6.1713	5.335	0.836
28/06/2023	MW168	2.5-8.5	6.1713	5.21	0.961
18/06/2018	MW170	2.5-8.5	5.639	5.161	0.478
20/08/2019	MW170	2.5-8.5	5.639	5.083	0.556
29/11/2019	MW170	2.5-8.5	5.639	5.27	0.369
24/06/2020	MW170	2.5-8.5	5.639	4.398	1.241
24/06/2020	MW170	2.5-8.5	5.639	4.398	1.241
16/10/2020	MW170	2.5-8.5	5.639	5.298	0.341
19/11/2020	MW170	2.5-8.5	5.639	5.299	0.34
24/02/2021	MW170	2.5-8.5	5.639	5.376	0.263
23/06/2021	MW170	2.5-8.5	5.639	4.764	0.875
23/11/2021	MW170	2.5-8.5	5.639	5.023	0.616
18/01/2022	MW170	2.5-8.5	5.639	4.994	0.645
22/06/2022	MW170	2.5-8.5	5.639	4.56	1.079
22/11/2022	MW170	2.5-8.5	5.639	4.785	0.854
24/03/2023	MW170	2.5-8.5	5.639	4.994	0.645
28/06/2023	MW170	2.5-8.5	5.639	5.15	0.489
7/09/2023	MW170	2.5-8.5	5.639	5.207	0.432
18/06/2018	MW172	2.5-8.5	5.6193	5.061	0.558
29/11/2019	MW172	2.5-8.5	5.6193	5.19	0.429
24/06/2020	MW172	2.5-8.5	5.6193	5.051	0.568
24/06/2020	MW172	2.5-8.5	5.6193	5.051	0.568
19/11/2020	MW172	2.5-8.5	5.6193	5.198	0.421
23/06/2021	MW172	2.5-8.5	5.6193	4.714	0.905
18/01/2022	MW172	2.5-8.5	5.6193	4.933	0.686
22/06/2022	MW172	2.5-8.5	5.6193	4.533	1.086
22/11/2022	MW172	2.5-8.5	5.6193	4.73	0.889
24/03/2023	MW172	2.5-8.5	5.6193	4.933	0.686
28/06/2023	MW172	2.5-8.5	5.6193	5.05	0.569
17/06/2018	MW175	7.0-7.5	4.7995	4.391	0.401
17/06/2018	MW175	7.0-7.5	4.7995	4.29	0.508
17/06/2018	MW175	7.0-7.5	4.7995	4.242	0.558
17/06/2018	MW175	7.0-7.5	4.7995	4.236	0.596
29/11/2019	MW175	7.0-7.5	4.7995	4.52	0.278
25/06/2020	MW175	7.0-7.5	4.7995	4.82	-0.022
25/06/2020	MW175	7.0-7.5	4.7995	4.82	-0.022
20/11/2020	MW175	7.0-7.5	4.7995	5	-0.202
23/06/2021	MW175	7.0-7.5	4.7995	4.13	0.67
18/01/2022	MW175	7.0-7.5	4.7995	4.3	0.498
23/06/2022	MW175	7.0-7.5	4.7995	3.84	0.952
23/11/2022	MW175	7.0-7.5	4.7995	4.21	0.582
24/03/2023	MW175	7.0-7.5	4.7995	4.3	0.498
28/06/2023	MW175	7.0-7.5	4.7995	4.75	0.048
17/06/2018	MW176	1.5-2.0	2.1274	1.835	0.292
17/06/2018	MW176	1.5-2.0	2.1274	1.7	0.428
17/06/2018	MW176	1.5-2.0	2.1274	1.72	0.439
17/06/2018	MW176	1.5-2.0	2.1274	1.631	0.54
29/11/2019	MW176	1.5-2.0	2.1274	1.97	0.158
24/06/2020	MW176	1.5-2.0	2.1274	1.88	0.247
24/06/2020	MW176	1.5-2.0	2.1274	1.88	0.247
20/11/2020	MW176	1.5-2.0	2.1274	1.835	0.292
23/06/2021	MW176	1.5-2.0	2.1274	1.24	0.888
18/01/2022	MW176	1.5-2.0	2.1274	1.78	0.379
23/06/2022	MW176	1.5-2.0	2.1274	1.315	0.812
22/11/2022	MW176	1.5-2.0	2.1274	1.85	0.277
24/03/2023	MW176	1.5-2.0	2.1274	1.78	0.379
28/06/2023	MW176	1.5-2.0	2.1274	1.882	0.245
17/06/2018	MW177	1.5-2.0	2.2299	1.739	0.491
17/06/2018	MW177	1.5-2.0	2.2299	1.553	0.699
17/06/2018	MW177	1.5-2.0	2.2299	1.415	0.838
17/06/2018	MW177	1.5-2.0	2.2299	1.371	0.901
29/11/2019	MW177	1.5-2.0	2.2299	2.01	0.22
24/06/2020	MW177	1.5-2.0	2.2299	1.7	0.53
24/06/2020	MW177	1.5-2.0	2.2299	1.7	0.53
20/11/2020	MW177	1.5-2.0	2.2299	1.535	0.695
23/06/2021	MW177	1.5-2.0	2.2299	0.9	1.352

18/01/2022	MW177	1.5-2.0	2.2299	1.63	0.622
23/06/2022	MW177	1.5-2.0	2.2299	1.205	1.025
22/11/2022	MW177	1.5-2.0	2.2299	1.77	0.46
24/03/2023	MW177	1.5-2.0	2.2299	1.63	0.622
28/06/2023	MW177	1.5-2.0	2.2299	1.662	0.568
17/06/2018	MW178	7.0-7.5	2.1726	2.068	0.093
17/06/2018	MW178	7.0-7.5	2.1726	1.995	0.166
17/06/2018	MW178	7.0-7.5	2.1726	1.887	0.286
17/06/2018	MW178	7.0-7.5	2.1726	1.86	0.316
29/11/2019	MW178	7.0-7.5	2.1726	2.3	-0.139
24/06/2020	MW178	7.0-7.5	2.1726	1.95	0.211
24/06/2020	MW178	7.0-7.5	2.1726	1.95	0.211
20/11/2020	MW178	7.0-7.5	2.1726	2.06	0.101
24/06/2021	MW178	7.0-7.5	2.1726	1.75	0.411
18/01/2022	MW178	7.0-7.5	2.1726	1.86	0.316
23/06/2022	MW178	7.0-7.5	2.1726	1.35	0.811
22/11/2022	MW178	7.0-7.5	2.1726	1.99	0.171
24/03/2023	MW178	7.0-7.5	2.1726	1.86	0.316
28/06/2023	MW178	7.0-7.5	2.1726	2.045	0.116
16/06/2018	MW179	1.0-1.5	2.2220	1.392	0.83
16/06/2018	MW179	1.0-1.5	2.2220	1.465	0.772
16/06/2018	MW179	1.0-1.5	2.2220	1.375	0.89
16/06/2018	MW179	1.0-1.5	2.2220	1.211	1.058
29/11/2019	MW179	1.0-1.5	2.2220	1.71	0.527
24/06/2020	MW179	1.0-1.5	2.2220	1.43	0.792
24/06/2020	MW179	1.0-1.5	2.2220	1.43	0.792
20/11/2020	MW179	1.0-1.5	2.2220	2.1	0.137
24/06/2021	MW179	1.0-1.5	2.2220	2.46	-0.223
18/01/2022	MW179	1.0-1.5	2.2220	1.535	0.702
22/06/2022	MW179	1.0-1.5	2.2220	0.9	1.322
23/11/2022	MW179	1.0-1.5	2.2220	1.37	0.852
24/03/2023	MW179	1.0-1.5	2.2220	1.535	0.702
28/06/2023	MW179	1.0-1.5	2.2220	1.44	0.782
17/06/2018	MW180	1.0-1.5	1.9179	1.48	0.438
17/06/2018	MW180	1.0-1.5	1.9179	1.177	0.746
17/06/2018	MW180	1.0-1.5	1.9179	1.06	0.877
17/06/2018	MW180	1.0-1.5	1.9179	1.028	0.918
29/11/2019	MW180	1.0-1.5	1.9179	1.75	0.187
24/06/2020	MW180	1.0-1.5	1.9179	1.47	0.453
24/06/2020	MW180	1.0-1.5	1.9179	1.47	0.453
21/11/2020	MW180	1.0-1.5	1.9179	1.521	0.402
24/06/2021	MW180	1.0-1.5	1.9179	1.16	0.758
18/01/2022	MW180	1.0-1.5	1.9179	1.64	0.283
23/06/2022	MW180	1.0-1.5	1.9179	0.85	1.068
23/11/2022	MW180	1.0-1.5	1.9179	1.52	0.403
24/03/2023	MW180	1.0-1.5	1.9179	1.64	0.283
28/06/2023	MW180	1.0-1.5	1.9179	1.51	0.413
16/06/2018	MW181	5.5-6.0	2.2789	1.855	0.378
16/06/2018	MW181	5.5-6.0	2.2789	1.701	0.576
16/06/2018	MW181	5.5-6.0	2.2789	1.81	0.469
16/06/2018	MW181	5.5-6.0	2.2789	1.74	0.572
29/11/2019	MW181	5.5-6.0	2.2789	2.05	0.227
24/06/2020	MW181	5.5-6.0	2.2789	2.05	0.227
24/06/2020	MW181	5.5-6.0	2.2789	1.9	0.377
20/11/2020	MW181	5.5-6.0	2.2789	1.904	0.329
24/06/2021	MW181	5.5-6.0	2.2789	1.52	0.759
18/01/2022	MW181	5.5-6.0	2.2789	1.81	0.467
23/06/2022	MW181	5.5-6.0	2.2789	1.3	0.977
23/11/2022	MW181	5.5-6.0	2.2789	2.14	0.093
24/03/2023	MW181	5.5-6.0	2.2789	1.81	0.467
28/06/2023	MW181	5.5-6.0	2.2789	1.85	0.383
9/03/2018	MW211	unknown	6.3409	5.445	0.896
9/06/2018	MW211	unknown	6.3409	5.39	0.951
15/10/2018	MW211	unknown	6.3409	5.432	0.909
14/08/2019	MW211	unknown	6.3409	5.437	0.904
26/11/2019	MW211	unknown	6.3409	5.57	0.771
24/06/2020	MW211	unknown	6.3409	5.455	0.886
24/06/2020	MW211	unknown	6.3409	5.455	0.886
14/10/2020	MW211	unknown	6.3409	5.591	0.75
19/11/2020	MW211	unknown	6.3409	5.64	0.701
23/02/2021	MW211	unknown	6.3409	5.595	0.746
23/06/2021	MW211	unknown	6.3409	5.08	1.261
23/11/2021	MW211	unknown	6.3409	5.359	0.982

18/01/2022	MW211	unknown	6.3409	5.408	0.933
22/06/2022	MW211	unknown	6.3409	4.87	1.471
31/10/2022	MW211	unknown	6.3409	3.622	2.719
22/11/2022	MW211	unknown	6.3409	5.13	1.211
24/03/2023	MW211	unknown	6.3409	5.408	0.933
28/06/2023	MW211	unknown	6.3409	5.374	0.967
4/09/2023	MW211	unknown	6.3409	5.493	0.848
2/12/2016	MW233	4.0-7.0	6.2620	5.145	1.117
6/03/2018	MW233	4.0-7.0	6.2620	5.34	0.922
10/06/2018	MW233	4.0-7.0	6.2620	5.32	0.942
15/10/2018	MW233	4.0-7.0	6.2620	5.369	0.893
15/08/2019	MW233	4.0-7.0	6.2620	5.265	0.997
15/10/2020	MW233	4.0-7.0	6.2620	5.502	0.76
23/02/2021	MW233	4.0-7.0	6.2620	5.538	0.724
23/06/2021	MW233	4.0-7.0	6.2620	5	1.262
23/11/2021	MW233	4.0-7.0	6.2620	5.286	0.976
18/01/2022	MW233	4.0-7.0	6.2620	5.247	1.015
22/06/2022	MW233	4.0-7.0	6.2620	4.8	1.462
1/11/2022	MW233	4.0-7.0	6.2620	5.067	1.195
22/11/2022	MW233	4.0-7.0	6.2620	5.05	1.212
24/03/2023	MW233	4.0-7.0	6.2620	5.247	1.015
28/06/2023	MW233	4.0-7.0	6.2620	5.346	0.916
6/09/2023	MW233	4.0-7.0	6.2620	5.423	0.839
18/03/2020	MW238	3.0-6.0	3.980	3.83	0.147
18/01/2022	MW238	3.0-6.0	3.980	3.16	0.82
22/06/2022	MW238	3.0-6.0	3.980	2.92	1.06
22/11/2022	MW238	3.0-6.0	3.980	3.48	0.5
24/03/2023	MW238	3.0-6.0	3.980	3.16	0.82
28/06/2023	MW238	3.0-6.0	3.980	3.65	0.33

				Field					
				Total Dissolved Solids (Field)	DO (Field)	Temperature (Field)	Redox Potential (Field)	Electrical Conductivity (Field)	pH (Field)
				mg/L	mg/L	°C	mV	µS/cm	pH Units
Site ID	Location Code	Date	Sample Type						
0960	MW018	10 Jun 2018	Normal		2.13	30.2	129.4	6,170	7.15
0960	MW018	10 Oct 2018	Normal	3,620.5	1.42	29.9		6,091	7.44
0960	MW018	14 Aug 2019	Normal	3,542.5	1.37	28.9		5,860	7.38
0960	MW018	24 Jun 2020	Normal		2.7	29.5	-52.8	3,462	7.47
0960	MW018	24 Jun 2020	Normal		2.7	29.5	-52.8	3,462	7.47
0960	MW018	14 Oct 2020	Normal		2.85	30.3	114.8	4,283	7.25
0960	MW018	19 Nov 2020	Normal		2.99	30.8	20.8	5,026	7.67
0960	MW018	23 Feb 2021	Normal		0.93	32.2	37.5	5,921	7.21
0960	MW018	23 Jun 2021	Normal		3.25	26.5	136.5	3,065	7.88
0960	MW018	18 Jan 2022	Normal		2.42	30	-47.9	3,195	7.9
0960	MW018	22 Jun 2022	Normal		3.06	29.8	28.9	2,889	7.93
0960	MW018	31 Oct 2022	Normal		2.33	28.3	48.2	2,680	7.87
0960	MW018	22 Nov 2022	Normal		3.42	27.6	-9	3,202	7.48
0960	MW018	24 Mar 2023	Normal		2.42	30	-47.9	3,195	7.9
0960	MW018	28 Jun 2023	Normal		1.66	25.8	-6.6	3,427	7.5
0960	MW021	06 Mar 2018	Normal		1.75	30.6	89.9	11,568	6.94
0960	MW021	10 Jun 2018	Normal		3.12	30	139.8	10,640	6.88
0960	MW021	12 Oct 2018	Normal	6,831.5	2.87	29.5		11,410	6.94
0960	MW021	14 Aug 2019	Normal	6,747	1.8	28.8		11,099	7.1
0960	MW021	26 Nov 2019	Normal			30.4	131	4,210	7.66
0960	MW021	24 Jun 2020	Normal		2.28	25.8	-73	5,275	7.19
0960	MW021	24 Jun 2020	Normal		2.28	25.8	-73	5,275	7.19
0960	MW021	23 Feb 2021	Normal		2.26	31.7	119.3	7,204	5.79
0960	MW021	23 Jun 2021	Normal		2.5	23.1	190.1	6,746	7.32
0960	MW021	23 Nov 2021	Normal		2.18	28.8	94.5	6,821	7.37
0960	MW021	18 Jan 2022	Normal		3.2	31.5	104	3,887	8.01
0960	MW021	22 Jun 2022	Normal		2.48	27.9	25.6	4,173	7.92
0960	MW021	31 Oct 2022	Normal		3.59	25.3	55.6	2,574	7.01
0960	MW021	22 Nov 2022	Normal		2.92	27.9	36.6	3,079	7.26
0960	MW021	24 Mar 2023	Normal		3.2	31.5	104	3,887	8.01
0960	MW021	28 Jun 2023	Normal		2.09	27.3	7.1	3,259	7.78
0960	MW102	09 Jun 2018	Normal		0.13	30.1	97.3	100,165	6.75
0960	MW102	02 Dec 2019	Normal		1.61	29.8	8.5	95,137	6.82
0960	MW102	24 Jun 2020	Normal		3.17	30	49.1	88,788	7.02
0960	MW102	24 Jun 2020	Normal		3.17	30	49.1	88,788	7.02
0960	MW102	19 Nov 2020	Normal		0.7	28.9	56.4	98,424	6.8
0960	MW102	23 Jun 2021	Normal		16.2	25.4	72.4	90,727	6.95
0960	MW102	18 Jan 2022	Normal		0.72	28.4	137	89,930	7.02
0960	MW102	22 Jun 2022	Normal		0.98	27.9	56.2	88,214	7.06
0960	MW102	22 Nov 2022	Normal		1.71	28.7	-109.4	88,291	7.03
0960	MW102	24 Mar 2023	Normal		0.72	28.4	137	89,930	7.02
0960	MW102	28 Jun 2023	Normal		2.3	26.1	-106	91,090	6.86
0960	MW103	15 Jun 2018	Normal		0.13	29.7	-59.9	75,220	6.82
0960	MW103	30 Nov 2019	Normal		1	31.4	-59.7	80,068	6.82
0960	MW103	24 Jun 2020	Normal		0.56	29.2	-142.1	76,604	6.85
0960	MW103	24 Jun 2020	Normal		0.56	29.2	-142.1	76,604	6.85
0960	MW103	20 Nov 2020	Normal		0.53	28.9	-93.3	79,683	6.66
0960	MW103	23 Jun 2021	Normal		0.78	26	-76.6	77,824	6.87
0960	MW103	18 Jan 2022	Normal		3.42	29.4	-21.8	76,112	7.2
0960	MW103	23 Nov 2022	Normal		0.93	26.7	-99.5	78,218	7.15
0960	MW103	24 Mar 2023	Normal		3.42	29.4	-21.8	76,112	7.2
0960	MW103	28 Jun 2023	Normal		1.3	24.7	-112.4	70,201	6.96
0960	MW104	14 Jun 2018	Normal		0.04	29.8	-83.2	85,415	6.97
0960	MW104	29 Nov 2019	Normal		2.76	28.3	-66.2	26,369	7.22
0960	MW104	24 Jun 2020	Normal		0.66	28.4	-164.8	86,955	7.02
0960	MW104	25 Jun 2020	Normal		0.66	28.4	-164.8	86,955	7.02
0960	MW104	19 Nov 2020	Normal		4.22	29.1	27.2	89,312	6.83
0960	MW104	23 Jun 2021	Normal		2.77	24.1	105.4	42,018	7.225
0960	MW104	18 Jan 2022	Normal		2.18	29.2	37.3	82,320	7.19
0960	MW104	22 Jun 2022	Normal		0.89	27.7	37	80,922	7.12
0960	MW104	22 Nov 2022	Normal		2.35	28.1	-112	60,290	7.26
0960	MW104	24 Mar 2023	Normal		2.18	29.2	37.3	82,320	7.19
0960	MW104	28 Jun 2023	Normal		1.07	26.4	39.7	75,870	7.08
0960	MW105	13 Jun 2018	Normal		0.15	29.9	108.3	48,895	6.69
0960	MW105	10 Oct 2018	Normal	28,411	0.52	28.9		46,998	7.12
0960	MW105	29 Nov 2019	Normal		2.38	30.5	-80.3	21,924	6.91
0960	MW105	02 Dec 2019	Normal		2.09	32.9	-160.3	48,900	6.95
0960	MW105	23 Jun 2021	Normal		2.31	22.9	1.5	44,390	7
0960	MW105	18 Jan 2022	Normal		1.11	27.8	106.3	45,186	6.91
0960	MW105	22 Jun 2022	Normal		0.8	27.5	33	46,173	6.85
0960	MW105	22 Nov 2022	Normal		1.49	28.9	-106.9	45,273	6.9
0960	MW105	24 Mar 2023	Normal		1.11	27.8	106.3	45,186	6.91
0960	MW105	28 Jun 2023	Normal		1.23	27.4	48	45,540	6.89
0960	MW112	08 Jun 2018	Normal		1.26	30.4	93.5	16,229	6.74
0960	MW112	26 Nov 2019	Normal		2.86	30.3	142.8	15,268	6.98
0960	MW112	25 Jun 2020	Normal		1.89	28.7	61.7	15,350	7.07
0960	MW112	25 Jun 2020	Normal		1.89	28.7	61.7	15,350	7.07
0960	MW112	19 Nov 2020	Normal		2.39	29.2	46.6	15,058	7.32
0960	MW112	24 Jun 2021	Normal		3.36	23.6	50.6	12,943	7.26
0960	MW112	18 Jan 2022	Normal		2.85	29.2	125.9	12,869	7.2
0960	MW112	22 Jun 2022	Normal		0.88	27.7	-183.2	12,559	7.17
0960	MW112	22 Nov 2022	Normal		2.09	28.7	-20	11,751	6.63
0960	MW112	24 Mar 2023	Normal		2.85	29.2	125.9	12,869	7.2
0960	MW112	28 Jun 2023	Normal		1.85	28.8	24.9	11,397	7.15
0960	MW113	14 Jun 2018	Normal		1.55	29.9	97.1	11,226	6.78
0960	MW113	15 Oct 2018	Normal	6,597.5	1.98	30.2		11,153	7.38
0960	MW113	29 Nov 2019	Normal		4.79	29.3	-37.3	12,161	7.26
0960	MW113	24 Jun 2020	Normal		2.5	28.9	-51.7	10,297	6.74
0960	MW113	25 Jun 2020	Normal		2.5	28.9	-51.7	10,297	6.74
0960	MW113	15 Oct 2020	Normal		3.55	30.7	145.8	11,285	6.76
0960	MW113	19 Nov 2020	Normal		4.09	30.3	84.5	12,515	7.33
0960	MW113	23 Feb 2021	Normal		1.32	33.6	89.3	11,792	6.85
0960	MW113	23 Jun 2021	Normal		2.6	26.2	125.1	10,527	7.06
0960	MW113	18 Jan 2022	Normal		2.55	30.5	123.8	10,462	6.99

				Field					
				Total Dissolved Solids (Field)	DO (Field)	Temperature (Field)	Redox Potential (Field)	Electrical Conductivity (Field)	pH (Field)
				mg/L	mg/L	°C	mV	µS/cm	pH Units
0960	MW113	22 Jun 2022	Normal		2.54	28.8	42.1	10,518	7.12
0960	MW113	01 Nov 2022	Normal		2.47	27.3	52.4	10,817	6.99
0960	MW113	22 Nov 2022	Normal		3.14	31.4	-88.8	11,223	6.95
0960	MW113	24 Mar 2023	Normal		2.55	30.5	123.8	10,462	6.99
0960	MW113	28 Jun 2023	Normal		1.95	27	5.2	12,471	6.86
0960	MW114	10 Jun 2018	Normal		0.78	26.7	123.4	9,566	7.03
0960	MW114	26 Nov 2019	Normal		5.66	34.4	131.3	4,991	7
0960	MW114	24 Jun 2020	Normal		1.78	26.3	10.7	8,455	6.91
0960	MW114	25 Jun 2020	Normal		1.78	26.3	10.7	8,455	6.91
0960	MW114	19 Nov 2020	Normal		2.89	27.7	125.3	10,704	7.26
0960	MW114	23 Jun 2021	Normal		2.61	24	142.6	8,998	7.2
0960	MW114	18 Jan 2022	Normal		2.16	29.4	114.1	8,863	7.19
0960	MW114	22 Jun 2022	Normal		1.4	28.7	34.7	8,931	7.14
0960	MW114	01 Nov 2022	Normal		2.53	23.5	57.7	9,030	7.28
0960	MW114	22 Nov 2022	Normal		2.56	28	18.3	9,109	6.26
0960	MW114	24 Mar 2023	Normal		2.16	29.4	114.1	8,863	7.19
0960	MW114	28 Jun 2023	Normal		2.26	27.6	11.9	8,765	6.94
0960	MW115	08 Jun 2018	Normal		0.85	30.5	101.5	42,390	6.56
0960	MW115	29 Nov 2019	Normal		4.37	28.4	-67.4	21,318	7.21
0960	MW115	25 Jun 2020	Normal		3.12	27.4	57.4	38,328	6.87
0960	MW115	25 Jun 2020	Normal		3.12	27.4	57.4	38,328	6.87
0960	MW115	19 Nov 2020	Normal		1.19	28.3	41.3	36,921	7.03
0960	MW115	24 Jun 2021	Normal		2.69	23.7	59.1	35,391	7.09
0960	MW115	18 Jan 2022	Normal		1.28	30.3	1,114	34,870	6.85
0960	MW115	22 Jun 2022	Normal		0.7	28.6	-208.8	33,667	6.89
0960	MW115	22 Nov 2022	Normal		1.57	30.1	-95.2	33,250	6.86
0960	MW115	24 Mar 2023	Normal		1.28	30.3	1,114	34,870	6.85
0960	MW115	28 Jun 2023	Normal		1.5	28.4	6.3	34,358	6.78
0960	MW122	15 Jun 2018	Normal		0.65	29.8	112.2	50,547	6.97
0960	MW122	30 Nov 2019	Normal		1.87	30.3	-398.7	34,606	7.28
0960	MW122	25 Jun 2020	Normal		0.92	27	40.6	33,727	7.37
0960	MW122	25 Jun 2020	Normal		0.92	27	40.6	33,727	7.37
0960	MW122	19 Nov 2020	Normal		0.66	28	69.9	34,302	7.44
0960	MW122	24 Jun 2021	Normal		0.89	25.1	55.6	46,016	7.08
0960	MW122	18 Jan 2022	Normal		1.25	28.6	25	44,823	7.17
0960	MW122	22 Jun 2022	Normal		1.11	28.4	41.3	33,250	7.56
0960	MW122	22 Nov 2022	Normal		0.68	28.6	-98.4	30,644	7.45
0960	MW122	24 Mar 2023	Normal		1.25	28.6	25	44,823	7.17
0960	MW122	28 Jun 2023	Normal		1.34	28.5	1	47,405	7
0960	MW124	09 Jun 2018	Normal		0.12	29.5	-115.7	92,877	6.89
0960	MW124	02 Dec 2019	Normal		0.84	29.8	28.3	94,945	6.97
0960	MW124	19 Nov 2020	Normal		1.07	29.1	75.4	93,370	6.79
0960	MW124	23 Jun 2021	Normal		3.51	24.7	13.4	52,600	7.45
0960	MW124	18 Jan 2022	Normal		1.51	30.1	-32.6	85,714	7.24
0960	MW124	22 Jun 2022	Normal		2.47	26.6	43.4	83,833	7.33
0960	MW124	22 Nov 2022	Normal		2.65	28	-109.4	83,726	7.15
0960	MW124	24 Mar 2023	Normal		1.51	30.1	-32.6	85,714	7.24
0960	MW124	28 Jun 2023	Normal		1.66	26.7	37.7	84,211	7.16
0960	MW126	08 Jun 2018	Normal		0.16	29.3	96.2	80,311	6.61
0960	MW126	29 Nov 2019	Normal		2.18		76.8	25,135	7
0960	MW126	24 Jun 2020	Normal		1.37	29	90.2	73,576	7.4
0960	MW126	25 Jun 2020	Normal		1.37	29	90.2	73,576	7.4
0960	MW126	23 Jun 2021	Normal		2.8	25.8	103.4	61,001	7.06
0960	MW126	18 Jan 2022	Normal		2.04	29.8	138.1	59,812	7.09
0960	MW126	22 Jun 2022	Normal		0.46	26.4	56.3	70,710	6.91
0960	MW126	22 Nov 2022	Normal		1.35	28.2	-69.3	63,192	7.1
0960	MW126	24 Mar 2023	Normal		2.04	29.8	138.1	59,812	7.09
0960	MW126	28 Jun 2023	Normal		2.27	25.6	-93.4	63,729	6.83
0960	MW127	08 Jun 2018	Normal		3.41	29.9	98.5	76,160	6.79
0960	MW127	29 Nov 2019	Normal		2.74	29.1	-71.4	21,454	7.05
0960	MW127	25 Jun 2020	Normal		2.34	29.5	111.8	74,776	6.97
0960	MW127	26 Jun 2020	Normal		2.34	29.5	111.8	74,776	6.97
0960	MW127	19 Nov 2020	Normal		1.52	31.4	106.8	66,878	7.22
0960	MW127	23 Jun 2021	Normal		2.2	25.3	122.7	37,527	7.2
0960	MW127	18 Jan 2022	Normal		1.33	28.4	125.4	71,601	7
0960	MW127	22 Jun 2022	Normal		1.42	25.5	81.4	68,237	6.98
0960	MW127	22 Nov 2022	Normal		1.51	28.5	-91.1	69,407	6.99
0960	MW127	24 Mar 2023	Normal		1.33	28.4	125.4	71,601	7
0960	MW127	28 Jun 2023	Normal		1.37	27.7	1.7	70,097	6.86
0960	MW134	10 Jun 2018	Normal		0.08	29.4	-98.6	64,396	7.14
0960	MW134	29 Nov 2019	Normal		0.92	29.2	-88.3	64,577	7.02
0960	MW134	26 Jun 2020	Normal		1.65	26.5	42.5	36,075	7.34
0960	MW134	26 Jun 2020	Normal		1.65	26.5	42.5	57,148	7.34
0960	MW134	20 Nov 2020	Normal		0.92	28.7	-81.2	63,692	6.95
0960	MW134	24 Jun 2021	Normal		2.97	22.8	8.1	61,680	5.85
0960	MW134	18 Jan 2022	Normal		1.28	30.3	81.6	60,099	7.3
0960	MW134	23 Jun 2022	Normal		1.01	24.8	54.5	60,852	7.02
0960	MW134	22 Nov 2022	Normal		1.55	30.6	66.4	60,866	5.97
0960	MW134	24 Mar 2023	Normal		1.28	30.3	81.6	60,099	7.3
0960	MW134	28 Jun 2023	Normal		1.5	25.1	-117.4	61,991	7.24
0960	MW135	08 Mar 2018	Normal		0.2	29.4	-185.6	40,733	7.47
0960	MW135	08 Mar 2018	Normal		0.22	29.6	-137.3	41,522	7.42
0960	MW135	08 Mar 2018	Normal		0.34	30.2	-73.6	34,560	7.35
0960	MW135	08 Mar 2018	Normal		0.34	29.5	-182.4	45,044	7.45
0960	MW135	16 Jun 2018	Normal		0.07	28.7	-95.8	47,820	7.19
0960	MW135	16 Jun 2018	Normal		0.09	29.1	-98.6	42,655	7.19
0960	MW135	16 Jun 2018	Normal		0.25	28.6	-102.8	51,772	7.26
0960	MW135	16 Jun 2018	Normal		0.35	28.5	-76.9	34,243	7.16
0960	MW135	29 Nov 2019	Normal		2.05	29	-4.8	31,727	7.19
0960	MW135	25 Jun 2020	Normal		1.97	25.6	-73.8	21,359	7.38
0960	MW135	25 Jun 2020	Normal		1.97	25.6	-73.8	33,200	7.38
0960	MW135	21 Nov 2020	Normal		1.76	28.2	-44.2	38,656	7.37
0960	MW135	24 Jun 2021	Normal		2.48	25.7	-13.9	33,920	6.64
0960	MW135	18 Jan 2022	Normal		1.79	27.4	-19.9	35,542	7.54
0960	MW135	23 Jun 2022	Normal		3.28	26.5	44.2	35,374	7.81
0960	MW135	23 Nov 2022	Normal		3.35	28.4	28.8	31,107	6.54

				Field					
				Total Dissolved Solids (Field)	DO (Field)	Temperature (Field)	Redox Potential (Field)	Electrical Conductivity (Field)	pH (Field)
				mg/L	mg/L	°C	mV	µS/cm	pH Units
0960	MW135	24 Mar 2023	Normal		1.79	27.4	-19.9	35,542	7.54
0960	MW135	28 Jun 2023	Normal		1.33	27.4	-100.7	33,238	7.29
0960	MW137	16 Jun 2018	Normal		0.39	28.6	63.9	82,155	7.12
0960	MW137	16 Jun 2018	Normal		0.41	28.8	21.1	88,093	7.33
0960	MW137	16 Jun 2018	Normal		0.84	28.3	70.3	87,361	7.33
0960	MW137	16 Jun 2018	Normal		2.6	25.8	80.3	82,500	7.34
0960	MW137	29 Nov 2019	Normal		2	28.9	35.7	44,424	7.46
0960	MW137	24 Jun 2020	Normal		1.92	24.2	55.2	78,192	7.77
0960	MW137	25 Jun 2020	Normal		1.92	24.2	55.2	51,610	7.77
0960	MW137	20 Nov 2020	Normal		0.56	30.5	191.3	78,837	7.51
0960	MW137	24 Jun 2021	Normal		2.77	25.6	13.1	73,157	7.68
0960	MW137	18 Jan 2022	Normal		3.99	32.7	-30.8	41,303	7.48
0960	MW137	22 Jun 2022	Normal		1.21	25.9	-186.1	82,874	7.36
0960	MW137	22 Nov 2022	Normal		2.14	28	-44.6	79,011	7.94
0960	MW137	24 Mar 2023	Normal		3.99	32.7	-30.8	41,303	7.48
0960	MW137	28 Jun 2023	Normal		2.3	23.3	62.1	76,584	7.56
0960	MW138	12 Mar 2018	Normal		0.55	30	-103.2	83,497	7.36
0960	MW138	12 Mar 2018	Normal		0.66	30.2	-175.4	72,441	7.38
0960	MW138	12 Mar 2018	Normal		0.75	30	-190.4	79,067	7.38
0960	MW138	16 Jun 2018	Normal		0.07	29.6	-119.1	103,810	6.91
0960	MW138	16 Jun 2018	Normal		0.14	29.5	-122.8	109,663	7.04
0960	MW138	16 Jun 2018	Normal		0.21	29.9	-84.2	95,278	7.07
0960	MW138	16 Jun 2018	Normal		3.56	29.4	-19	40,029	7.57
0960	MW138	29 Nov 2019	Normal		1.95	29.4	-18.6	72,287	7.31
0960	MW138	24 Jun 2020	Normal		0.75	29.4	-99.1	78,021	7.36
0960	MW138	25 Jun 2020	Normal		0.75	29.4	-99.1	46,800	7.36
0960	MW138	20 Nov 2020	Normal		1.12	29.6	232.9	55,967	7.71
0960	MW138	24 Jun 2021	Normal		0.85	27.4	-177.2	41,420	7.31
0960	MW138	18 Jan 2022	Normal		2.36	30.5	-172.1	43,189	7.4
0960	MW138	22 Jun 2022	Normal		2.77	27.9	71	44,998	7.39
0960	MW138	22 Nov 2022	Normal		2.01	28.2	-52.4	42,775	7.28
0960	MW138	24 Mar 2023	Normal		2.36	30.5	-172.1	43,189	7.4
0960	MW139	16 Jun 2018	Normal		0.05	29.6	80.5	83,408	6.89
0960	MW139	29 Nov 2019	Normal		3.99	29.4	16.3	41,690	7.57
0960	MW139	24 Jun 2020	Normal		1.24	25.7	66	71,923	7.07
0960	MW139	25 Jun 2020	Normal		1.24	25.7	66	46,215	7.07
0960	MW139	21 Nov 2020	Normal		0.64	28.2		53,232	9.83
0960	MW139	24 Jun 2021	Normal		0.45	25.8	126	69,914	6.99
0960	MW139	18 Jan 2022	Normal		1.11	28.4	-67.8	63,060	7.12
0960	MW139	22 Jun 2022	Normal		0.4	29.9	38.3	67,196	6.95
0960	MW139	22 Nov 2022	Normal		0.62	28.8	-107	61,883	7.17
0960	MW139	24 Mar 2023	Normal		1.11	28.4	-67.8	63,060	7.12
0960	MW139	28 Jun 2023	Normal		2.65	27	135.5	53,210	7.03
0960	MW140	16 Jun 2018	Normal		0.04	28.5	-49.1	97,766	6.89
0960	MW140	16 Jun 2018	Normal		0.04	28.5	-88.6	87,081	6.96
0960	MW140	16 Jun 2018	Normal		0.22	27	3.7	103,198	7.02
0960	MW140	16 Jun 2018	Normal		0.23	28.7	7.7	105,617	6.94
0960	MW140	29 Nov 2019	Normal		9.5	29	214	938	6.7
0960	MW140	24 Jun 2020	Normal		1.97	25.2	-22.2	63,310	7.52
0960	MW140	24 Jun 2020	Normal		1.97	25.2	-22.2	97,682	7.52
0960	MW140	20 Nov 2020	Normal		0.93	28	-83.6	104,111	6.62
0960	MW140	24 Jun 2021	Normal		2.67	23.5	123.2	98,966	7.62
0960	MW140	18 Jan 2022	Normal		2.51	27.8	141.4	100,090	7.94
0960	MW140	23 Jun 2022	Normal		3.04	24.4	47.4	53,588	7.71
0960	MW140	23 Nov 2022	Normal		0	28.8	-101.7	106,157	7.3
0960	MW140	24 Mar 2023	Normal		2.51	27.8	141.4	100,090	7.94
0960	MW140	28 Jun 2023	Normal		2.12	24.9	158.8	87,992	7.21
0960	MW141	08 Mar 2018	Normal		0.25	30.1	-160.9	39,699	7.07
0960	MW141	08 Mar 2018	Normal		0.71	29.8	-209.4	41,836	7.67
0960	MW141	08 Mar 2018	Normal		1.1	30.2	-212.2	40,295	7.53
0960	MW141	08 Mar 2018	Normal		2.45	31.2	-144	38,330	7.32
0960	MW141	16 Jun 2018	Normal		0.06	28.2	-221.9	41,130	7.14
0960	MW141	16 Jun 2018	Normal		0.13	28.1	-90.1	37,426	6.97
0960	MW141	16 Jun 2018	Normal		0.23	28.1	-129.4	49,665	7.28
0960	MW141	16 Jun 2018	Normal		2.08	29.2	39.4	35,926	7.42
0960	MW141	29 Nov 2019	Normal		1.78	30.9	-398.5	43,833	7.18
0960	MW141	24 Jun 2020	Normal		1.01	24.7	-107.4	23,094.5	7.38
0960	MW141	24 Jun 2020	Normal		1.01	24.7	-107.4	35,323	7.38
0960	MW141	20 Nov 2020	Normal		0.65	28.3	-134.1	37,786	6.93
0960	MW141	24 Jun 2021	Normal		1.51	24.8	-80.6	19,068	7.26
0960	MW141	18 Jan 2022	Normal		2.34	27.3	124.6	47,332	7.75
0960	MW141	23 Jun 2022	Normal		2.85	24.6	51.4	40,799	7.66
0960	MW141	23 Nov 2022	Normal		0.81	26.7	-98.8	36,399	7.23
0960	MW141	24 Mar 2023	Normal		2.34	27.3	124.6	47,332	7.75
0960	MW141	28 Jun 2023	Normal		1.07	23.8	-25.9	31,191	7.15
0960	MW143	10 Mar 2018	Normal		0.49	31.9	13	98,077	7.34
0960	MW143	10 Mar 2018	Normal		0.57	31.4	-27.9	98,362	7.37
0960	MW143	10 Mar 2018	Normal		0.73	31.7	50.4	91,130	7.41
0960	MW143	10 Mar 2018	Normal		1.06	32.7	48.5	98,591	7.37
0960	MW143	16 Jun 2018	Normal		0.14	30.1	-145.7	111,884	6.8
0960	MW143	16 Jun 2018	Normal		0.28	30.4	3.8	111,083	6.85
0960	MW143	16 Jun 2018	Normal		0.4	29.9	-65.9	112,784	7
0960	MW143	16 Jun 2018	Normal		0.7	29.3	17.6	107,233	7.03
0960	MW143	29 Nov 2019	Normal		1.69	31.2	-12.4	96,237	6.92
0960	MW143	24 Jun 2020	Normal		1.81	26.3	52.4	55,705	7.67
0960	MW143	25 Jun 2020	Normal		1.81	26.3	52.4	87,884	7.67
0960	MW143	20 Nov 2020	Normal		1.69	31.4	128.7	86,887	7.51
0960	MW143	24 Jun 2021	Normal		4.19	28.1	132.4	49,386	6.76
0960	MW143	18 Jan 2022	Normal		38.4	28.9	114.9	45,293	7.34
0960	MW143	22 Jun 2022	Normal		3.77	27.7	38.2	87,832	7.56
0960	MW143	23 Nov 2022	Normal		2.16	27	13.7	86,170	7.13
0960	MW143	24 Mar 2023	Normal		38.4	28.9	114.9	45,293	7.34
0960	MW143	28 Jun 2023	Normal		2.69	27.6	7.7	87,795	7.38
0960	MW144	08 Mar 2018	Normal		0.2	29.5	-133.1	58,350	7.25
0960	MW144	08 Mar 2018	Normal		0.36	29.6	-131.6	62,608	7.33
0960	MW144	08 Mar 2018	Normal		0.52	30.3	-96.1	44,616	7.37

				Field					
				Total Dissolved Solids (Field)	DO (Field)	Temperature (Field)	Redox Potential (Field)	Electrical Conductivity (Field)	pH (Field)
				mg/L	mg/L	°C	mV	µS/cm	pH Units
0960	MW144	08 Mar 2018	Normal		1.27	29.6	-185.9	47,463	7.2
0960	MW144	16 Jun 2018	Normal		0.1	28.6	-119.9	69,979	6.93
0960	MW144	16 Jun 2018	Normal		0.11	29	-116.3	52,917	6.95
0960	MW144	16 Jun 2018	Normal		0.16	28.7	-148.3	82,470	7.02
0960	MW144	16 Jun 2018	Normal		0.39	28.3	-35.4	45,637	7.26
0960	MW144	29 Nov 2019	Normal		1.16	29.2	-39.5	38,912	7.02
0960	MW144	24 Jun 2020	Normal		2.07	25.8	8.5	23,432	7.41
0960	MW144	25 Jun 2020	Normal		2.07	25.8	8.5	36,675	7.41
0960	MW144	20 Nov 2020	Normal		1.65	31.2	76.8	40,485	7.52
0960	MW144	24 Jun 2021	Normal		3.78	25.3	-87.7	18,402	6.4
0960	MW144	18 Jan 2022	Normal		2.75	28.4	27.3	36,853	7.41
0960	MW144	22 Jun 2022	Normal		3.77	27.2	30.8	37,044	7.8
0960	MW144	22 Nov 2022	Normal		2.07	27.3	24	36,842	6.58
0960	MW144	24 Mar 2023	Normal		2.75	28.4	27.3	36,853	7.41
0960	MW144	28 Jun 2023	Normal		3.44	26.7	1.5	44,641	7.44
0960	MW145	12 Mar 2018	Normal		0.52	29.7	-72.5	109,440	7.29
0960	MW145	12 Mar 2018	Normal		0.76	30	-101.6	108,700	7.33
0960	MW145	12 Mar 2018	Normal		0.88	29.7	12.8	110,602	7.34
0960	MW145	12 Mar 2018	Normal		0.89	30.8	34.6	102,556	7.3
0960	MW145	16 Jun 2018	Normal		0.27	29.5	-166.5	129,517	6.95
0960	MW145	16 Jun 2018	Normal		0.31	29.2	-169.3	128,342	6.92
0960	MW145	16 Jun 2018	Normal		0.35	29.5	-155.7	126,524	6.91
0960	MW145	16 Jun 2018	Normal		1.73	29.4	-8.4	117,162	7.11
0960	MW145	29 Nov 2019	Normal		1.85	33	-329.5	116,387	7.05
0960	MW145	24 Jun 2020	Normal		0.61	25.4	-71	33,800	7.24
0960	MW145	24 Jun 2020	Normal		0.61	25.4	-71	52,412	7.24
0960	MW145	20 Nov 2020	Normal		1.46	31.1	187	97,272	7.39
0960	MW145	24 Jun 2021	Normal		2.78	23.6	1.1	54,865	7.15
0960	MW145	18 Jan 2022	Normal		2.49	29.9	5.5	57,770	7.36
0960	MW145	22 Jun 2022	Normal		3.16	28.3	75.8	94,315	7.18
0960	MW145	23 Nov 2022	Normal		3.01	27.2	-6.4	92,839	7.27
0960	MW145	24 Mar 2023	Normal		2.49	29.9	5.5	57,770	7.36
0960	MW145	28 Jun 2023	Normal		2.85	27	153.7	86,790	7.1
0960	MW146	08 Mar 2018	Normal		0.55	30.7	-97.8	113,553	7.32
0960	MW146	08 Mar 2018	Normal		0.88	30.8	-76	116,664	7.35
0960	MW146	08 Mar 2018	Normal		0.96	31.9	-30.5	108,809	7.38
0960	MW146	08 Mar 2018	Normal		1.95	32.7	23.3	103,882	7.48
0960	MW146	16 Jun 2018	Normal		0.17	29.7	-173.9	130,377	6.77
0960	MW146	16 Jun 2018	Normal		0.23	28.5	-131.5	130,943	6.96
0960	MW146	16 Jun 2018	Normal		0.3	29	-13.5	113,137	6.91
0960	MW146	16 Jun 2018	Normal		0.53	28.9	-82.3	113,502	6.83
0960	MW146	29 Nov 2019	Normal		2.32	29.7	7	48,507	7.33
0960	MW146	24 Jun 2020	Normal		1.77	27.8	3.5	62,205	7.33
0960	MW146	24 Jun 2020	Normal		1.77	27.8	3.5	100,780	7.33
0960	MW146	21 Nov 2020	Normal		4.75	27.4	73	102,759	6.94
0960	MW146	24 Jun 2021	Normal		2.5	25.8	28	50,435	7.58
0960	MW146	18 Jan 2022	Normal		3	29.4	-15.7	98,004	7.39
0960	MW146	22 Jun 2022	Normal		2.53	27.5	29.5	47,830	7.57
0960	MW146	23 Nov 2022	Normal		3.36	29.1	-89.6	91,675	7.32
0960	MW146	24 Mar 2023	Normal		3	29.4	-15.7	98,004	7.39
0960	MW146	28 Jun 2023	Normal		2.93	26.4	2.5	85,890	7.24
0960	MW147	08 Mar 2018	Normal		0.41	31.1	-133.4	110,606	7.27
0960	MW147	08 Mar 2018	Normal		0.59	32.1	-81.6	112,080	7.23
0960	MW147	08 Mar 2018	Normal		0.64	31.8	-151.4	111,599	7.4
0960	MW147	08 Mar 2018	Normal		0.95	31	-113.6	111,222	7.33
0960	MW147	16 Jun 2018	Normal		0	28.9	-120.9	104,776	7.01
0960	MW147	16 Jun 2018	Normal		0.07	29.3	-109.3	108,700	6.97
0960	MW147	16 Jun 2018	Normal		0.11	29	-79.6	106,650	6.97
0960	MW147	16 Jun 2018	Normal		0.22	28.4	-10.5	104,900	7.04
0960	MW147	29 Nov 2019	Normal		2.22	28.1	429	583	7.29
0960	MW147	24 Jun 2020	Normal		1.55	25.7	-10.6	62,400	7.15
0960	MW147	24 Jun 2020	Normal		1.55	25.7	-10.6	97,183	7.15
0960	MW147	20 Nov 2020	Normal		1.06	29	30.7	109,345	7.13
0960	MW147	24 Jun 2021	Normal		1.8	25.4	156.8	102,851	7.25
0960	MW147	18 Jan 2022	Normal		3.46	28.9	4.7	101,218	7.36
0960	MW147	23 Jun 2022	Normal		1.98	26.4	40.5	101,321	7.45
0960	MW147	23 Nov 2022	Normal		0.93	29.4	-103.8	96,268	7.04
0960	MW147	24 Mar 2023	Normal		3.46	28.9	4.7	101,218	7.36
0960	MW147	28 Jun 2023	Normal		1.69	26.6	31.7	87,132	7.05
0960	MW148D	15 Jun 2018	Normal		0.04	28.9	86.2	93,615	6.87
0960	MW148D	15 Jun 2018	Normal		0.09	29.3	87.3	46,767	6.82
0960	MW148D	02 Dec 2019	Normal		3.18	29.6	-225.8	80,452	7.42
0960	MW148D	24 Jun 2020	Normal		0.44	28.7	-241.6	52,065	7.14
0960	MW148D	24 Jun 2020	Normal		0.44	28.7	-241.6	85,665	7.14
0960	MW148D	19 Nov 2020	Normal		0.97	30.7	-129.7	94,652	7.27
0960	MW148D	23 Jun 2021	Normal		2.21	26.1	-4.3	77,031	7.6
0960	MW148D	18 Jan 2022	Normal		0.67	28.3	76.3	80,379	7.26
0960	MW148D	22 Jun 2022	Normal		1.17	27.3	24	79,860	7.05
0960	MW148D	22 Nov 2022	Normal		3.31	27.6	-26	77,180	7.76
0960	MW148D	24 Mar 2023	Normal		0.67	28.3	76.3	80,379	7.26
0960	MW148D	28 Jun 2023	Normal		1.87	25	47.8	77,097	7.5
0960	MW148S	02 Dec 2019	Normal		3.01	29.6	-14.9	24,240	6.85
0960	MW148S	24 Jun 2020	Normal		0.55	28.9	6.79	30,485	6.79
0960	MW148S	24 Jun 2020	Normal		0.55	28.9	6.79	50,307	6.79
0960	MW148S	19 Nov 2020	Normal		0.62	29.3	67.2	53,311	6.63
0960	MW148S	23 Jun 2021	Normal		1.04	27.8	36.8	43,357	6.91
0960	MW148S	18 Jan 2022	Normal		0.7	27.1	113.5	38,882	6.94
0960	MW148S	22 Jun 2022	Normal		3.35	26.2	22.2	34,512	7.29
0960	MW148S	22 Nov 2022	Normal		0.88	27.8	-35	33,410	7.04
0960	MW148S	24 Mar 2023	Normal		0.7	27.1	113.5	38,882	6.94
0960	MW148S	28 Jun 2023	Normal		3.54	24.7		39,544	6.95
0960	MW151	18 Jun 2018	Normal		0.36	28.8	135.5	10,900	7.17
0960	MW151	04 Oct 2018	Normal	5,999.5	0.56	28.6		9,862	7.11
0960	MW151	16 Mar 2020	Normal	4,530	1.2	32		7,707	7.7
0960	MW151	24 Jun 2020	Normal		0.98	28.5	7.19	7,312.5	7.19
0960	MW151	24 Jun 2020	Normal		0.98	28.5	50.2	11,990	7.19

				Field					
				Total Dissolved Solids (Field)	DO (Field)	Temperature (Field)	Redox Potential (Field)	Electrical Conductivity (Field)	pH (Field)
				mg/L	mg/L	°C	mV	µS/cm	pH Units
0960	MW151	19 Nov 2020	Normal		2.93	30.1	31.4	16,411	6.84
0960	MW151	23 Jun 2021	Normal		1.78	25.1	105	12,800	7.17
0960	MW151	18 Jan 2022	Normal		1.96	29.7	85.6	16,319	7.14
0960	MW151	22 Jun 2022	Normal		1.69	26.1	51.3	14,797	6.97
0960	MW151	22 Nov 2022	Normal		1.13	28.9	-92	12,032	7.22
0960	MW151	24 Mar 2023	Normal		1.96	29.7	85.6	16,319	7.14
0960	MW151	28 Jun 2023	Normal		1.18	24.7	18.8	11,239	7.09
0960	MW159	15 Jun 2018	Normal		0.26	29.6	118.6	27,809	7
0960	MW159	12 Oct 2018	Normal	15,594	0.4	28.8		25,755	6.94
0960	MW159	20 Aug 2019	Normal	17,407	1.32	28.6		28,606	6.89
0960	MW159	29 Nov 2019	Normal		1.24	30.1	3.7	27,610	6.98
0960	MW159	16 Mar 2020	Normal	16,500	0.64	33.3		25,820	6.66
0960	MW159	24 Jun 2020	Normal		3.22	29.8	50.2	25,707	7.07
0960	MW159	24 Jun 2020	Normal		3.22	29.8	150.7	25,707	7.07
0960	MW159	20 Nov 2020	Normal		1.8	29.1	21.1	31,172	6.79
0960	MW159	23 Jun 2021	Normal		2.35	27	77.5	29,611	7.16
0960	MW159	23 Nov 2021	Normal		1.03	30	-23.3	81,407	6.82
0960	MW159	18 Jan 2022	Normal		0.98	29.9	-24	28,563	6.84
0960	MW159	22 Jun 2022	Normal		0.87	28	35.6	21,763	6.79
0960	MW159	01 Nov 2022	Normal		1.14	23.7	77	27,286	6.87
0960	MW159	23 Nov 2022	Normal		0.95	27.3	-100	28,272	7.01
0960	MW159	24 Mar 2023	Normal		0.98	29.9	-24	28,563	6.84
0960	MW159	28 Jun 2023	Normal		1.34	26.3	-113	34,645	6.79
0960	MW162	15 Jun 2018	Normal		0.21	29.3	-85.4	14,595	6.84
0960	MW162	14 Oct 2018	Normal	8,469.5	0.41	29.8		14,345	7.23
0960	MW162	26 Nov 2019	Normal		4.71	30	20.9	12,600	6.96
0960	MW162	24 Jun 2020	Normal		1.67	27.8	150.7	13,050	6.91
0960	MW162	24 Jun 2020	Normal		1.67	27.8	-65.5	13,050	6.91
0960	MW162	15 Oct 2020	Normal		0.35	30.1	-205.7	13,867	7.07
0960	MW162	19 Nov 2020	Normal		2.84	29	64.5	13,989	7.52
0960	MW162	23 Feb 2021	Normal		0.2	31.8	-119	14,621	7.06
0960	MW162	23 Jun 2021	Normal		0.84	25.3	165.1	13,319	6.96
0960	MW162	18 Jan 2022	Normal		2.89	32	77.1	1,801	8.25
0960	MW162	22 Jun 2022	Normal		0.75	28.9	20.7	12,776	7.18
0960	MW162	01 Nov 2022	Normal		1.56	27.3	20.7	13,346	6.96
0960	MW162	22 Nov 2022	Normal		1.58	28.8	39	12,721	6.77
0960	MW162	24 Mar 2023	Normal		2.89	32	77.1	1,801	8.25
0960	MW162	28 Jun 2023	Normal		3.38	26.2	1.1	13,088	6.86
0960	MW163	15 Jun 2018	Normal		0.14	29.2	-85	13,947	7
0960	MW163	14 Oct 2018	Normal	8,073	1.79	29.5		13,500	7.25
0960	MW163	26 Nov 2019	Normal		10.7	29.2	15.3	7,935	6.6
0960	MW163	24 Jun 2020	Normal		1.46	26.6	-65.5	13,809	6.8
0960	MW163	24 Jun 2020	Normal		1.46	26.6	-135.8	13,809	6.8
0960	MW163	19 Nov 2020	Normal		2.69	32.1	26.6	17,922	7.13
0960	MW163	23 Jun 2021	Normal		2.43	23.7	91.6	12,160	7.4
0960	MW163	18 Jan 2022	Normal		1.92	28.8	101.8	12,802	7.21
0960	MW163	22 Jun 2022	Normal		2.06	28.8	-57.2	14,218	7.36
0960	MW163	22 Nov 2022	Normal		4.08	26.3	55.5	14,146	6.37
0960	MW163	24 Mar 2023	Normal		1.92	28.8	101.8	12,802	7.21
0960	MW163	28 Jun 2023	Normal		4.65	26.8	-2.1	11,440	7.17
0960	MW164	15 Jun 2018	Normal		0.46	29.2	84.9	17,210	6.68
0960	MW164	26 Nov 2019	Normal		1.83	29.6	15.7	13,636	6.77
0960	MW164	24 Jun 2020	Normal		1.27	27.5	-135.8	13,985	6.71
0960	MW164	24 Jun 2020	Normal		1.27	27.5	-70.3	13,985	6.71
0960	MW164	19 Nov 2020	Normal		1.88	31.6	-33.1	9,727	7.91
0960	MW164	23 Jun 2021	Normal		1.81	25.2	108	7,078	7.8
0960	MW164	18 Jan 2022	Normal		1.71	29.5	-55.5	14,464	7.15
0960	MW164	22 Jun 2022	Normal		2.5	29.7	-103.4	7,102	7.69
0960	MW164	22 Nov 2022	Normal		4.27	27.5	10.5	6,105	7.78
0960	MW164	24 Mar 2023	Normal		1.71	29.5	-55.5	14,464	7.15
0960	MW164	28 Jun 2023	Normal		4.06	21.8	11.4	6,127	8.11
0960	MW165	10 Jun 2018	Normal		1.08	27.1	73.7	2,399	7.84
0960	MW165	26 Nov 2019	Normal		3.12	29.8	4.2	2,319	6.84
0960	MW165	24 Jun 2020	Normal		2.02	27.6	-70.3	2,381	7.72
0960	MW165	24 Jun 2020	Normal		2.02	27.6	-127	2,381	7.72
0960	MW165	19 Nov 2020	Normal		2.04	30.2	109.1	2,633	8.21
0960	MW165	23 Jun 2021	Normal		2.02	23.6	117.6	3,801	7.94
0960	MW165	18 Jan 2022	Normal		3.12	26.6	117.9	2,727	7.93
0960	MW165	22 Jun 2022	Normal		1.99	26.8	-162.2	3,665	8.06
0960	MW165	22 Nov 2022	Normal		2.83	26.8	1.6	3,025	7.52
0960	MW165	24 Mar 2023	Normal		3.12	26.6	117.9	2,727	7.93
0960	MW165	28 Jun 2023	Normal		2.59	24.5	-48.9	2,614	7.83
0960	MW166	10 Jun 2018	Normal		0.42	29.1	84.3	3,451	7.61
0960	MW166	26 Nov 2019	Normal		5.57	31.1	85.5	3,509	7.63
0960	MW166	24 Jun 2020	Normal		3.18	28.6	-127	2,953	7.63
0960	MW166	24 Jun 2020	Normal		3.18	28.6	-106.7	2,953	7.63
0960	MW166	19 Nov 2020	Normal		2.22	30.7	93.3	3,227	7.91
0960	MW166	23 Jun 2021	Normal		1.83	28.6	117.4	3,332	7.77
0960	MW166	18 Jan 2022	Normal		3.27	29.6	104.4	2,611	7.91
0960	MW166	22 Jun 2022	Normal		2.29	26.5	-144.8	2,883	7.86
0960	MW166	22 Nov 2022	Normal		2.58	28.7	41.3	2,837	6.82
0960	MW166	24 Mar 2023	Normal		3.27	29.6	104.4	2,611	7.91
0960	MW166	28 Jun 2023	Normal		1.74	26.4	3.6	2,959	7.76
0960	MW167	10 Jun 2018	Normal		1.06	28.8	104.3	6,829	7.17
0960	MW167	26 Nov 2019	Normal		6.69	30.7	88.1	6,734	7.26
0960	MW167	25 Jun 2020	Normal		1.6	29.7	-106.7	5,909	7.36
0960	MW167	25 Jun 2020	Normal		1.6	29.7	44.4	5,909	7.36
0960	MW167	19 Nov 2020	Normal		1.98	32.7	59.3	6,335	7.57
0960	MW167	23 Jun 2021	Normal		2.16	25	151.6	7,066	7.37
0960	MW167	18 Jan 2022	Normal		2.51	30	110.6	5,437	7.42
0960	MW167	22 Jun 2022	Normal		2.52	27.8	-161.1	5,297	7.54
0960	MW167	22 Nov 2022	Normal		2.75	28.2	68.6	5,222	5.89
0960	MW167	24 Mar 2023	Normal		2.51	30	110.6	5,437	7.42
0960	MW167	28 Jun 2023	Normal		2.21	28.1	6	5,759	7.25
0960	MW168	10 Jun 2018	Normal		0.43	28.9	105.6	14,149	6.78
0960	MW168	26 Nov 2019	Normal		3.98	30.9	95.5	14,772	6.72

				Field					
				Total Dissolved Solids (Field)	DO (Field)	Temperature (Field)	Redox Potential (Field)	Electrical Conductivity (Field)	pH (Field)
				mg/L	mg/L	°C	mV	µS/cm	pH Units
0960	MW168	25 Jun 2020	Normal		1	30.2	44.4	14,593	6.88
0960	MW168	25 Jun 2020	Normal		1	30.2	43.6	14,593	6.88
0960	MW168	19 Nov 2020	Normal		1.86	29.6	69.7	13,910	7.14
0960	MW168	23 Jun 2021	Normal		1.18	26.1	73.1	13,890	6.99
0960	MW168	18 Jan 2022	Normal		1.31	30.2	150.2	12,849	6.94
0960	MW168	22 Jun 2022	Normal		1.26	26.6	-165.5	12,256	7
0960	MW168	22 Nov 2022	Normal		0.99	27.9	71.8	12,035	5.6
0960	MW168	24 Mar 2023	Normal		1.31	30.2	150.2	12,849	6.94
0960	MW168	28 Jun 2023	Normal		0.78	27.7	19.5	12,712	6.95
0960	MW170	18 Jun 2018	Normal		0.09	28.6	70.4	62,293	6.71
0960	MW170	20 Aug 2019	Normal	33,540	0.3	26.9		53,409	6.71
0960	MW170	29 Nov 2019	Normal		2.5	29.1	-70.2	22,523	7.02
0960	MW170	24 Jun 2020	Normal		0.92	28.5	43.6	51,001	6.98
0960	MW170	24 Jun 2020	Normal		0.92	28.5	117.2	51,001	6.98
0960	MW170	16 Oct 2020	Normal		2.5	29.1	158.8	48,196	6.7
0960	MW170	19 Nov 2020	Normal		5.28	27.7	1.6	48,116	6.7
0960	MW170	24 Feb 2021	Normal		1.41	32	48	51,157	7.07
0960	MW170	23 Jun 2021	Normal		2.39	23.2	81.8	48,493	6.95
0960	MW170	23 Nov 2021	Normal		2.55	29.9	-29.3	43,860	7.07
0960	MW170	18 Jan 2022	Normal		3.21	29	116.6	40,988	7
0960	MW170	22 Jun 2022	Normal		2.8	28.1	38	41,372	7.14
0960	MW170	22 Nov 2022	Normal		2.01	28.7	-68.1	23,355	7.11
0960	MW170	24 Mar 2023	Normal		3.21	29	116.6	40,988	7
0960	MW170	28 Jun 2023	Normal		3.97	26	-97.1	43,298	6.82
0960	MW172	18 Jun 2018	Normal		2.59	30.7	82.8	54,405	6.84
0960	MW172	29 Nov 2019	Normal		4.06	27.9	-33.4	21,488	7.48
0960	MW172	24 Jun 2020	Normal		3.57	30	117.2	38,531	7.24
0960	MW172	24 Jun 2020	Normal		3.57	30	126.4	38,531	7.24
0960	MW172	23 Jun 2021	Normal		4.09	24.7	48.1	18,584	7.17
0960	MW172	18 Jan 2022	Normal		2.2	29	108.4	35,750	7.01
0960	MW172	22 Jun 2022	Normal		2.17	29.3	47.9	33,497	7.04
0960	MW172	22 Nov 2022	Normal		2.6	30	-53	32,853	7.25
0960	MW172	24 Mar 2023	Normal		2.2	29	108.4	35,750	7.01
0960	MW172	28 Jun 2023	Normal		4.35	26.3	-78	32,159	6.98
0960	MW175	17 Jun 2018	Normal		0.14	28.4	20.3	31,725	7.25
0960	MW175	17 Jun 2018	Normal		0.3	28.6	-58.5	8,520	7.61
0960	MW175	17 Jun 2018	Normal		0.36	28.8	47.2	14,908	7.41
0960	MW175	17 Jun 2018	Normal		0.57	28.6	-32.9	11,216	7.3
0960	MW175	29 Nov 2019	Normal		1.76	29.3	-19.7	6,926	7.57
0960	MW175	25 Jun 2020	Normal		0.59	25	126.4	3,133	7.75
0960	MW175	25 Jun 2020	Normal		0.59	25	-78.9	3,133	7.75
0960	MW175	20 Nov 2020	Normal		2.05	30	-107.5	3,878	7.55
0960	MW175	23 Jun 2021	Normal		1.57	25.6	-254.9	2,580	7.77
0960	MW175	18 Jan 2022	Normal		0.76	28.6	-122.7	4,932	7.52
0960	MW175	23 Jun 2022	Normal		1.35	27.6	-108.5	3,485	7.82
0960	MW175	23 Nov 2022	Normal		1.59	32.3	-9.1	5,058	6.99
0960	MW175	24 Mar 2023	Normal		0.76	28.6	-122.7	4,932	7.52
0960	MW175	28 Jun 2023	Normal		2.67	27.1	-172.8	5,739	7.77
0960	MW176	17 Jun 2018	Normal		0.01	28.6	-113.3	104,479	6.99
0960	MW176	17 Jun 2018	Normal		0.13	28.5	-97.4	69,540	7.06
0960	MW176	17 Jun 2018	Normal		0.16	28.9	-108.9	63,977	7.13
0960	MW176	17 Jun 2018	Normal		0.25	27.3	-30.1	56,663	7.1
0960	MW176	29 Nov 2019	Normal		0.88	33.1	-71	50,091	7.15
0960	MW176	24 Jun 2020	Normal		3.47	24.7	-78.9	41,708	8.01
0960	MW176	24 Jun 2020	Normal		3.47	24.7	64	41,708	8.01
0960	MW176	20 Nov 2020	Normal		3.13	30.8	15.5	54,030	7.39
0960	MW176	23 Jun 2021	Normal		4.09	24.6	71.3	31,808	8
0960	MW176	18 Jan 2022	Normal		2.61	28	99.9	68,441	7.91
0960	MW176	23 Jun 2022	Normal		2.55	24	89.7	53,753	7.47
0960	MW176	22 Nov 2022	Normal		0.27	28.1	-136.7	54,365	7.09
0960	MW176	24 Mar 2023	Normal		2.61	28	99.9	68,441	7.91
0960	MW176	28 Jun 2023	Normal		3.81	25.7	-0.7	30,783	7.17
0960	MW177	17 Jun 2018	Normal		0.01	28	-111.3	100,576	7.09
0960	MW177	17 Jun 2018	Normal		0.07	28.3	-90.8	110,799	7.06
0960	MW177	17 Jun 2018	Normal		0.08	28.5	-50.6	113,763	7.06
0960	MW177	17 Jun 2018	Normal		0.2	26.6	2.3	83,509	7.16
0960	MW177	29 Nov 2019	Normal		1.73	29.4	-24.1	73,791	7.01
0960	MW177	24 Jun 2020	Normal		2.58	27	64	77,445	7.52
0960	MW177	24 Jun 2020	Normal		2.58	27	18.7	77,445	7.52
0960	MW177	20 Nov 2020	Normal		2.24	29.7	-5.7	84,902	7.49
0960	MW177	23 Jun 2021	Normal		2.97	24.2	51.5	71,736	7.42
0960	MW177	18 Jan 2022	Normal		2.62	28.6	87.9	94,268	7.86
0960	MW177	23 Jun 2022	Normal		1.49	24.6	69	91,072	7.2
0960	MW177	22 Nov 2022	Normal		1.09	27.2	-101.3	91,058	7
0960	MW177	24 Mar 2023	Normal		2.62	28.6	87.9	94,268	7.86
0960	MW177	28 Jun 2023	Normal		2.94	25.5	-2.2	92,355	7.03
0960	MW178	17 Jun 2018	Normal		0.07	28.5	-68.9	80,461	7.13
0960	MW178	17 Jun 2018	Normal		0.09	28.7	-95.5	89,268	7.17
0960	MW178	17 Jun 2018	Normal		0.11	28.9	-93.9	94,355	7.08
0960	MW178	17 Jun 2018	Normal		0.12	27.9	-84.5	94,559	7.05
0960	MW178	29 Nov 2019	Normal		0.43	31.7	-23.7	98,968	7.18
0960	MW178	24 Jun 2020	Normal		2.55	25	18.7	86,481	7.66
0960	MW178	24 Jun 2020	Normal		2.55	25	73.6	86,481	7.66
0960	MW178	20 Nov 2020	Normal		1.62	30.2	186.5	89,899	7.55
0960	MW178	24 Jun 2021	Normal		4.29	22.6	0.5	85,879	6.9
0960	MW178	18 Jan 2022	Normal		0.71	26.6	-21.5	90,308	7.36
0960	MW178	23 Jun 2022	Normal		3.9	22.6	109.7	63,338	6.95
0960	MW178	22 Nov 2022	Normal		3.23	26.9	-82.1	93,195	7.22
0960	MW178	24 Mar 2023	Normal		0.71	26.6	-21.5	90,308	7.36
0960	MW178	28 Jun 2023	Normal		2.31	26.3	6.1	91,060	7.21
0960	MW179	16 Jun 2018	Normal		0.04	28.3	-74.5	74,416	7
0960	MW179	16 Jun 2018	Normal		0.06	28.7	-78	50,874	7.15
0960	MW179	16 Jun 2018	Normal		0.1	28.7	-76.5	59,663	7.21
0960	MW179	29 Nov 2019	Normal		1.79	32.6	-191.5	90,064	7.63
0960	MW179	24 Jun 2020	Normal		3.09	24.1	73.6	75,422	7.76
0960	MW179	24 Jun 2020	Normal		3.09	24.1	58	75,422	7.76

				Field					
				Total Dissolved Solids (Field)	DO (Field)	Temperature (Field)	Redox Potential (Field)	Electrical Conductivity (Field)	pH (Field)
				mg/L	mg/L	°C	mV	µS/cm	pH Units
0960	MW179	20 Nov 2020	Normal		1.64	30	178.3	46,304	7.82
0960	MW179	24 Jun 2021	Normal		10.85	18.2	34.5	1,260	6.28
0960	MW179	18 Jan 2022	Normal		1.56	27.5	-8.17	79,070	7.45
0960	MW179	22 Jun 2022	Normal		2.46	26.1	-107.9	81,954	7.48
0960	MW179	23 Nov 2022	Normal		2.48	26.9	-57	40,430	7.65
0960	MW179	24 Mar 2023	Normal		1.56	27.5	-8.17	79,070	7.45
0960	MW179	28 Jun 2023	Normal		1.89	24.4	84.3	73,344	7.17
0960	MW180	17 Jun 2018	Normal		0.13	25.1	75.7	83,777	7.13
0960	MW180	17 Jun 2018	Normal		0.13	27.8	-65.8	90,374	7.04
0960	MW180	17 Jun 2018	Normal		0.23	27.1	-39.5	89,229	7.09
0960	MW180	17 Jun 2018	Normal		0.25	28	-74.6	91,447	7.21
0960	MW180	29 Nov 2019	Normal		0.98	31	-231.2	89,128	7.38
0960	MW180	24 Jun 2020	Normal		0.55	24	-56.4	89,811	7.32
0960	MW180	24 Jun 2020	Normal		0.55	24	-56.4	89,811	7.32
0960	MW180	21 Nov 2020	Normal		1.09	27.7	78.3	96,847	6.79
0960	MW180	24 Jun 2021	Normal		3.54	22.5	103.4	62,058	7.59
0960	MW180	18 Jan 2022	Normal		2.2	28.3	-61.7	91,645	7.49
0960	MW180	23 Jun 2022	Normal		2.56	25.1	36.4	91,570	7.47
0960	MW180	23 Nov 2022	Normal		2.23	29	-104.7	90,725	7.47
0960	MW180	24 Mar 2023	Normal		2.2	28.3	-61.7	91,645	7.49
0960	MW180	28 Jun 2023	Normal		2.18	24	39.6	76,301	7.06
0960	MW181	16 Jun 2018	Normal		0.07	29.1	-60	96,186	6.7
0960	MW181	16 Jun 2018	Normal		0.16	29	-12	107,962	6.74
0960	MW181	16 Jun 2018	Normal		1.24	27.6	47.4	103,968	7.02
0960	MW181	16 Jun 2018	Normal		1.65	28.3	32.7	106,635	7.18
0960	MW181	29 Nov 2019	Normal		8.55	28.8	58.8	1,255	7.15
0960	MW181	24 Jun 2020	Normal		1.91	23.8	50.6	96,553	7.54
0960	MW181	24 Jun 2020	Normal		1.91	23.8	50.6	96,553	7.54
0960	MW181	20 Nov 2020	Normal		1.21	28.6	3.9	108,667	6.76
0960	MW181	24 Jun 2021	Normal		1.35	23.7	-3	101,852	6.81
0960	MW181	18 Jan 2022	Normal		1.52	28.3	77.7	103,120	7.21
0960	MW181	23 Jun 2022	Normal		1.78	25.9	38	101,760	7.42
0960	MW181	23 Nov 2022	Normal		2.04	28.6	-87.7	97,674	7.08
0960	MW181	24 Mar 2023	Normal		1.52	28.3	77.7	103,120	7.21
0960	MW181	28 Jun 2023	Normal		1.99	23.4	96.6	88,842	7.03
0960	MW211	09 Jun 2018	Normal		3.98	29.6	64.5	2,260	8.15
0960	MW211	15 Oct 2018	Normal	1,527.5	3.71	28.5		2,508	8
0960	MW211	14 Aug 2019	Normal	1,547	3.78	27.9		2,512	8.17
0960	MW211	26 Nov 2019	Normal		9.28	30.5	13.5	856	8.1
0960	MW211	24 Jun 2020	Normal		3.79	27.5	-76.4	2,329	7.96
0960	MW211	24 Jun 2020	Normal		3.79	27.5	-76.4	2,329	7.96
0960	MW211	14 Oct 2020	Normal		4.73	29.3	104.4	2,487	7.9
0960	MW211	19 Nov 2020	Normal		4.47	30.6	27.9	2,698	8.23
0960	MW211	23 Feb 2021	Normal		3.33	31.5	33.8	2,566	8.21
0960	MW211	23 Jun 2021	Normal		3.45	24.4	124.7	2,160	8.25
0960	MW211	23 Nov 2021	Normal		3.66	77.6	95.5	2,272	8
0960	MW211	18 Jan 2022	Normal		4.64	29.2	5.7	2,264	8.43
0960	MW211	22 Jun 2022	Normal		3.1	28.3	-105.8	2,061	8.3
0960	MW211	31 Oct 2022	Normal		3.48	24.5	72.5	2,532	7.21
0960	MW211	22 Nov 2022	Normal		3.76	27.9	5.5	1,997	7.69
0960	MW211	24 Mar 2023	Normal		4.64	29.2	5.7	2,264	8.43
0960	MW211	28 Jun 2023	Normal		4.15	22.6	5.8	1,845	8.33
0960	MW233	10 Jun 2018	Normal		4.05	30.1	84.9	2,260	7.93
0960	MW233	15 Oct 2018	Normal	1,209	3.07	29.1		2,000	8.17
0960	MW233	15 Aug 2019	Normal	1,378	2.89	28.9		2,282	8
0960	MW233	15 Oct 2020	Normal		4.2	30.5	8.6	2,062	8.18
0960	MW233	23 Feb 2021	Normal		2.2	32.8	39.1	2,231	7.99
0960	MW233	23 Jun 2021	Normal		2.59	25.2	129.6	1,973	8.27
0960	MW233	23 Nov 2021	Normal		2.43	28.8	82.1	1,861	8.22
0960	MW233	18 Jan 2022	Normal		2.93	33.1	76.1	1,707	8.24
0960	MW233	22 Jun 2022	Normal		2.71	27.4	5.7	1,983	8.3
0960	MW233	01 Nov 2022	Normal		1.62	28.6	49.9	12,837	7.14
0960	MW233	22 Nov 2022	Normal		2.89	28.8	-6.3	2,026	7.66
0960	MW233	24 Mar 2023	Normal		2.93	33.1	76.1	1,707	8.24
0960	MW233	28 Jun 2023	Normal		3.06	28.8	0.1	12,459	7.44
0960	MW238	16 Mar 2020	Normal	699	1.72	32.4		1,092	7.35
0960	MW238	18 Jan 2022	Normal		3.57	26.4	5,967	9,177	7.74
0960	MW238	22 Jun 2022	Normal		4.14	27.1	50.1	5,913	7.8
0960	MW238	22 Nov 2022	Normal		7.24	27.9	-17.2	17.5	8.18
0960	MW238	24 Mar 2023	Normal		3.57	26.4	5,967	9,177	7.74
0960	MW238	28 Jun 2023	Normal		3.87	26.6	22.8	6,070	7.9
0960	OTH103	10 Jun 2018	Normal		4.72	18.8		47,249	7.84
0960	OTH103	01 Dec 2019	Normal		5.47	28.8	-315.6	27,929	8.14
0960	OTH103	20 Nov 2020	Normal		1.95	27.6		63,985	7.83
0960	OTH103	23 Jun 2021	Normal		6.06	17.2	-35.9	36,172	7.92
0960	OTH103	23 Jun 2022	Normal		0.85	25.2	-77.7	53,158	7.85
0960	OTH103	23 Nov 2022	Normal		3.24	27.9	98.6	54,575	7.89
0960	OTH103	28 Jun 2023	Normal		3.05	21	-134.9	51,978	7.86
0960	OTH106	09 Jun 2018	Normal		4.98	23.5		53,489	7.75
0960	OTH106	29 Nov 2019	Normal		5.26	29	-17.3	63,803	7.7
0960	OTH106	26 Jun 2020	Normal		5.42	20.3	39.3	50,871	7.98
0960	OTH106	20 Nov 2020	Normal		3.59	31.2		66,414	8.12
0960	OTH106	24 Jun 2021	Normal		6.29	15.1	131.7	57,455	7.66
0960	OTH106	23 Jun 2022	Normal		5.18	20.3	52.1	54,602	8.06
0960	OTH106	23 Nov 2022	Normal		4.66	24.8	-95	57,508	7.98
0960	OTH106	28 Jun 2023	Normal		6.58	15	148.2	40,997	7.94
0960	OTH107	09 Jun 2018	Normal		2.82	24.6		53,986	7.58
0960	OTH107	29 Nov 2019	Normal		71.5	30.9	-426.8	63,173	7.79
0960	OTH107	26 Jun 2020	Normal		5.41	20.7	35.5	51,084	7.96
0960	OTH107	20 Nov 2020	Normal		4.42	26.8		58,999	7.59
0960	OTH107	24 Jun 2021	Normal		6.21	16	144.1	57,722	6.77
0960	OTH107	23 Jun 2022	Normal		5.16	20.3	58.8	53,775	7.79
0960	OTH107	23 Nov 2022	Normal		5.86	23.7	-93.7	56,989	8.17
0960	OTH107	28 Jun 2023	Normal		7.56	14.2	136.2	37,323	7.92
0960	OTH129	10 Jun 2018	Normal		3.65	19.5		47,485	7.67
0960	OTH129	01 Dec 2019	Normal		5.11	27.7	-168.6	58,597	8.09

Table 4 Groundwater and Seepage Water Field Parameters

				Field					
				Total Dissolved Solids (Field)	DO (Field)	Temperature (Field)	Redox Potential (Field)	Electrical Conductivity (field)	pH (Field)
				mg/L	mg/L	°C	mV	µS/cm	pH Units
0960	OTH129	20 Nov 2020	Normal		1.27	28.5		68,418	7.76
0960	OTH129	23 Jun 2021	Normal		5.89	21.3	79.4	58,193	8.19
0960	OTH129	23 Jun 2022	Normal		4.2	26.8	23.2	32,596	7.96
0960	OTH129	23 Nov 2022	Normal		3.05	29.5	22	53,742	7.74
0960	OTH129	28 Jun 2023	Normal		5.42	23.8	-75.9	62,086	8.36
0960	OTH132	10 Jun 2018	Normal		1.95	20.5		49,903	7.79
0960	OTH132	01 Dec 2019	Normal		4.42	27.4	-331.5	56,336	8.13
0960	OTH132	20 Nov 2020	Normal		1.39	25.9		63,688	7.87
0960	OTH132	23 Jun 2021	Normal		5.34	16.9	68.4	56,614	8.06
0960	OTH132	23 Jun 2022	Normal		2.28	24.6	63.6	54,880	7.68
0960	OTH132	23 Nov 2022	Normal		2.88	26.9	74.4	53,723	6.95
0960	OTH132	28 Jun 2023	Normal		2.81	19.3	-109.1	58,420	7.83
0960	OTH134	01 Dec 2019	Normal		5.71	27.7	-208.7	44,981	8.09
0960	OTH134	20 Nov 2020	Normal		3.41	29.1		69,054	7.86
0960	OTH134	23 Jun 2021	Normal		7.14	17.8	57.4	30,756	8.06
0960	OTH134	23 Jun 2022	Normal		5.56	22.2	12.3	2,625	8.45
0960	OTH134	23 Nov 2022	Normal		8.2	29.4	42	53,233	7.63
0960	OTH134	28 Jun 2023	Normal		3.25	18.6	-86.1	58,963	7.8

Table 5 - Surface Water Field Parameters

	Field				
	DO (Field)	Temperature (Field)	Redox Potential (Field)	Electrical Conductivity (field)	pH (Field)
	mg/L	°C	mV	µS/cm	pH Units

Location Code	Date					
SW001	01 Dec 2019	4.24	26	-345.3	63,312	7.98
SW001	20 Nov 2020	4.2	35.5		89,662	8.06
SW001	04 Mar 2021	4.4	33.6	84.3	37,379	8.26
SW001	23 Jun 2021	6.03	20.3	66.9	27,761	8.05
SW001	24 Nov 2021	3.09	33.8	88.4	77,382	8.15
SW001	18 May 2022	4.27	21.2	90	59,727	8.07
SW001	23 Jun 2022	7.03	20	65.8	56,519	8.56
SW001	23 Nov 2022	3.36	35.9	-23.1	94,197	7.76
SW001	28 Jun 2023	3.36	22.7	38.1	72,706	8.07
SW108	22 Jun 2022	5.19	24.5	38.9	2,377	8.37
SW157	17 May 2022	6.31	23.9	148.9	8,317	
SW157	22 Jun 2022	7.89	26.5	28.3	1,872	9.15
SW170	17 May 2022	4.65	21	195	593	5.95
SW170	22 Jun 2022	3.63	20.6	36.6	324	8.61
SW189	28 May 2020	6.63	17.8	98	3,534	8.43
SW189	04 Mar 2021	203	268	922	1,216	843
SW189	24 Jun 2021	7.4	15.3	154.6	1,451	7.25
SW189	17 May 2022	4.98	21.8	199.2	4,307	
SW189	23 Jun 2022	6.35	16.8	48.7	1,260	7.49
SW190	04 Mar 2021	126	320	654	758	829
SW190	23 Jun 2021	9.86	15.8	25.6	5,535	8.83
SW190	17 May 2022	5.51	22	207.7	5,554	
SW190	23 Jun 2022	6.16	25.8	18.3	2,607	8.79
SW192	18 May 2022	5.49	17.3	101.9	40,893	8.14
SW192	23 Jun 2022	4.15	22.9	26.9	9,358	8.13
SW193	28 May 2020	3.03	19.3	135.3	33,839	7.85
SW193	04 Mar 2021	188	340	8,966	2,587	816
SW193	23 Jun 2021	4.93	19.9	65.4	50,328	8.27
SW193	18 May 2022	5.26	17.3	98.5	41,281	8.09
SW193	23 Jun 2022	6.99	22.9	19.8	2,425	8.43
SW199	26 May 2020	1.16	22	113.7	526	8.05
SW199	04 Mar 2021	1.82	30.3	90	727	8.01
SW199	22 Jun 2022	1.99	26.8	12.3	2,144	7.68
SW200	26 May 2020	11.83	17.8	114	1,900	8.62
SW200	04 Mar 2021	3.26	30	115.6	138.2	8.15
SW200	24 Jun 2021	7.47	17.1	58.2	1,357	8.64
SW200	22 Jun 2022	5.76	25.8	30.2	253.4	8.16
SW205	14 Jun 2018	4.95	14.6	115.2	65,126	7.74
SW205	27 May 2020	4.38	27.6	140.3	60,782	8.37
SW205	20 Nov 2020	3.41	33.7	61.2	94,981	8.01
SW205	04 Mar 2021	3.56	31.2	86.5	54,728	8
SW205	24 Jun 2021	6.06	16.1	99.1	34,521	7.6
SW205	17 May 2022	4.85	24.1	131	57,152	
SW205	23 Jun 2022	4.21	20.4	50.9	69,153	7.76
SW205	23 Nov 2022	4.6	27.9	-82.1	94,406	8.16
SW207	13 Jun 2018	4.6	23.8	88.7	68,223	8.09
SW207	02 Dec 2019	2.69	34.3	-364	76,950	7.52
SW207	27 May 2020	7.74	26.1	138.2	67,366	8.21
SW207	20 Nov 2020	3.42	32.3	155.2	58,687	8.2
SW207	04 Mar 2021	3.75	320	84.1	54,484	7.99
SW207	24 Jun 2021	5.27	22.2	111.5	62,965	7.97
SW207	24 Nov 2021	3.96	28.8	15.4	62,828	7.79
SW207	18 May 2022	4.42	22.8	115.6	55,291	8.12
SW207	23 Jun 2022	3.05	22.5	43	54,623	7.64
SW207	23 Nov 2022	4.16	30	104.2	69,745	7.94
SW207	28 Jun 2023	4.84	17.7	123.2	47,946	7.91
SW208	14 Jun 2018	5.98	17.9	115.8	55,681	8.04
SW208	01 Dec 2019	4.54	26.8	-421.1	58,856	7.9
SW208	26 May 2020	5.27	19.5	101.5	50,541	8.36
SW208	19 Nov 2020	3.92	29.4	-25.8	65,205	8.21
SW208	04 Mar 2021	3.07	29.7	833	54,507	80
SW208	24 Jun 2021	5.32	15.1	131.9	57,188	7.86
SW208	25 Nov 2021	3.15	25.1	126.9	57,644	7.91
SW208	17 May 2022	4.08	21.8	146.9	55,049	
SW208	23 Jun 2022	4.27	19.9	52.5	54,508	8
SW208	23 Nov 2022	3.22	24.1	-87.1	57,843	8.02
SW208	28 Jun 2023	6.11	15.7	155.2	43,088	8.04
SW209	13 Jun 2018	5.8	21	82.7	64,473	7.79
SW209	26 May 2020	4.23	21.4	135.5	45,233	8.24
SW209	20 Nov 2020	3.26	31.7	156	63,862	8.24
SW209	04 Mar 2021	4.1	34.7	75.9	25,507	8.08
SW209	24 Jun 2021	5.53	21.1	34.7	29,416	7.89
SW209	24 Nov 2021	4.55	31.2	37.2	65,972	7.68
SW209	18 May 2022	2.51	22	121.1	55,102	7.81
SW209	22 Jun 2022	3.48	21.4	-144.9	36,493	7.79
SW209	23 Nov 2022	2.47	28.1	-58.8	63,970	7.91
SW209	28 Jun 2023	5.47	22.6	46.6	62,938	7.89
SW210	13 Jun 2018	4.21	27.5	85.8	79,486	8.04
SW210	26 May 2020	6.03	20.3	124.7	25,493	8.44
SW210	20 Nov 2020	3.37	29.1	180.1	69,889	7.99
SW210	04 Mar 2021	3.17	31.9	111.5	32,976	7.71
SW210	24 Jun 2021	6.5	21.2	32.5	62,295	8.1
SW210	18 May 2022	3.83	22.3	117.8	54,509	7.88
SW210	22 Jun 2022	4.17	24.8	-124.5	46,457	7.65
SW210	23 Nov 2022	3.21	30.7	7.99	68,444	7.99
SW210	28 Jun 2023	3.87	15.9	42.3	68,949	7.96
SW211	13 Jun 2018	6.18	23.8	89.7	83,288	7.95
SW211	02 Dec 2019	4.64	35.3	48.7	108,763	8.2
SW211	26 May 2020	6.43	22.8	113.9	27,388	8.74
SW211	20 Nov 2020	4.08	31.4	156.6	91,215	8.39
SW211	04 Mar 2021	264	350	1,064	32,426	807
SW211	23 Jun 2021	6.81	22	76	27,328	8.29
SW211	24 Nov 2021	4.13	32	3.1	94,791	7.88
SW211	18 May 2022	4.73	21.1	108.7	53,854	8.02

Ongoing Monitoring Report 2023
Learmonth

Trend Report

Report Date & Time: 2024-05-10 04:12:34

Data File Name: MKA_240510_PFO5.csv

Report Title: Groundwater Trend Data

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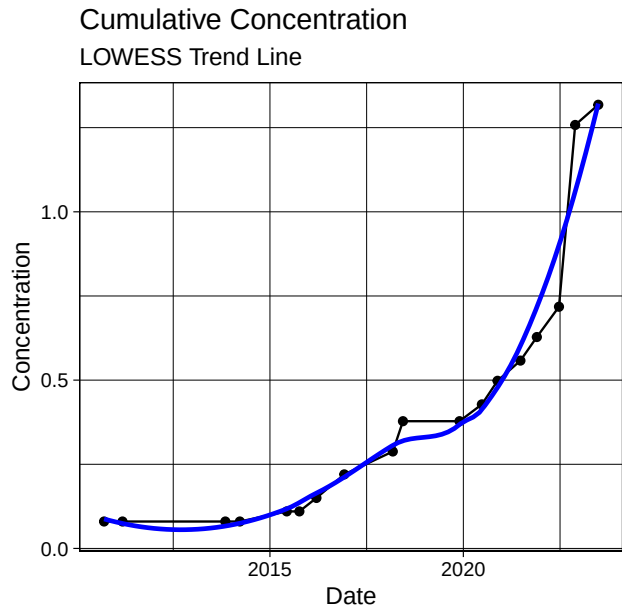
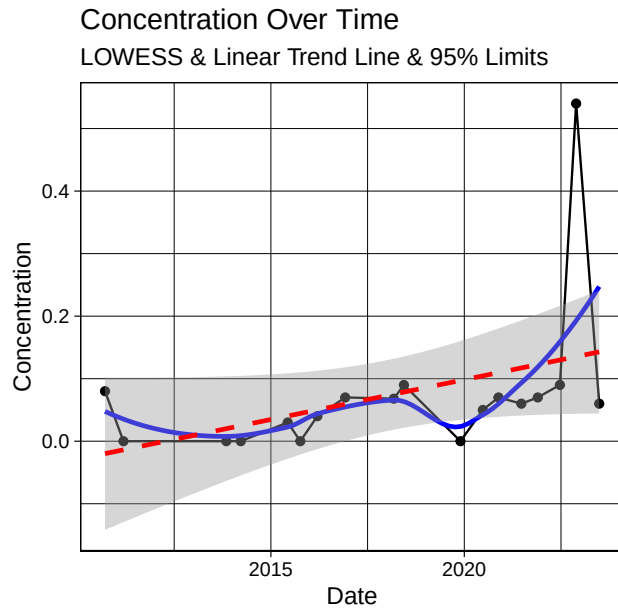
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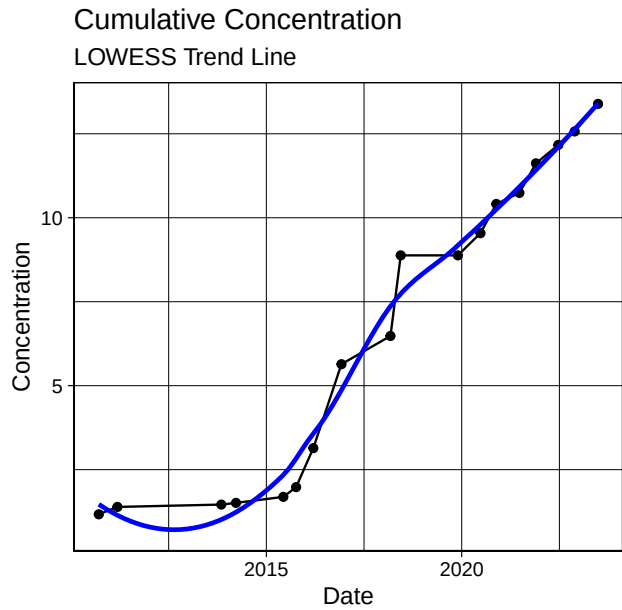
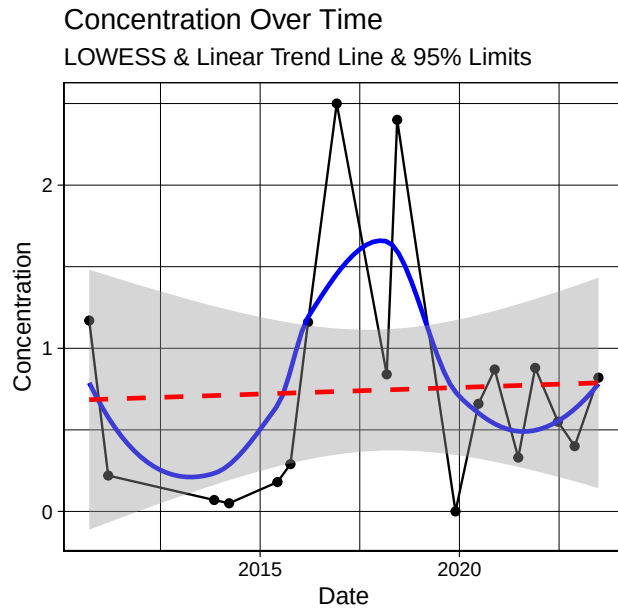
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cov	1.65
results	INCREASING

Report for ID : MW018 and Analyte : PFOA



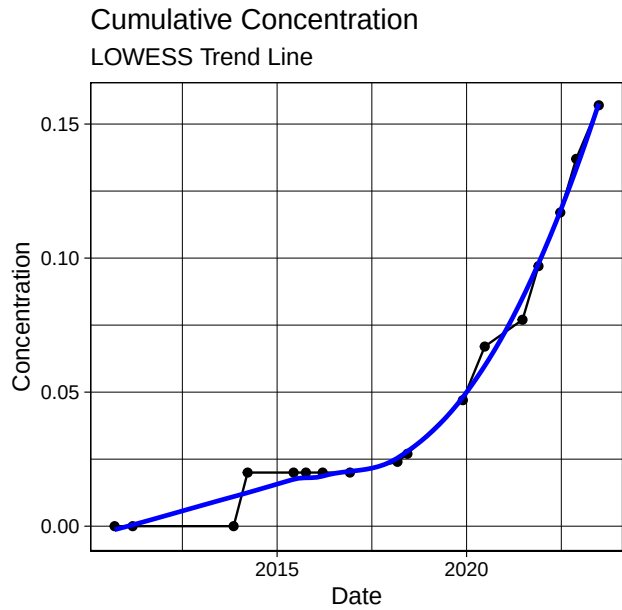
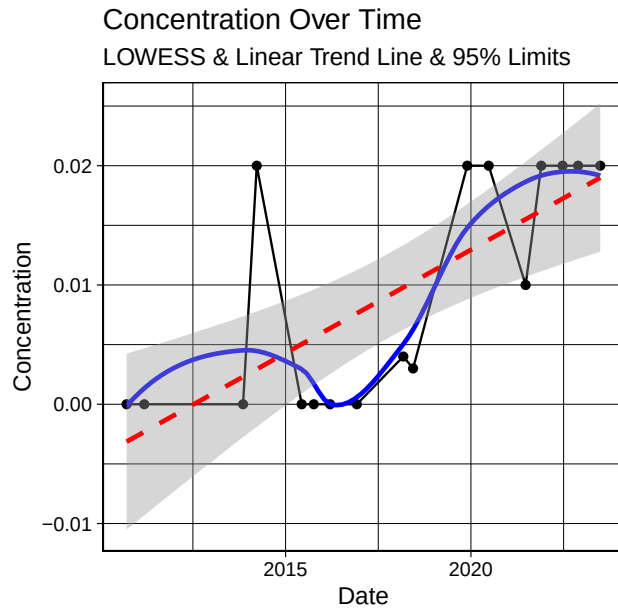
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cov	0.97
results	NO CLEAR TREND

Report for ID : MW018 and Analyte : PFOS



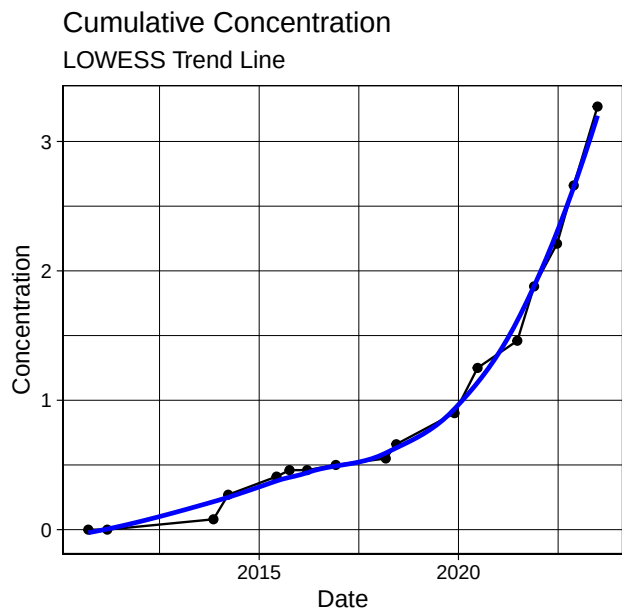
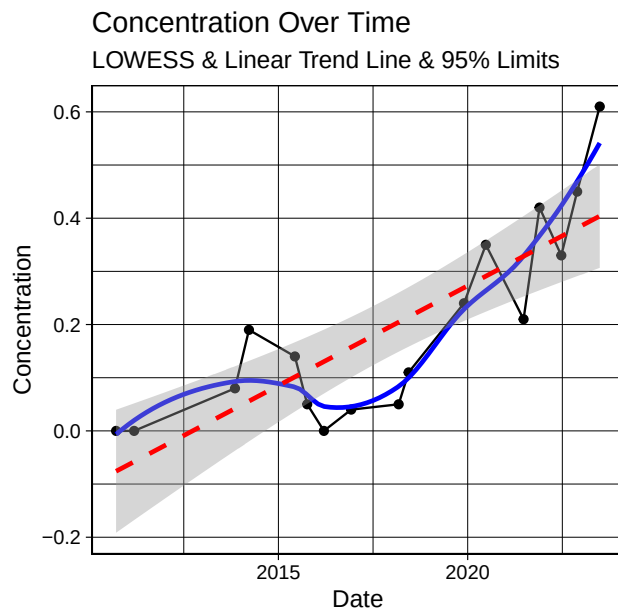
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p	0
S	74
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cov	1.04
results	INCREASING

Report for ID : MW021 and Analyte : PFOA



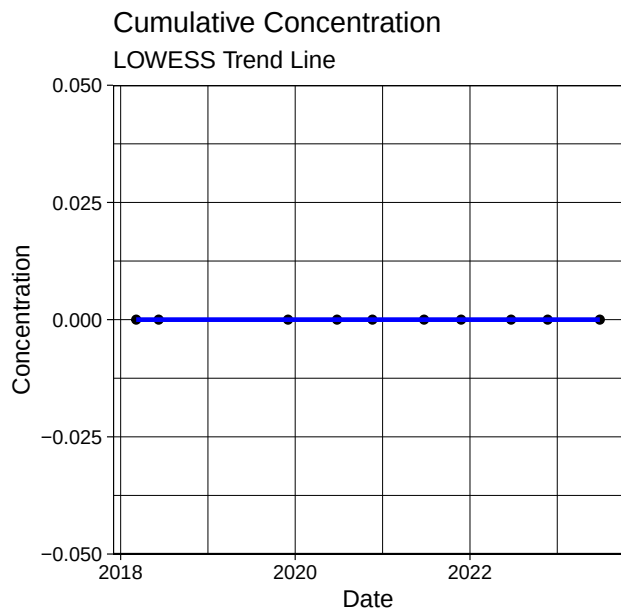
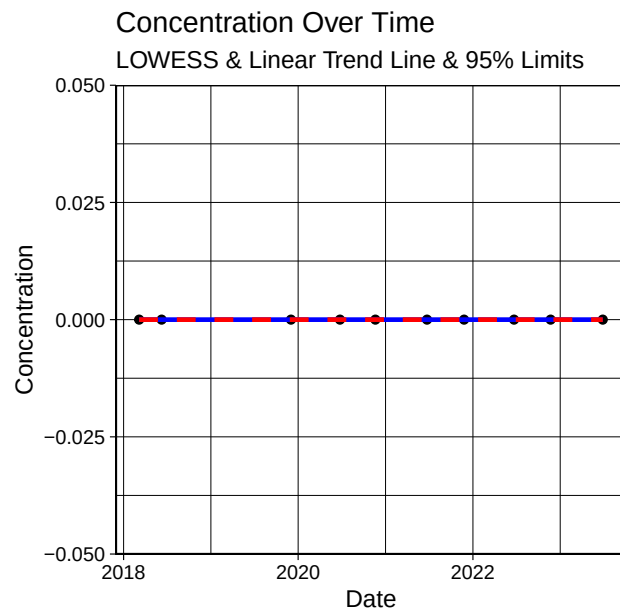
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p	0
S	90
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mean	0.19
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cov	0.95
results	INCREASING

Report for ID : MW021 and Analyte : PFOS



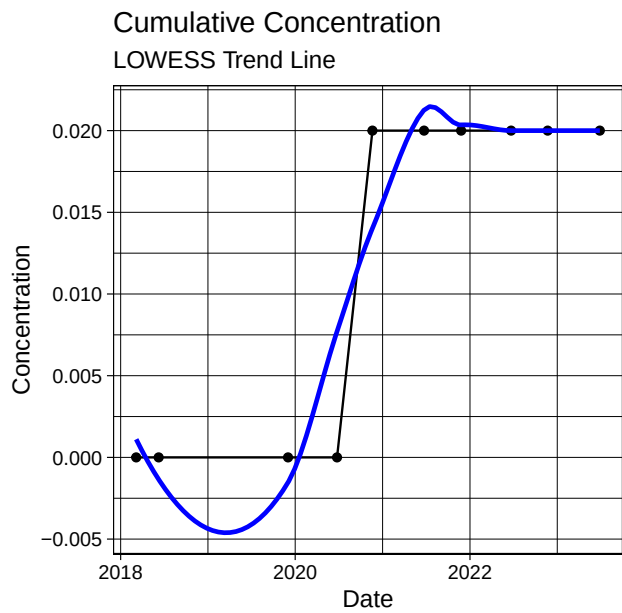
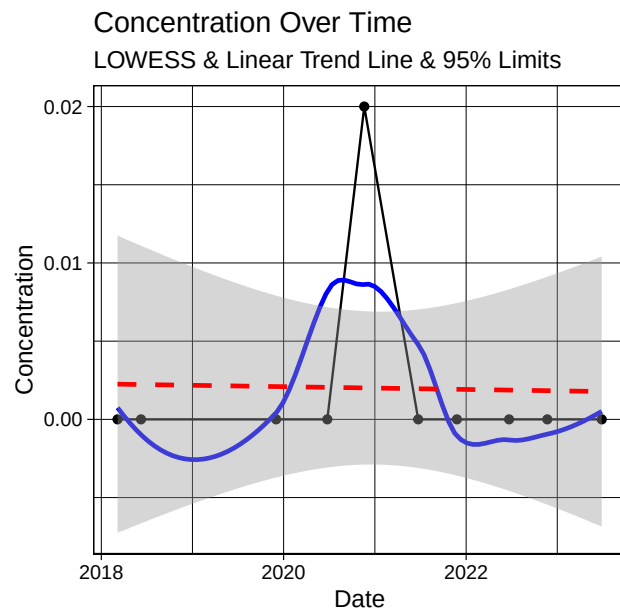
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S	0
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tau	NaN
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results	NA

Report for ID : MW102 and Analyte : PFOA



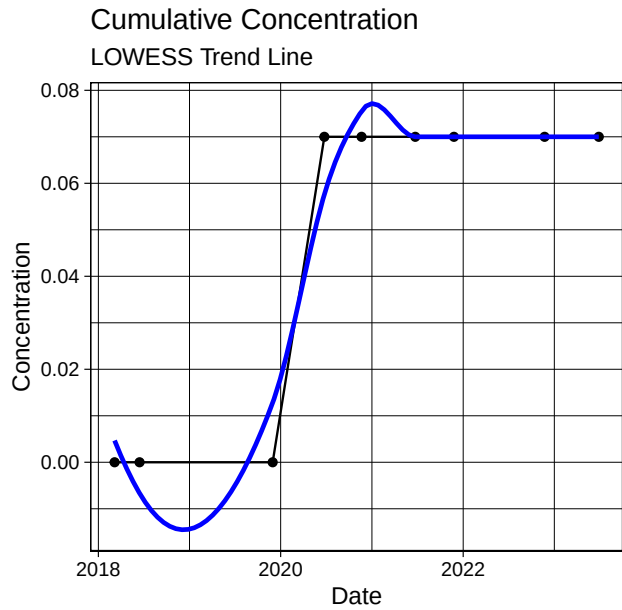
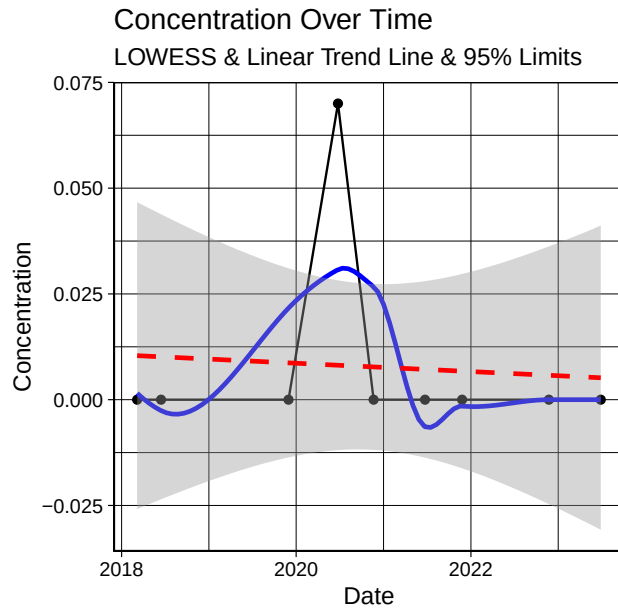
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z	0
p	1
S	-1
varS	33
tau	-0.05
mean	0
sd	0.01
cov	3.16
results	NO CLEAR TREND

Report for ID : MW102 and Analyte : PFOS



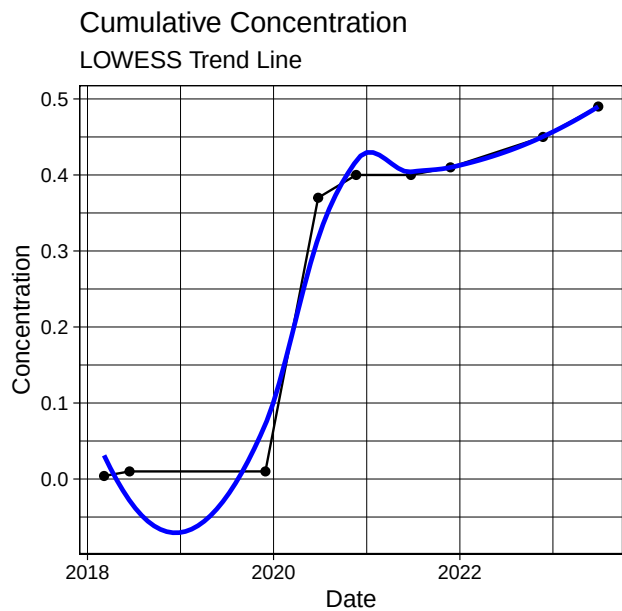
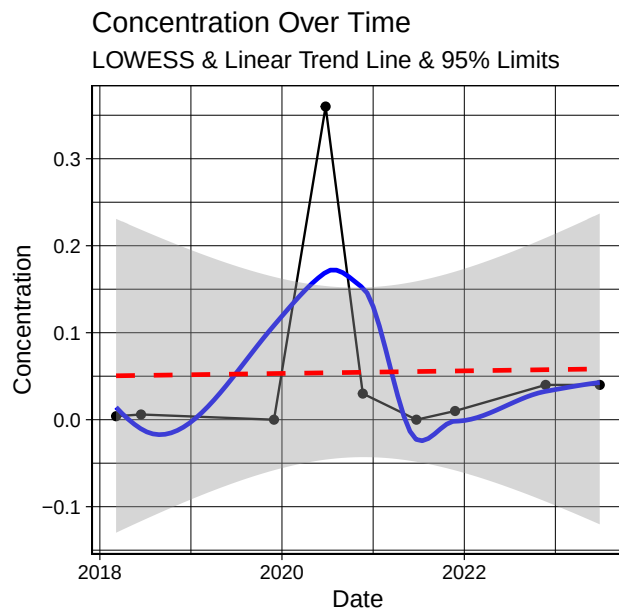
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z	-0.19
p	0.85
S	-2
varS	26.67
tau	-0.12
mean	0.01
sd	0.02
cov	3
results	NO CLEAR TREND

Report for ID : MW103 and Analyte : PFOA



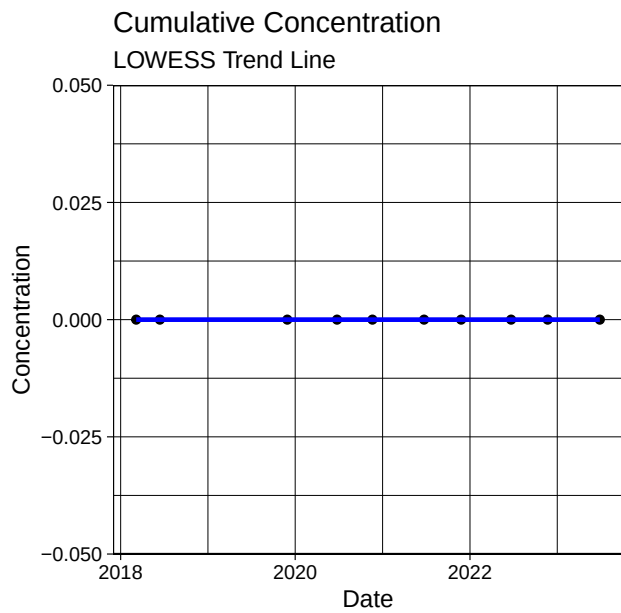
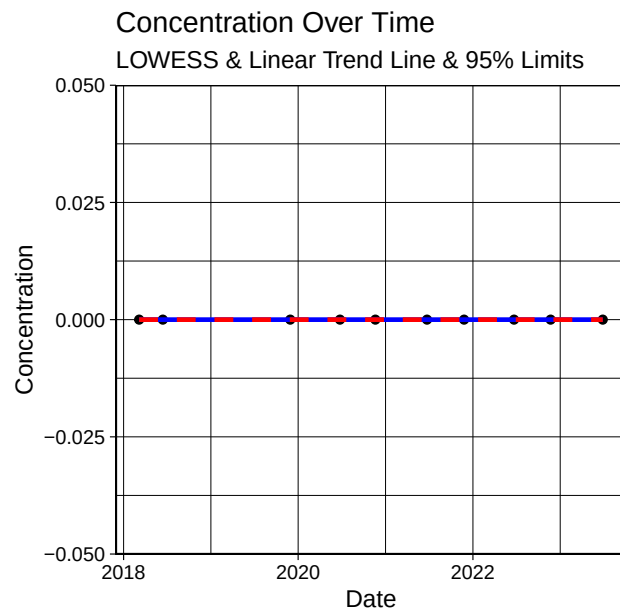
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z	1.16
p	0.25
S	12
varS	90
tau	0.34
mean	0.05
sd	0.12
cov	2.13
results	NO CLEAR TREND

Report for ID : MW103 and Analyte : PFOS



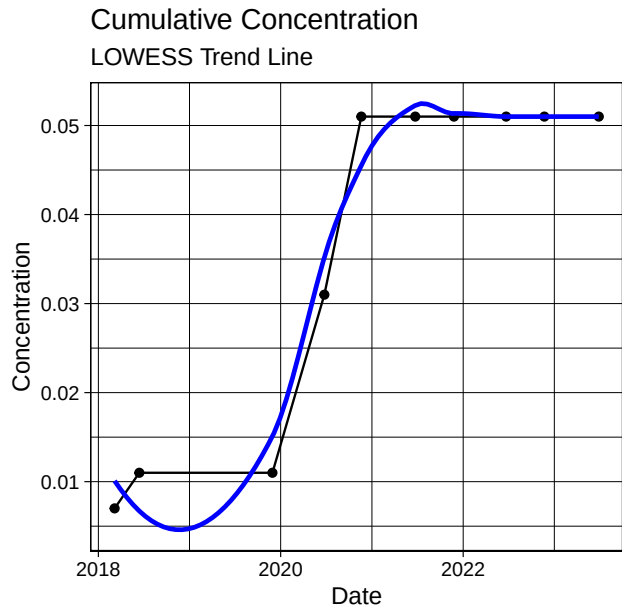
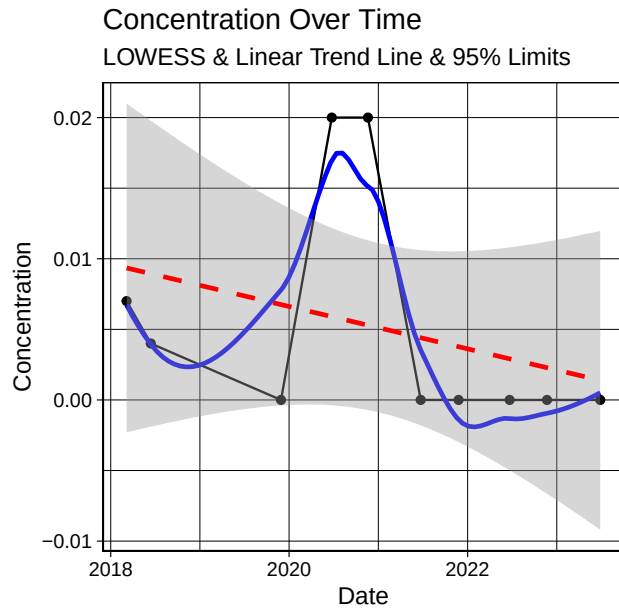
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p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	NaN
results	NA

Report for ID : MW104 and Analyte : PFOA



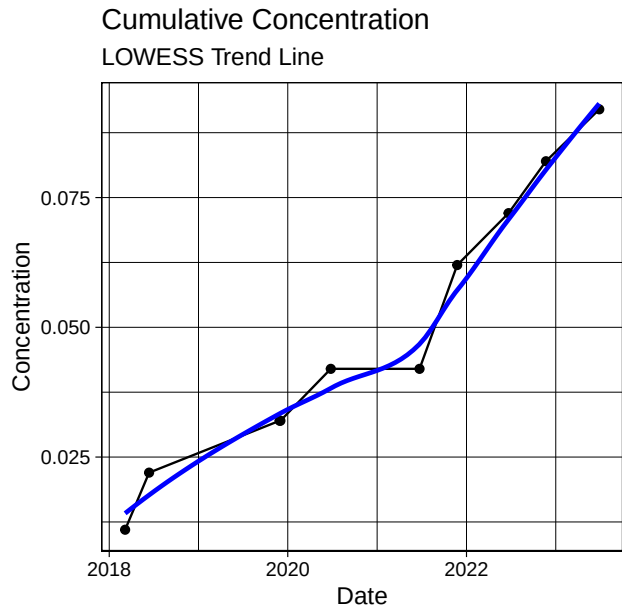
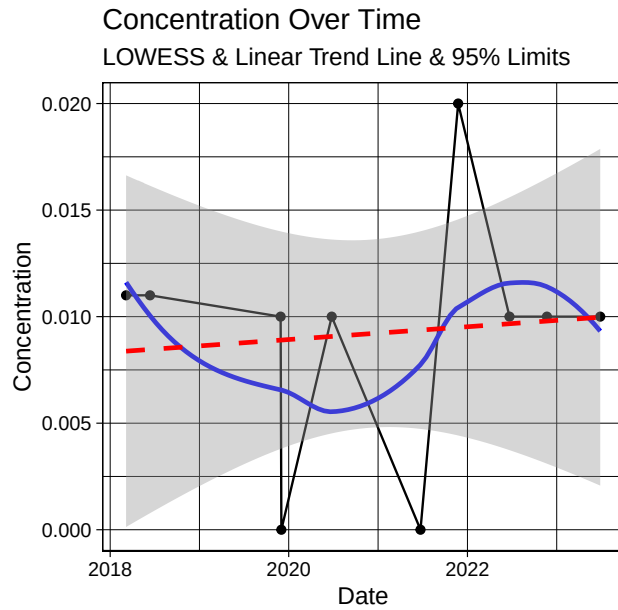
Kendall Trend Test Results Continuous	
n	10
z	-1.64
p	0.1
S	-17
varS	95.67
tau	-0.47
mean	0.01
sd	0.01
cov	1.61
results	NO CLEAR TREND

Report for ID : MW104 and Analyte : PFOS



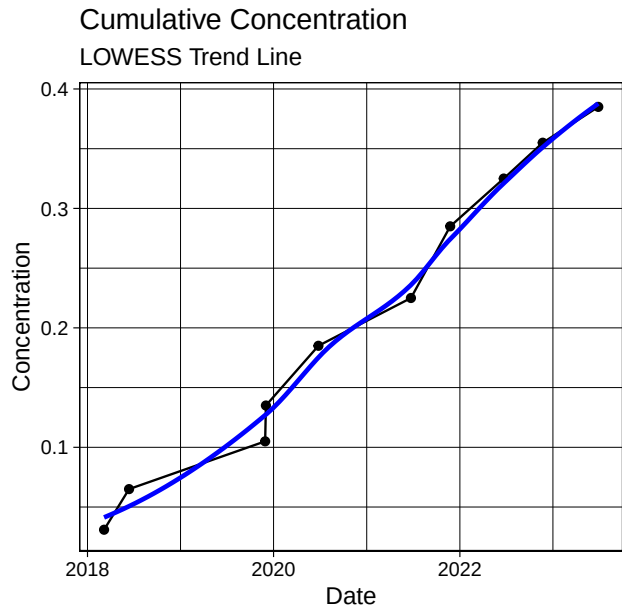
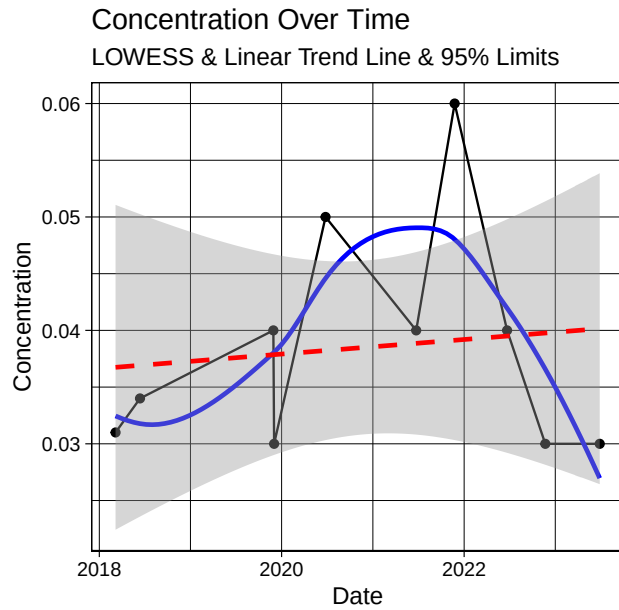
Kendall Trend Test Results Continuous	
n	10
z	-0.58
p	0.56
S	-7
varS	106.33
tau	-0.18
mean	0.01
sd	0.01
cov	0.62
results	STABLE

Report for ID : MW105 and Analyte : PFOA



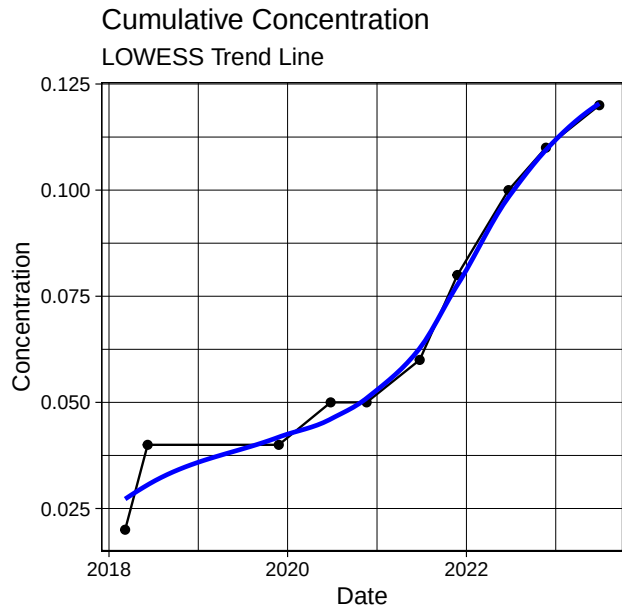
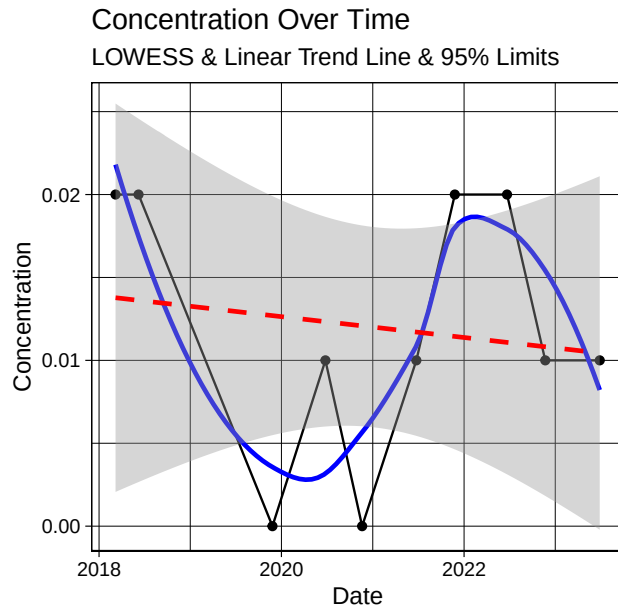
Kendall Trend Test Results Continuous	
n	10
z	0
p	1
S	-1
varS	117.67
tau	-0.02
mean	0.04
sd	0.01
cov	0.26
results	STABLE

Report for ID : MW105 and Analyte : PFOS



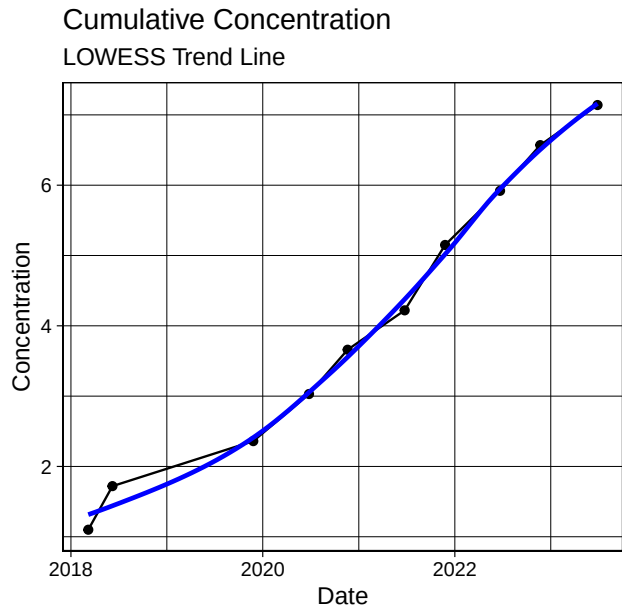
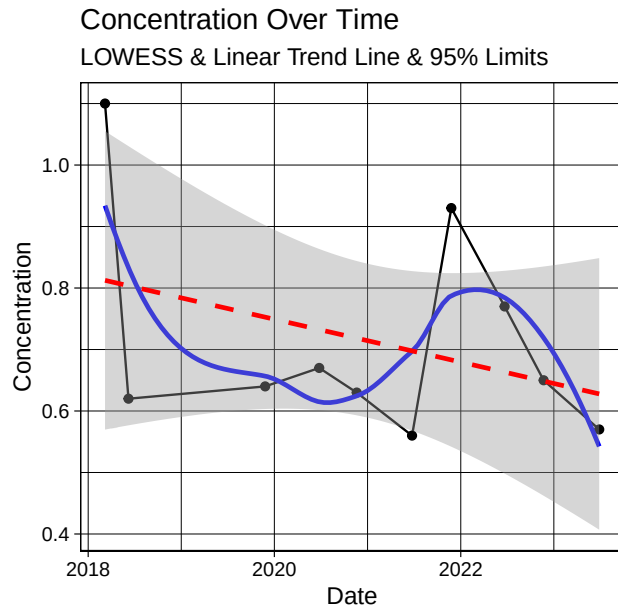
Kendall Trend Test Results Continuous	
n	10
z	-0.1
p	0.92
S	-2
varS	106.67
tau	-0.05
mean	0.01
sd	0.01
cov	0.66
results	STABLE

Report for ID : MW112 and Analyte : PFOA



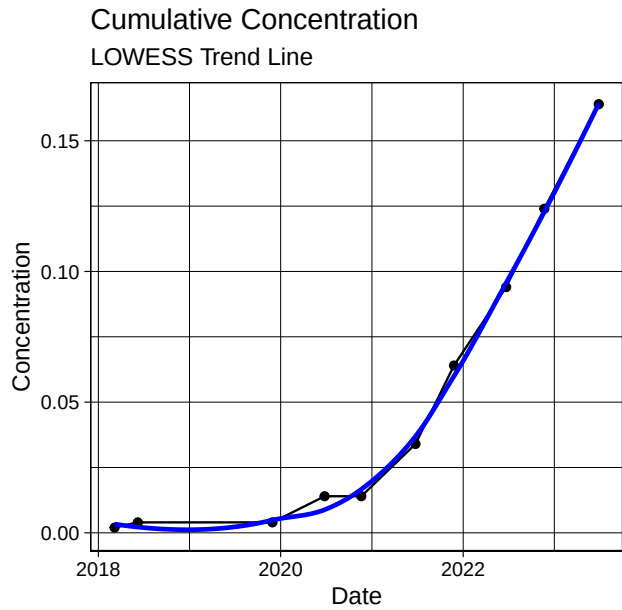
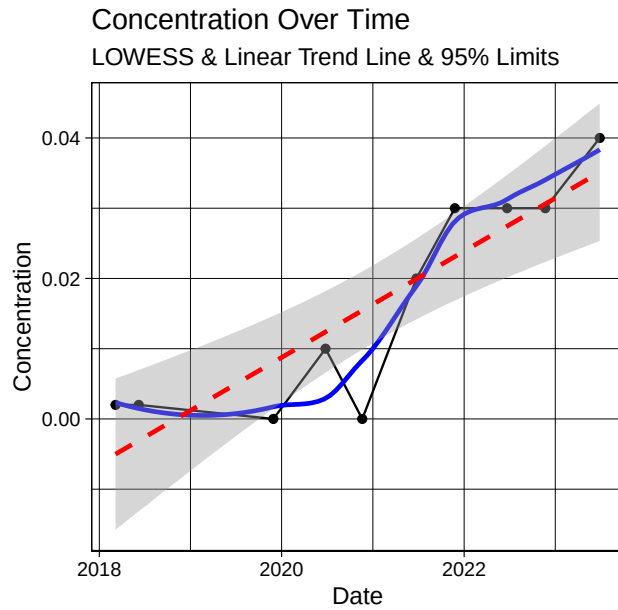
Kendall Trend Test Results Continuous	
n	10
z	-0.54
p	0.59
S	-7
varS	125
tau	-0.16
mean	0.71
sd	0.17
cov	0.24
results	STABLE

Report for ID : MW112 and Analyte : PFOS



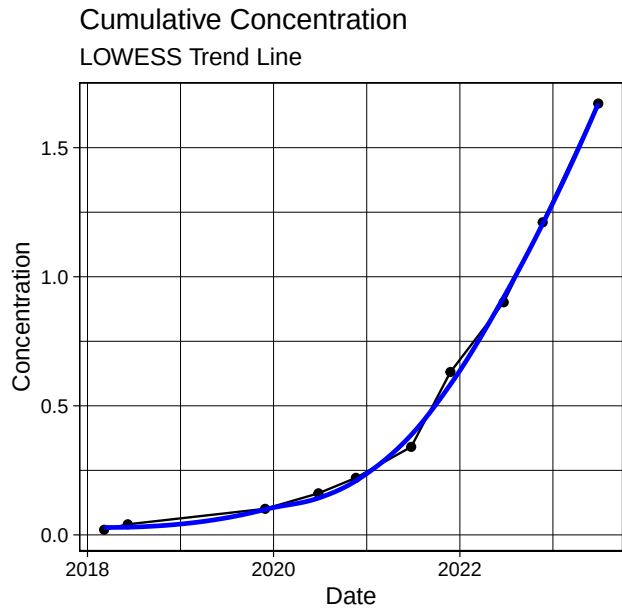
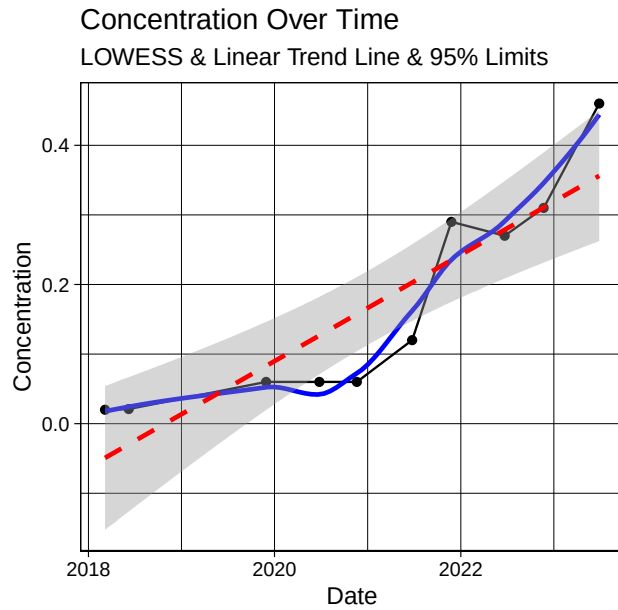
Kendall Trend Test Results Continuous	
n	10
z	2.65
p	0.01
S	30
varS	119.33
tau	0.71
mean	0.02
sd	0.02
cov	0.94
results	INCREASING

Report for ID : MW115 and Analyte : PFOA



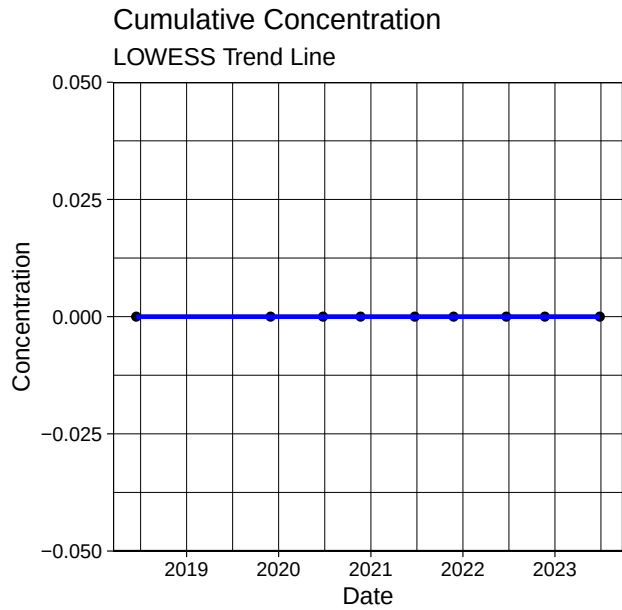
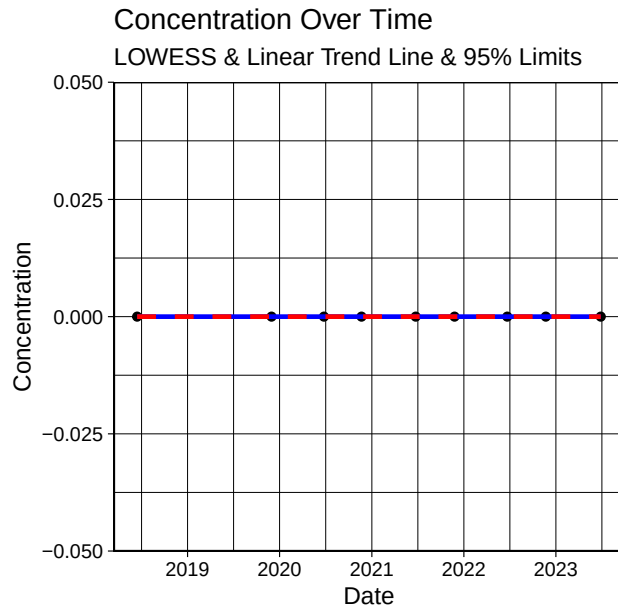
Kendall Trend Test Results Continuous	
n	10
z	3.54
p	0
S	40
varS	121.33
tau	0.92
mean	0.17
sd	0.15
cov	0.92
results	INCREASING

Report for ID : MW115 and Analyte : PFOS



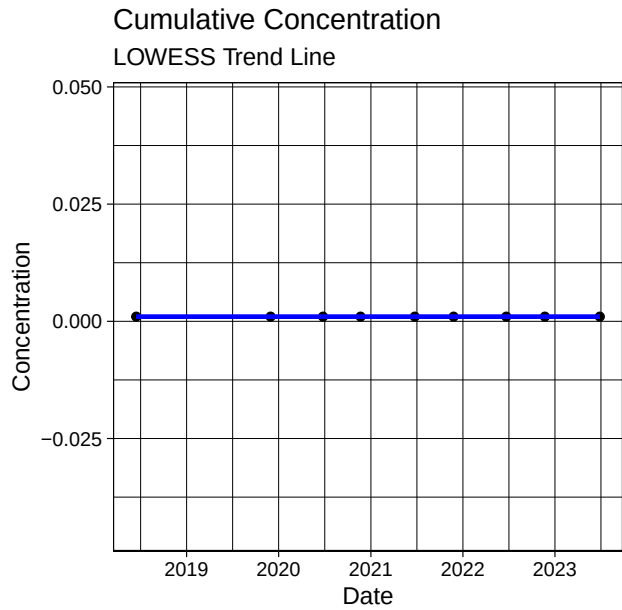
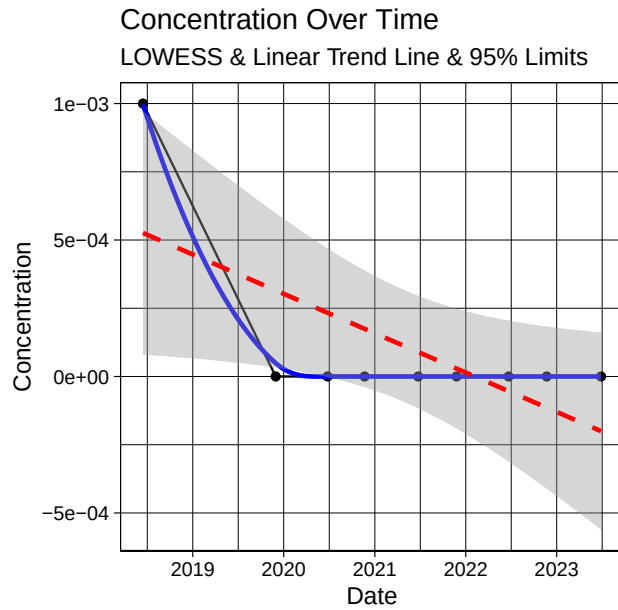
Kendall Trend Test Results Continuous	
n	9
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	NaN
results	NA

Report for ID : MW122 and Analyte : PFOA



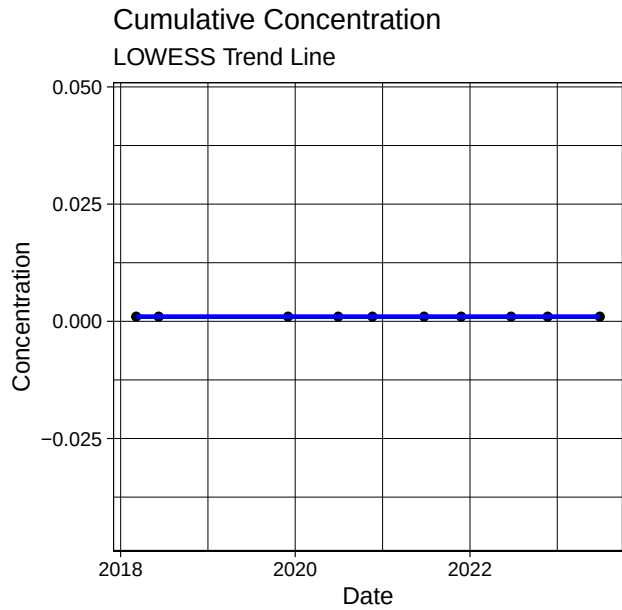
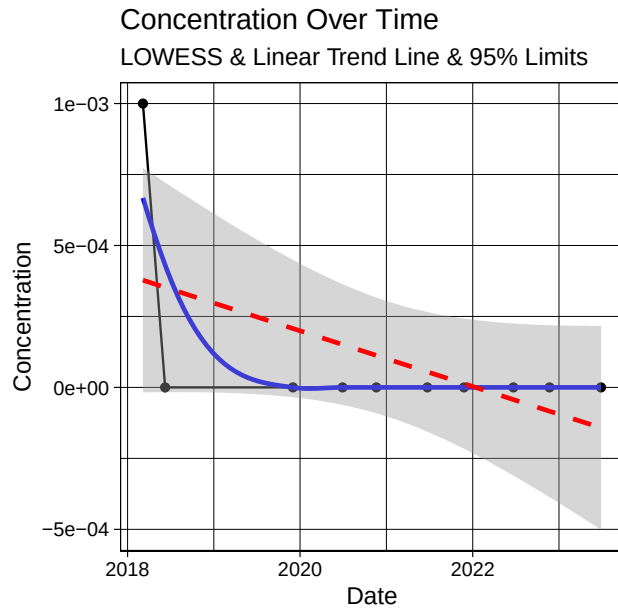
Kendall Trend Test Results Continuous	
n	9
z	-1.36
p	0.18
S	-8
varS	26.67
tau	-0.47
mean	0
sd	0
cov	3
results	NO CLEAR TREND

Report for ID : MW122 and Analyte : PFOS



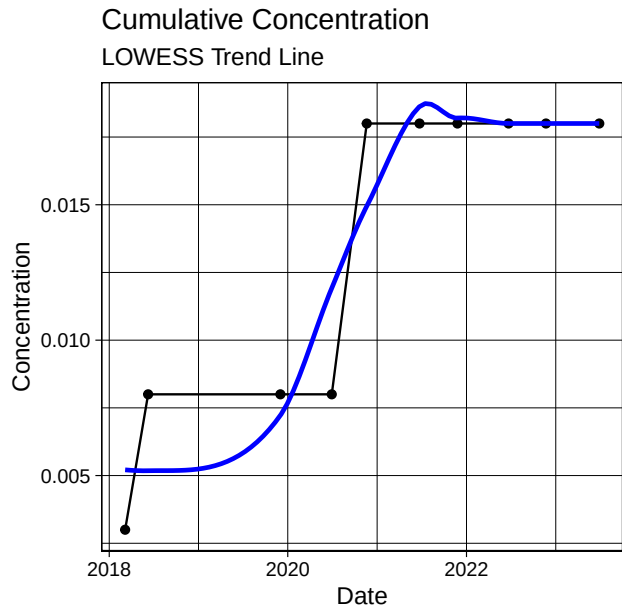
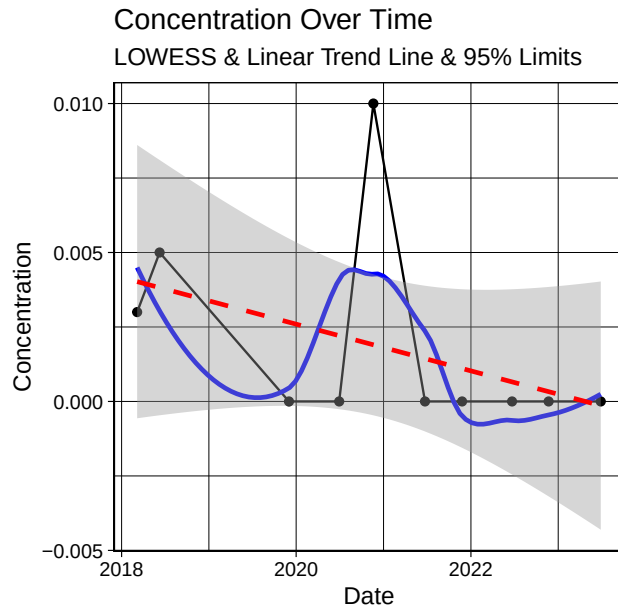
Kendall Trend Test Results Continuous	
n	10
z	-1.39
p	0.16
S	-9
varS	33
tau	-0.45
mean	0
sd	0
cov	3.16
results	NO CLEAR TREND

Report for ID : MW124 and Analyte : PFOA



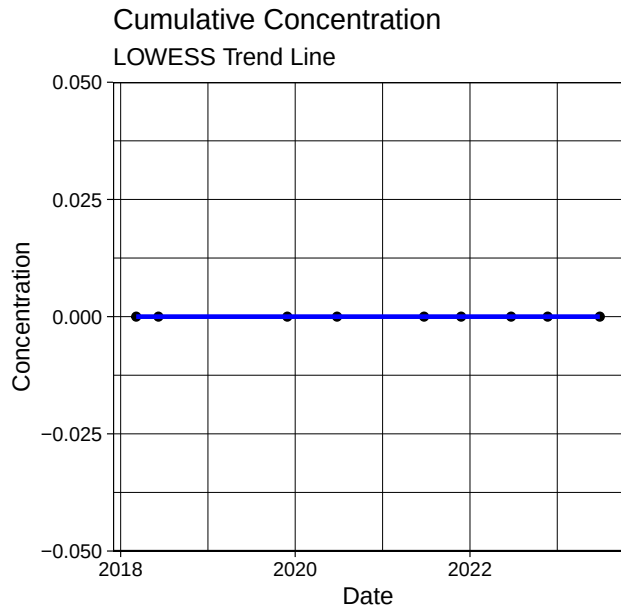
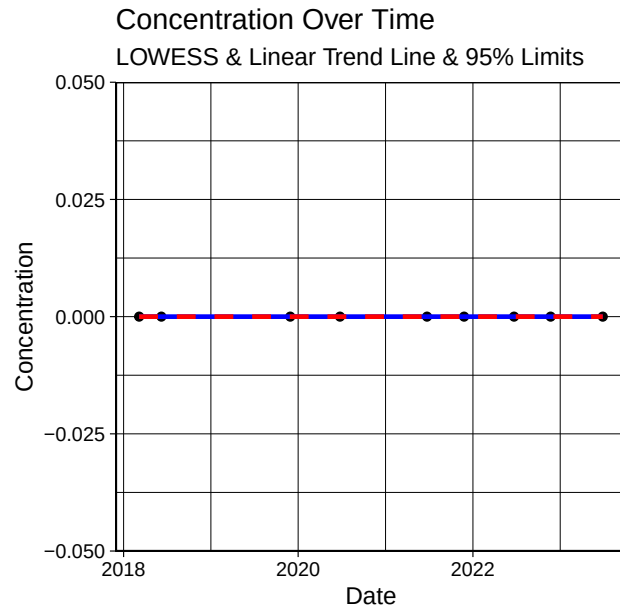
Kendall Trend Test Results Continuous	
n	10
z	-1.45
p	0.15
S	-14
varS	80.67
tau	-0.43
mean	0
sd	0
cov	1.87
results	NO CLEAR TREND

Report for ID : MW124 and Analyte : PFOS



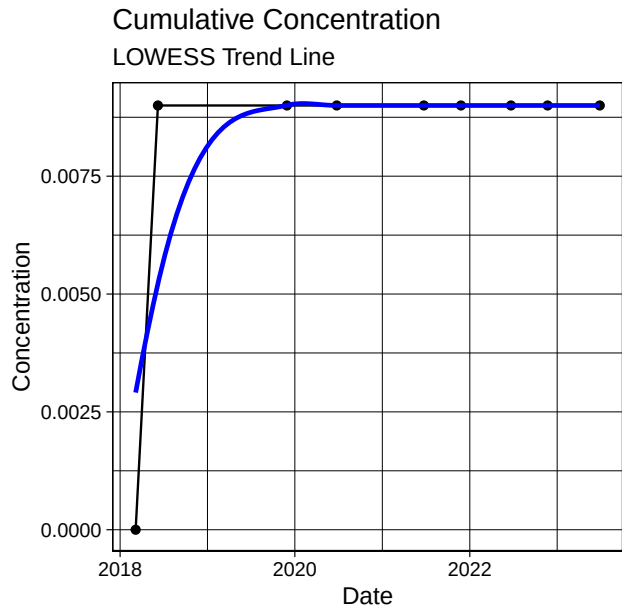
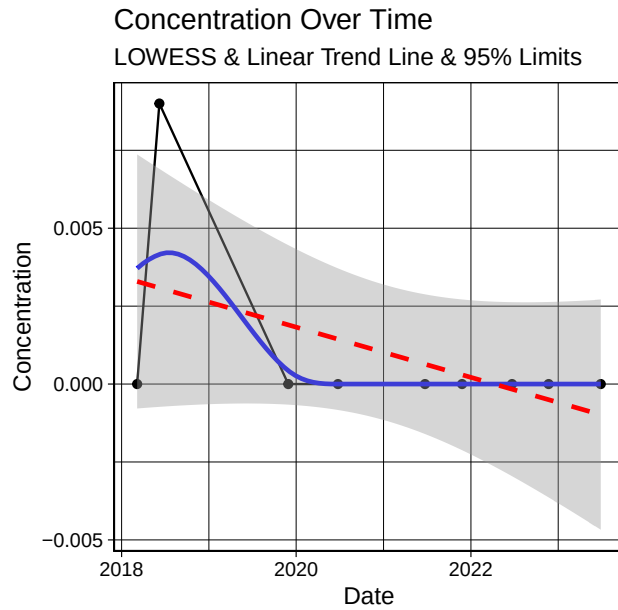
Kendall Trend Test Results Continuous	
n	9
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	NaN
results	NA

Report for ID : MW126 and Analyte : PFOA



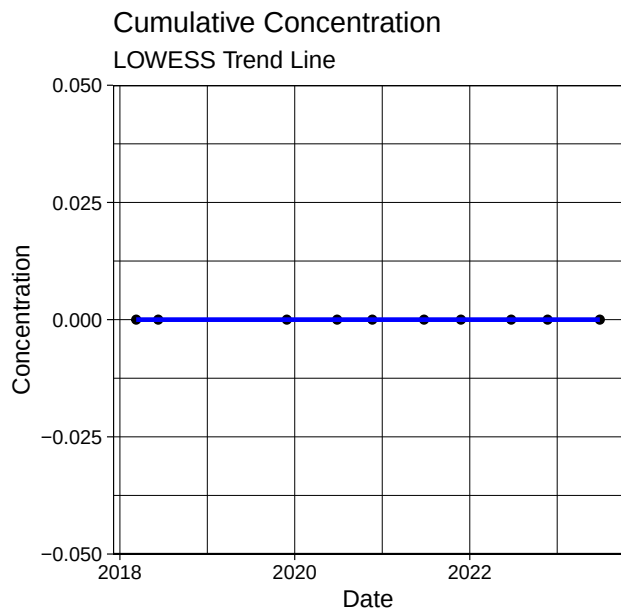
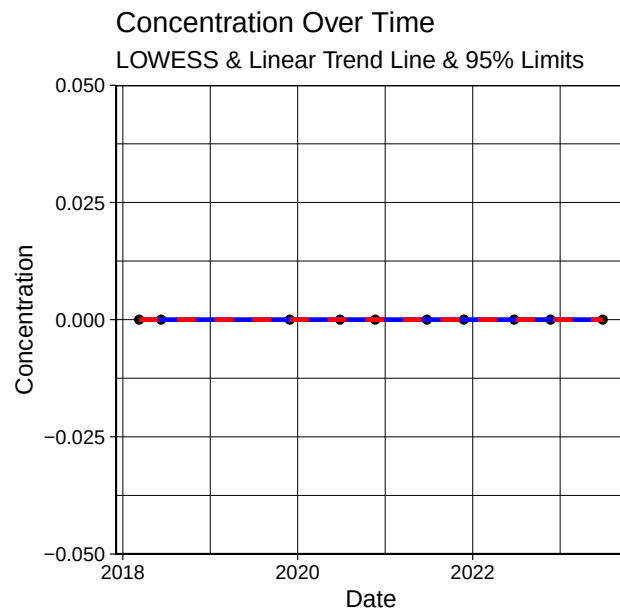
Kendall Trend Test Results Continuous	
n	9
z	-0.97
p	0.33
S	-6
varS	26.67
tau	-0.35
mean	0
sd	0
cov	3
results	NO CLEAR TREND

Report for ID : MW126 and Analyte : PFOS



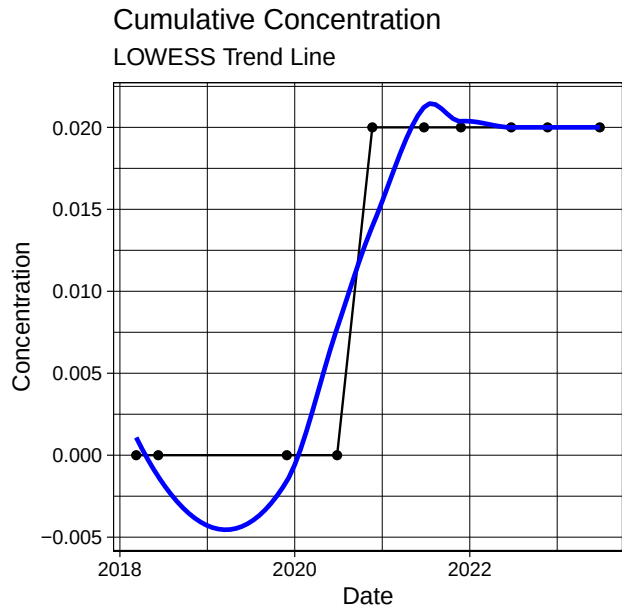
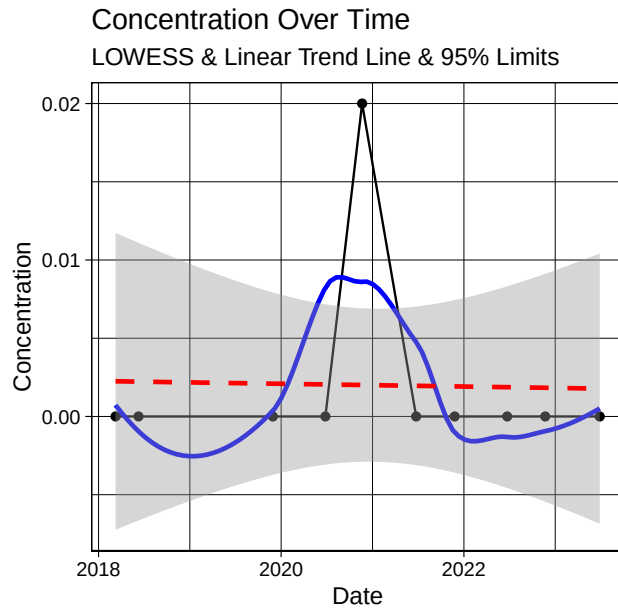
Kendall Trend Test Results Continuous	
n	10
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	NaN
results	NA

Report for ID : MW134 and Analyte : PFOA



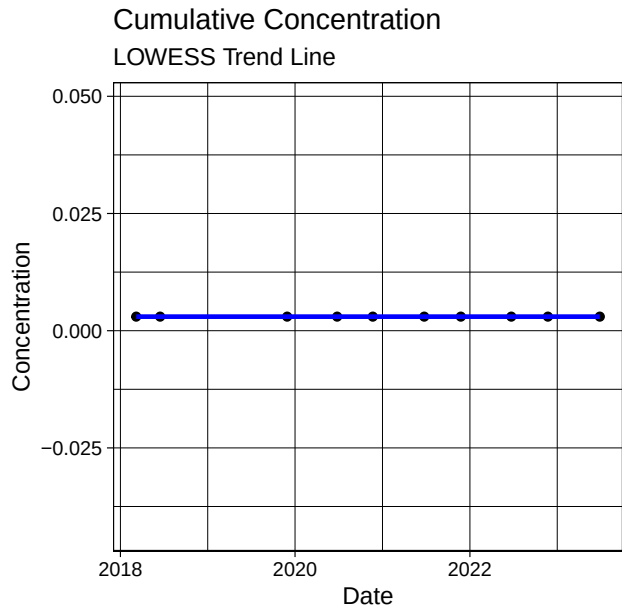
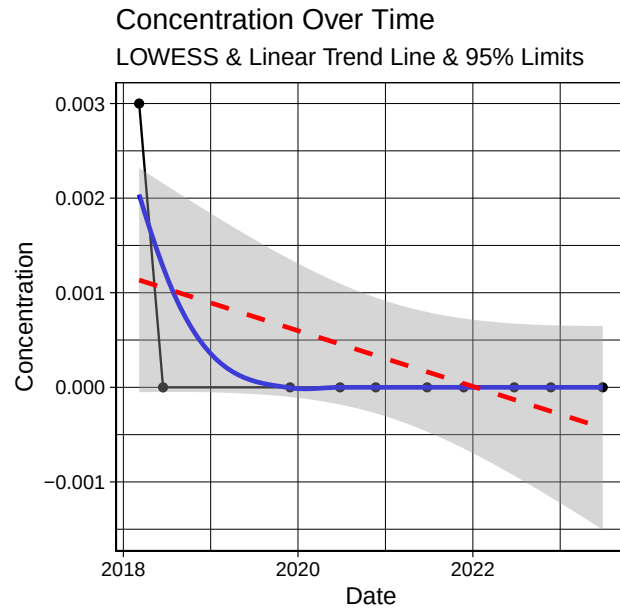
Kendall Trend Test Results Continuous	
n	10
z	0
p	1
S	-1
varS	33
tau	-0.05
mean	0
sd	0.01
cov	3.16
results	NO CLEAR TREND

Report for ID : MW134 and Analyte : PFOS



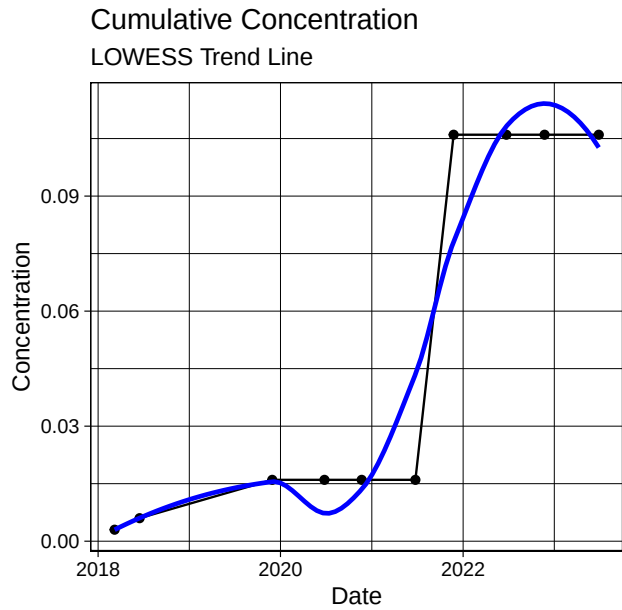
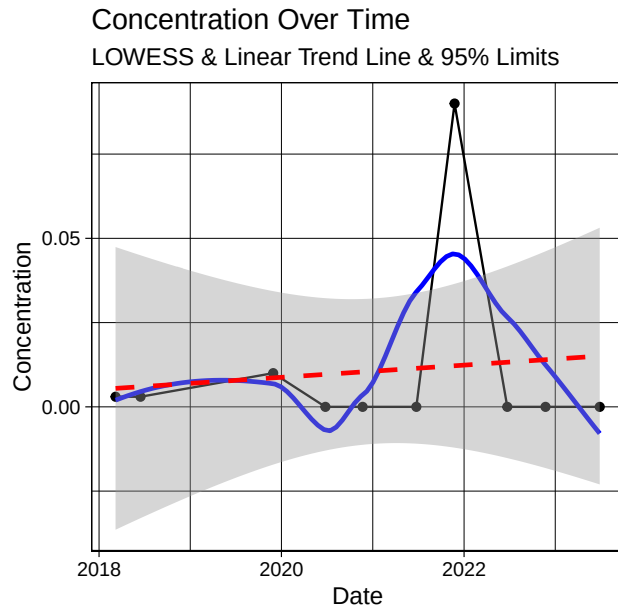
Kendall Trend Test Results Continuous	
n	10
z	-1.39
p	0.16
S	-9
varS	33
tau	-0.45
mean	0
sd	0
cov	3.16
results	NO CLEAR TREND

Report for ID : MW135 and Analyte : PFOA



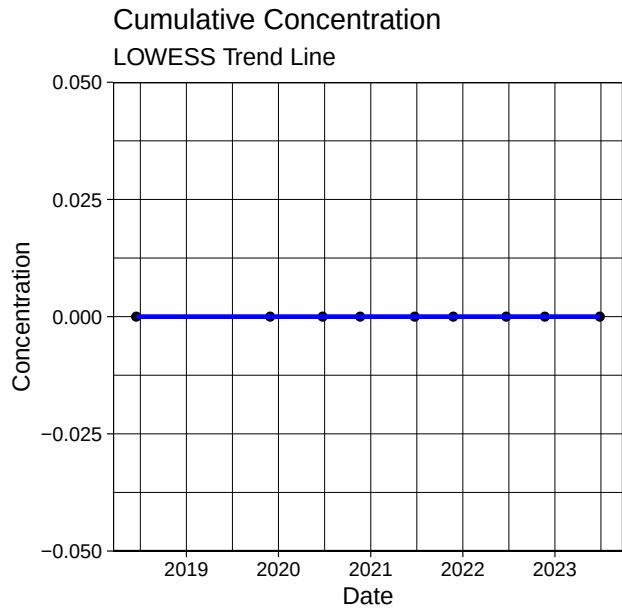
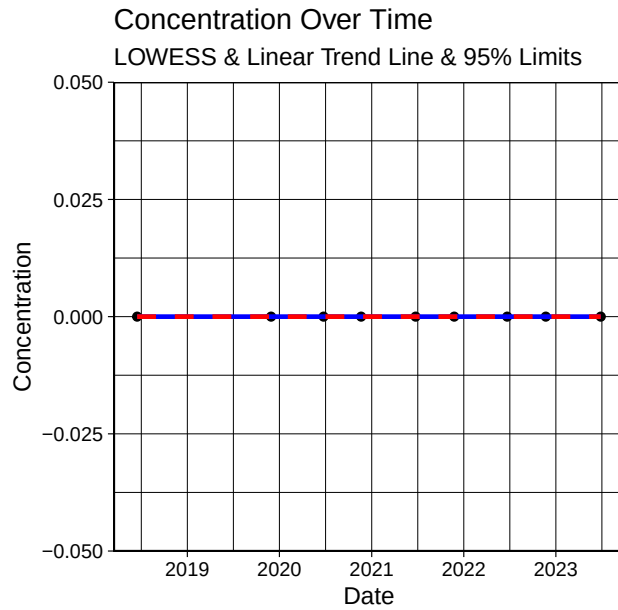
Kendall Trend Test Results Continuous	
n	10
z	-1.23
p	0.22
S	-13
varS	95.67
tau	-0.36
mean	0.01
sd	0.03
cov	2.65
results	NO CLEAR TREND

Report for ID : MW135 and Analyte : PFOS



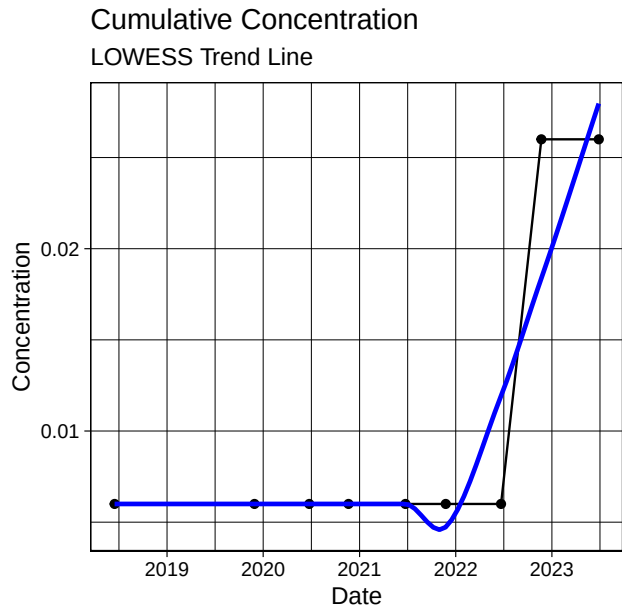
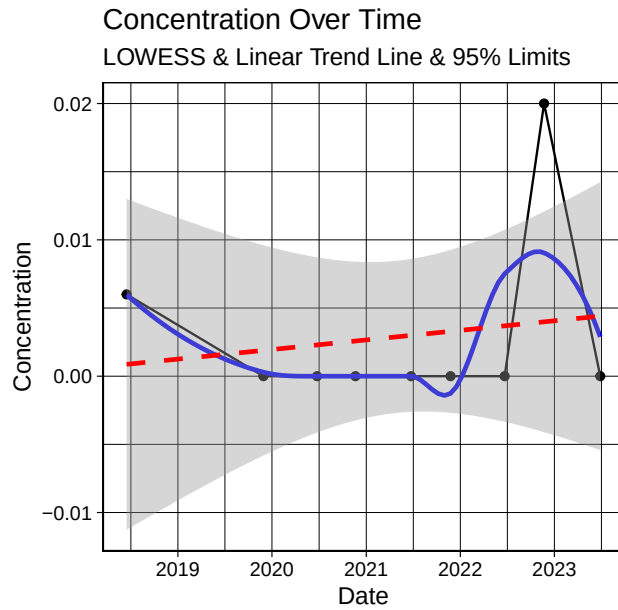
Kendall Trend Test Results Continuous	
n	9
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	NaN
results	NA

Report for ID : MW137 and Analyte : PFOA



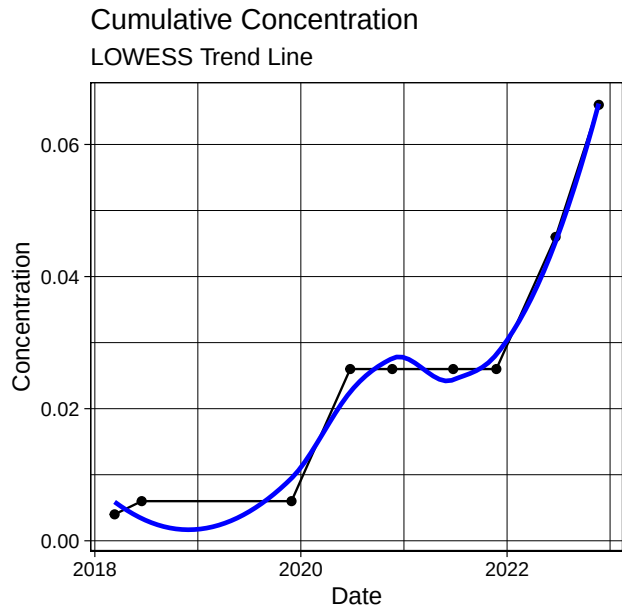
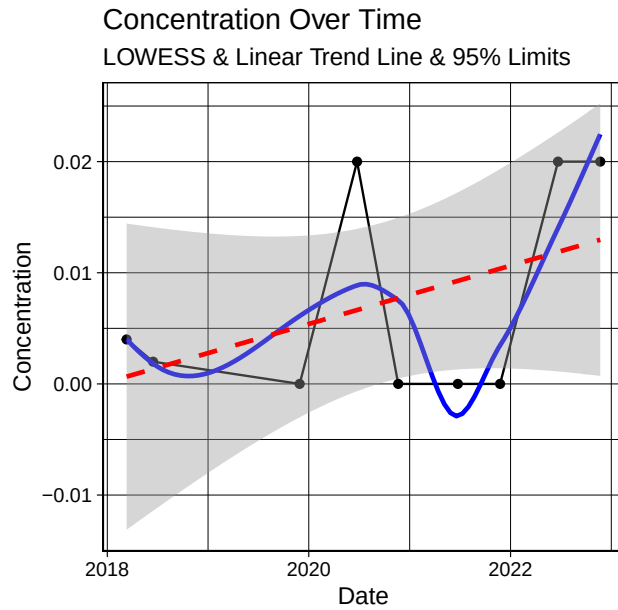
Kendall Trend Test Results Continuous	
n	9
z	0
p	1
S	-1
varS	47.67
tau	-0.04
mean	0
sd	0.01
cov	2.32
results	NO CLEAR TREND

Report for ID : MW137 and Analyte : PFOS



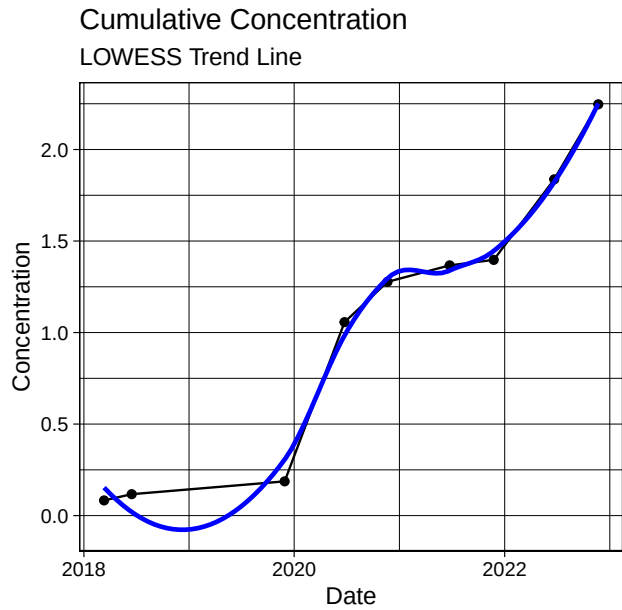
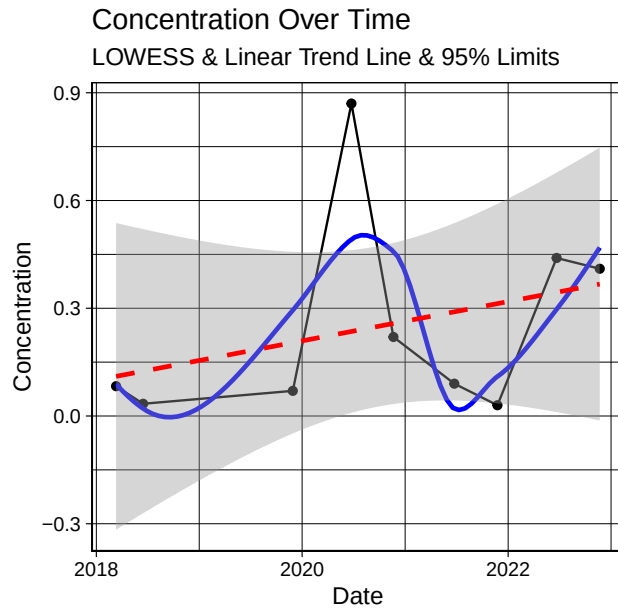
Kendall Trend Test Results Continuous	
n	9
z	0.22
p	0.82
S	3
varS	79.67
tau	0.1
mean	0.01
sd	0.01
cov	1.31
results	NO CLEAR TREND

Report for ID : MW138 and Analyte : PFOA



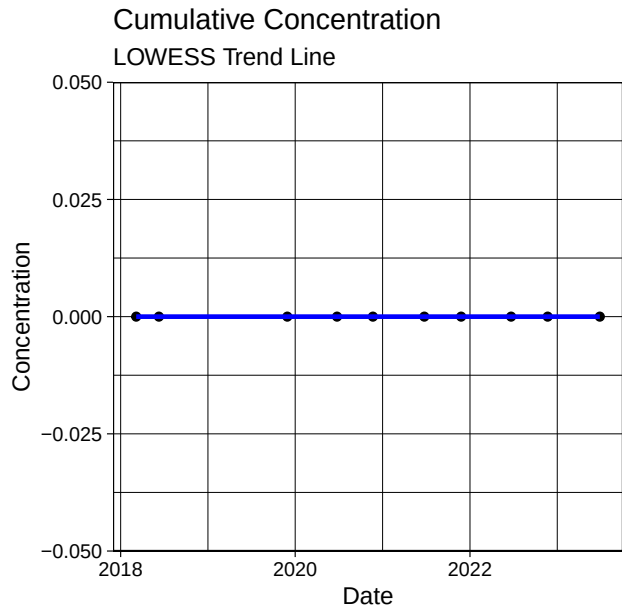
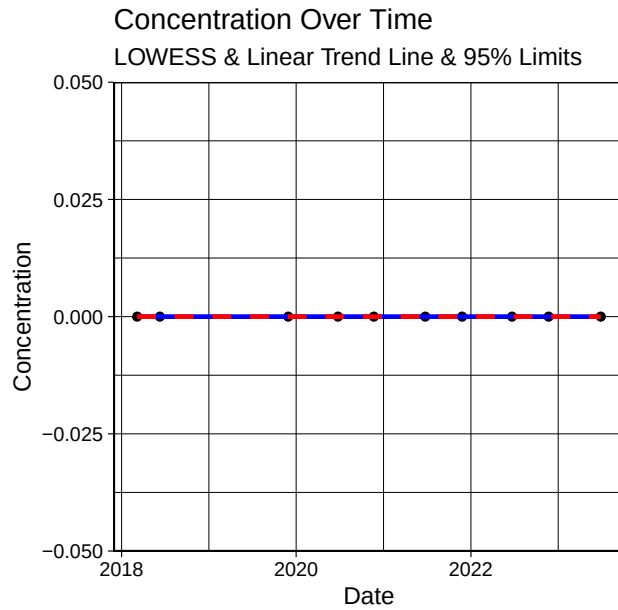
Kendall Trend Test Results Continuous	
n	9
z	0.73
p	0.47
S	8
varS	92
tau	0.22
mean	0.25
sd	0.28
cov	1.12
results	NO CLEAR TREND

Report for ID : MW138 and Analyte : PFOS



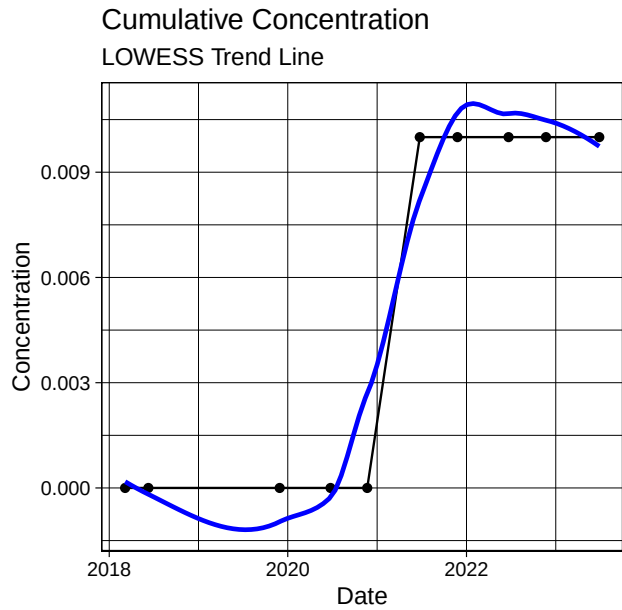
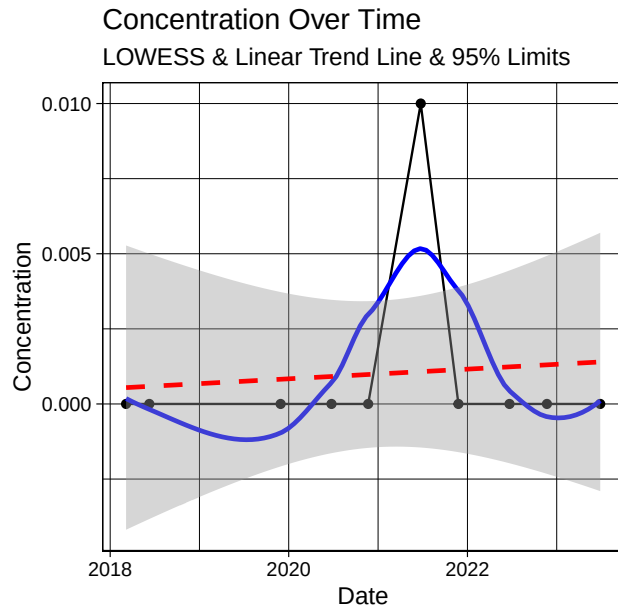
Kendall Trend Test Results Continuous	
n	10
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	NaN
results	NA

Report for ID : MW139 and Analyte : PFOA



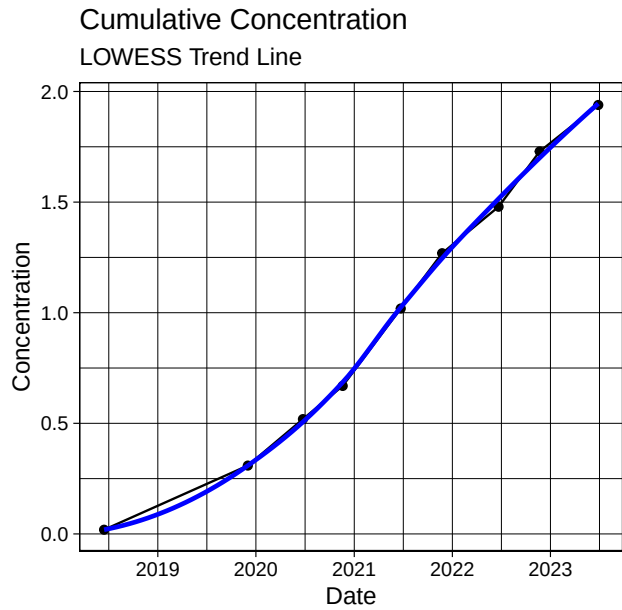
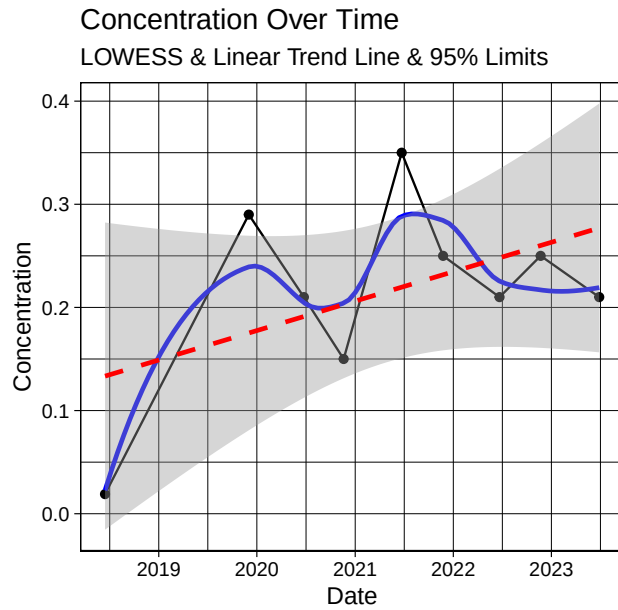
Kendall Trend Test Results Continuous	
n	10
z	0
p	1
S	1
varS	33
tau	0.05
mean	0
sd	0
cov	3.16
results	NO CLEAR TREND

Report for ID : MW139 and Analyte : PFOS



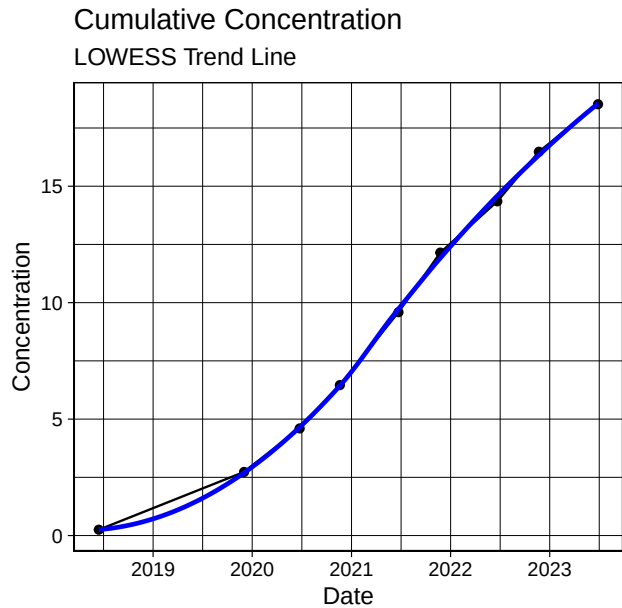
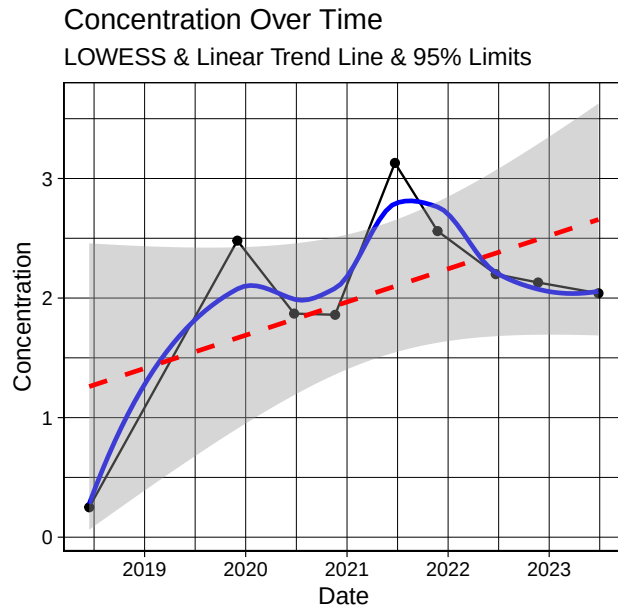
Kendall Trend Test Results Continuous	
n	9
z	0.32
p	0.75
S	4
varS	87.33
tau	0.12
mean	0.22
sd	0.09
cov	0.43
results	NO CLEAR TREND

Report for ID : MW148D and Analyte : PFOA



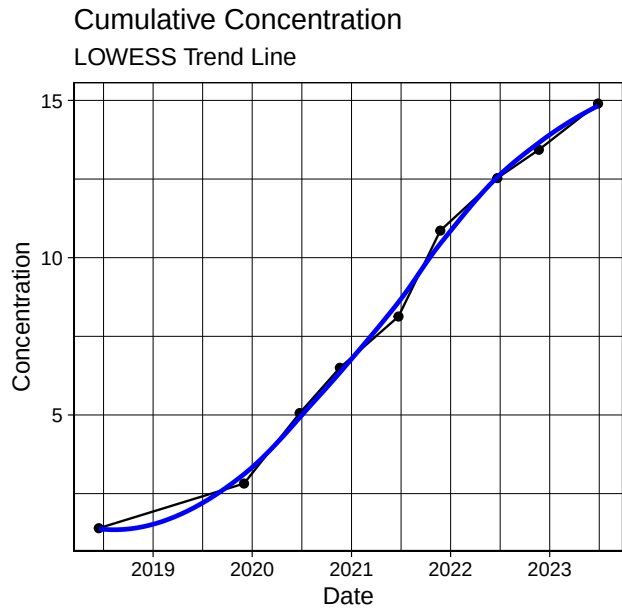
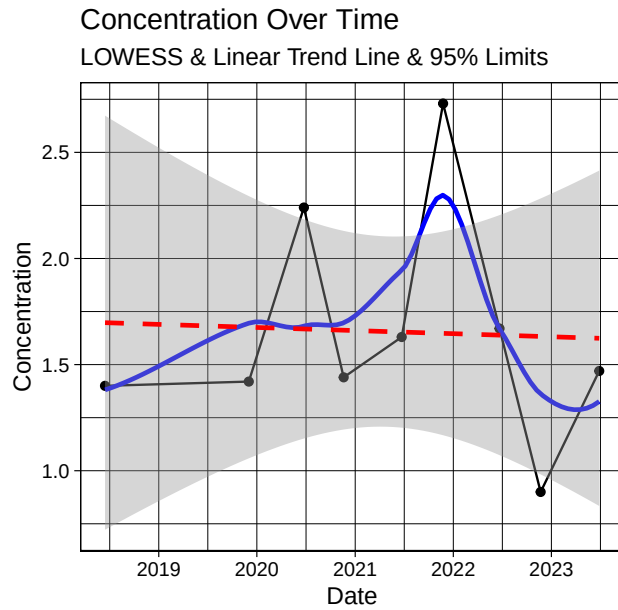
Kendall Trend Test Results Continuous	
n	9
z	0.31
p	0.75
S	4
varS	92
tau	0.11
mean	2.06
sd	0.79
cov	0.38
results	NO CLEAR TREND

Report for ID : MW148D and Analyte : PFOS



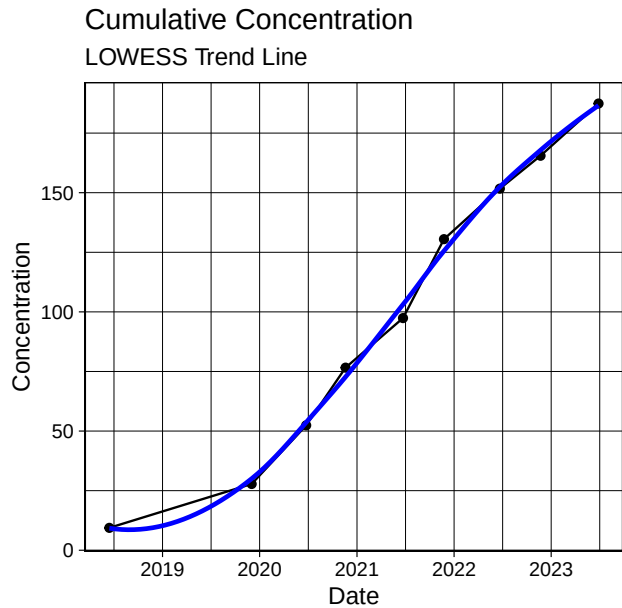
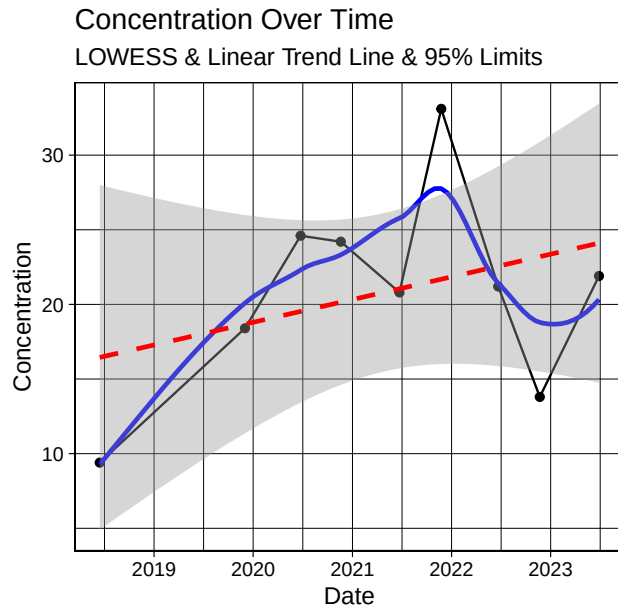
Kendall Trend Test Results Continuous	
n	9
z	0.52
p	0.6
S	6
varS	92
tau	0.17
mean	1.66
sd	0.53
cov	0.32
results	NO CLEAR TREND

Report for ID : MW148S and Analyte : PFOA



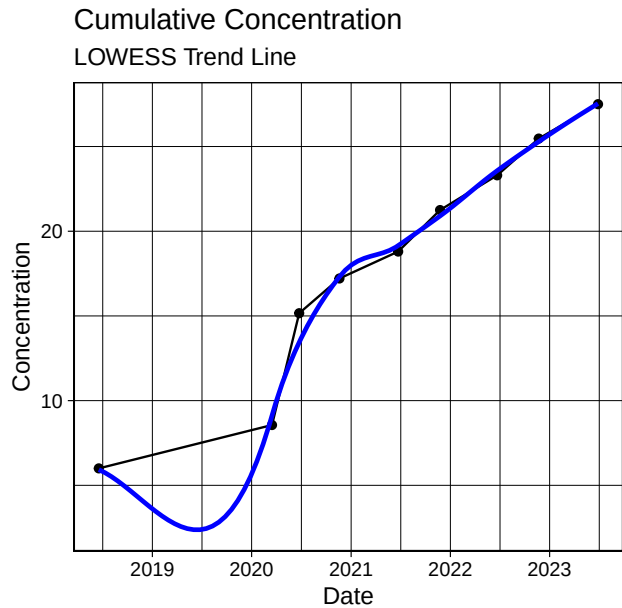
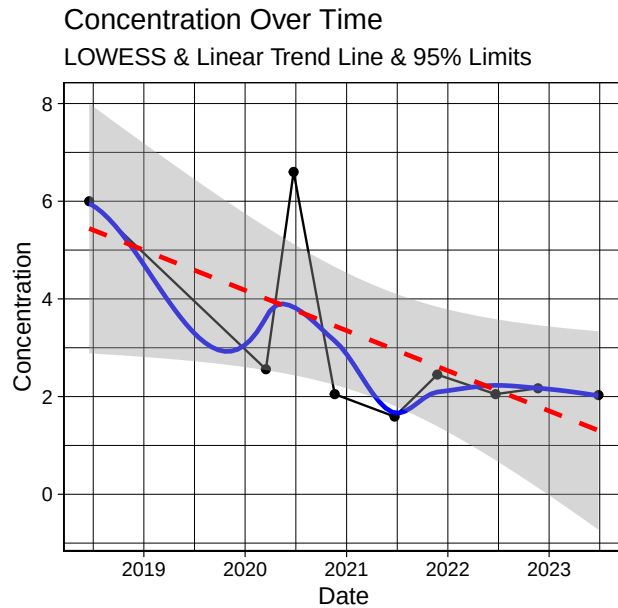
Kendall Trend Test Results Continuous	
n	9
z	0.52
p	0.6
S	6
varS	92
tau	0.17
mean	20.82
sd	6.74
cov	0.32
results	NO CLEAR TREND

Report for ID : MW148S and Analyte : PFOS



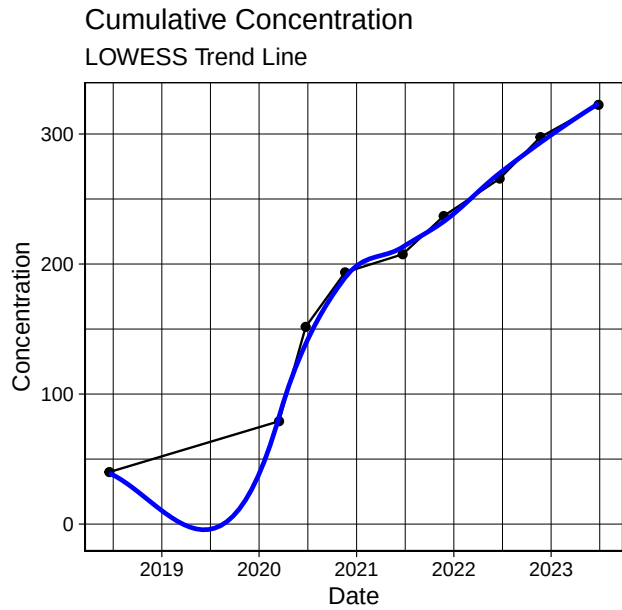
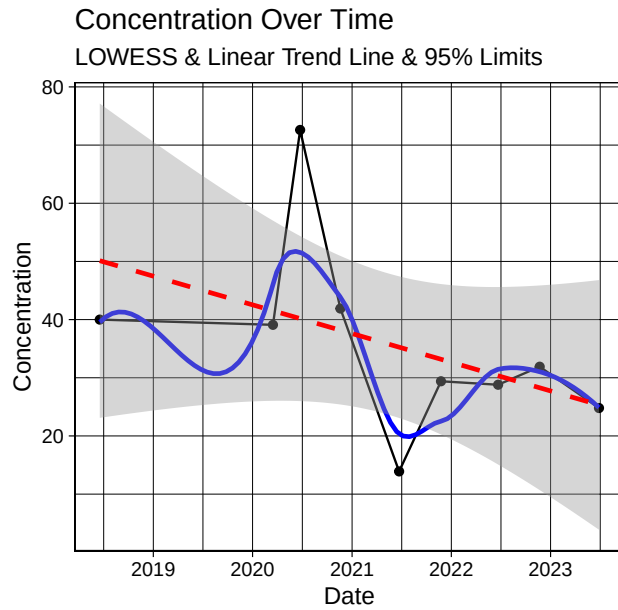
Kendall Trend Test Results Continuous	
n	9
z	-1.68
p	0.09
S	-17
varS	91
tau	-0.48
mean	3.06
sd	1.87
cov	0.61
results	POSSIBLY DECREASING

Report for ID : MW151 and Analyte : PFOA



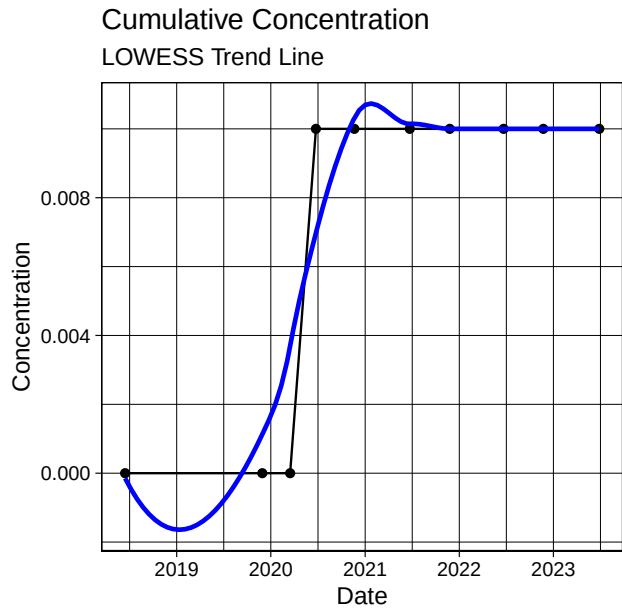
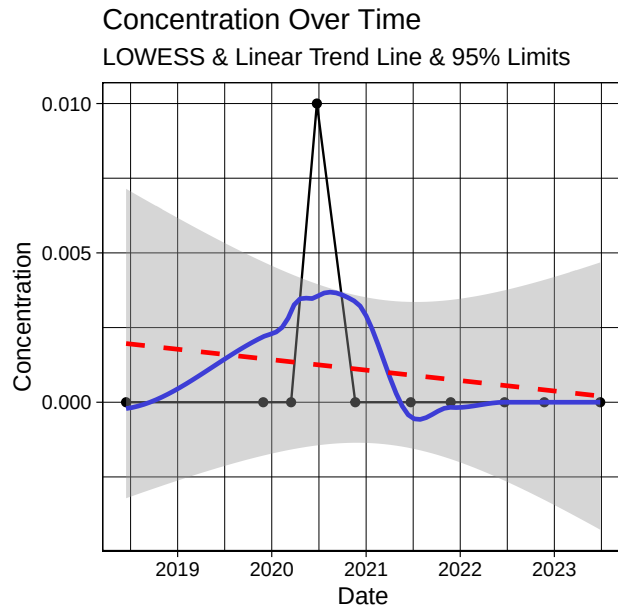
Kendall Trend Test Results Continuous	
n	9
z	-1.56
p	0.12
S	-16
varS	92
tau	-0.44
mean	35.82
sd	16.3
cov	0.46
results	STABLE

Report for ID : MW151 and Analyte : PFOS



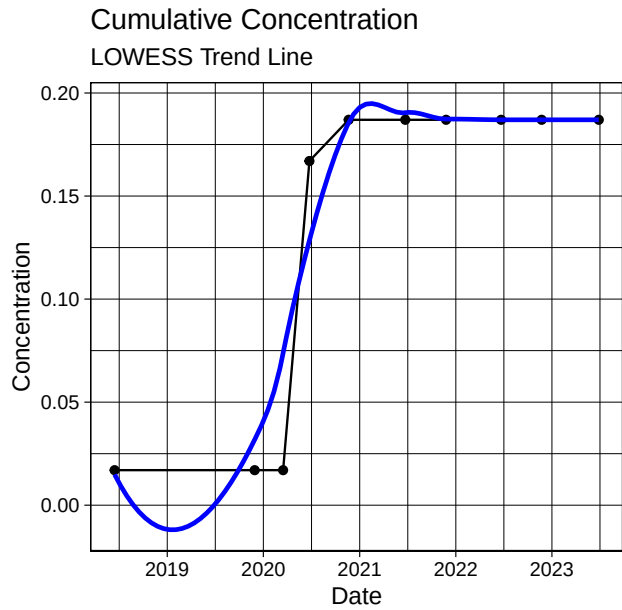
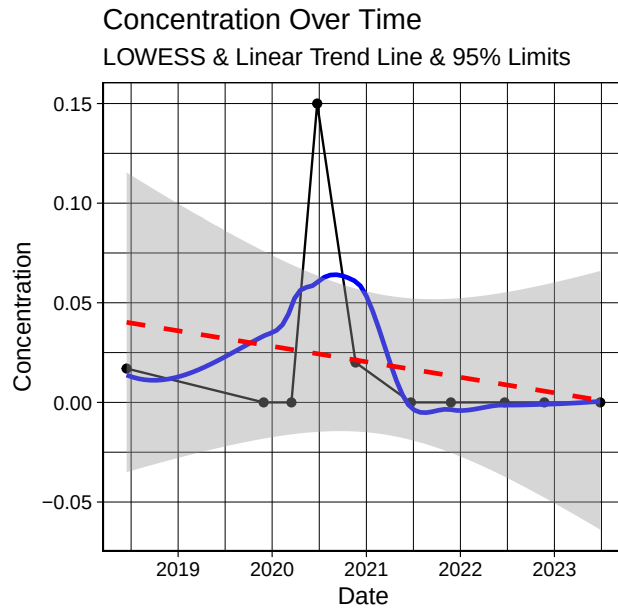
Kendall Trend Test Results Continuous	
n	10
z	-0.35
p	0.73
S	-3
varS	33
tau	-0.15
mean	0
sd	0
cov	3.16
results	NO CLEAR TREND

Report for ID : MW159 and Analyte : PFOA



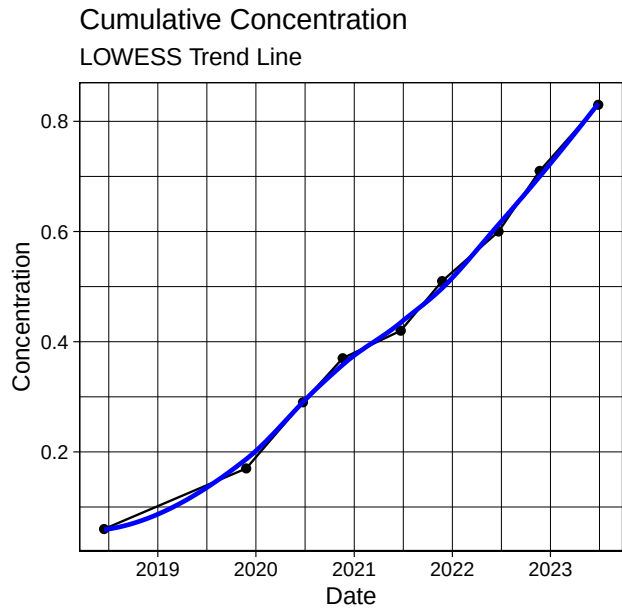
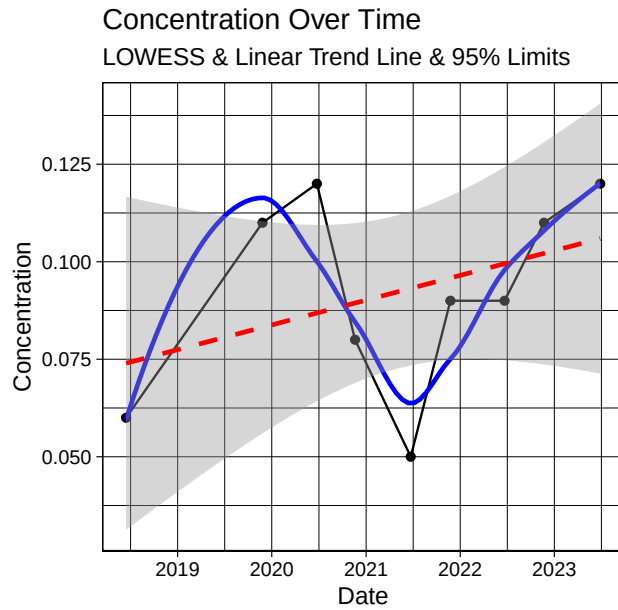
Kendall Trend Test Results Continuous	
n	10
z	-1.22
p	0.22
S	-12
varS	80.67
tau	-0.37
mean	0.02
sd	0.05
cov	2.5
results	NO CLEAR TREND

Report for ID : MW159 and Analyte : PFOS



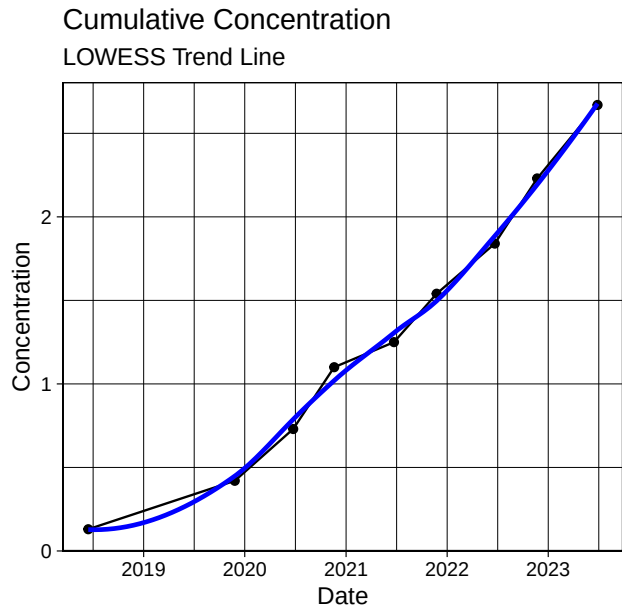
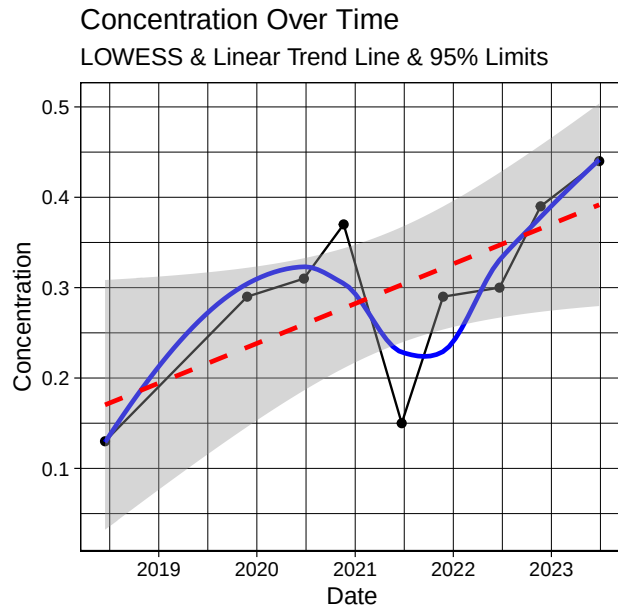
Kendall Trend Test Results Continuous	
n	9
z	1.06
p	0.29
S	11
varS	89
tau	0.32
mean	0.09
sd	0.03
cov	0.28
results	NO CLEAR TREND

Report for ID : MW162 and Analyte : PFOA



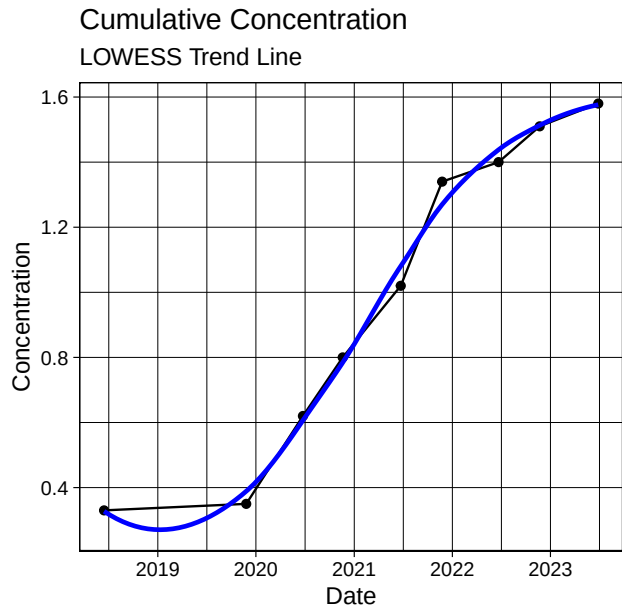
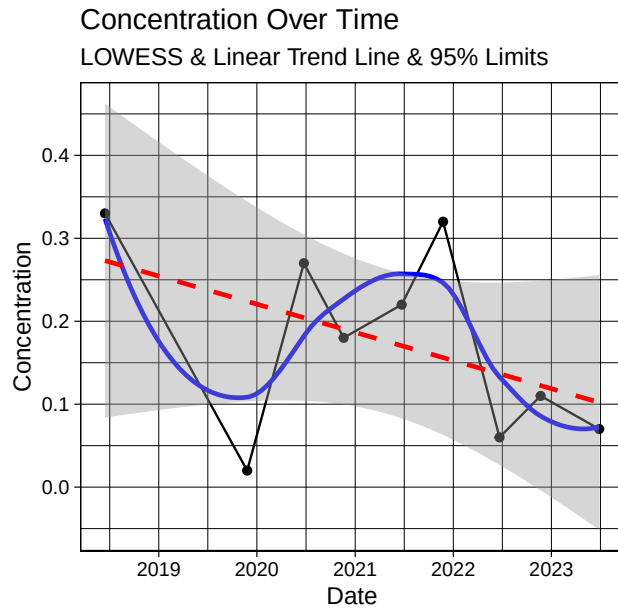
Kendall Trend Test Results Continuous	
n	9
z	2.1
p	0.04
S	21
varS	91
tau	0.59
mean	0.3
sd	0.1
cov	0.35
results	INCREASING

Report for ID : MW162 and Analyte : PFOS



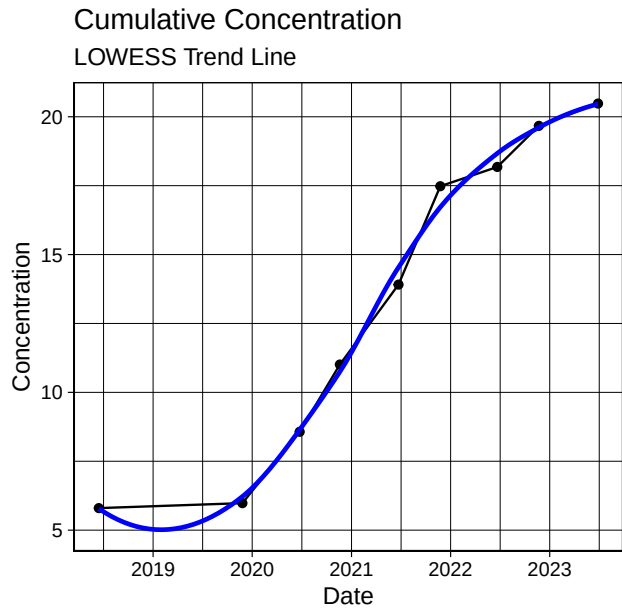
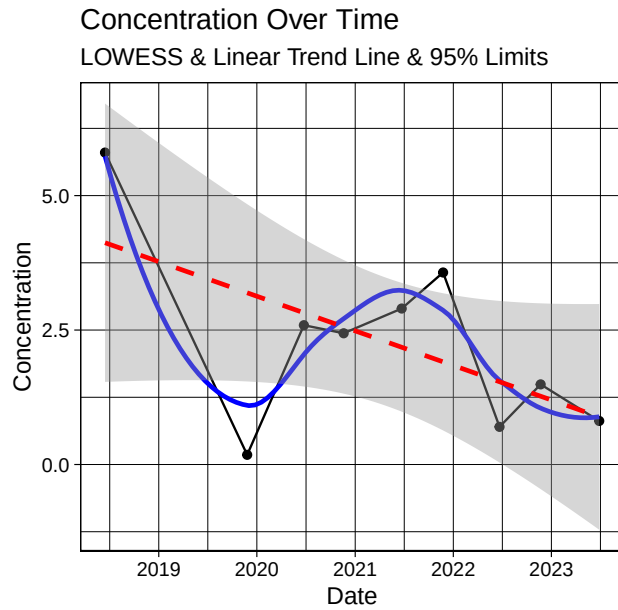
Kendall Trend Test Results Continuous	
n	9
z	-0.94
p	0.35
S	-10
varS	92
tau	-0.28
mean	0.18
sd	0.12
cov	0.66
results	STABLE

Report for ID : MW163 and Analyte : PFOA



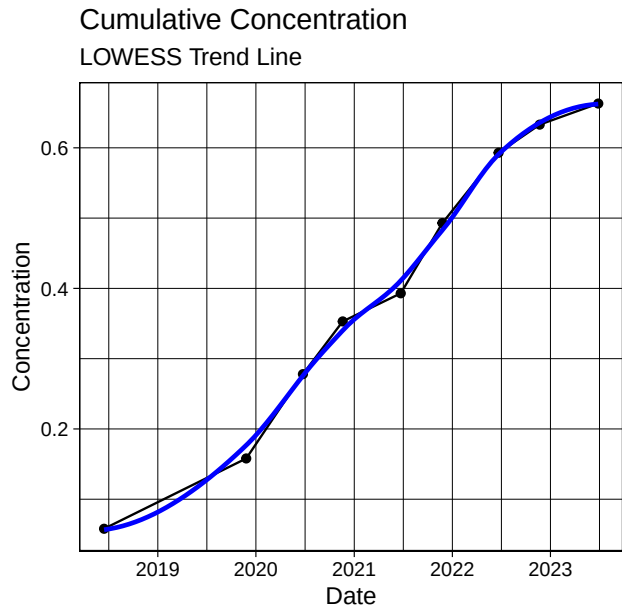
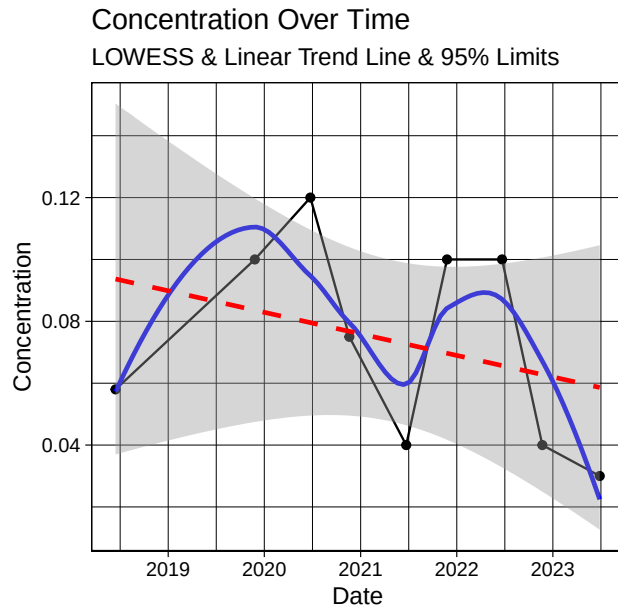
Kendall Trend Test Results Continuous	
n	9
z	-0.73
p	0.47
S	-8
varS	92
tau	-0.22
mean	2.28
sd	1.74
cov	0.77
results	STABLE

Report for ID : MW163 and Analyte : PFOS



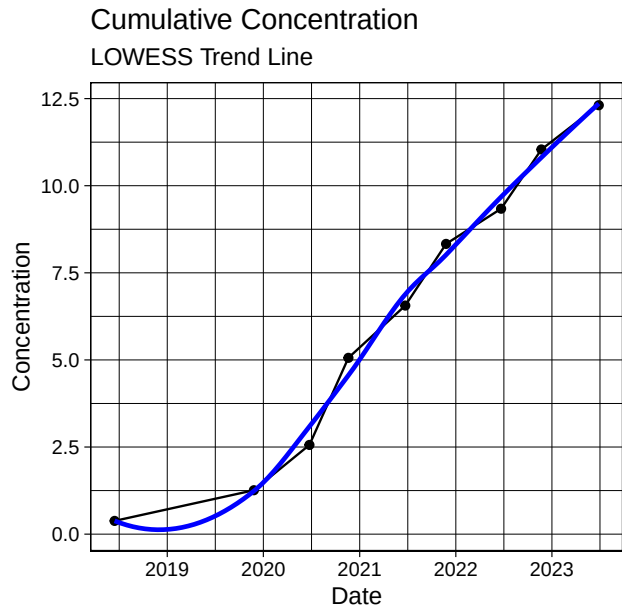
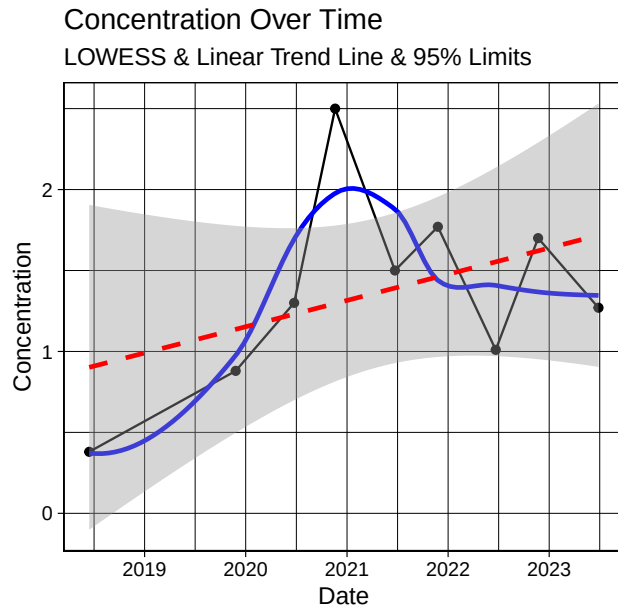
Kendall Trend Test Results Continuous	
n	9
z	-1.18
p	0.24
S	-12
varS	87.33
tau	-0.35
mean	0.07
sd	0.03
cov	0.45
results	STABLE

Report for ID : MW164 and Analyte : PFOA



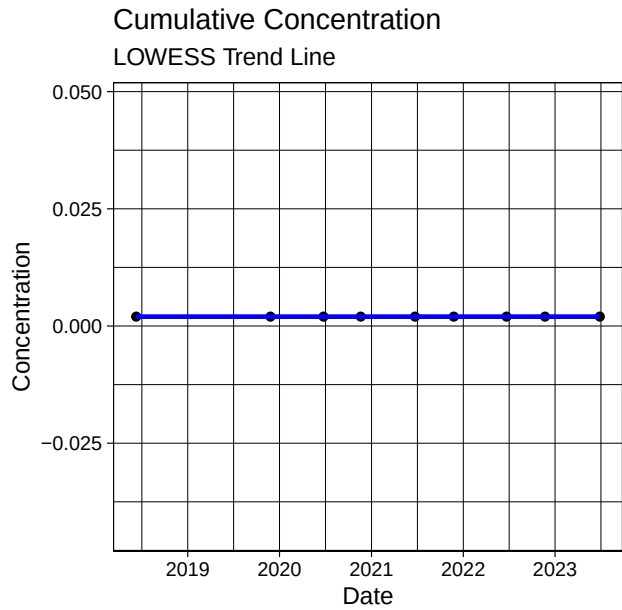
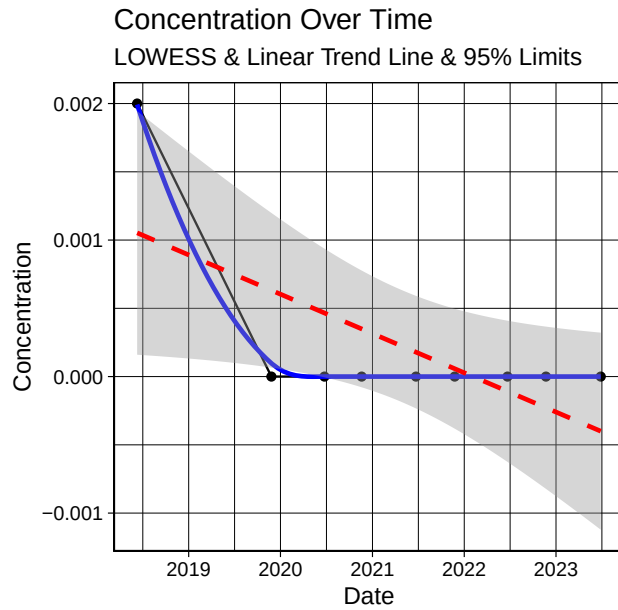
Kendall Trend Test Results Continuous	
n	9
z	0.94
p	0.35
S	10
varS	92
tau	0.28
mean	1.37
sd	0.6
cov	0.44
results	NO CLEAR TREND

Report for ID : MW164 and Analyte : PFOS



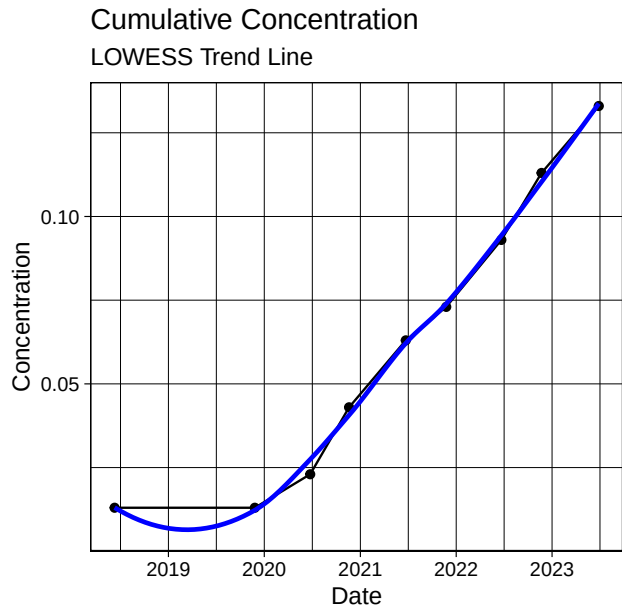
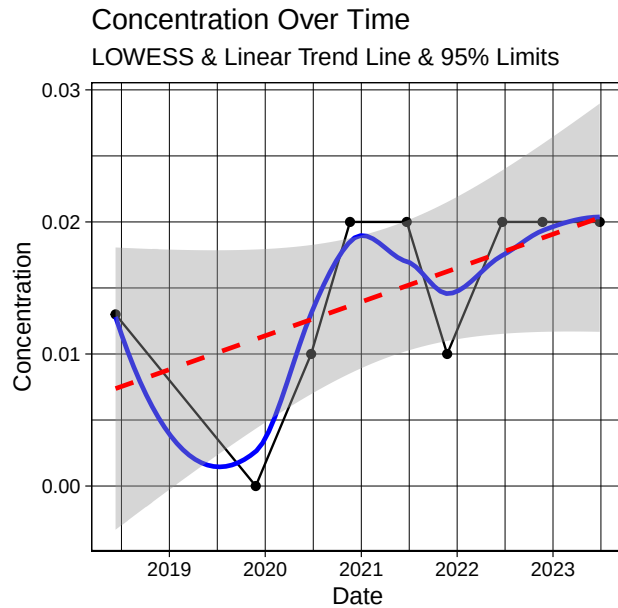
Kendall Trend Test Results Continuous	
n	9
z	-1.36
p	0.18
S	-8
varS	26.67
tau	-0.47
mean	0
sd	0
cov	3
results	NO CLEAR TREND

Report for ID : MW165 and Analyte : PFOA



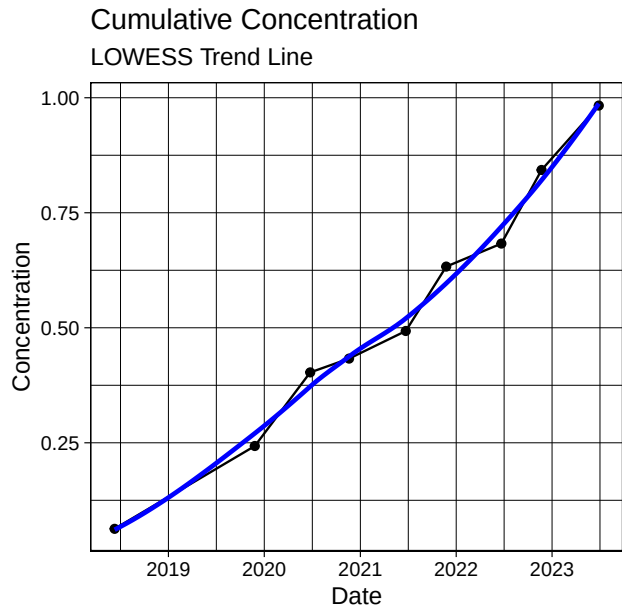
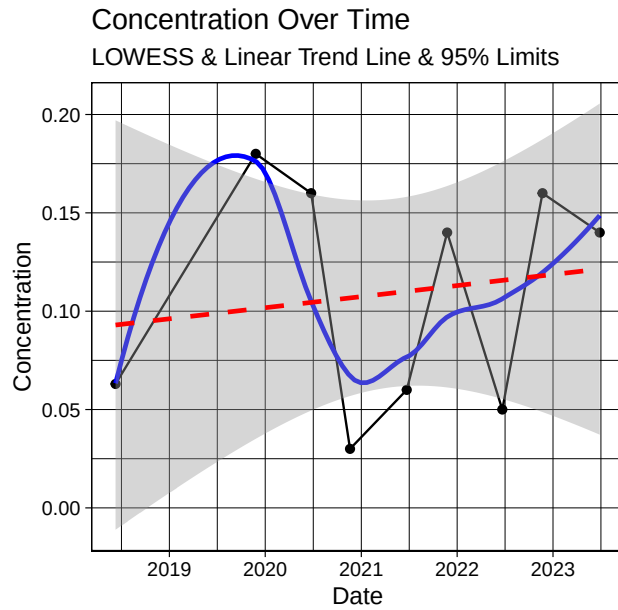
Kendall Trend Test Results Continuous	
n	9
z	1.62
p	0.1
S	15
varS	74.33
tau	0.5
mean	0.01
sd	0.01
cov	0.48
results	NO CLEAR TREND

Report for ID : MW165 and Analyte : PFOS



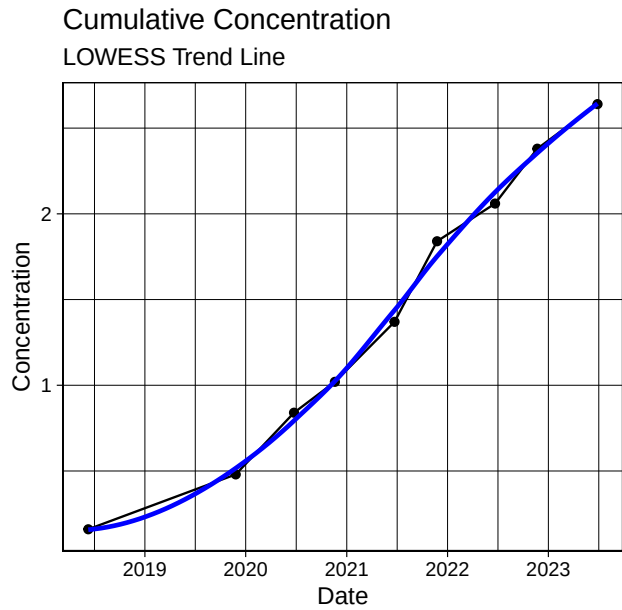
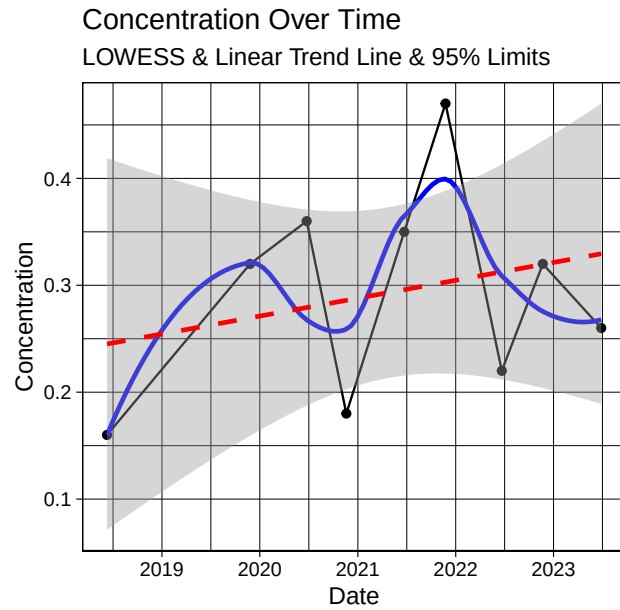
Kendall Trend Test Results Continuous	
n	9
z	-0.11
p	0.92
S	-2
varS	90
tau	-0.06
mean	0.11
sd	0.06
cov	0.53
results	STABLE

Report for ID : MW166 and Analyte : PFOA



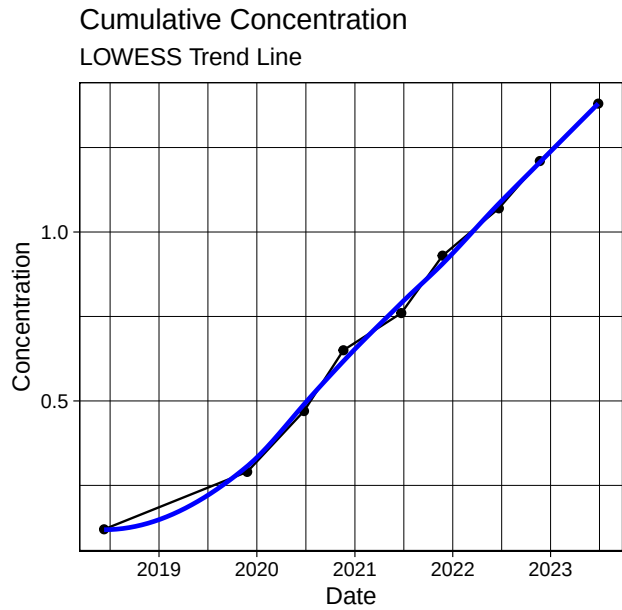
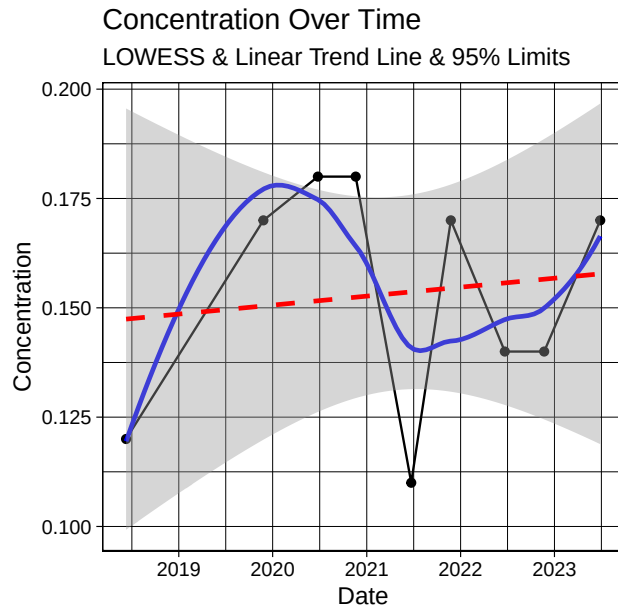
Kendall Trend Test Results Continuous	
n	9
z	0.42
p	0.67
S	5
varS	91
tau	0.14
mean	0.29
sd	0.1
cov	0.34
results	NO CLEAR TREND

Report for ID : MW166 and Analyte : PFOS



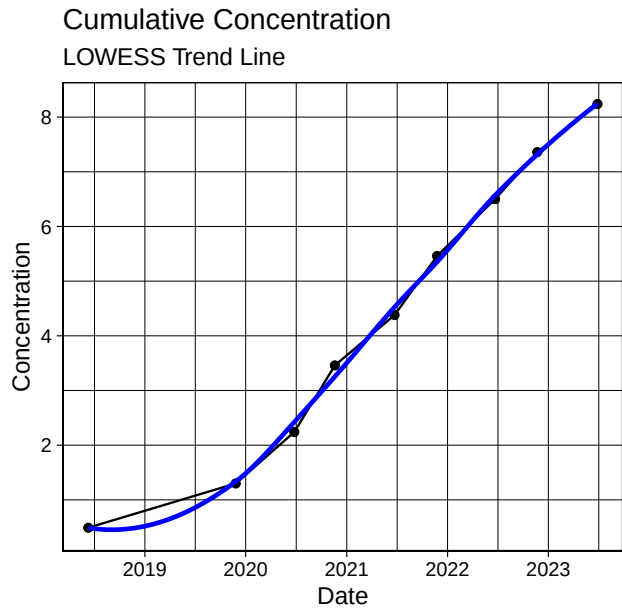
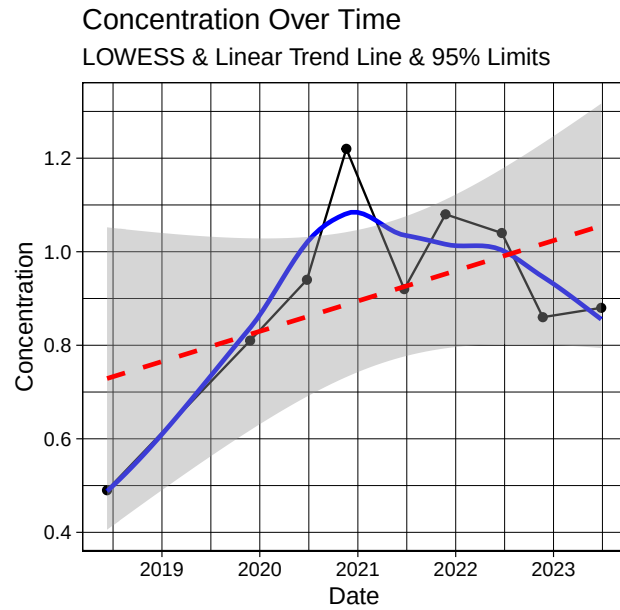
Kendall Trend Test Results Continuous	
n	9
z	0
p	1
S	-1
varS	86.33
tau	-0.03
mean	0.15
sd	0.03
cov	0.17
results	STABLE

Report for ID : MW167 and Analyte : PFOA



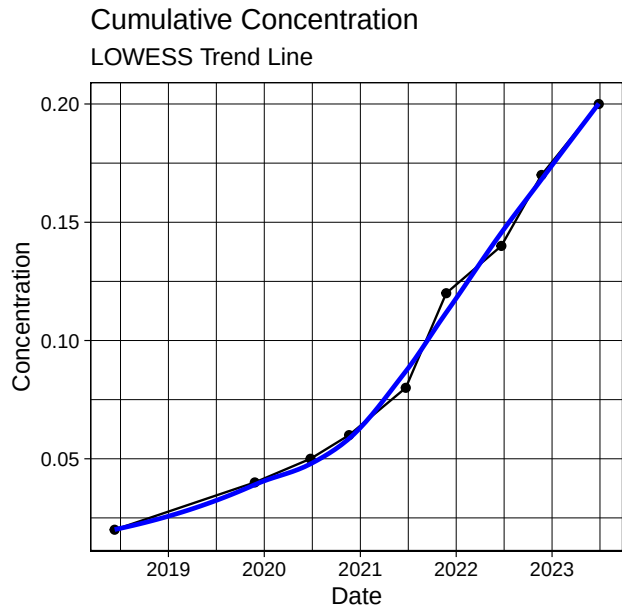
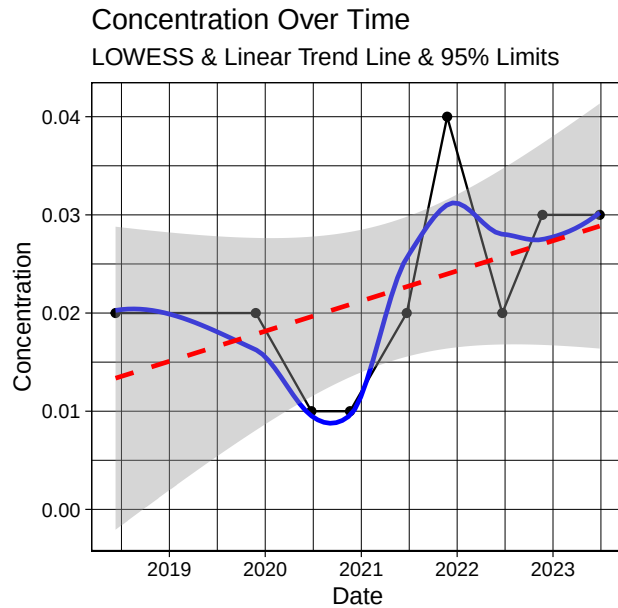
Kendall Trend Test Results Continuous	
n	9
z	0.52
p	0.6
S	6
varS	92
tau	0.17
mean	0.92
sd	0.2
cov	0.22
results	NO CLEAR TREND

Report for ID : MW167 and Analyte : PFOS



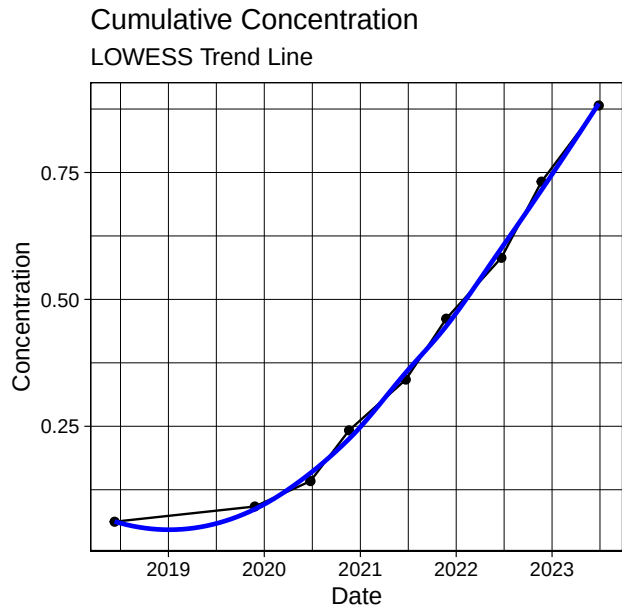
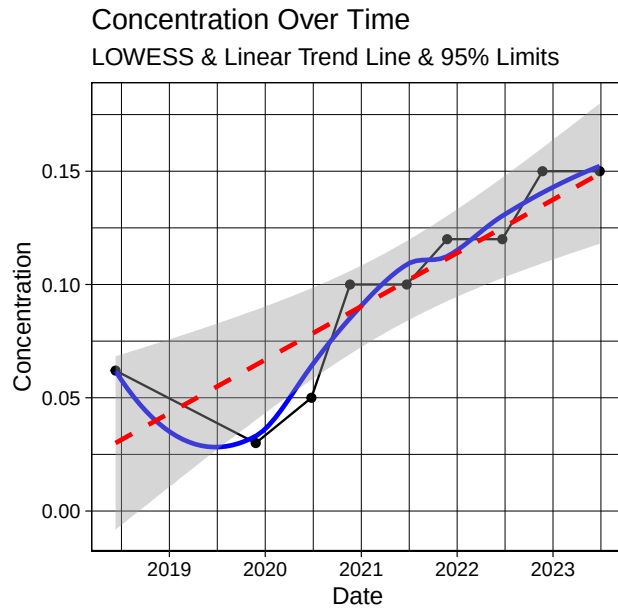
Kendall Trend Test Results Continuous	
n	9
z	1.44
p	0.15
S	14
varS	81.33
tau	0.44
mean	0.02
sd	0.01
cov	0.44
results	NO CLEAR TREND

Report for ID : MW168 and Analyte : PFOA



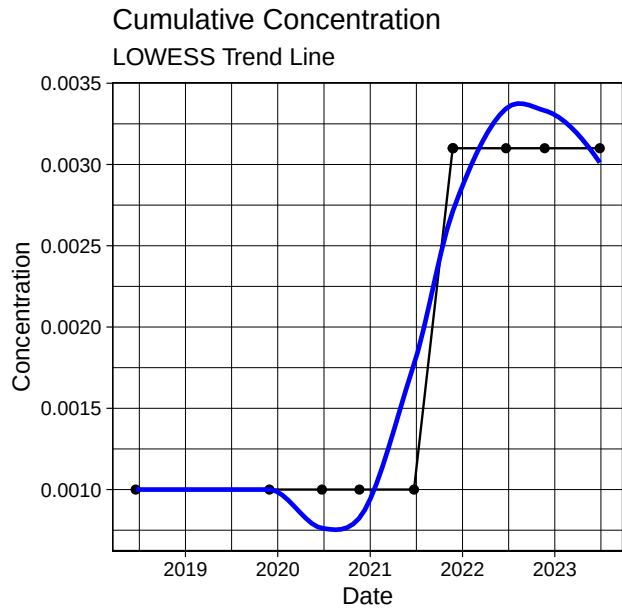
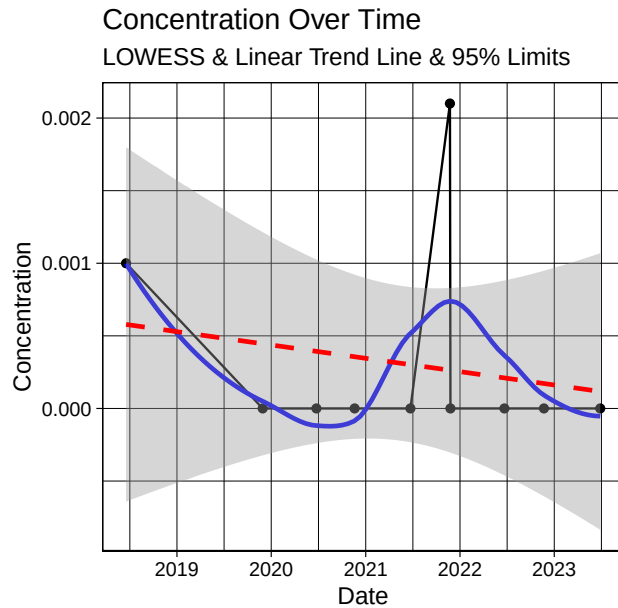
Kendall Trend Test Results Continuous	
n	9
z	2.97
p	0
S	29
varS	89
tau	0.84
mean	0.1
sd	0.04
cov	0.44
results	INCREASING

Report for ID : MW168 and Analyte : PFOS



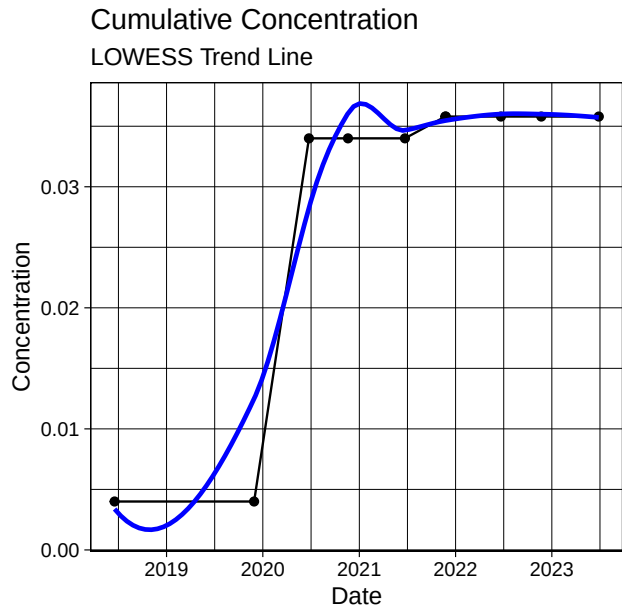
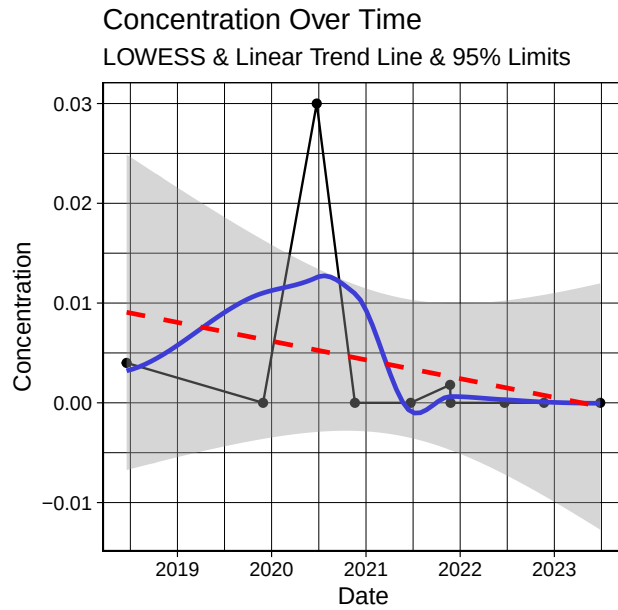
Kendall Trend Test Results Continuous	
n	10
z	-0.78
p	0.44
S	-7
varS	59.67
tau	-0.25
mean	0
sd	0
cov	2.27
results	NO CLEAR TREND

Report for ID : MW170 and Analyte : PFOA



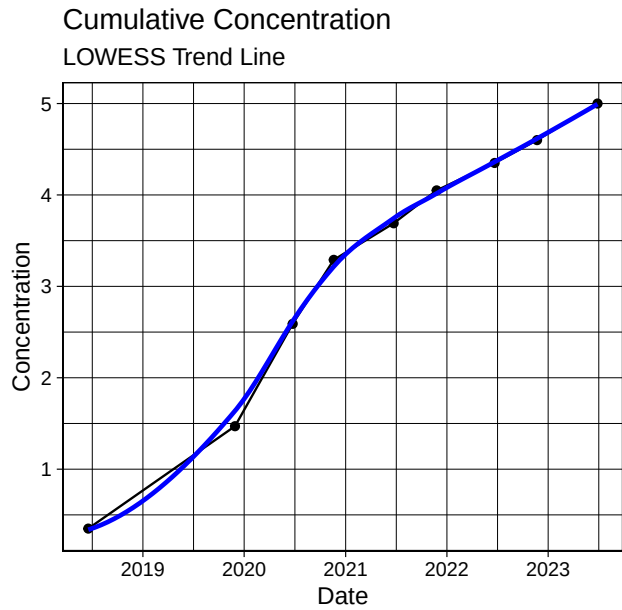
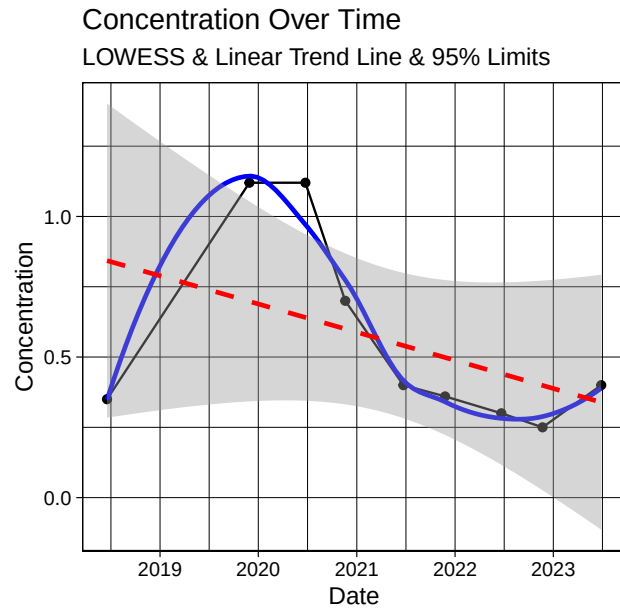
Kendall Trend Test Results Continuous	
n	10
z	-1.45
p	0.15
S	-14
varS	80.67
tau	-0.43
mean	0
sd	0.01
cov	2.62
results	NO CLEAR TREND

Report for ID : MW170 and Analyte : PFOS



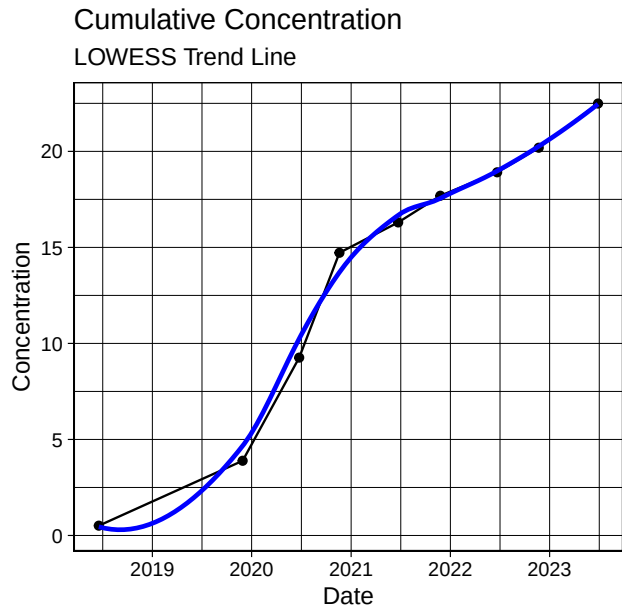
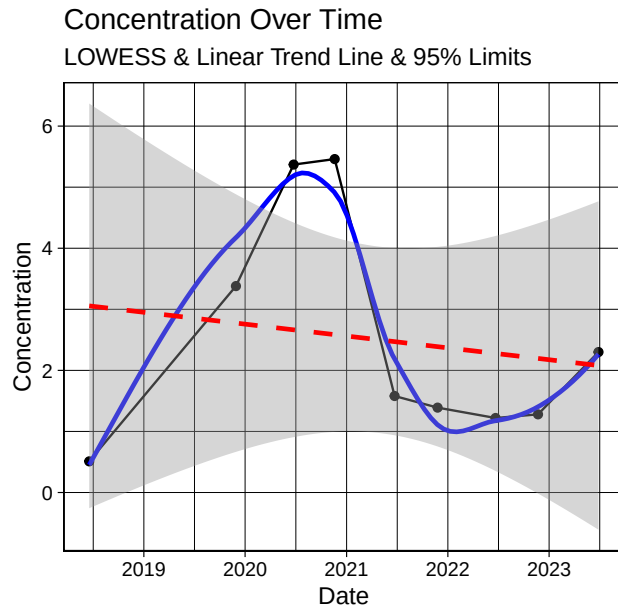
Kendall Trend Test Results Continuous	
n	9
z	-1.58
p	0.11
S	-16
varS	90
tau	-0.46
mean	0.56
sd	0.34
cov	0.62
results	STABLE

Report for ID : MW172 and Analyte : PFOA



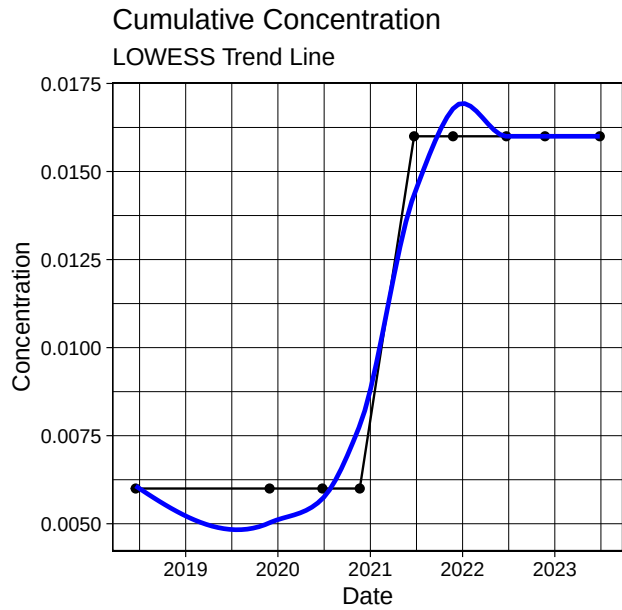
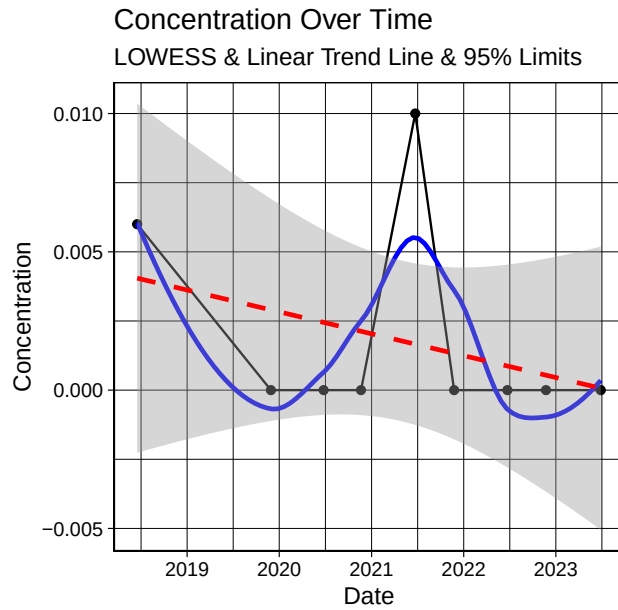
Kendall Trend Test Results Continuous	
n	9
z	-0.31
p	0.75
S	-4
varS	92
tau	-0.11
mean	2.5
sd	1.84
cov	0.73
results	STABLE

Report for ID : MW172 and Analyte : PFOS



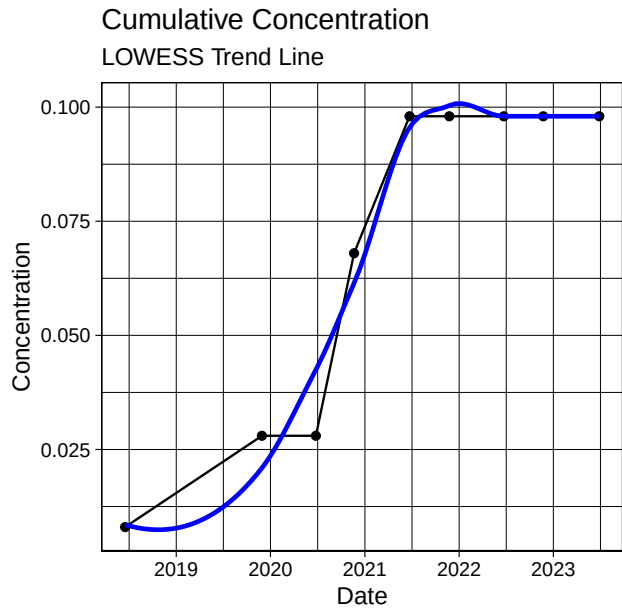
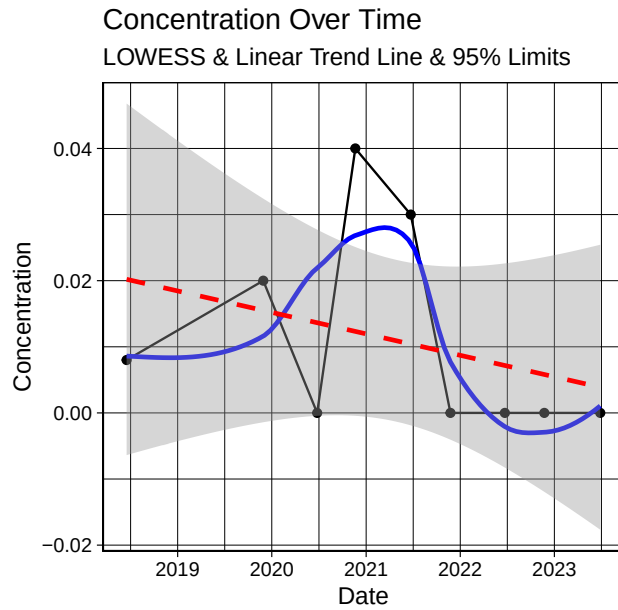
Kendall Trend Test Results Continuous	
n	9
z	-0.87
p	0.38
S	-7
varS	47.67
tau	-0.3
mean	0
sd	0
cov	2.06
results	NO CLEAR TREND

Report for ID : MW175 and Analyte : PFOA



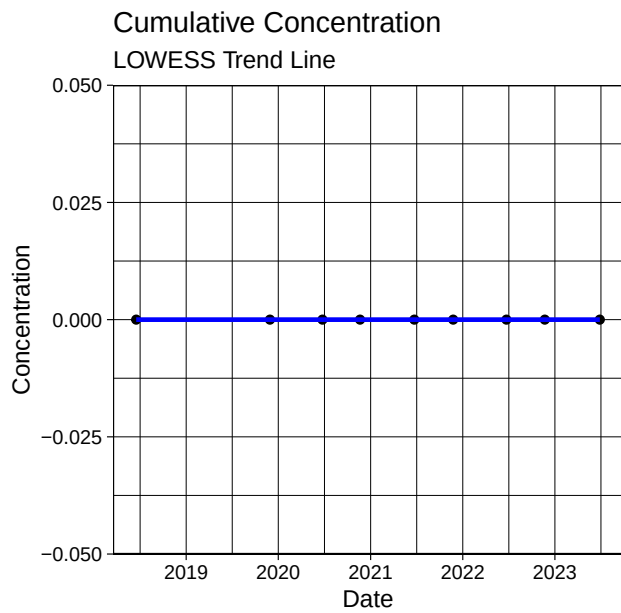
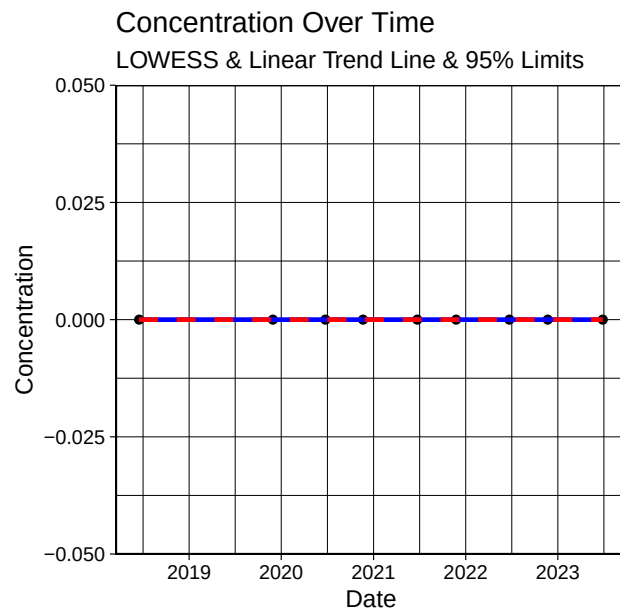
Kendall Trend Test Results Continuous	
n	9
z	-1.27
p	0.21
S	-12
varS	75.33
tau	-0.39
mean	0.01
sd	0.02
cov	1.41
results	NO CLEAR TREND

Report for ID : MW175 and Analyte : PFOS



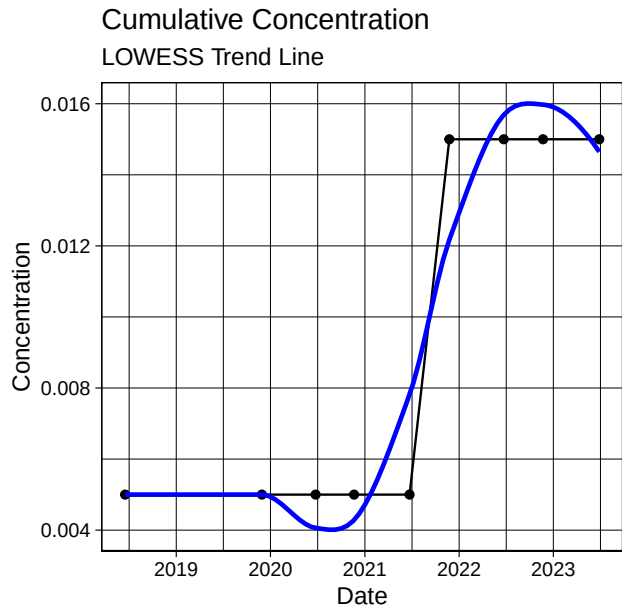
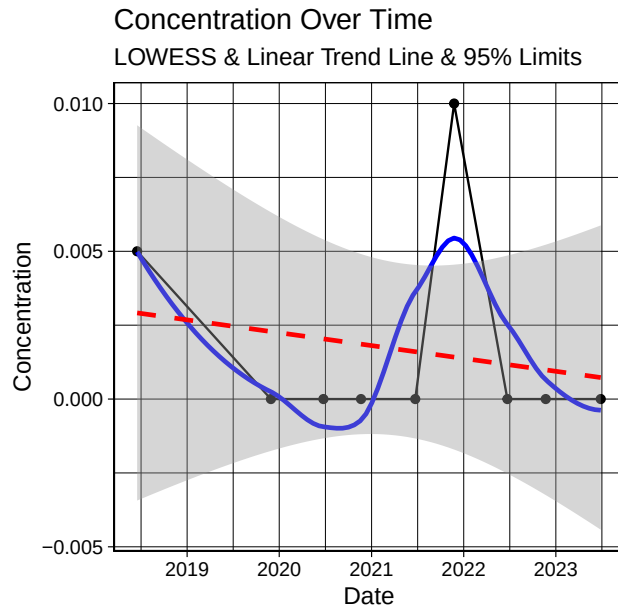
Kendall Trend Test Results Continuous	
n	9
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	NaN
results	NA

Report for ID : MW176 and Analyte : PFOA



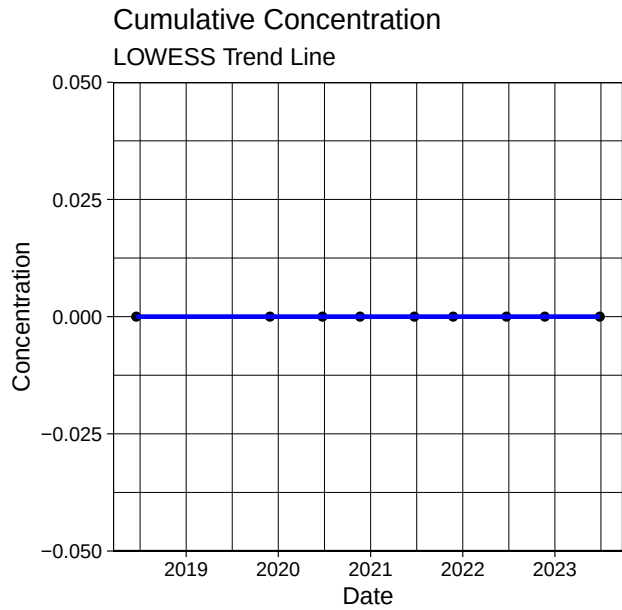
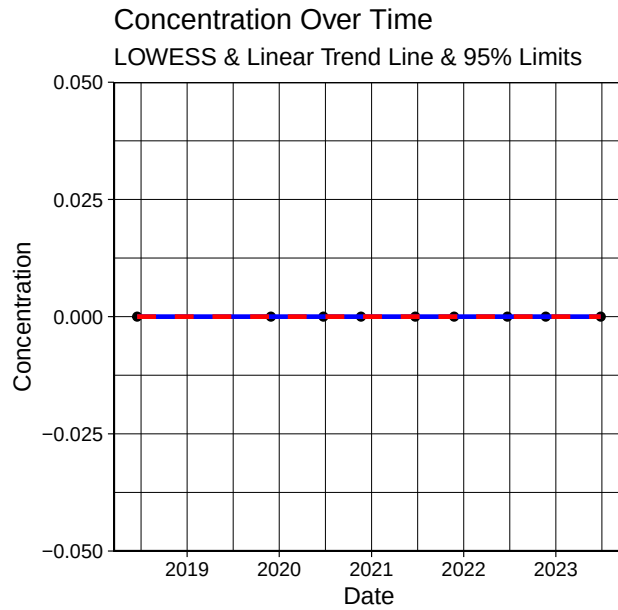
Kendall Trend Test Results Continuous	
n	9
z	-0.58
p	0.56
S	-5
varS	47.67
tau	-0.22
mean	0
sd	0
cov	2.12
results	NO CLEAR TREND

Report for ID : MW176 and Analyte : PFOS



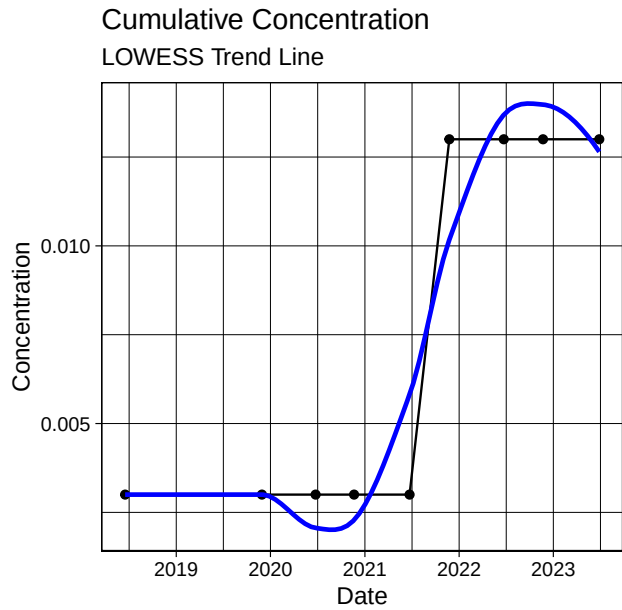
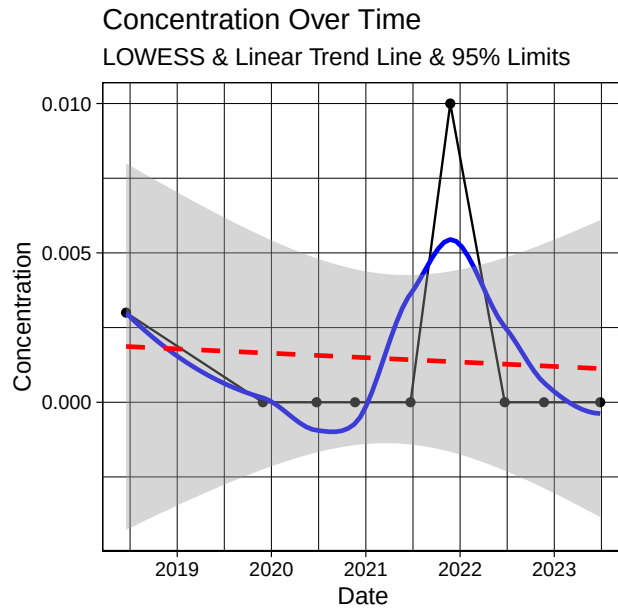
Kendall Trend Test Results Continuous	
n	9
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	NaN
results	NA

Report for ID : MW177 and Analyte : PFOA



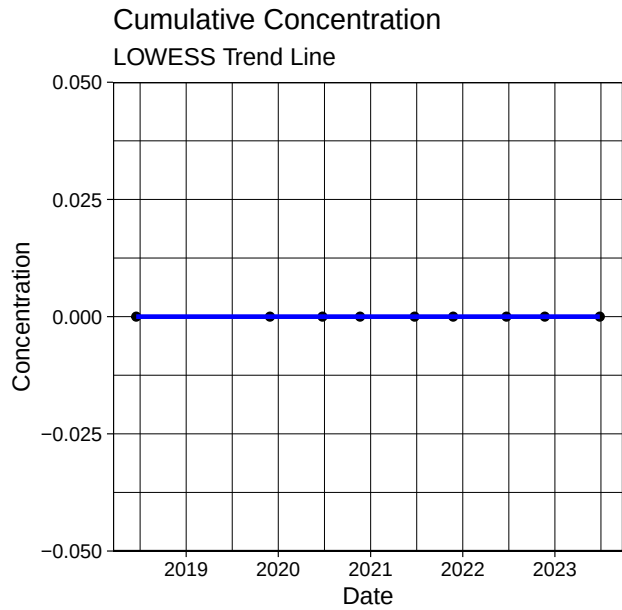
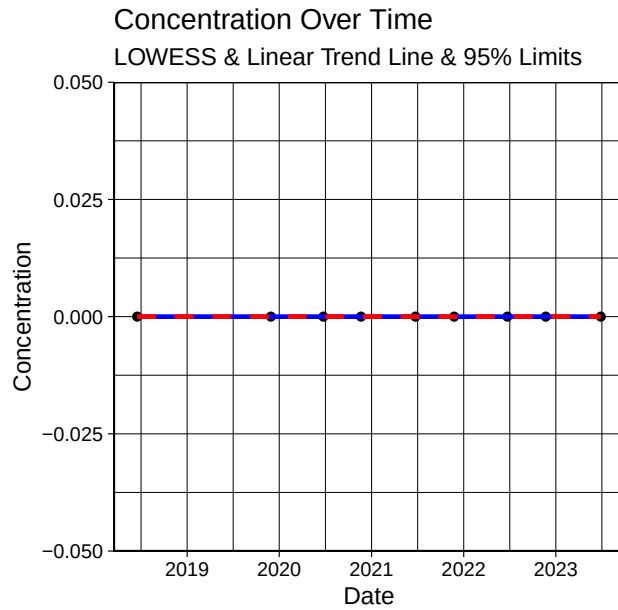
Kendall Trend Test Results Continuous	
n	9
z	-0.58
p	0.56
S	-5
varS	47.67
tau	-0.22
mean	0
sd	0
cov	2.32
results	NO CLEAR TREND

Report for ID : MW177 and Analyte : PFOS



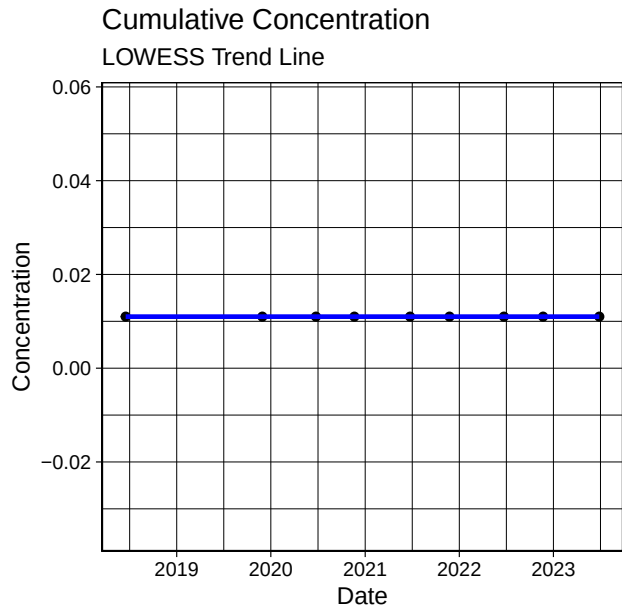
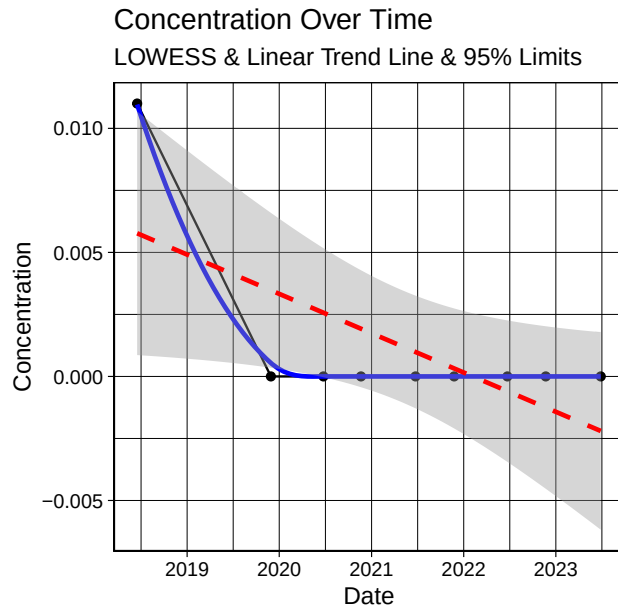
Kendall Trend Test Results Continuous	
n	9
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	NaN
results	NA

Report for ID : MW178 and Analyte : PFOA



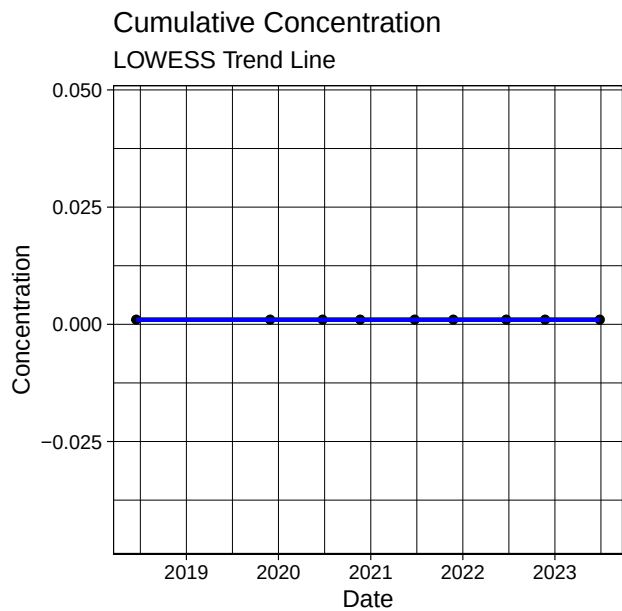
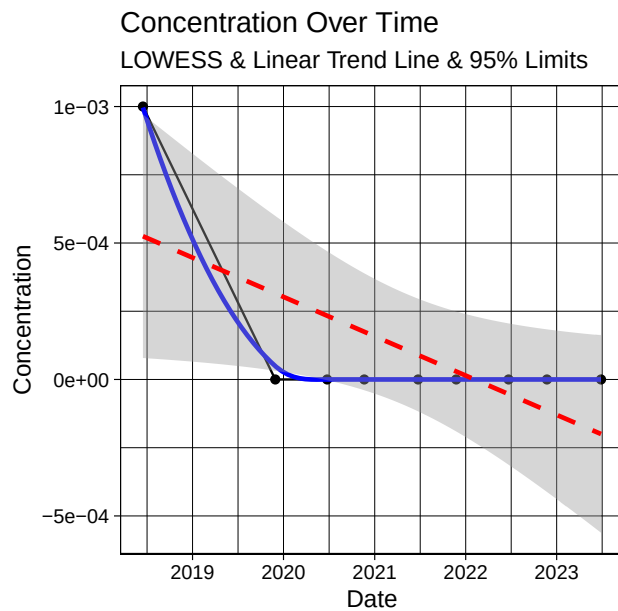
Kendall Trend Test Results Continuous	
n	9
z	-1.36
p	0.18
S	-8
varS	26.67
tau	-0.47
mean	0
sd	0
cov	3
results	NO CLEAR TREND

Report for ID : MW178 and Analyte : PFOS



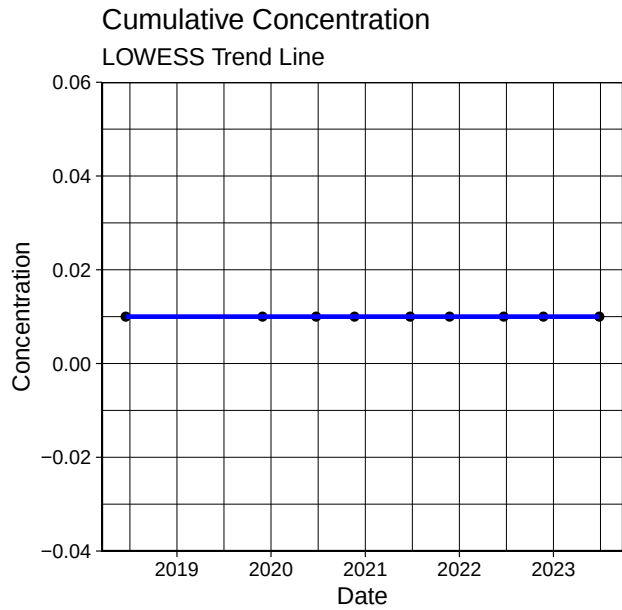
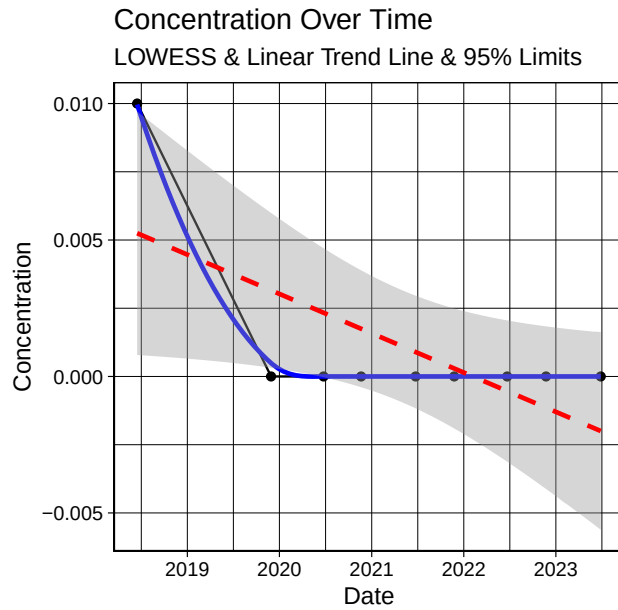
Kendall Trend Test Results Continuous	
n	9
z	-1.36
p	0.18
S	-8
varS	26.67
tau	-0.47
mean	0
sd	0
cov	3
results	NO CLEAR TREND

Report for ID : MW179 and Analyte : PFOA



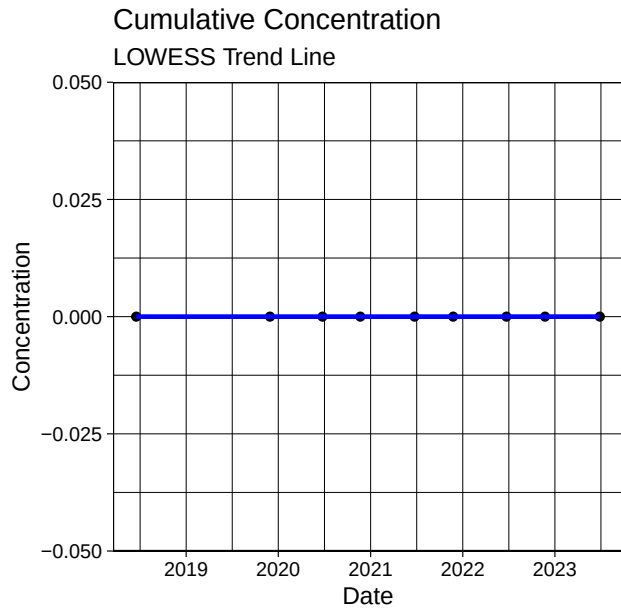
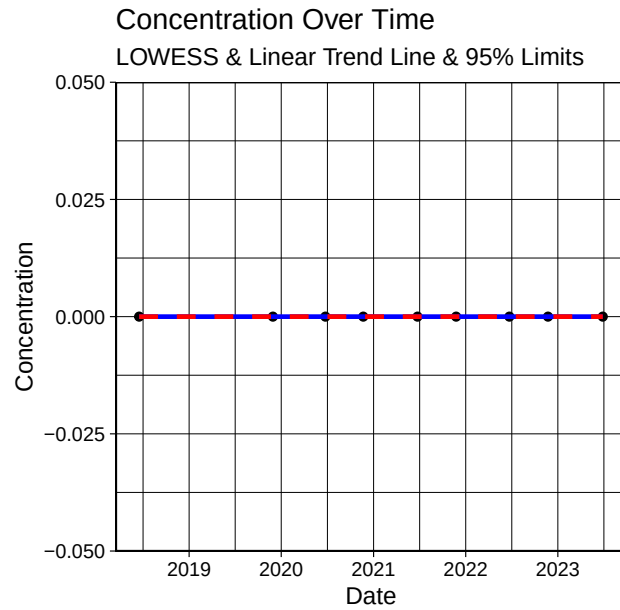
Kendall Trend Test Results Continuous	
n	9
z	-1.36
p	0.18
S	-8
varS	26.67
tau	-0.47
mean	0
sd	0
cov	3
results	NO CLEAR TREND

Report for ID : MW179 and Analyte : PFOS



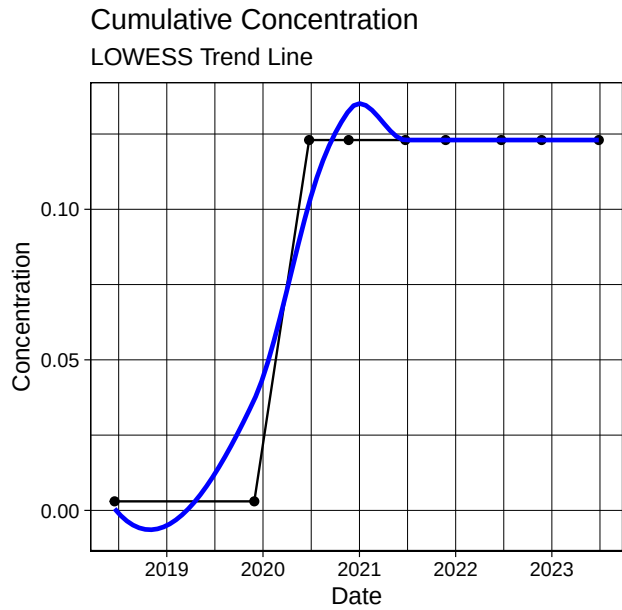
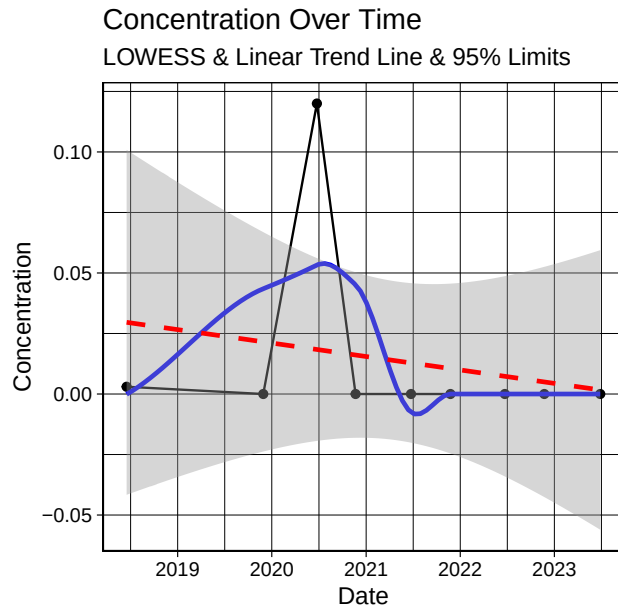
Kendall Trend Test Results Continuous	
n	9
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	NaN
results	NA

Report for ID : MW180 and Analyte : PFOA



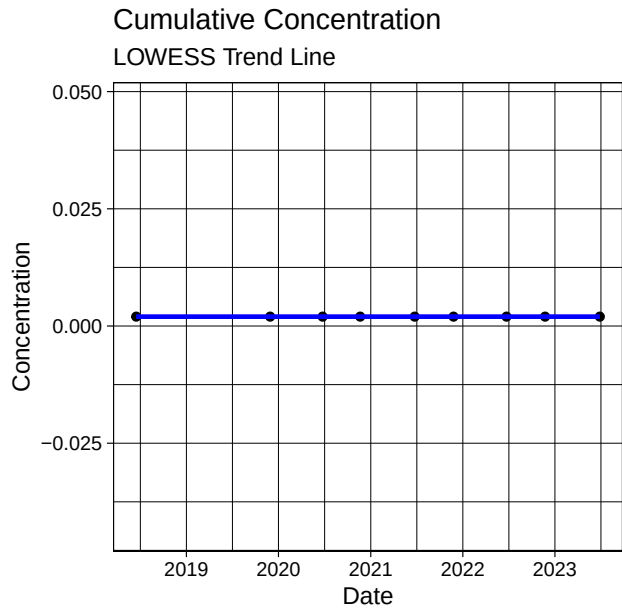
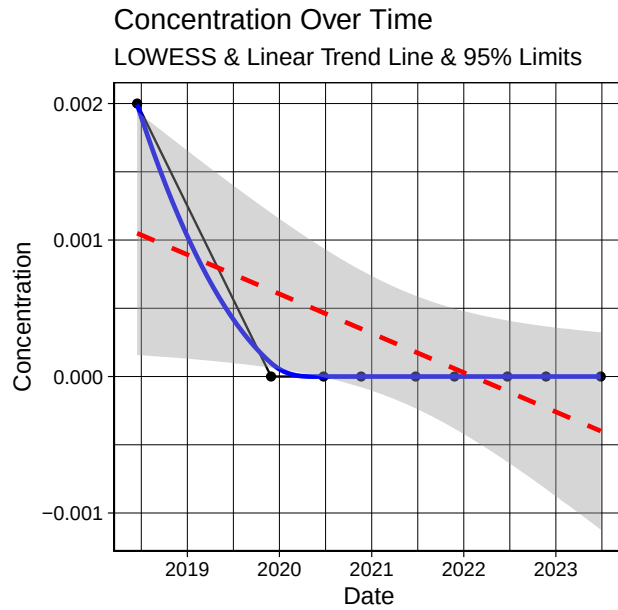
Kendall Trend Test Results Continuous	
n	9
z	-1.45
p	0.15
S	-11
varS	47.67
tau	-0.47
mean	0.01
sd	0.04
cov	2.92
results	NO CLEAR TREND

Report for ID : MW180 and Analyte : PFOS



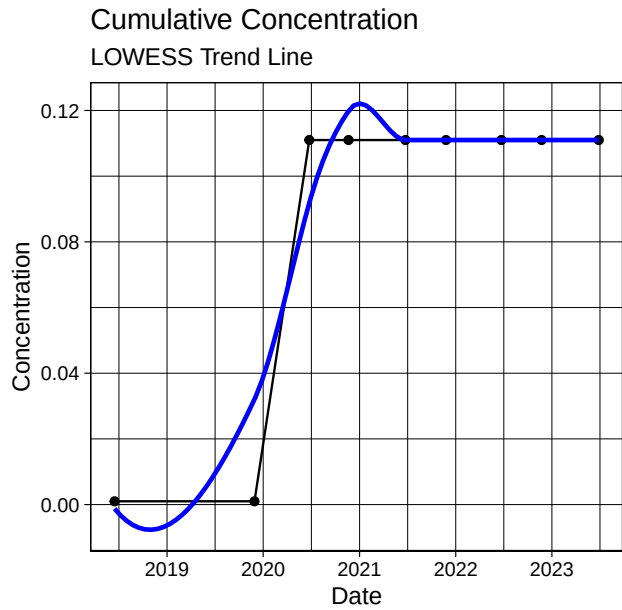
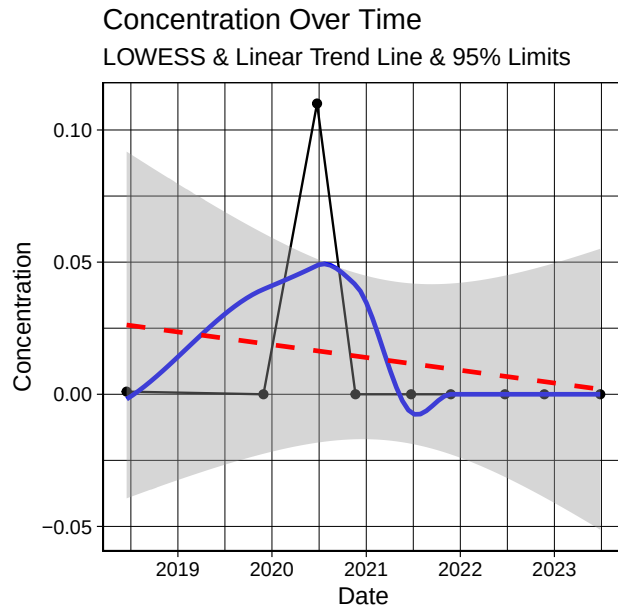
Kendall Trend Test Results Continuous	
n	9
z	-1.36
p	0.18
S	-8
varS	26.67
tau	-0.47
mean	0
sd	0
cov	3
results	NO CLEAR TREND

Report for ID : MW181 and Analyte : PFOA



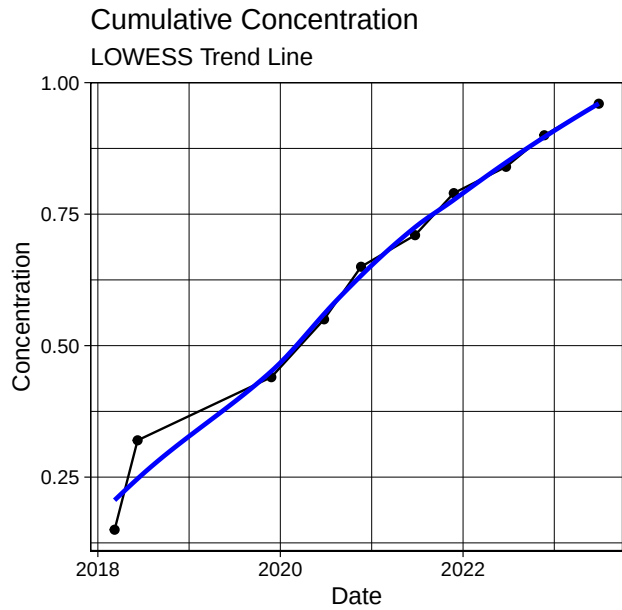
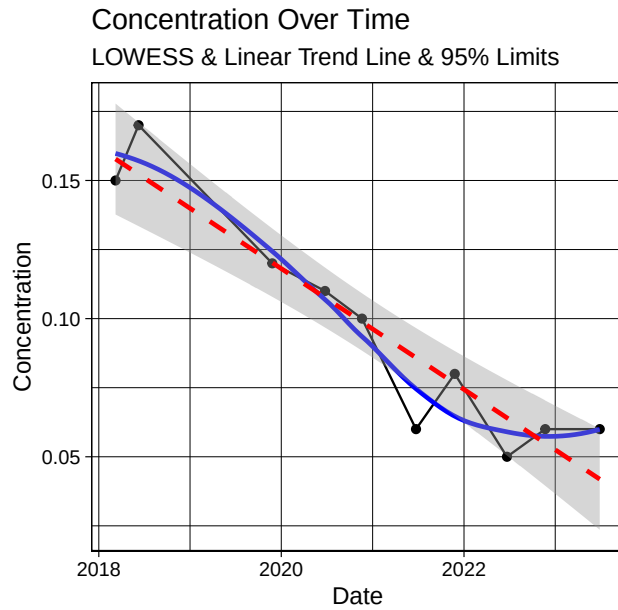
Kendall Trend Test Results Continuous	
n	9
z	-1.45
p	0.15
S	-11
varS	47.67
tau	-0.47
mean	0.01
sd	0.04
cov	2.97
results	NO CLEAR TREND

Report for ID : MW181 and Analyte : PFOS



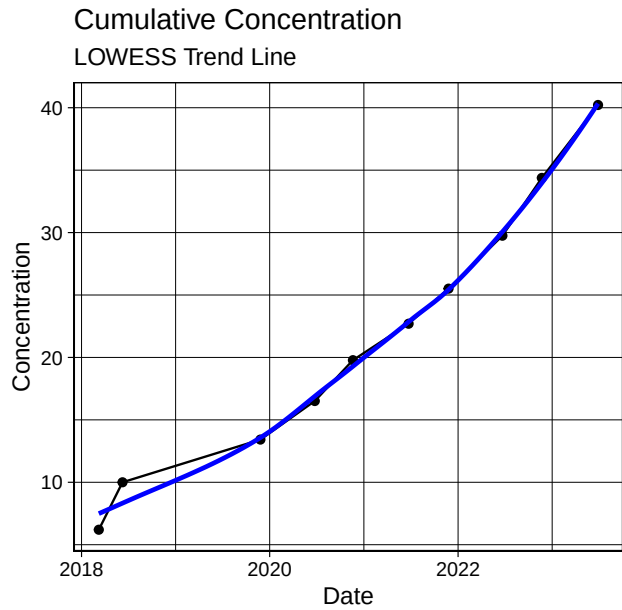
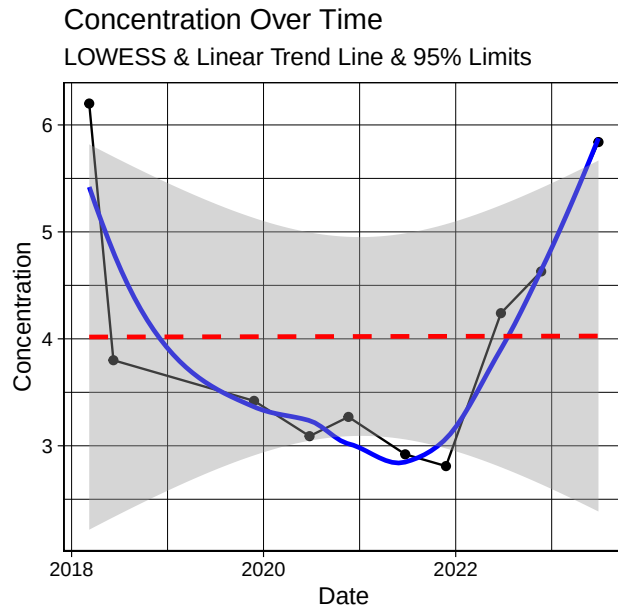
Kendall Trend Test Results Continuous	
n	10
z	-3
p	0
S	-34
varS	121.33
tau	-0.78
mean	0.1
sd	0.04
cov	0.43
results	DECREASING

Report for ID : MW211 and Analyte : PFOA



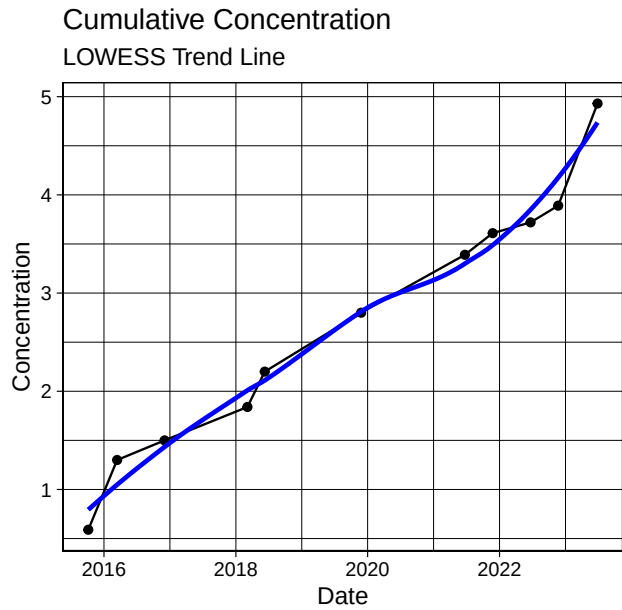
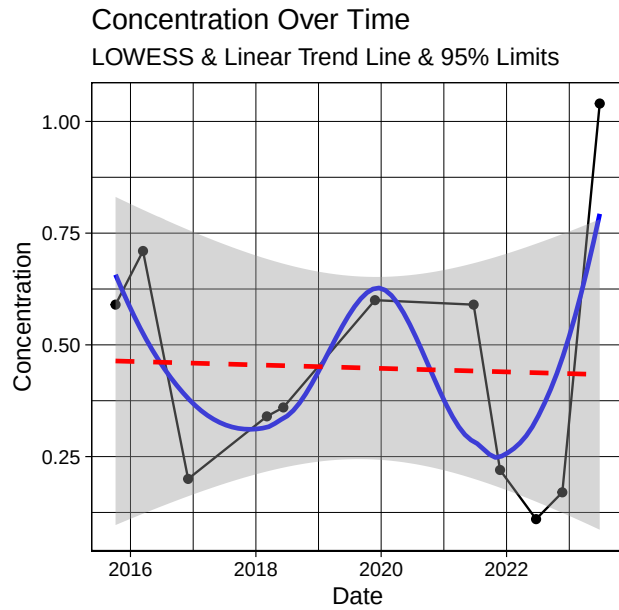
Kendall Trend Test Results Continuous	
n	10
z	0
p	1
S	-1
varS	125
tau	-0.02
mean	4.02
sd	1.2
cov	0.3
results	STABLE

Report for ID : MW211 and Analyte : PFOS



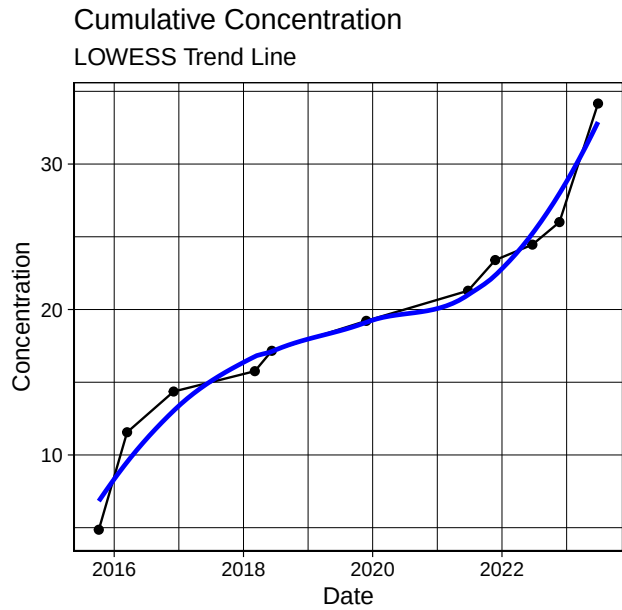
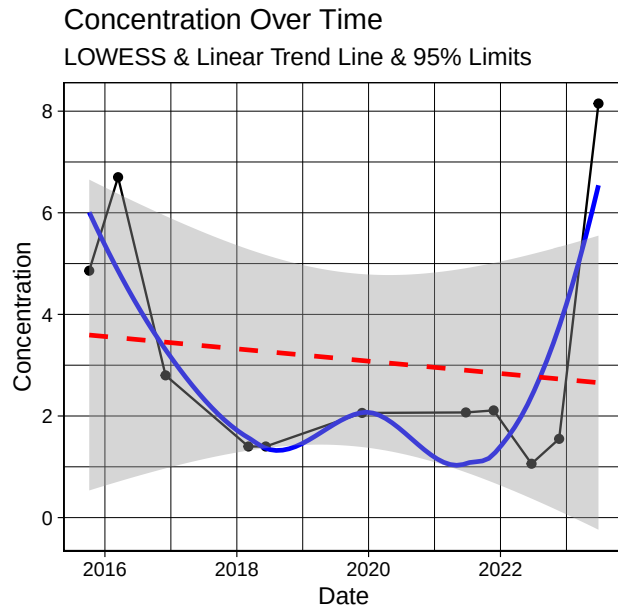
Kendall Trend Test Results Continuous	
n	11
z	-0.55
p	0.58
S	-8
varS	164
tau	-0.15
mean	0.45
sd	0.28
cov	0.63
results	STABLE

Report for ID : MW233 and Analyte : PFOA



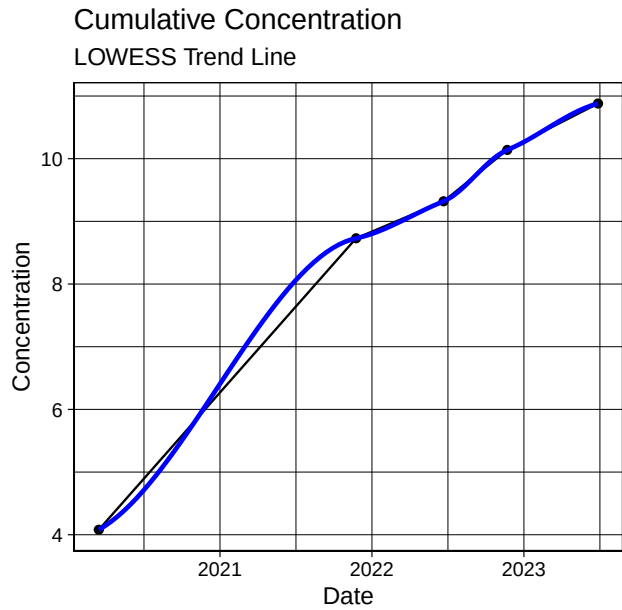
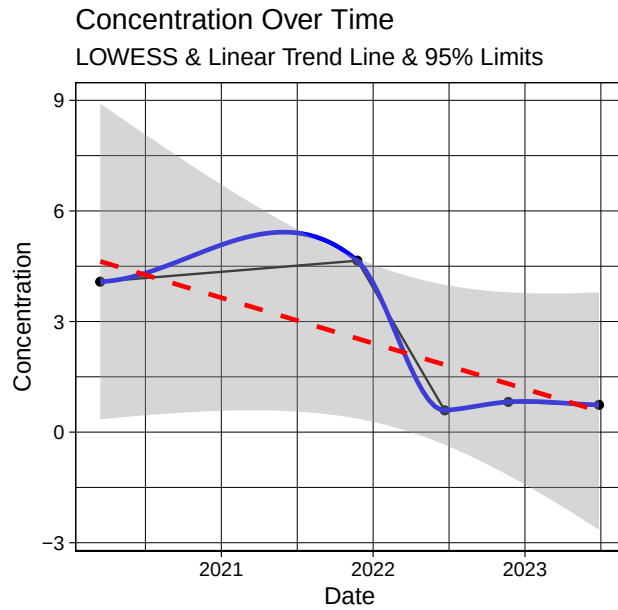
Kendall Trend Test Results Continuous	
n	11
z	-0.55
p	0.58
S	-8
varS	164
tau	-0.15
mean	3.11
sd	2.39
cov	0.77
results	STABLE

Report for ID : MW233 and Analyte : PFOS



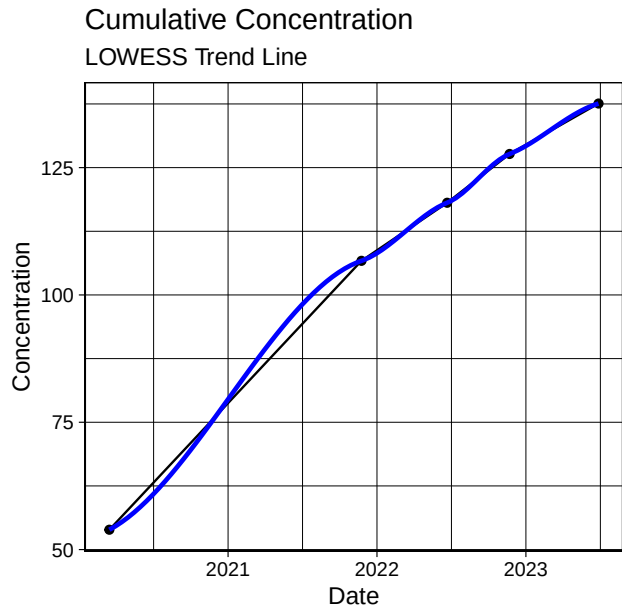
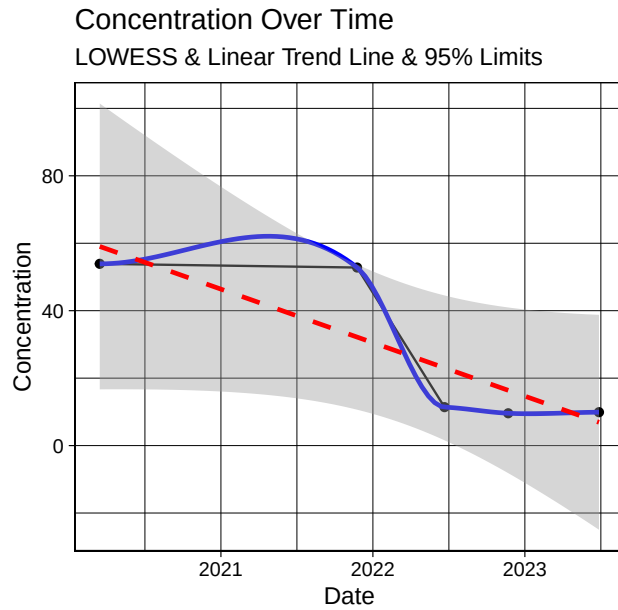
Kendall Trend Test Results Continuous	
n	5
z	-0.73
p	0.46
S	-4
varS	16.67
tau	-0.4
mean	2.18
sd	2.01
cov	0.92
results	STABLE

Report for ID : MW238 and Analyte : PFOA



Kendall Trend Test Results Continuous	
n	5
z	-1.71
p	0.09
S	-8
varS	16.67
tau	-0.8
mean	27.52
sd	23.6
cov	0.86
results	POSSIBLY DECREASING

Report for ID : MW238 and Analyte : PFOS



Trend Report

Report Date & Time: 2024-05-10 04:21:34

Data File Name: MKA_240510_PFOs+PFHxS.csv

Report Title: Groundwater Trend Data

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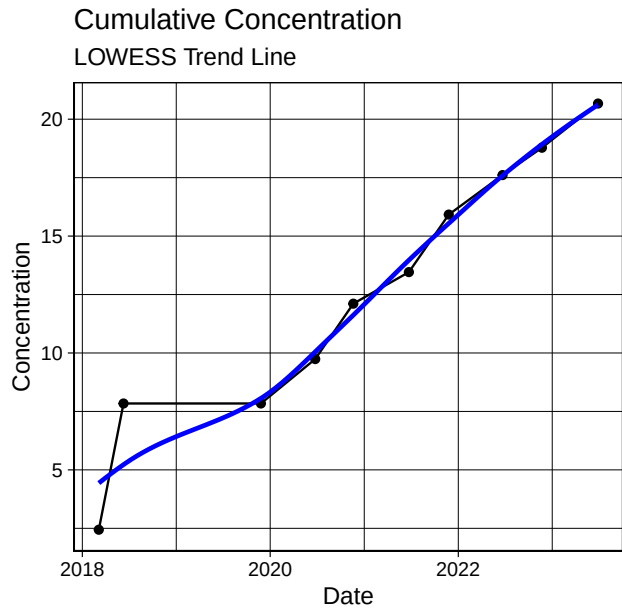
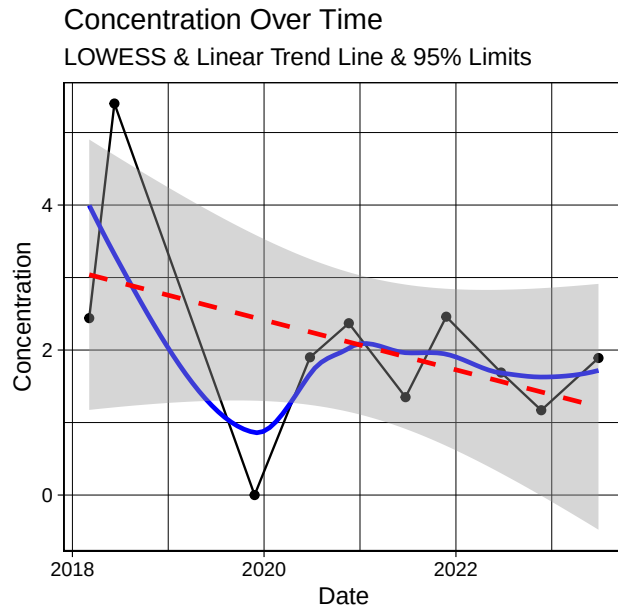
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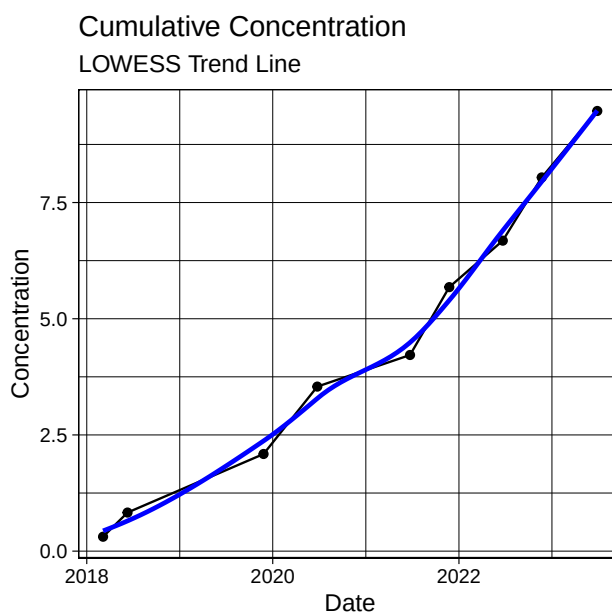
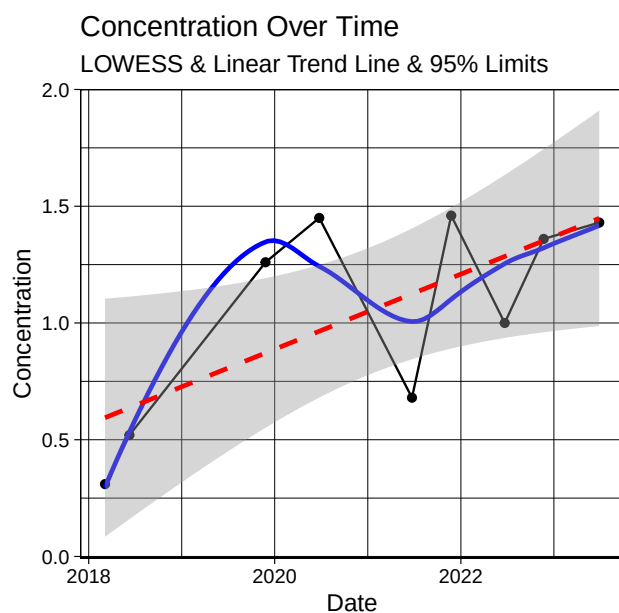
Kendall Trend Test Results Continuous	
n	10
z	-0.89
p	0.37
S	-11
varS	125
tau	-0.24
mean	2.07
sd	1.39
cov	0.67
results	STABLE

Report for ID : MW018 and Analyte : PFOS+PFHxS



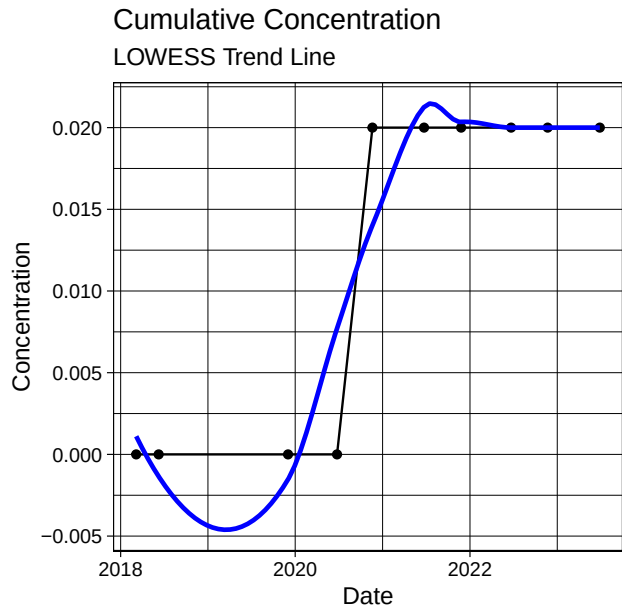
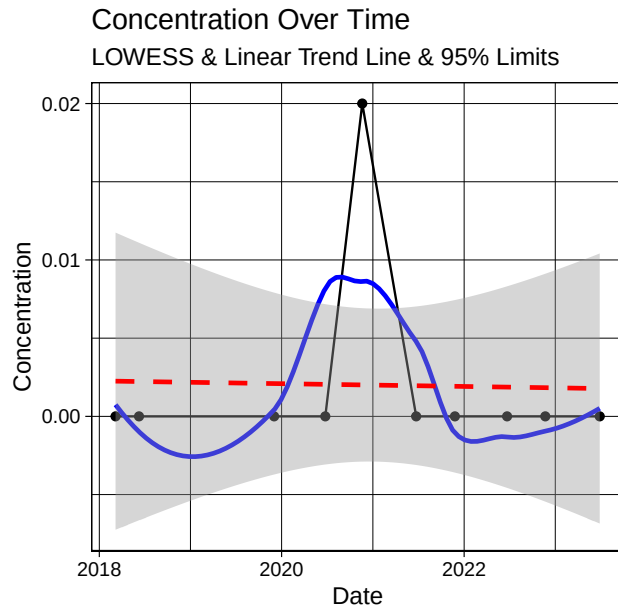
Kendall Trend Test Results Continuous	
n	9
z	1.77
p	0.08
S	18
varS	92
tau	0.5
mean	1.05
sd	0.44
cov	0.42
results	POSSIBLY INCREASING

Report for ID : MW021 and Analyte : PFOS+PFHxS



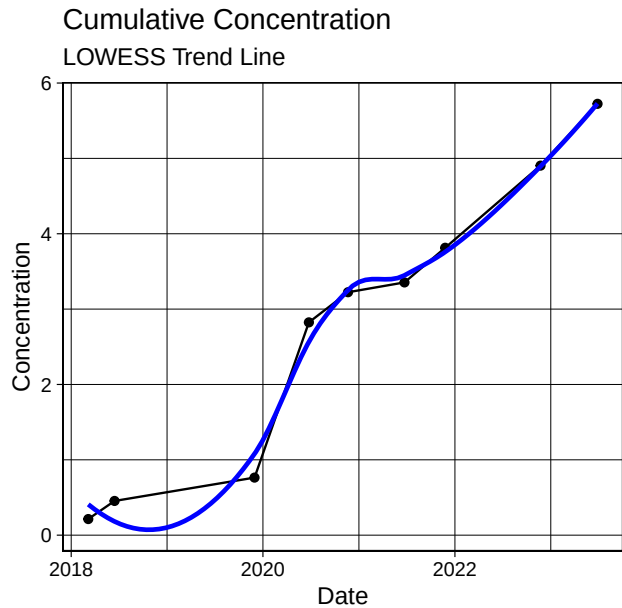
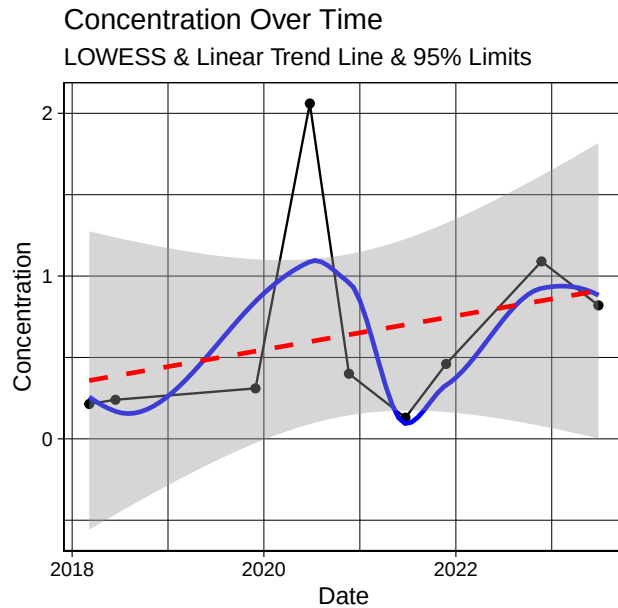
Kendall Trend Test Results Continuous	
n	10
z	0
p	1
S	-1
varS	33
tau	-0.05
mean	0
sd	0.01
cov	3.16
results	NO CLEAR TREND

Report for ID : MW102 and Analyte : PFOS+PFHxS



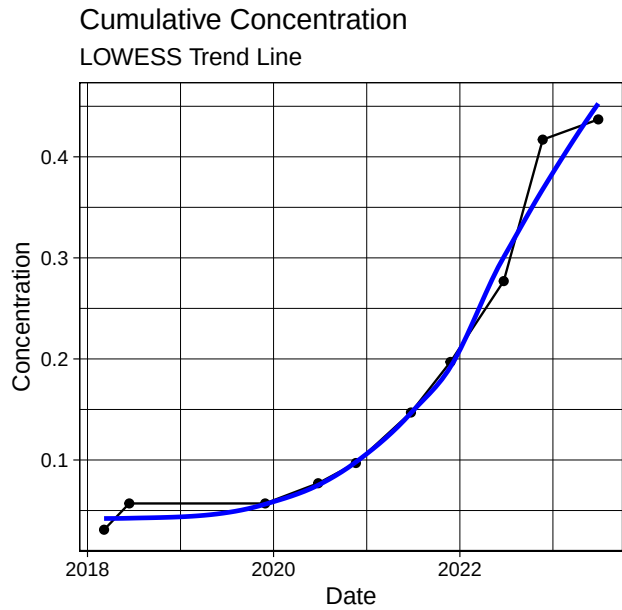
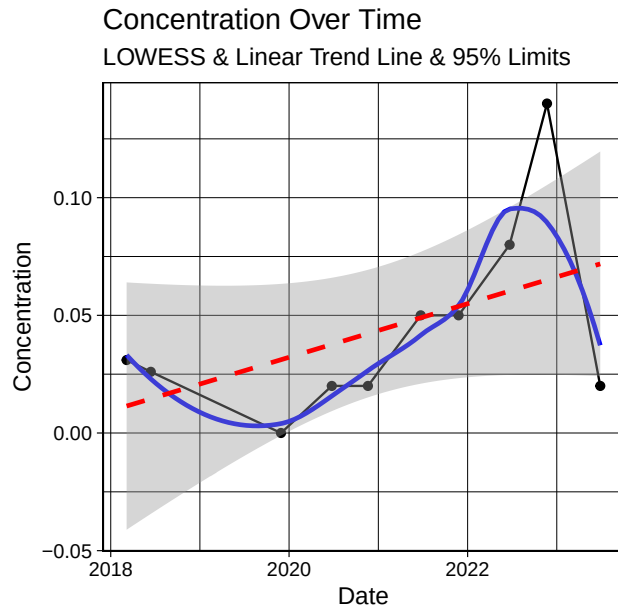
Kendall Trend Test Results Continuous	
n	9
z	1.56
p	0.12
S	16
varS	92
tau	0.44
mean	0.64
sd	0.62
cov	0.97
results	NO CLEAR TREND

Report for ID : MW103 and Analyte : PFOS+PFHxS



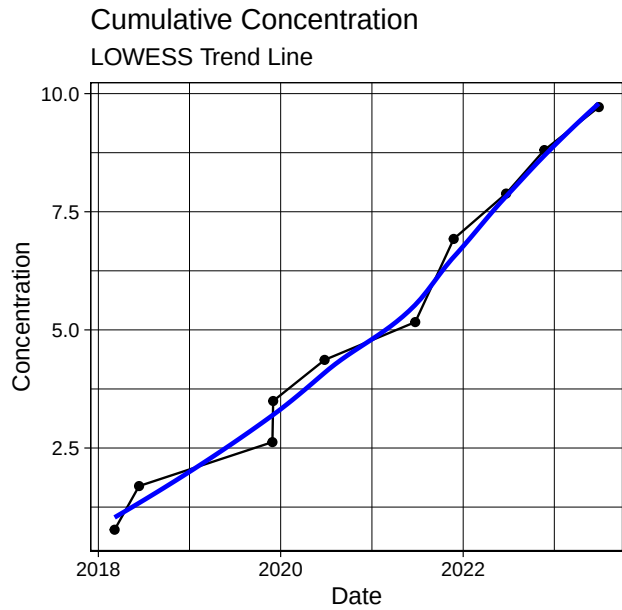
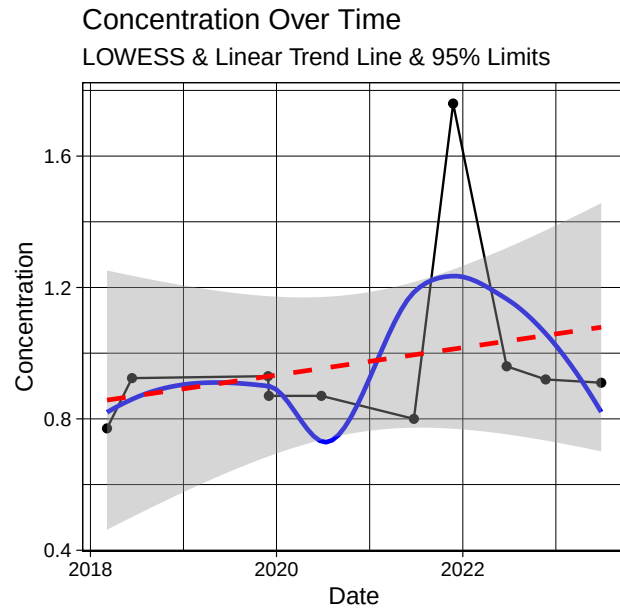
Kendall Trend Test Results Continuous	
n	10
z	1.28
p	0.2
S	15
varS	120.33
tau	0.35
mean	0.04
sd	0.04
cov	0.93
results	NO CLEAR TREND

Report for ID : MW104 and Analyte : PFOS+PFHxS



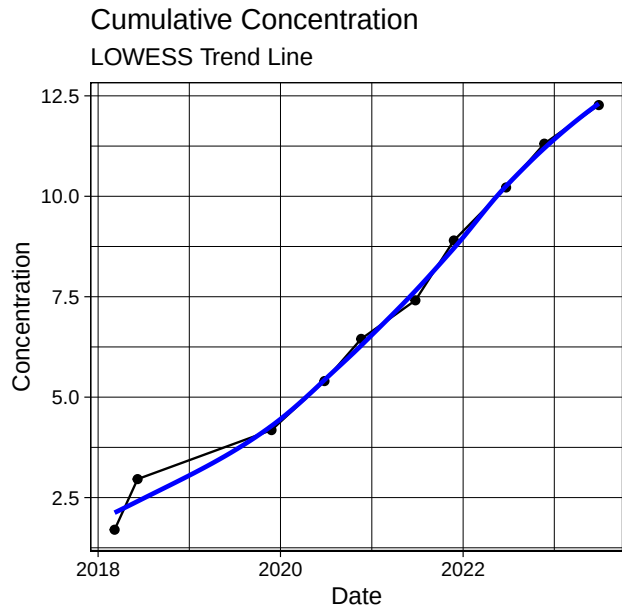
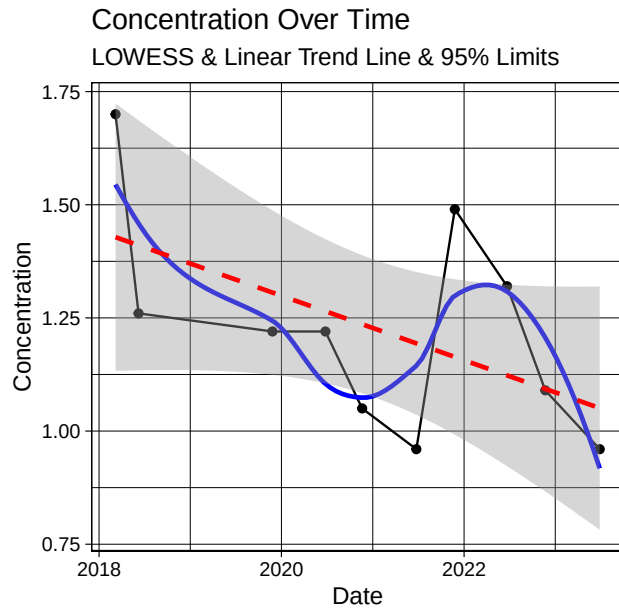
Kendall Trend Test Results Continuous	
n	10
z	0.63
p	0.53
S	8
varS	124
tau	0.18
mean	0.97
sd	0.28
cov	0.29
results	NO CLEAR TREND

Report for ID : MW105 and Analyte : PFOS+PFHxS



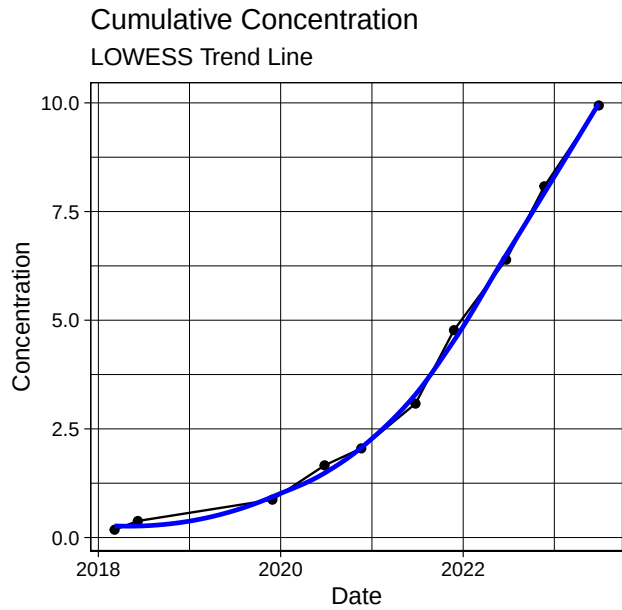
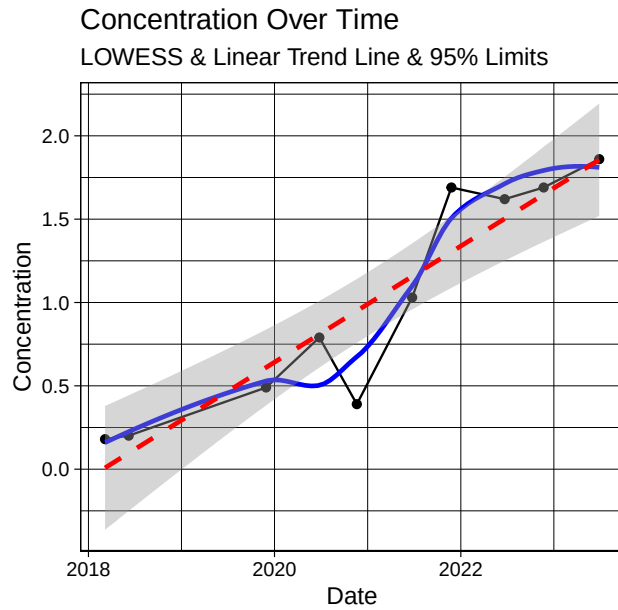
Kendall Trend Test Results Continuous	
n	10
z	-1.62
p	0.1
S	-19
varS	123
tau	-0.43
mean	1.23
sd	0.23
cov	0.19
results	STABLE

Report for ID : MW112 and Analyte : PFOS+PFHxS



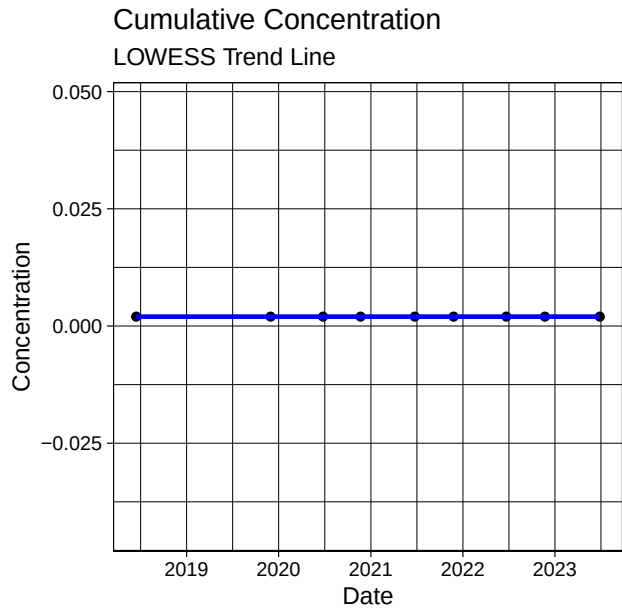
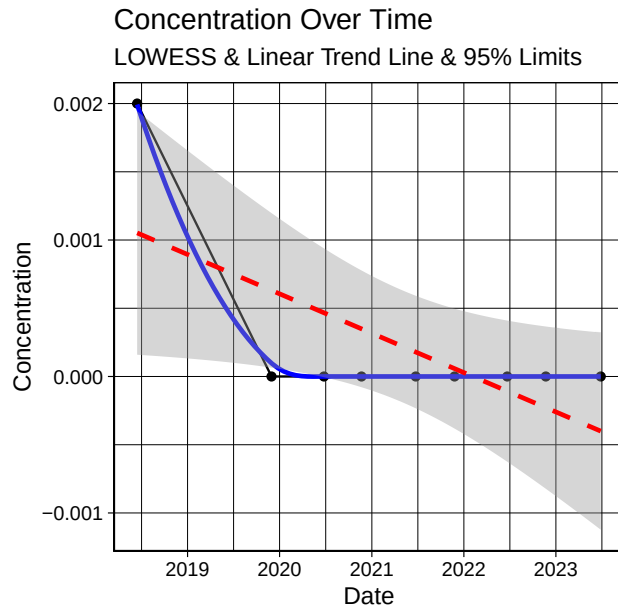
Kendall Trend Test Results Continuous	
n	10
z	3.32
p	0
S	38
varS	124
tau	0.85
mean	0.99
sd	0.67
cov	0.68
results	INCREASING

Report for ID : MW115 and Analyte : PFOS+PFHxS



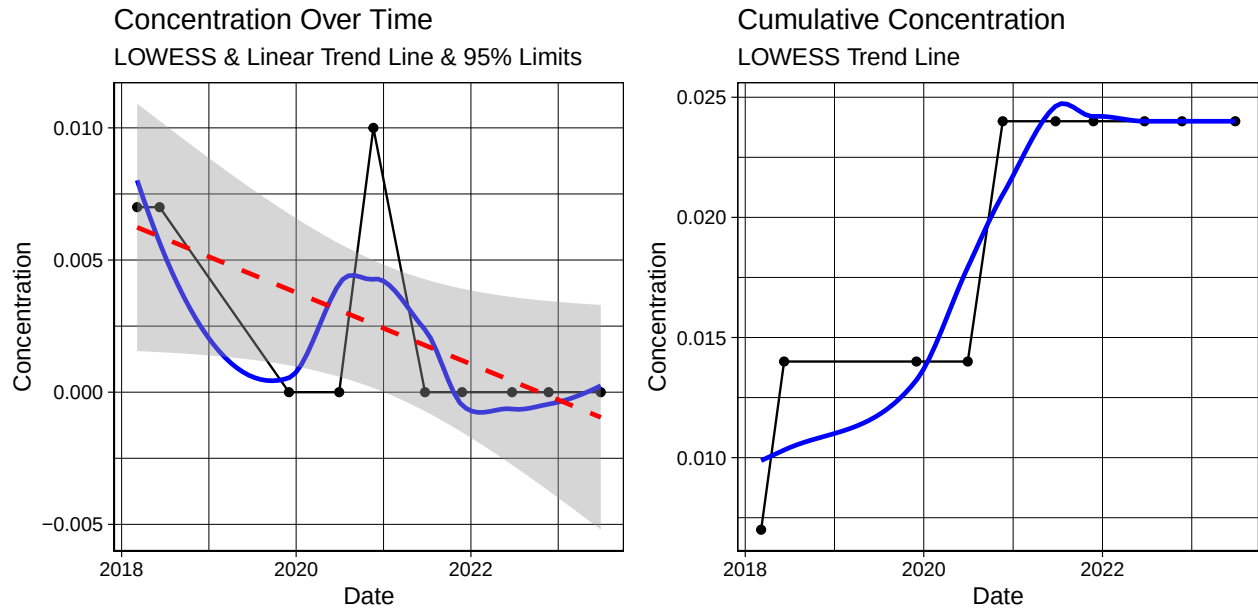
Kendall Trend Test Results Continuous	
n	9
z	-1.36
p	0.18
S	-8
varS	26.67
tau	-0.47
mean	0
sd	0
cov	3
results	NO CLEAR TREND

Report for ID : MW122 and Analyte : PFOS+PFHxS



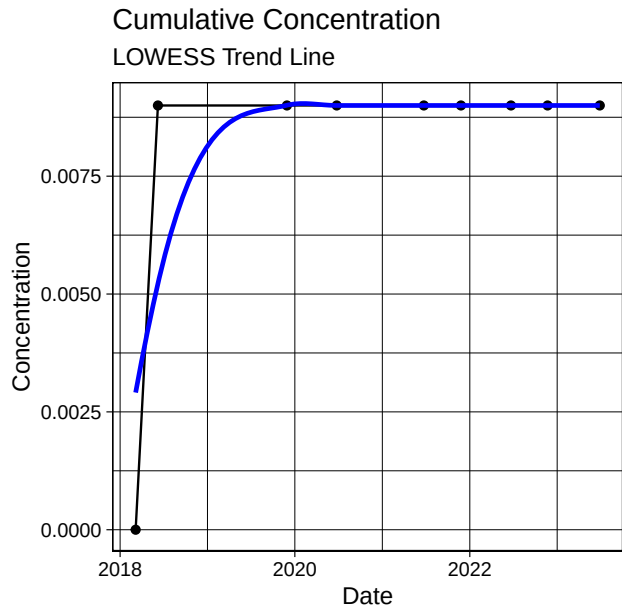
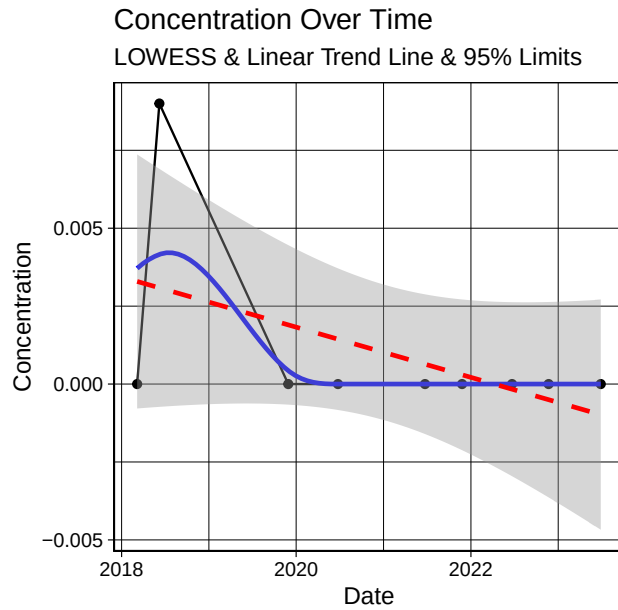
Kendall Trend Test Results Continuous	
n	10
z	-1.57
p	0.12
S	-15
varS	79.67
tau	-0.47
mean	0
sd	0
cov	1.65
results	NO CLEAR TREND

Report for ID : MW124 and Analyte : PFOS+PFHxS



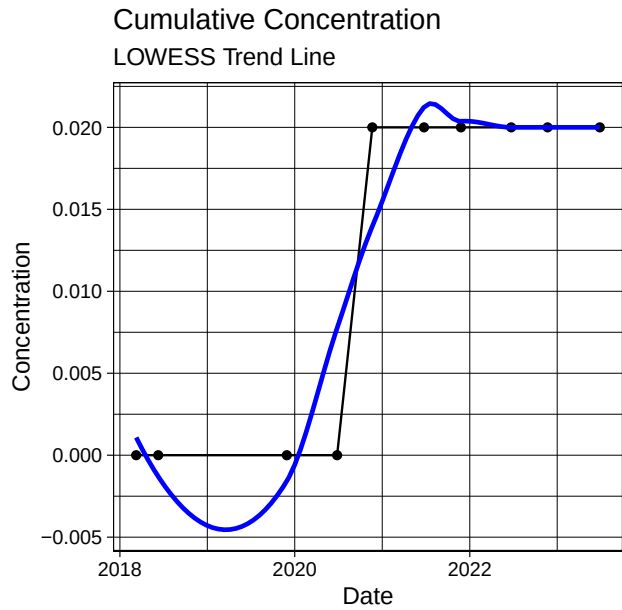
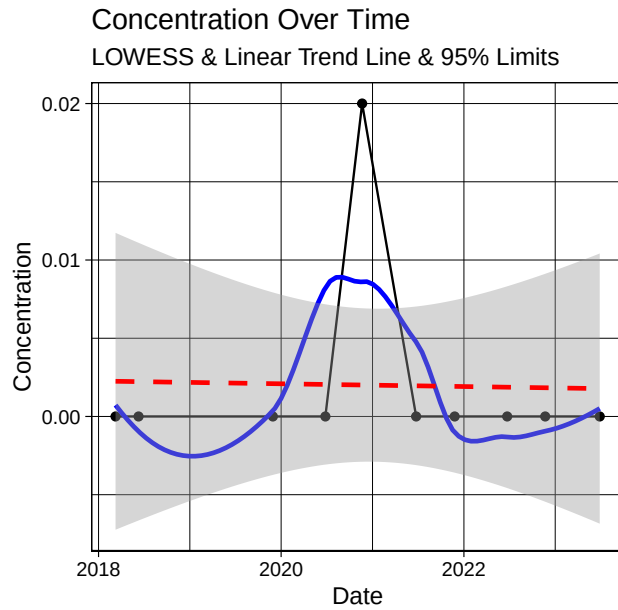
Kendall Trend Test Results Continuous	
n	9
z	-0.97
p	0.33
S	-6
varS	26.67
tau	-0.35
mean	0
sd	0
cov	3
results	NO CLEAR TREND

Report for ID : MW126 and Analyte : PFOS+PFHxS



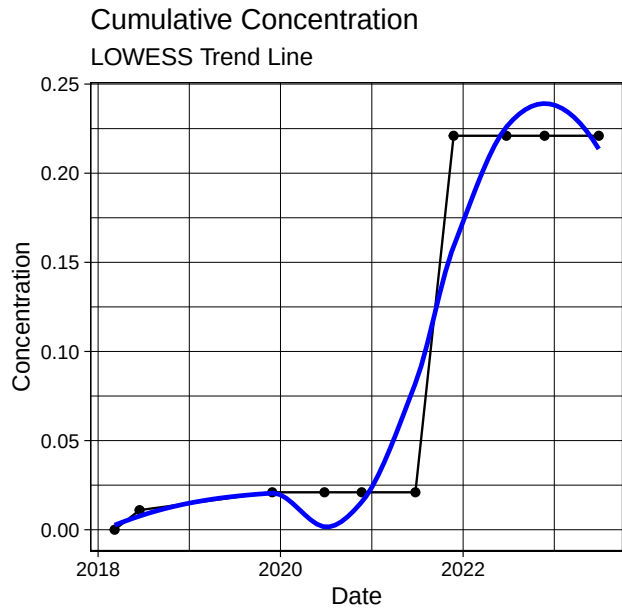
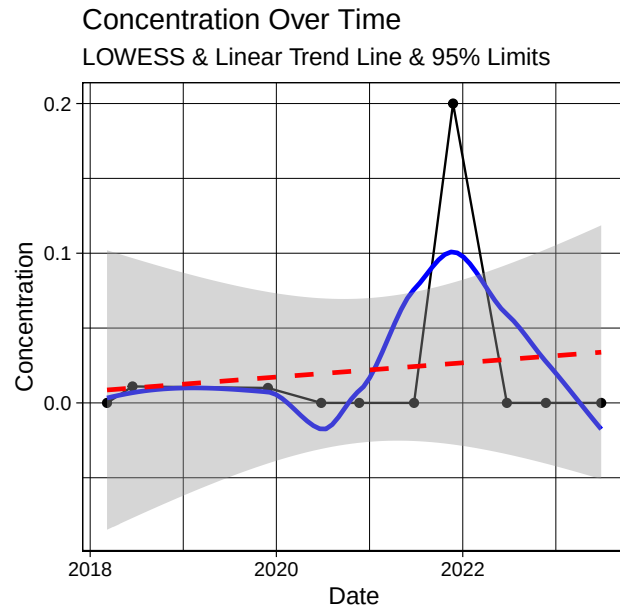
Kendall Trend Test Results Continuous	
n	10
z	0
p	1
S	-1
varS	33
tau	-0.05
mean	0
sd	0.01
cov	3.16
results	NO CLEAR TREND

Report for ID : MW134 and Analyte : PFOS+PFHxS



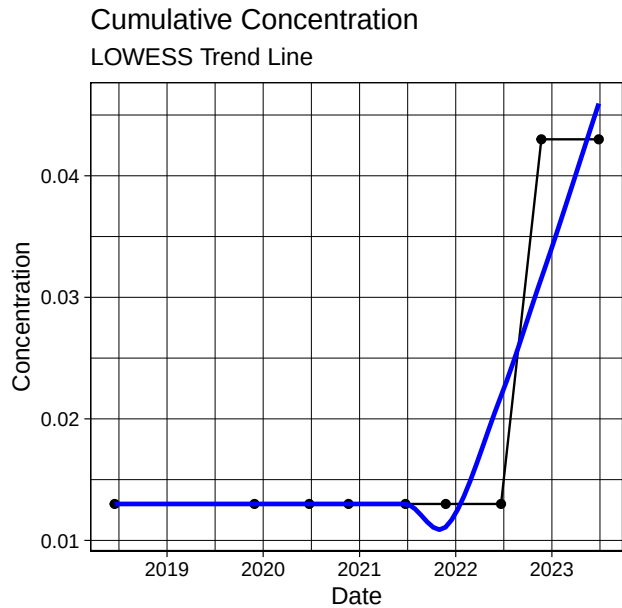
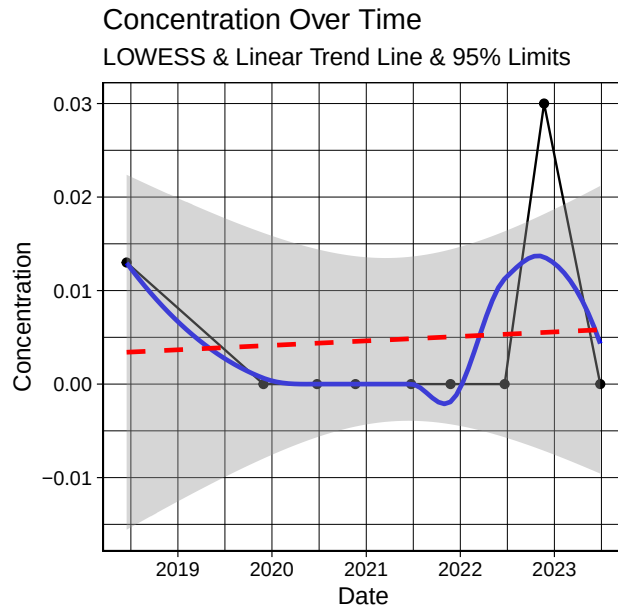
Kendall Trend Test Results Continuous	
n	10
z	-0.78
p	0.44
S	-8
varS	80.67
tau	-0.24
mean	0.02
sd	0.06
cov	2.84
results	NO CLEAR TREND

Report for ID : MW135 and Analyte : PFOS+PFHxS



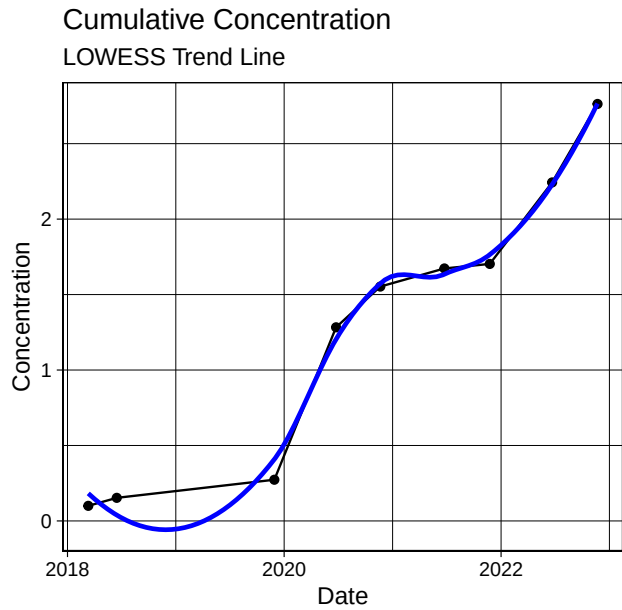
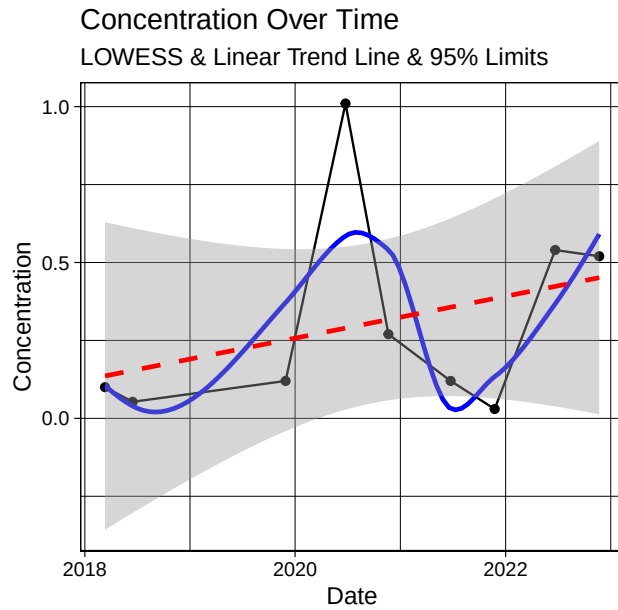
Kendall Trend Test Results Continuous	
n	9
z	0
p	1
S	-1
varS	47.67
tau	-0.04
mean	0
sd	0.01
cov	2.17
results	NO CLEAR TREND

Report for ID : MW137 and Analyte : PFOS+PFHxS



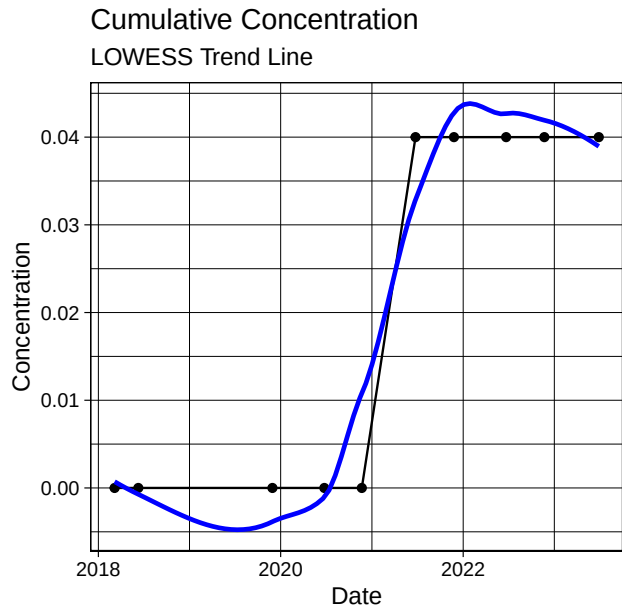
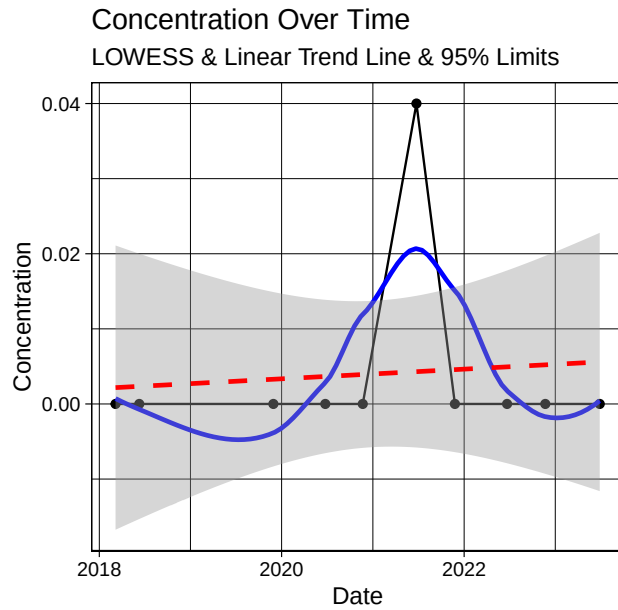
Kendall Trend Test Results Continuous	
n	9
z	0.84
p	0.4
S	9
varS	91
tau	0.25
mean	0.31
sd	0.33
cov	1.06
results	NO CLEAR TREND

Report for ID : MW138 and Analyte : PFOS+PFHxS



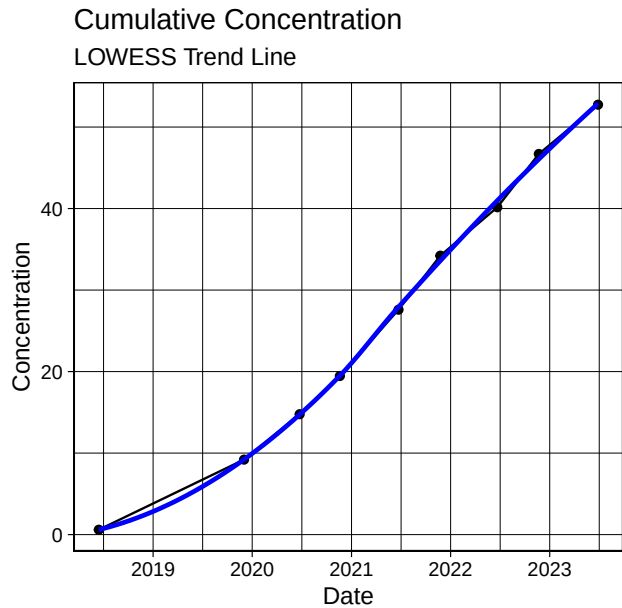
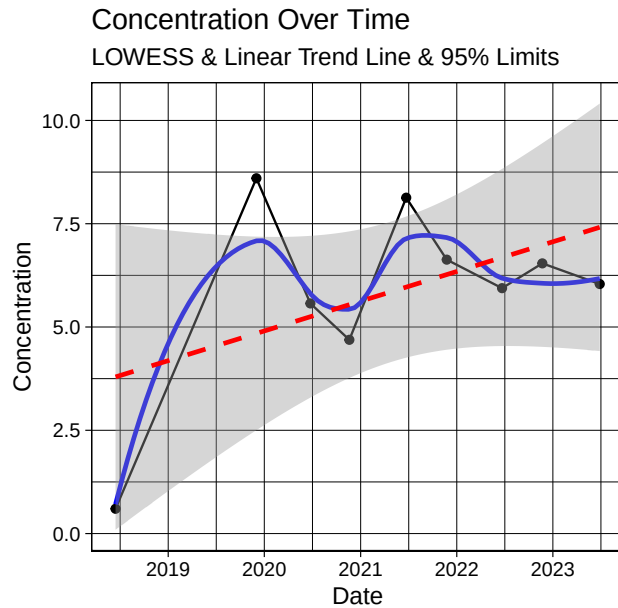
Kendall Trend Test Results Continuous	
n	10
z	0
p	1
S	1
varS	33
tau	0.05
mean	0
sd	0.01
cov	3.16
results	NO CLEAR TREND

Report for ID : MW139 and Analyte : PFOS+PFHxS



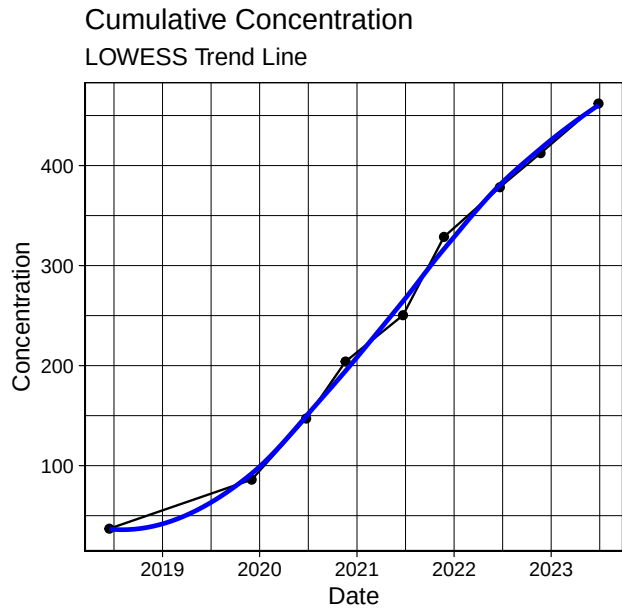
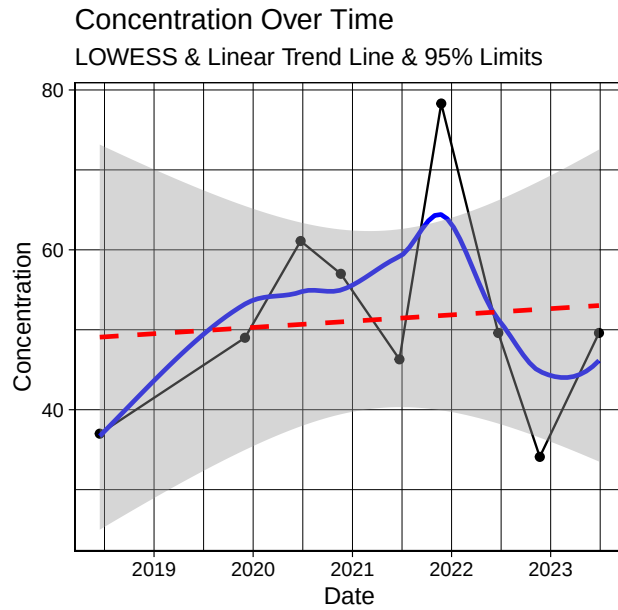
Kendall Trend Test Results Continuous	
n	9
z	0.31
p	0.75
S	4
varS	92
tau	0.11
mean	5.86
sd	2.32
cov	0.4
results	NO CLEAR TREND

Report for ID : MW148D and Analyte : PFOS+PFHxS



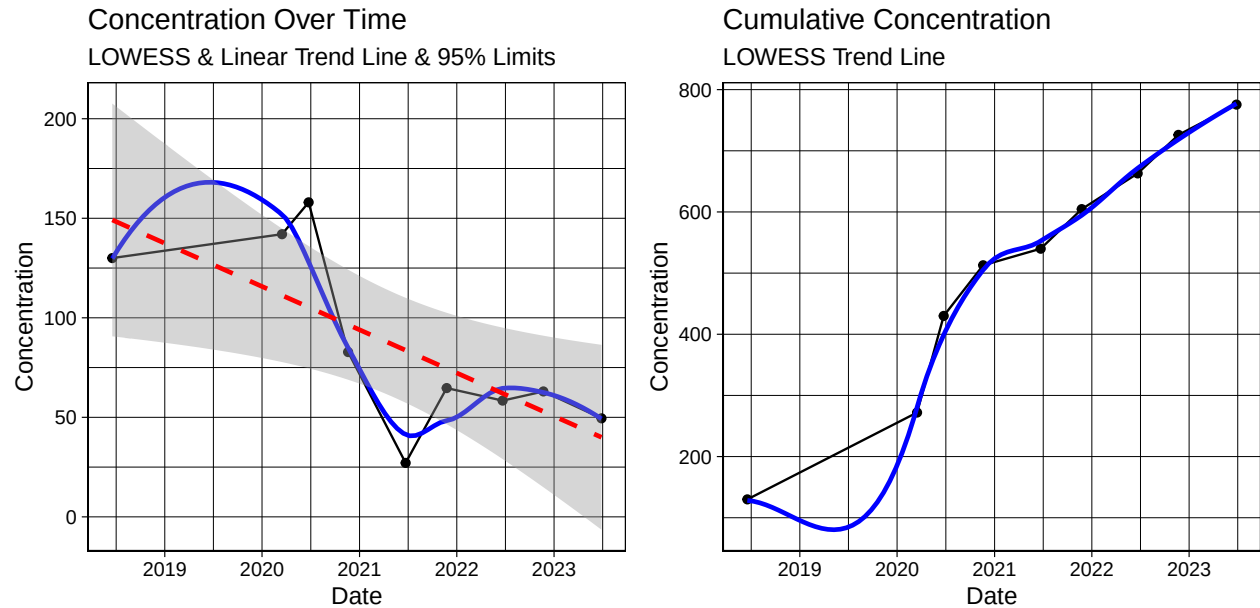
Kendall Trend Test Results Continuous	
n	9
z	0
p	1
S	1
varS	91
tau	0.03
mean	51.33
sd	13.2
cov	0.26
results	NO CLEAR TREND

Report for ID : MW148S and Analyte : PFOS+PFHxS



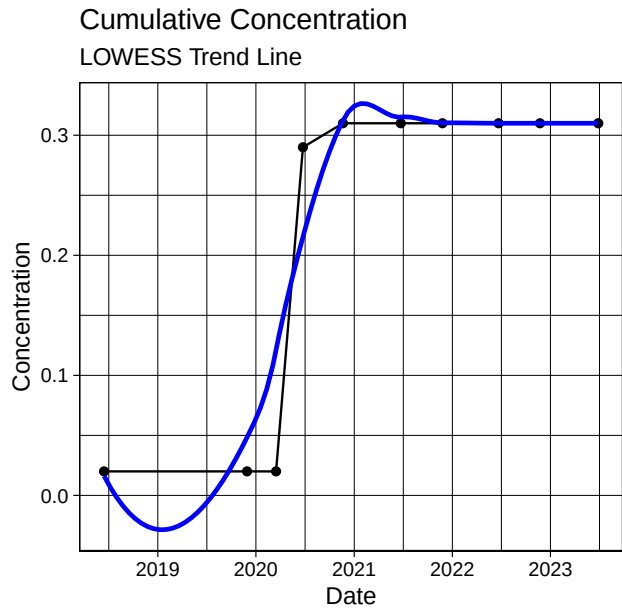
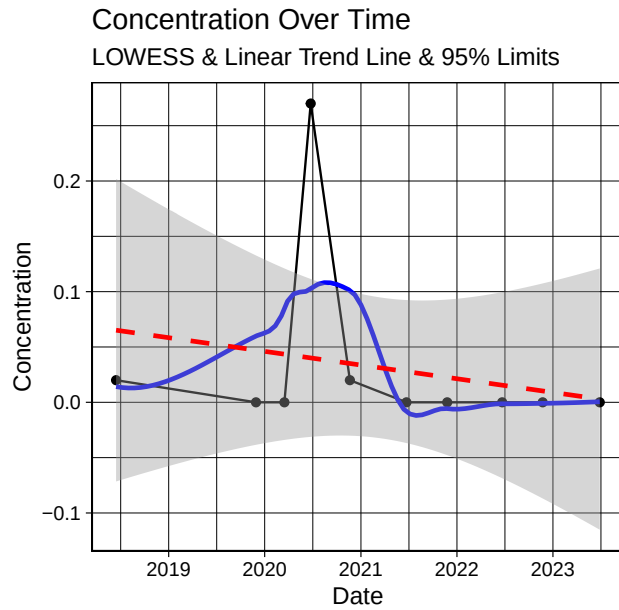
Kendall Trend Test Results Continuous	
n	9
z	-1.98
p	0.05
S	-20
varS	92
tau	-0.56
mean	86.17
sd	45.84
cov	0.53
results	DECREASING

Report for ID : MW151 and Analyte : PFOS+PFHxS



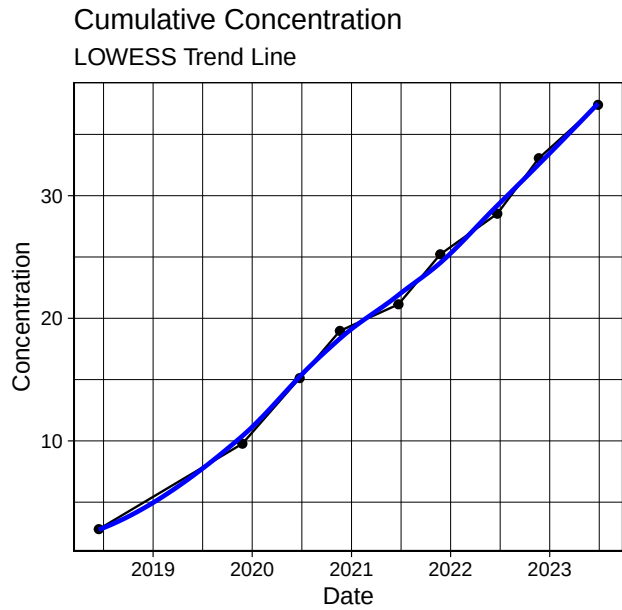
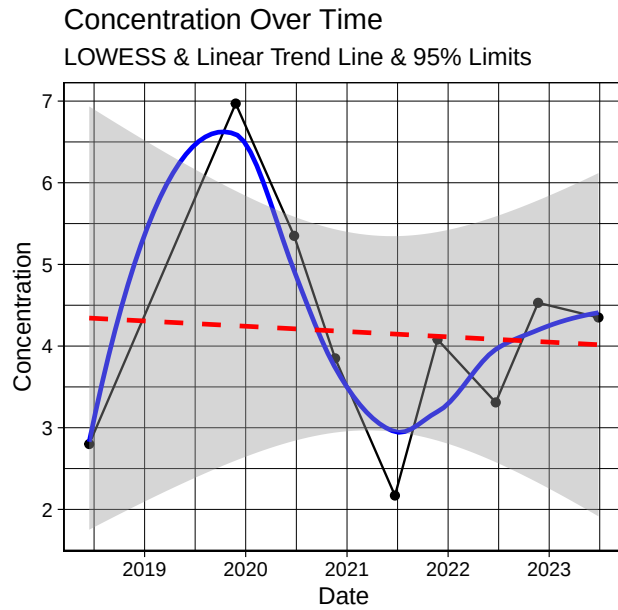
Kendall Trend Test Results Continuous	
n	10
z	-1.34
p	0.18
S	-13
varS	79.67
tau	-0.4
mean	0.03
sd	0.08
cov	2.72
results	NO CLEAR TREND

Report for ID : MW159 and Analyte : PFOS+PFHxS



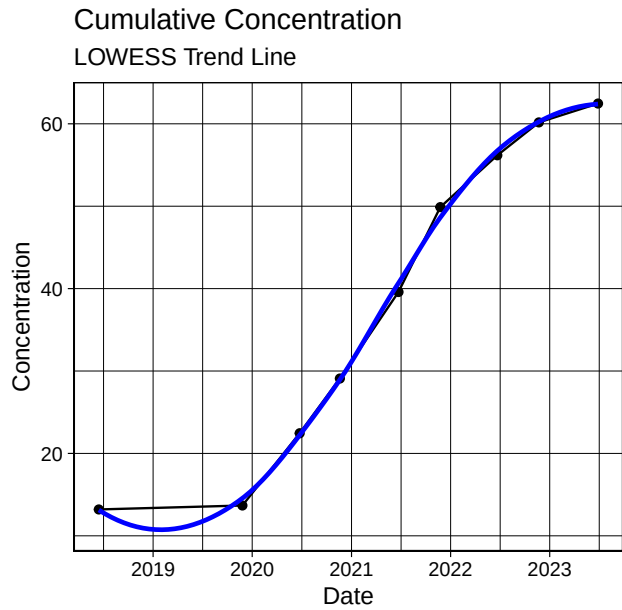
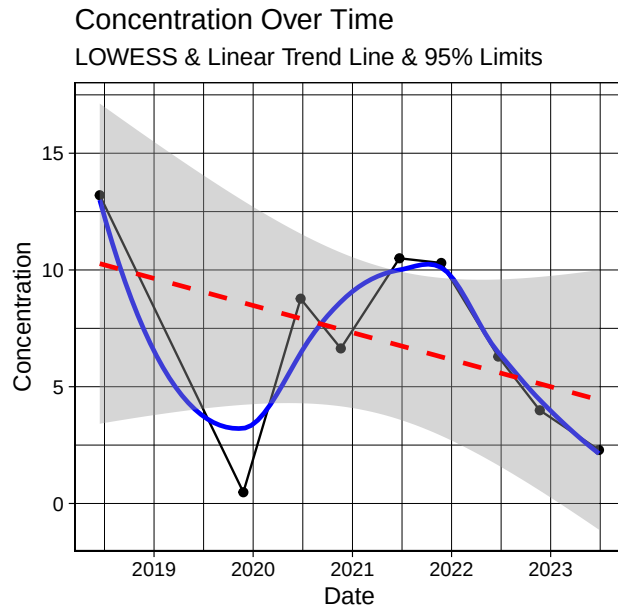
Kendall Trend Test Results Continuous	
n	9
z	0
p	1
S	0
varS	92
tau	0
mean	4.16
sd	1.42
cov	0.34
results	STABLE

Report for ID : MW162 and Analyte : PFOS+PFHxS



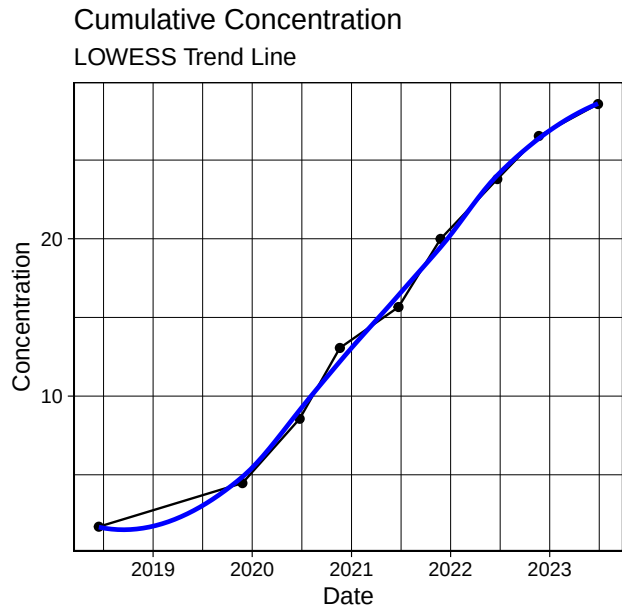
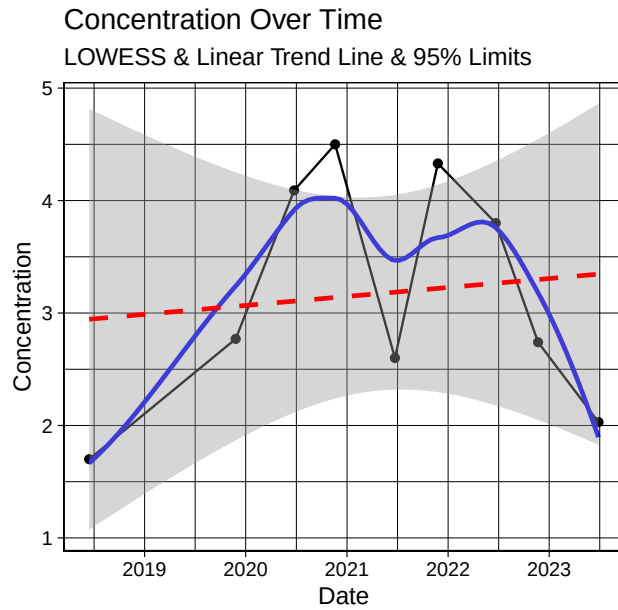
Kendall Trend Test Results Continuous	
n	9
z	-1.36
p	0.18
S	-14
varS	92
tau	-0.39
mean	6.94
sd	4.17
cov	0.6
results	STABLE

Report for ID : MW163 and Analyte : PFOS+PFHxS



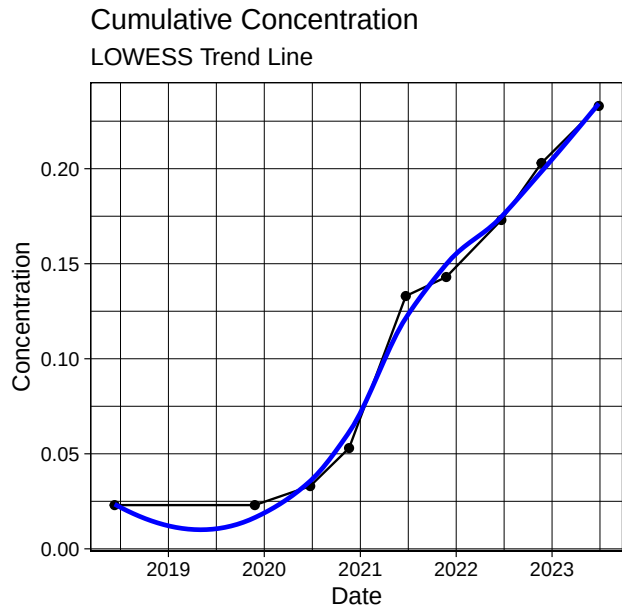
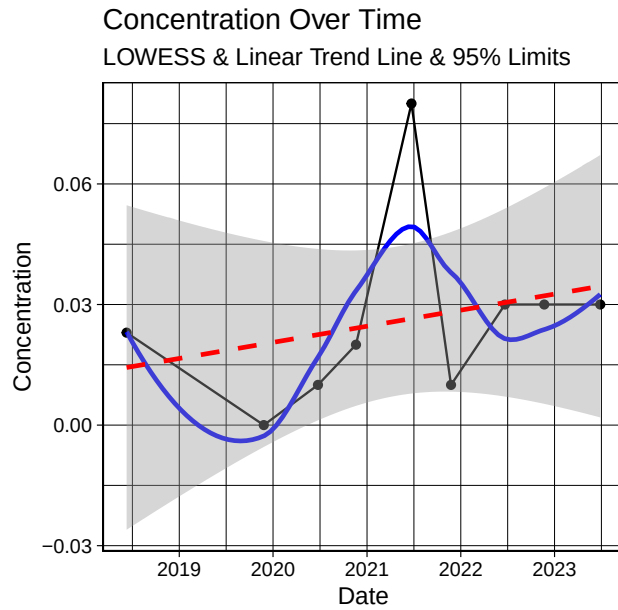
Kendall Trend Test Results Continuous	
n	9
z	-0.1
p	0.92
S	-2
varS	92
tau	-0.06
mean	3.17
sd	1.03
cov	0.32
results	STABLE

Report for ID : MW164 and Analyte : PFOS+PFHxS



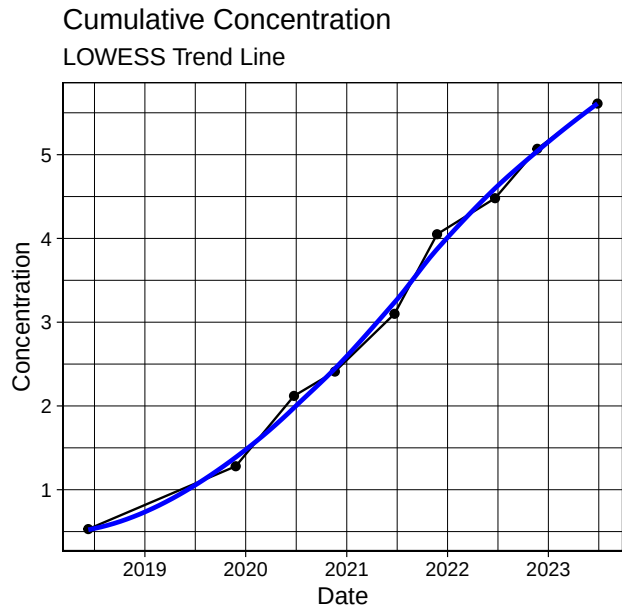
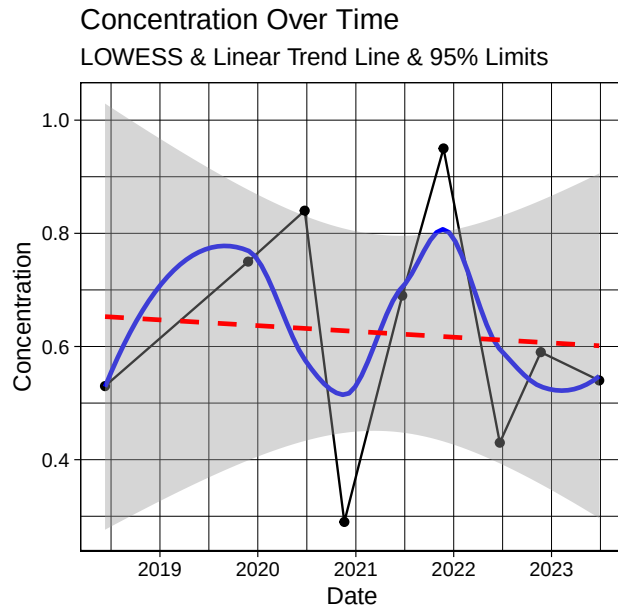
Kendall Trend Test Results Continuous	
n	9
z	1.39
p	0.16
S	14
varS	87.33
tau	0.41
mean	0.03
sd	0.02
cov	0.88
results	NO CLEAR TREND

Report for ID : MW165 and Analyte : PFOS+PFHxS



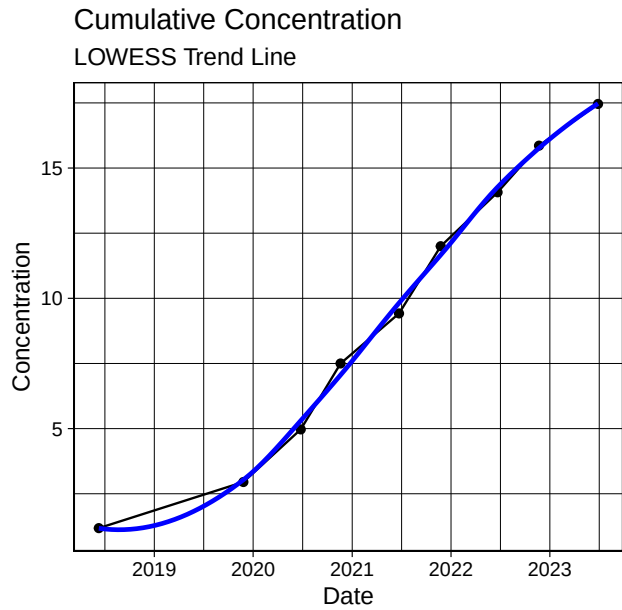
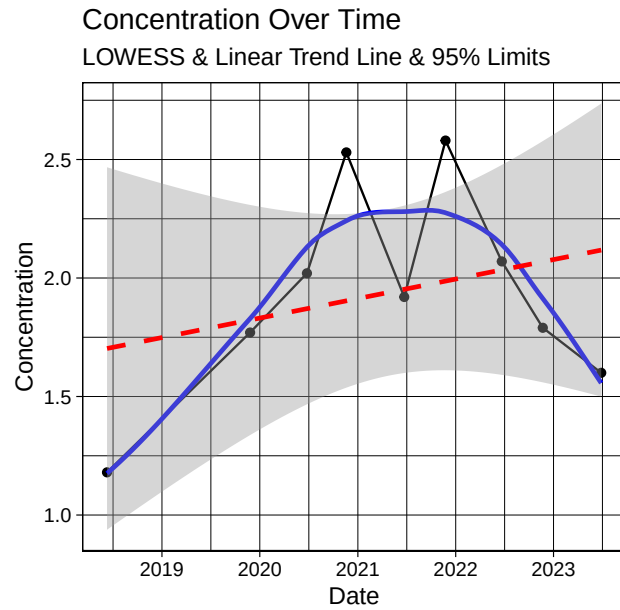
Kendall Trend Test Results Continuous	
n	9
z	-0.1
p	0.92
S	-2
varS	92
tau	-0.06
mean	0.62
sd	0.21
cov	0.33
results	STABLE

Report for ID : MW166 and Analyte : PFOS+PFHxS



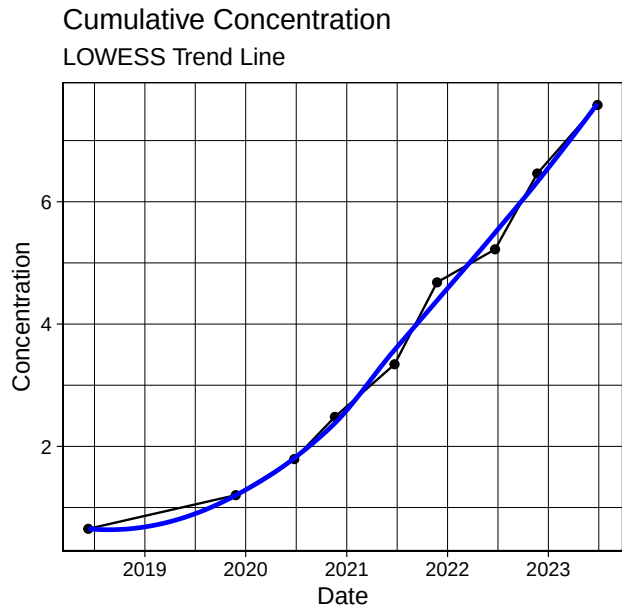
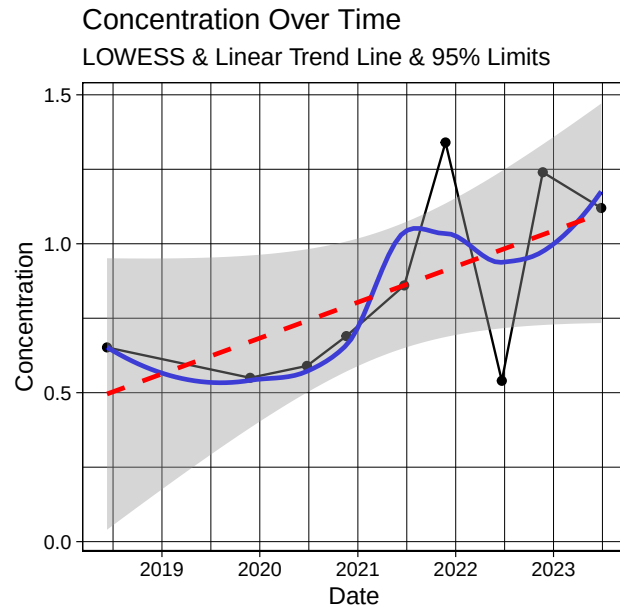
Kendall Trend Test Results Continuous	
n	9
z	0.31
p	0.75
S	4
varS	92
tau	0.11
mean	1.94
sd	0.44
cov	0.23
results	NO CLEAR TREND

Report for ID : MW167 and Analyte : PFOS+PFHxS



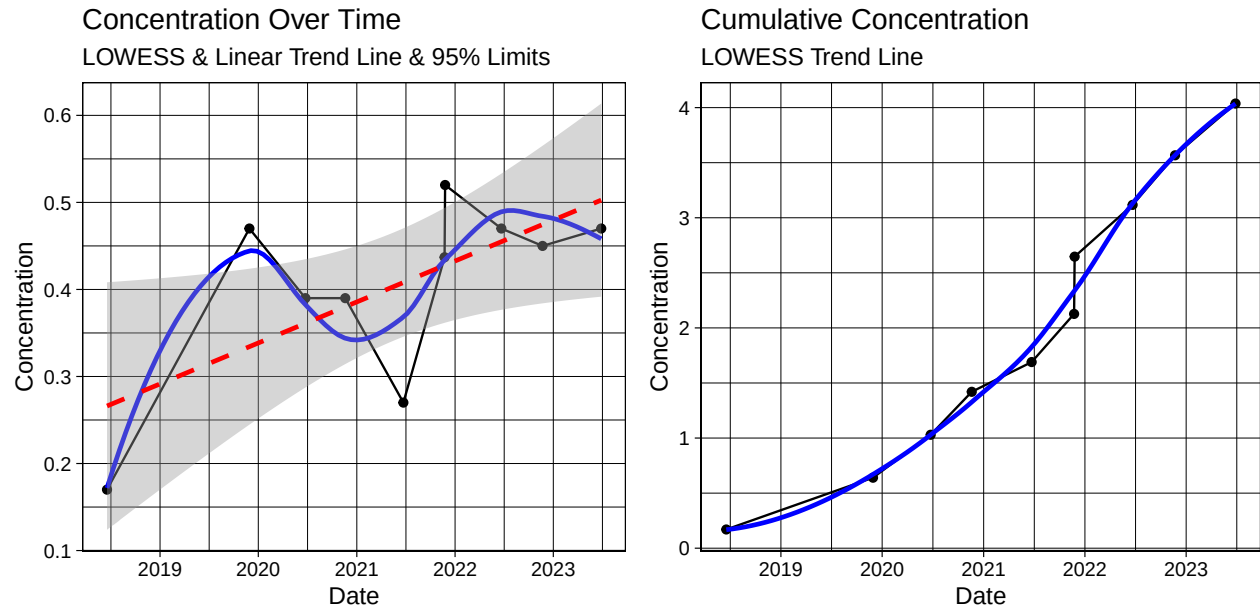
Kendall Trend Test Results Continuous	
n	9
z	1.36
p	0.18
S	14
varS	92
tau	0.39
mean	0.84
sd	0.31
cov	0.37
results	NO CLEAR TREND

Report for ID : MW168 and Analyte : PFOS+PFHxS



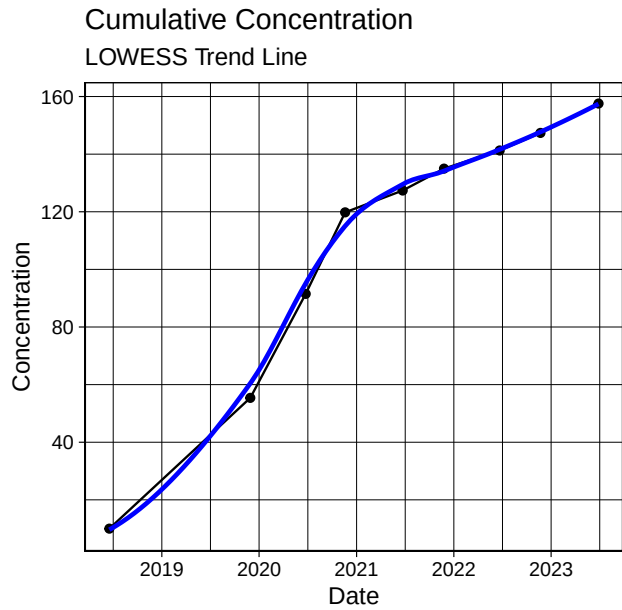
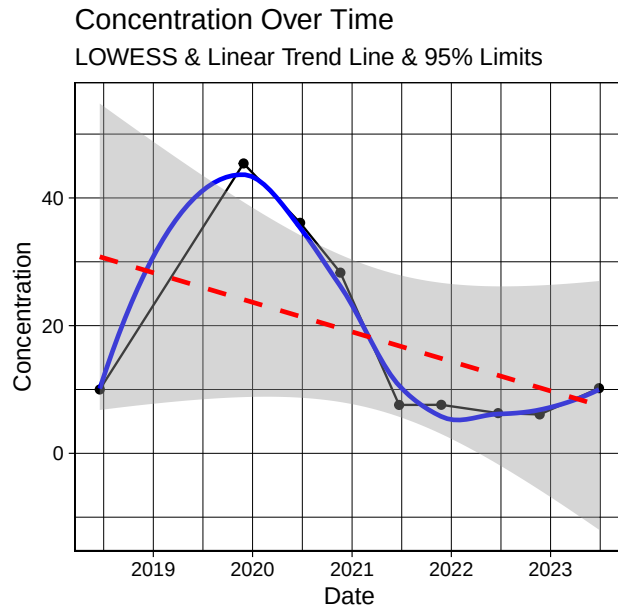
Kendall Trend Test Results Continuous	
n	10
z	1.64
p	0.1
S	19
varS	120.33
tau	0.44
mean	0.4
sd	0.11
cov	0.26
results	NO CLEAR TREND

Report for ID : MW170 and Analyte : PFOS+PFHxS



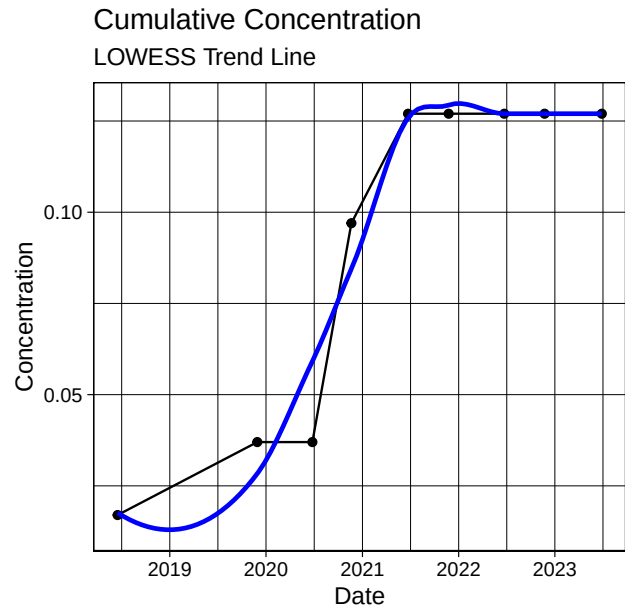
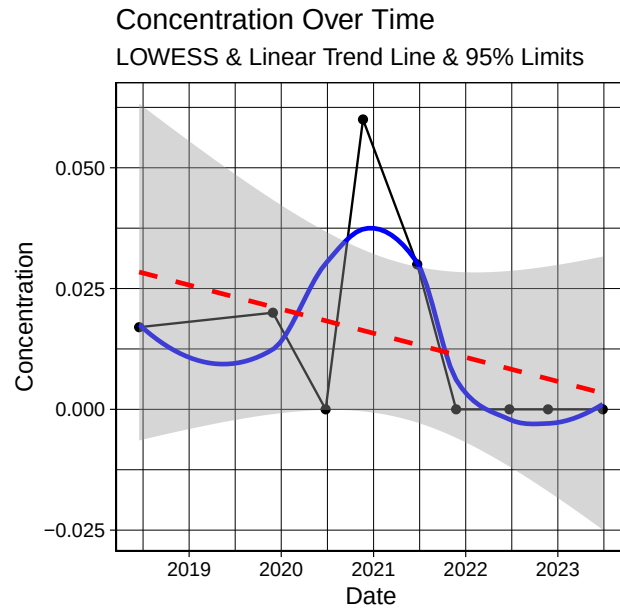
Kendall Trend Test Results Continuous	
n	9
z	-1.77
p	0.08
S	-18
varS	92
tau	-0.5
mean	17.51
sd	15.01
cov	0.86
results	POSSIBLY DECREASING

Report for ID : MW172 and Analyte : PFOS+PFHxS



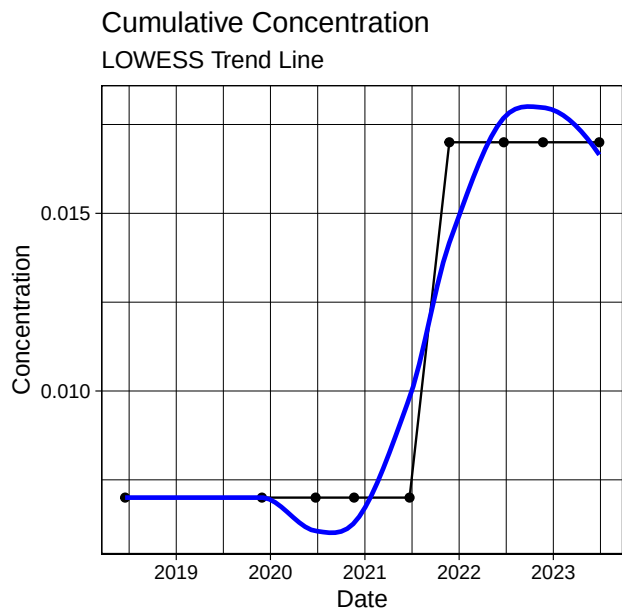
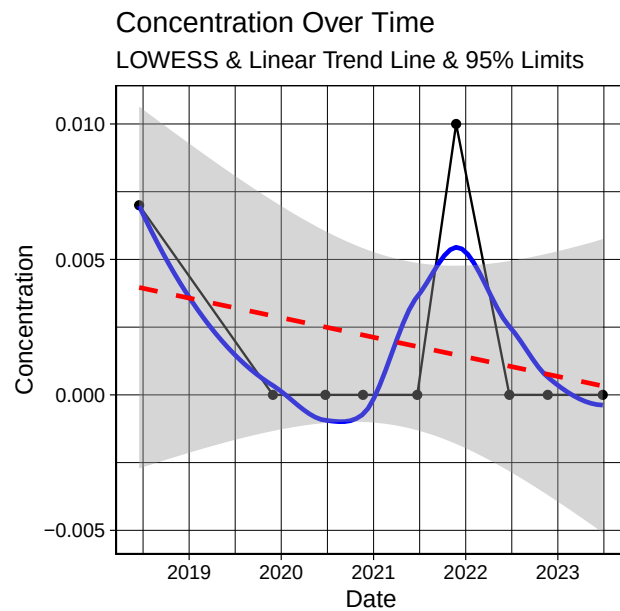
Kendall Trend Test Results Continuous	
n	9
z	-1.27
p	0.21
S	-12
varS	75.33
tau	-0.39
mean	0.01
sd	0.02
cov	1.46
results	NO CLEAR TREND

Report for ID : MW175 and Analyte : PFOS+PFHxS



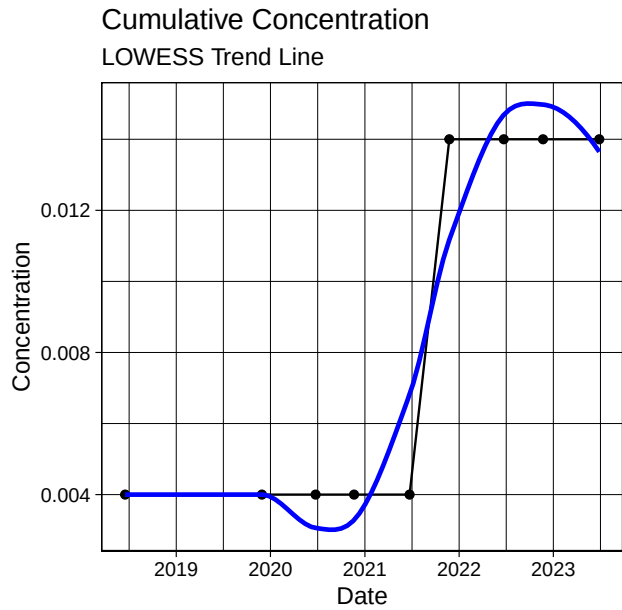
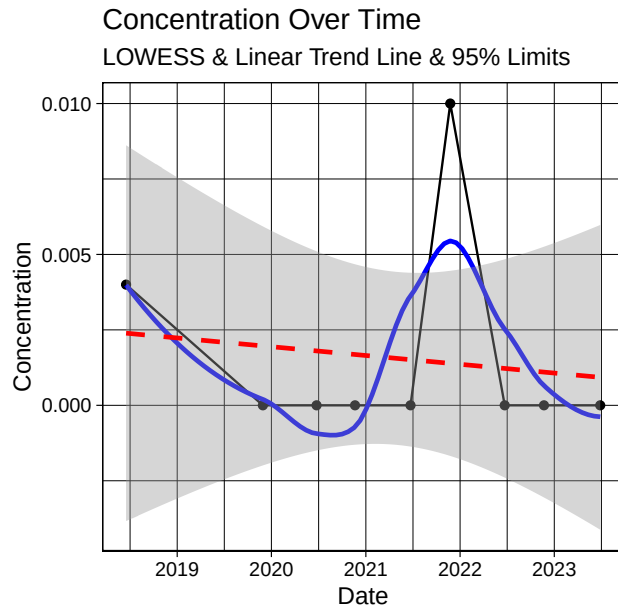
Kendall Trend Test Results Continuous	
n	9
z	-0.58
p	0.56
S	-5
varS	47.67
tau	-0.22
mean	0
sd	0
cov	2.02
results	NO CLEAR TREND

Report for ID : MW176 and Analyte : PFOS+PFHxS



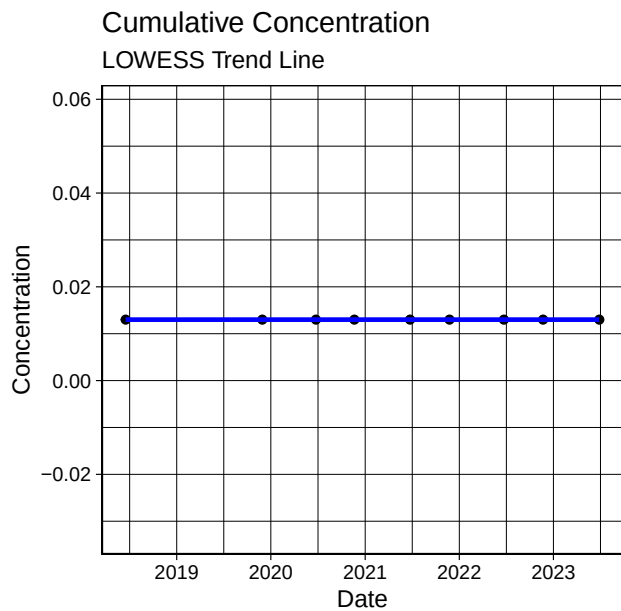
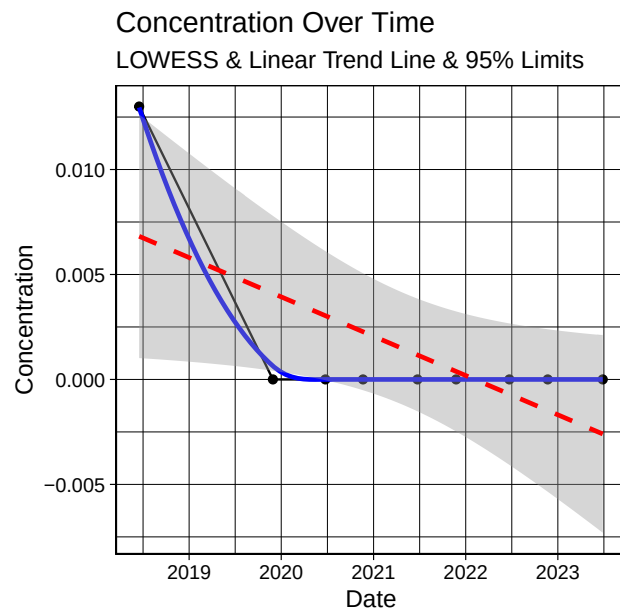
Kendall Trend Test Results Continuous	
n	9
z	-0.58
p	0.56
S	-5
varS	47.67
tau	-0.22
mean	0
sd	0
cov	2.21
results	NO CLEAR TREND

Report for ID : MW177 and Analyte : PFOS+PFHxS



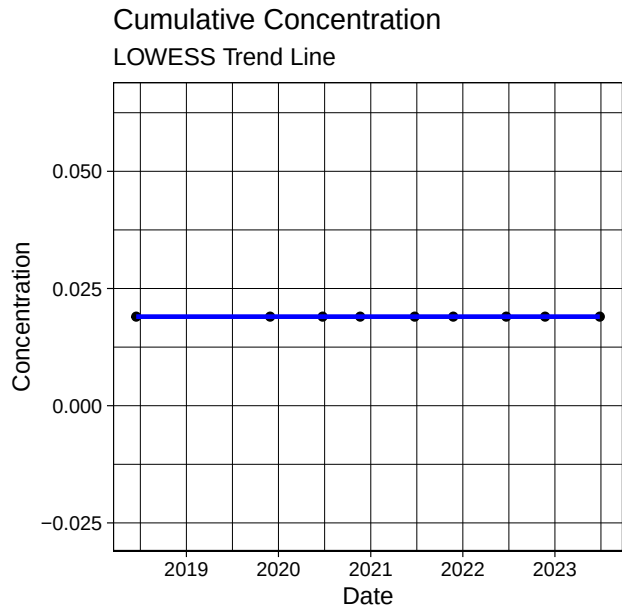
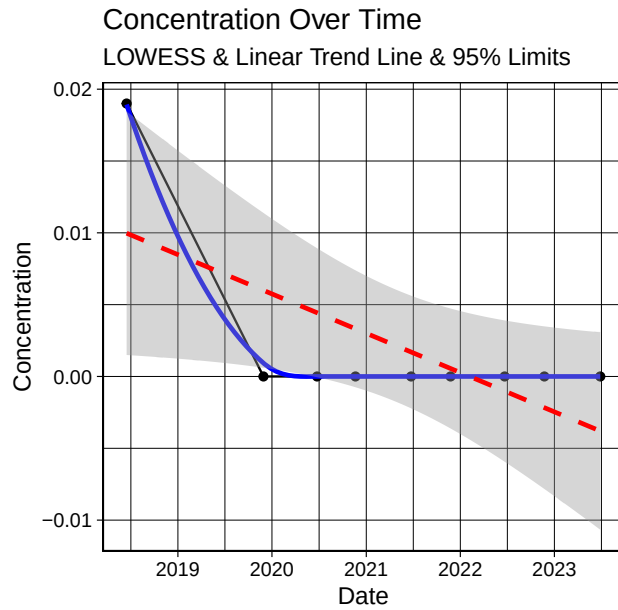
Kendall Trend Test Results Continuous	
n	9
z	-1.36
p	0.18
S	-8
varS	26.67
tau	-0.47
mean	0
sd	0
cov	3
results	NO CLEAR TREND

Report for ID : MW178 and Analyte : PFOS+PFHxS



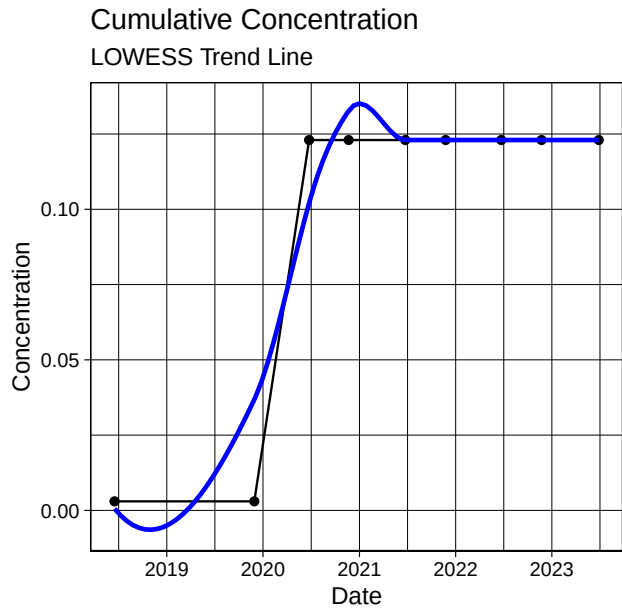
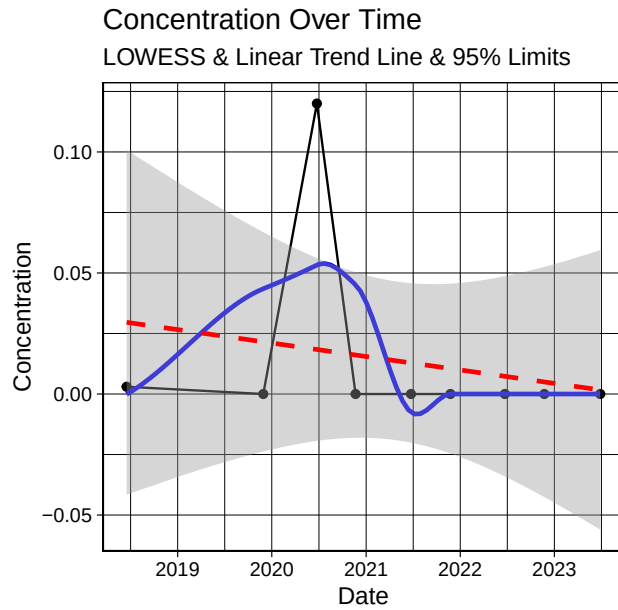
Kendall Trend Test Results Continuous	
n	9
z	-1.36
p	0.18
S	-8
varS	26.67
tau	-0.47
mean	0
sd	0.01
cov	3
results	NO CLEAR TREND

Report for ID : MW179 and Analyte : PFOS+PFHxS



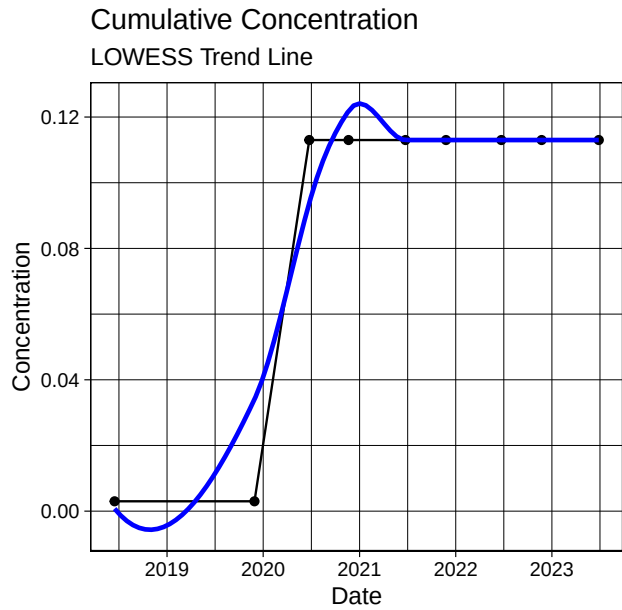
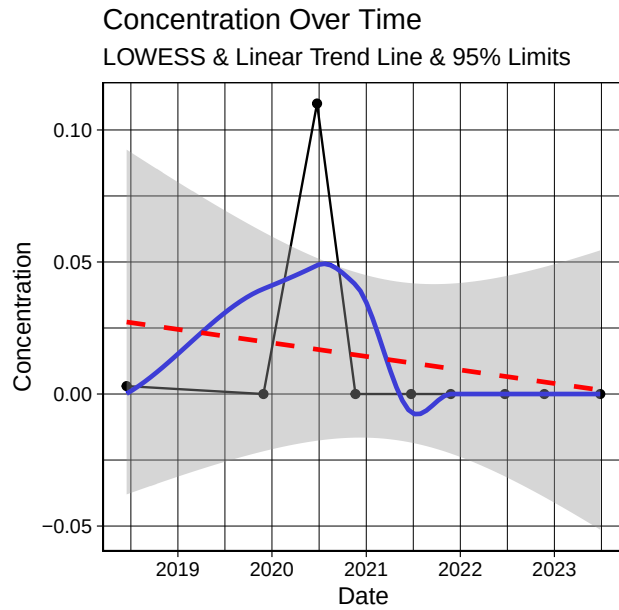
Kendall Trend Test Results Continuous	
n	9
z	-1.45
p	0.15
S	-11
varS	47.67
tau	-0.47
mean	0.01
sd	0.04
cov	2.92
results	NO CLEAR TREND

Report for ID : MW180 and Analyte : PFOS+PFHxS



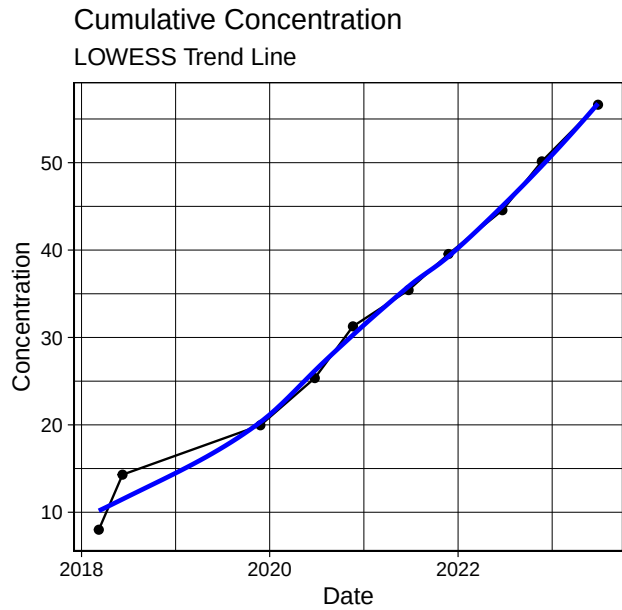
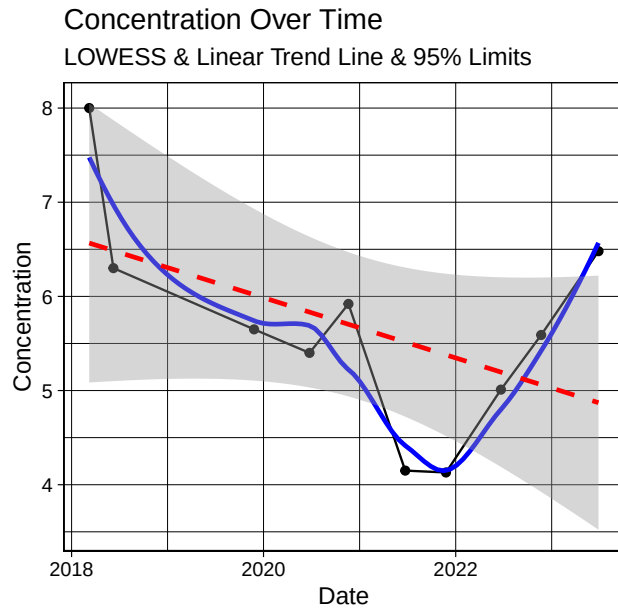
Kendall Trend Test Results Continuous	
n	9
z	-1.45
p	0.15
S	-11
varS	47.67
tau	-0.47
mean	0.01
sd	0.04
cov	2.91
results	NO CLEAR TREND

Report for ID : MW181 and Analyte : PFOS+PFHxS



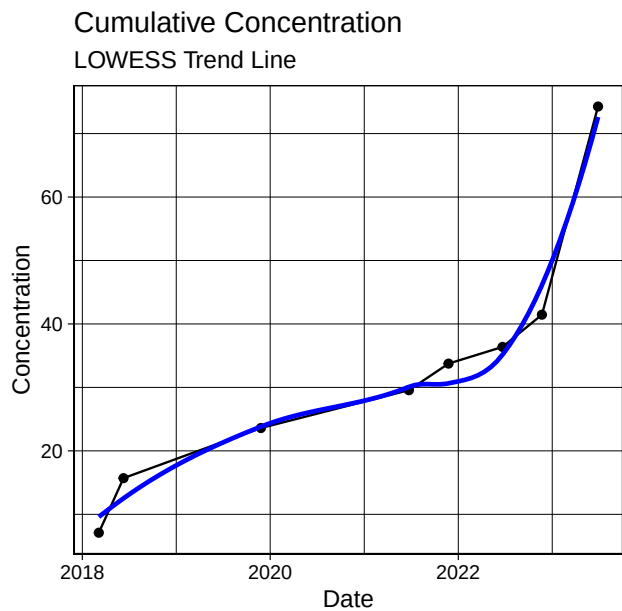
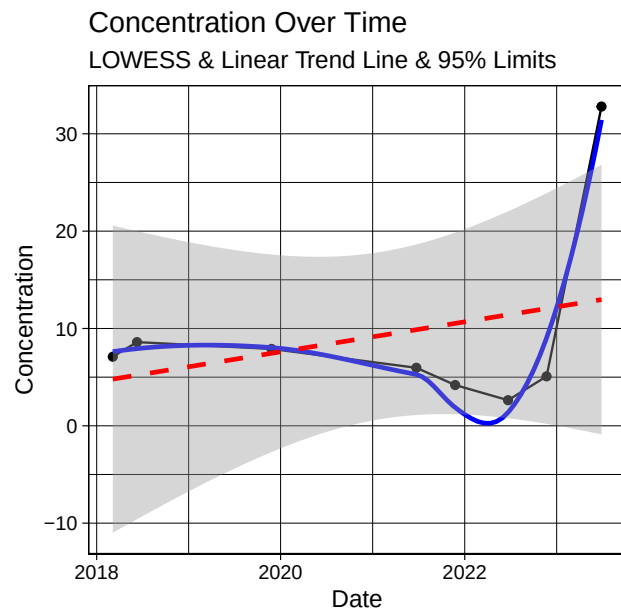
Kendall Trend Test Results Continuous	
n	10
z	-1.07
p	0.28
S	-13
varS	125
tau	-0.29
mean	5.66
sd	1.14
cov	0.2
results	STABLE

Report for ID : MW211 and Analyte : PFOS+PFHxS



Kendall Trend Test Results Continuous	
n	8
z	-0.62
p	0.54
S	-6
varS	65.33
tau	-0.21
mean	9.28
sd	9.7
cov	1.05
results	NO CLEAR TREND

Report for ID : MW233 and Analyte : PFOS+PFHxS



Kendall Trend Test Results Continuous	
n	5
z	-1.22
p	0.22
S	-6
varS	16.67
tau	-0.6
mean	53.74
sd	44.98
cov	0.84
results	STABLE

Report for ID : MW238 and Analyte : PFOS+PFHxS

