Ongoing Monitoring Report (November 2021 – October 2022)

Naval Communication Station Harold E Holt Area A - PFAS OMP

Prepared for

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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 and around Naval Communication Station Harold E Holt – Area A ("HEH-A" or the "site") on the North-West Cape, Western Australia (WA) (Figure 1, Appendix A).

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 source areas identified at HEH-A. The source areas are depicted on Figure 2, Appendix A

The OMP includes sampling and analysis not only from the site, but also from surrounding (off-site) waterways. The site and these surrounding areas are collectively referred to as the 'Management Area', which was identified during a Detailed Site Investigation (DSI) in 2018 (GHD, 2018)[2]. The Management Area is shown on Figure 2, Appendix A.

Objectives

The objective of the ongoing monitoring program is to assess changes in the nature and extent of PFAS within the environment. The ongoing monitoring program uses the monitoring network developed as part of the PFAS Management Area Plan (PMAP)[3] to monitor the amount of PFAS leaving the site through the groundwater migration and surface water runoff. The PMAP documents ways to manage potential risks to receptors (for example, to people or the environment) associated with Defence's historical use of legacy aqueous film forming foam (AFFF).

Monitoring Scope

The November 2021 – October 2022 monitoring period ("monitoring period") consists of biannual monitoring events (November 2021 and June 2022) as well as 'first flush' monitoring event undertaken in May 2022 following the first heavy rainfall of the wet season. The scope of work for the biannual monitoring events comprised monitoring of 33 groundwater wells, 12 seepage water locations and six co-located sediment and surface water locations, as specified in the OMP. The first flush event comprised the monitoring of six co-located sediment and surface water locations. A first flush event seeks to understand whether PFAS concentrations are higher after the first heavy rainfall event of the wet season than they would be measured at other times of the year.

Groundwater elevation data was collected from 32 groundwater wells in the November 2021 monitoring event and 29 groundwater wells during the June 2022 monitoring event. Groundwater samples were collected from 31 wells in November 2021 and June 2022.

Works were conducted in general accordance with the methodologies detailed in the Sampling and Analysis Quality Plan (SAQP) (Cardno, 2021c, Appendix B), except as summarised in Section 3.6 of this report.

The current monitoring network is considered adequately positioned to monitor PFAS in groundwater, seepage water, surface water runoff and sediment, and to provide an early detection of significant changes in migration.

Groundwater Results

Groundwater Flow Direction

The local groundwater (GHD, 2018) was observed to flow inland from the site, with a seaward flow closer to the coast, likely due to increased recharge in the sand dunes. A tidal influence was also reported at most wells.

The November 2021 and June 2022 inferred groundwater elevation contours indicated a generally consistent groundwater flow direction from the sand dunes towards the central clay pan area (i.e. inland direction) with

[1] The OMP is publically available at www.defence.gov.au/Environment/PFAS/Iharoldeholt, and is found as Attachment 1 of the PFAS Management Area Plan
[2] Publically available at www.defence.gov.au/Environment/PFAS/haroldeholt
[3] Defence, 2019, Naval Communication Station Harold E Holt – Ara A – PFAS Management Area Plan.

slight seasonal differences in groundwater depth linked to increased groundwater recharge from rainfall infiltration during the winter months.

It is noted that the groundwater level measurements were collected over several days and tide cycles, which limits the conclusions that can be drawn with respect to tidal influence on groundwater elevation. However, the interpreted groundwater flow direction remains consistent with previous gauging events and the DSI findings.

PFAS Concentrations

The groundwater results recorded during the monitoring period were consistent between monitoring events and the majority remained within the same order of magnitude as historical data.

One on-site source area monitoring well, MW004, was sampled for the first time this monitoring period as a replacement for MW003 which was found damaged. The PFOS concentration at this well exceeded the adopted ecological assessment criteria. There were no first-time detections or new exceedances of PFAS at any of the pathway or receptor area monitoring locations.

Trend interpretation of PFAS concentrations (using Mann Kendall analysis) showed that groundwater monitoring wells at the source areas displayed either decreasing, stable or the absence of a trend depending on the analyte under review, with exception of a possibly increasing trend for PFOS at POL Storage Area monitoring well MW119. The PFAS concentrations appear to be slowly diluted with rainfall recharge and groundwater migration with concentrations becoming undetectable (i.e. below laboratory LOR) before reaching the marine environment. Additional monitoring events will be required to confirm these trends observed for the PFAS concentrations.

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.

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 to the Exmouth Gulf environment. All seepage water monitoring locations reported PFAS concentrations below the laboratory LOR during the monitoring period. It is noted OTH113, located on the north-west coastline, recorded a new maximum for Sum of PFOS and PFHxS (0.56 µg/L) during the June 2021 monitoring event, two orders of magnitude above historical data. However, the results were reported below the LOR in the subsequent November 2021 and June 2022 monitoring events, suggesting the June 2021 result was an outlier and does not indicate migration of PFAS concentrations. Considering the detectable concentrations were lower than the adopted criteria and the dilution factor when reaching the Exmouth Gulf, it is considered that the potential risk remains low and acceptable. However, further monitoring of the PFOS and Sum of PFOS and PFHxS concentrations at this location through the continuation of OMP monitoring is warranted.

What is a 'limit of reporting'?

The limit of reporting (LOR) is the lowest concentration level that the laboratory can 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.

Surface Water Results

The surface water monitoring locations consistently reported PFAS concentrations below the laboratory LOR, with exception of SW113, located within the Powerhouse Area. This location has consistently reported PFAS concentrations above the LOR. There were no first-time detections of PFOA or Sum of PFOS and PFHxS, or new guideline exceedances reported during the monitoring period.

Sediment Results

The sediment monitoring locations reported all PFAS concentrations below the laboratory LOR, with exception of SD113, located within the Powerhouse Area. This location has consistently reported PFAS concentrations above the LOR and is consistent with the co-located surface water results. There were no first-time detections of PFOA or Sum of PFOS and PFHxS reported during the monitoring period.

Risk Summary

The evaluation of November 2021 – October 2022 monitoring results indicates the nature and extent of PFAS in groundwater, seepage water, surface water and sediment remain consistent with that inferred from previous investigations.

The potential exposure pathways, human receptors (such as recreational anglers in the Management Area), and ecological receptors (such as land and marine flora and fauna) identified during the DSI (GHD, 2018) have been reviewed and are still considered to be appropriate, and the ongoing monitoring program data collected to date does not suggest any significant changes to these transport mechanisms or risks.

No new sources of PFAS contamination, transport pathways or potential receptors have been identified during the monitoring period.

Information gathered during the monitoring period supports the conclusions made in the Environmental Risk Assessment (ERA) (GHD, 2019), that PFAS poses a low risk to receptors (such as recreational anglers and land and marine flora and fauna). Based on the current available data, including the monitoring data collected as part of the OMP implementation, there is no change to the above risk profile.

The OMP contains management response triggers to assess whether a more active response is required to manage changes in PFAS. There were no management response triggers reported during the monitoring period.

Potential changes in groundwater, surface water, seepage water and sediment PFAS concentrations will continue to be evaluated through future monitoring and reporting.

Conclusions

The nature and extent of PFAS across all OMP monitoring locations has not changed from the understanding presented in the investigation phases, PMAP (Defence, 2019) and previous 2020 and 2021 Annual Interpretive Reports (Cardno, 2021e and Cardno 2023). Potential trends in PFAS concentrations (both decreasing and increasing depending on the location and PFAS compound under review) are noted at some groundwater monitoring locations within the on-site source areas. The PFAS concentrations appear to be slowly diluted by rainfall recharge and groundwater migration, with undetectable concentrations recorded (i.e., below laboratory LOR) before reaching the marine environment. Additional monitoring rounds will be required to confirm these trends observed for the PFAS concentrations.

The November 2021 – October 2022 monitoring results met the objective of the OMP, and monitoring was carried out in general accordance with the SAQP (Cardno, 2021c, Appendix B). Based on the current available data there is no significant change to the risk profile of the Management Area.

Given the remaining PFAS concentrations reported at the monitoring locations within the on-site source areas, the ongoing monitoring program is being continued to further support temporal data trend assessment, PFAS concentration behaviour and assess potential changes in exposure pathways and associated risk.

The OMP is currently under review as the initial implementation period has been reached and changes in access to the existing monitoring network have been noted. Changes to the monitoring network include the relocation of SD112/SW112 and SD120/SW120 due to site access restrictions, removal of MW123 due to permanent site access restrictions and replacement of MW003 due to damaged well casing. The OMP will be updated considering the monitoring data collected to date.

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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)
TSS	Total Suspended Solids

Technical Terms & Abbreviations

AFFF	Aqueous Film Forming Foam
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
AS	Australian Standard
BGL	Below Ground Level
CS	Contaminated Sites
CSM	Conceptual Site Model
DSI	Detailed Site Investigation
EC	Electrical Conductivity
EPA	Environment Protection Authority
ERA	Ecological Risk Assessment
HEPA	Heads of Environmental Protection Authority
LOR	Limit of Reporting
N/A	Not Applicable
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
NEMP	National Environmental Management Plan
OMIR	Ongoing Monitoring Interpretive Report
QA	Quality Assurance
QC	Quality Control
RPD	Relative Percentage Difference
RWL	Reduced water level
SAQP	Sampling and Analysis Quality Plan
SWL	Standing Water Level

Units

ha	Hectares
mBGL	Metres Below Ground Level
mAHD	Metres Above Height Datum
mbTOC	Metres Below Top of Casing
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
mV	Millivolt
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

OMP	Ongoing Monitoring Plan
OMR	Ongoing Monitoring Report
PMAP	PFAS Management Area Plan
POL	Petrol oil and lubricants
VLF	Very low frequency

1 Introduction

The Australian Department of Defence (”Defence”) engaged Cardno, now Stantec (Cardno) to undertake the November 2021, first flush (May 2022), and June 2022 groundwater, surface water, seepage water and sediment monitoring events at and around the Naval Communication Station Harold E Holt – Area A (‘HEH-A’ or the ‘site’) as part of the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP).

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 ongoing monitoring program consists of biannual monitoring events in November and June, 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 site has been subject to numerous PFAS investigations, including:

- A detailed Site Investigation (GHD, 2018)
- An Ecological Risk Assessment (GHD, 2019)
- Implementation of the PFAS OMP since 2019

1.2 Purpose & Objectives

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

- Evaluate the nature and extent (spatial and temporal) of PFAS impact in groundwater and surface water pathways associated with 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, seepage water, groundwater, and sediment; and
- Assess any variations in the distribution of PFAS for the site and how this changes the understanding of the Conceptual Site Model (CSM) and risk profile.

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)[4], provided in Appendix B and the SAQP deviations outlined in Section 3.6.

The assessment included the following main components:

1. Undertake the November 2021 groundwater, seepage water, surface water and sediment monitoring event:
   - Gauging of 32 single and multi-level groundwater monitoring wells;
   - Sampling of 31 groundwater monitoring wells,
   - Sampling 11 seepage water locations;

[4] Cardno, June 2021, Reference: DEF19009, ‘PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) Naval Communication Station Harold Holt A’.

- Sampling of two surface water locations; and
- Sampling of five sediment locations.

2. Undertake the first flush (May 2022) surface water and sediment monitoring event:
   - Sampling of five surface water locations; and
   - Sampling of six sediment locations.
   - Sampling of one seepage water location (to replace a lost seepage water sample from November 2021 monitoring event that was collected but not analysed by the laboratory. Details provided in Section 3.6.
3. Undertake the June 2022 groundwater, seepage water, surface water and sediment monitoring event:
   - Gauging of 29 single and multi-level groundwater monitoring wells;
   - Sampling of 31 groundwater monitoring wells,
   - Sampling of 11 seepage water locations;
   - Sampling of six surface water locations; and
   - Sampling six sediment locations.
4. Data assessment and reporting for the November 2021 – October 2022 monitoring period.

1.4 Standards of Assessment and Limitations

This OMR has been prepared in 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

HEH-A is situated on the North-West Cape in the Pilbara Region of WA, approximately 14 kilometres (km) north of the township of Exmouth and 1,250 km north of Perth. The site covers an area of approximately 2,310 hectares (ha) and is presented on Figure 1 of Appendix A. HEH-A was established in 1967 and is host to a Very Low Frequency (VLF) antenna field and associated infrastructure including a central transmitter building, power station, fuel farms, fuel pipelines, Point Murat Pier, and saltwater bore field.

The HEH-A site encompasses the waters extending 400 m around the Point Murat Pier. The majority of the buildings and associated infrastructure and support services are located in the eastern portion of the site and include:

- VLF transmitter Station;
- Bulk fuel storage, referred to as the Petrol Oil Lubricants (POL) Storage Area;
- Bulk fuel storage at the Ready Use Fuel Farm (RUFF) above ground storage tanks (ASTs) at the power station;
- Point Murat Pier – diesel fuel supplied by ships berthed at Point Murat Pier and transferred via pipeline (above and below ground) to the POL and ready storage facility adjacent to the power station; and
- Power station.

2.1 Site Definition and Planning

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

Table 2-1 Site Identification Details

Details	Description
Site Address	Murat Rd, North-West Cape, WA 6707
Land Description	Harold E Holt Area A
Owner	Commonwealth of Australia
Title Details	Lot 44 on Plan P209471
Planning Zone / Land use	Public Purposes – Government Services / Naval Communication Station
Local Government Authority (LGA)	Shire of Exmouth
Boundary corner coordinates (as determined by Cardno**)** (eastings and northings in GDA94, Zone 50)	▪ North corner: 201,817 mE, 7,588,922 mN ▪ East corner: 209,638 mE, 7,585,003 mN ▪ South corner: 206,410 mE, 7,581,168 mN ▪ West corner: 203,378 mE, 7,585,914 mN

Source: GHD Pty Ltd (December 2018) Naval Communication Station Harold E Holt – Area A, PFAS Investigations – DSI Report (GHD 2018)

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	Ningaloo Marine Park / Indian Ocean
West	Ningaloo Marine Park / Indian Ocean
East	Ningaloo Marine Park / Exmouth Gulf, used for commercial aquaculture (prawn fishing)
South	▪ Bundegi Coastal Park and vacant crown land (open space) ▪ Harold E Holt – Area B ▪ Exmouth Township

2.3 Monitoring Area Description

The HEH-A site boundary is presented in Figure 1 of Appendix A. The OMP includes sampling of groundwater and surface water not only from within the site boundary, but also from a number of surrounding (off-site) waterways, groundwater wells and seepage locations. The site and these surrounding areas are collectively referred to as the 'Management Area'. The Management Area in the HEH-A PFAS Management Area Plan (PMAP) (Defence, 2019) includes the source areas and the land surrounding the site to the coastline and is presented in Figure 2, Appendix A.

2.4 Environmental Setting

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

Table 2-3 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 37.9ºC (January) and 24.2ºC (July) while minimum temperatures range between 11.4ºC (July) and 24.7ºC (February) [Bureau of Meteorology (BoM), 2023]. 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. The monthly rainfall amounts for the monitoring period were below average in the dry season (November 2021 to March 2022) and higher than average in April to June 2022, August and September 2022.
Topography	Elevation across HEH-A typically range between 1 and 20 metres relative to the Australian Height Datum (mAHD). To the east of HEH-A, the coastline is comprised of sand dunes, which have a maximum elevation of 20 mAHD. The dunes have a succession profile of primary and secondary dunes, which increase in elevation with distance from the coast.
Geology	**Regional Geology** The site is underlain by the geological units of the North-West Cape Range primarily comprising carbonate sediments. The Cape Range Group consists of: ▪ Trealla Limestone: permeable, hard, and tightly jointed limestone beneath unconsolidated Quaternary deposits. Contains both karst areas and areas of recrystallization. ▪ Tulki Limestone: relatively permeable, hard, and tightly jointed. Encountered at depths of 50 to 100 m below ground level (mBGL). Karst features such as caves occur within the recrystallised limestone. ▪ Mandu Limestone: low permeability limestone encountered at greater than 150 mBGL. ▪ The Birdrong Sandstone which underlies the Cape Range Group, is an Early Cretaceous geologic formation of the Barrow Group. Comprising a fine to coarse grained silty sandstone. **Site Specific Geology** Previous environmental investigations have reported that the geology at HEH-A is primarily a clay pan, comprising silt, sand, and gravels (GHD, 2018). The clay pan encompasses most of the far north-eastern tip of the peninsula and is fringed along the coast to the north and east of the site by extensive beach and coastal dunes. The lithology encountered during the DSI was as follows: – Clay Pan: the central clay pan comprised a thin surface clay layer with some sand and gravels underlain by silt to at least 5 mBGL. The rim of the clay pan consisted of a sandy top layer underlain by clay and/or gravelly sands. – Coastal zone: the coastal zone comprised well graded sand to approximately 10 mBGL.
Acid Sulfate Soil	A review of the Acid Sulfate Soils (ASS) risk mapping, available on the WA Atlas online database indicates that most of the area encompassing the site is classified as having either a high to moderate or moderate to low risk of ASS occurring.
Hydrology	HEH-A can be inundated by sea water during extreme storm surges. Later evaporation of this water has left visible salt crusts and localised hypersaline conditions. The coastal sand dunes and inland topographical depression that characterise HEH-A effectively form a basin where, in the absence of drainage pathways to the coast, surface

Setting	Description
	water can stand for up to several months following substantial rainfall events and storm surges. Site drainage primarily follows the local topography, prior to infiltration into the ground surface. The drainage lines are ephemeral, flowing with high amounts of seasonal rainfall.
Hydrogeology	The Quaternary and Tertiary-aged sediments are hydraulically interconnected and together form the major, unconfined aquifer of the area. The superficial Quaternary layers (dunes, colluvium, alluvium) are no more than 20 m in thickness. ▪ **Groundwater Occurrence/Quality** – The main regional aquifer occurs predominantly within the Tulki Limestone (within permeable beds and the karst system) on the flanks of the Cape Range and the Mandu Limestone (within joints and minor permeable beds) on the crest of the Cape Range. The aquifer is unconfined and is recharged by rainfall. Groundwater in the Quaternary units is considered to be perched and discontinuous. The coastal dunes may also contain relatively fresh groundwater, however of limited extent (lenses), but may influence groundwater flow directions locally. The groundwater underlying the clay/salt pan is hypersaline due to the clay pan acting as an evaporation basin where salts are concentrated. Brackish groundwater conditions exist around the power station and POL areas, which may indicate an interaction with fresher recharge source. ▪ **Depth to Groundwater** – During the 2018 DSI, the majority of existing groundwater monitoring wells reported groundwater less than 7 mBGL. The hydraulic gradient of the site is low (in the order of 0.0002 to 0.003 m/m [GHD, 2018]). The groundwater is therefore likely to be vulnerable to local changes in flow direction through preferential recharge. Recharge is limited to rainfall infiltration and occasional sea water flooding. Groundwater has been recorded beneath the site at shallow levels between -0.0207 mAHD and 1.471 mAHD (approximately 0.485 to 9.859 mBGL) during the November 2021 monitoring event and between 0.404 m AHD and 0.963 mAHD (approximately 1.5 to 9.42 mBGL) during the June 2022 monitoring event. ▪ **Groundwater Flow Direction** – The installation of data loggers during the DSI (GHD, 2018) found the flow of groundwater across the Management Area was generally inland rather than towards the coast, with exception of periods of consistent flooding (i.e. cyclonic events). The DSI determined that a tidal influence was visible at most wells with a consistent flow over tidal periods. Data loggers indicated a seaward groundwater flow closer to the coast, likely due to recharge from the coastal dunes. The November 2021 and June 2022 inferred groundwater elevation contours indicated a generally consistent groundwater flow direction from the sand dunes towards the central clay pan area (i.e. inland direction). Figure 4 and Figure 5 of A shows the groundwater levels and flow direction recorded during the November 2021 and June 2022 monitoring events. ▪ **Groundwater Use** – No registered groundwater bores were identified within a 1.0 km radius of HEH-A. A number of unregistered extraction bores are understood to be present at residential properties within the township of Exmouth, located approximately 14 km south of the site. Saltwater production bores were installed within the Trealla Limestone to the southeast of the power plant compound area. Groundwater is continuously pumped from this borefield, which may be responsible for localised deviations in the groundwater elevation contours near the southeast portion of the site. ▪ **Protective Drinking Water Source Area (PDWSA**) – The site is not located within a PDWSA. However, the Exmouth Water Reserve, which is a Priority 1 PDWSA, is located approximately 12 km southwest of the site at its closest point. Priority 1 areas are usually undeveloped and under state management. ▪ **Receiving Surface Water Body** – A component of flow from the sand dunes towards the coast is present on the eastern coast near Point Murat Pier, although this is reversed at high tide, such that groundwater discharges over full tidal cycles may be minimal.
Environmental Sensitive Areas	The site occurs within an area that is included on the Register of the National Estate because of its natural heritage value, under the Australian Heritage Council Act 2003 of the Commonwealth. ▪ The Cape Range Subterranean Waterways wetlands occurs across the site. ▪ The Cape Range National Park is located approximately 28 km to the south-west of the site at its closest point.

Setting	Description
	▪ The Jurabi Coastal Park is adjacent to the west of the site. ▪ The Bundegi Conservation Reserve is adjacent to the south-east of the site. The Ningaloo Reef, a World Heritage listed site is located within 10 km of HEH-A. The Ningaloo Reef is also listed on the National Heritage Property register.
Further information can be found in the DSI report (GHD, 2018) and previous interpretive reports (Cardno, 2021) and (Cardno, 2022).	

2.5 Source Areas

There are three monitoring areas, where PFAS was detected in soil or groundwater at concentrations exceeding the adopted assessment levels. These include (as shown on Figure 2 of Appendix A):

> The POL Storage Area (or Fuel Farm);

> The Powerhouse; and

> Point Murat Pier.

The extent of contamination identified during the DSI and ERA indicates that "*PFAS concentrations in groundwater were generally low across the site, with higher concentrations in the immediate vicinity of the bulk fuel storages at the POL Storage Area and the Power Station*" (Defence, 2019).

2.6 Pathway Areas and Broader Area

The Pathway Areas are monitored to provide a confirmation of overall PFAS impact identified in the DSI (GHD, 2018) and indication of a potential migration of the PFAS concentrations from the source areas. Assessment of changes in PFAS concentrations and distribution in the main migration pathways allows for early detection of significant changes in migration enabling contingencies to be put in place.

The Broader Area wells are sampled to assess the presence of PFAS concentrations in the wider environment, outside the site operational areas. These wells are located in the north-western portion of the Management Area and could provide early indication of a potential migration of PFAS concentrations towards the Indian Ocean.

3 Sampling and Analytical Methodology

3.1 Sampling Dates

A summary of the monitoring dates for each event of the November 2021 – October 2022 monitoring period is presented in Table 3-1.

Table 3-1 Summary of Sampling Dates

Sampling Event	OMP activity	Sampling Period
November 2021	Groundwater monitoring (sampling and gauging)	23 – 24 November 2021
	Surface water, seepage water and sediment sampling	
First flush 2022	Surface water and sediment sampling	16 May 2022
June 2022	Groundwater monitoring (sampling and gauging)	21 June 2022
	Surface water, seepage water and sediment sampling	

3.2 Groundwater Sampling

Sampling of selected groundwater monitoring locations was performed in accordance with the SAQP (Cardno 2021c, Appendix B), applying methods set out in Section 6.3.3 of the SAQP. The groundwater wells monitored as part of the OMP are presented in Table 3-2 and are shown on Figure 3, Appendix A.

Table 3-2 Groundwater Monitoring Locations

Monitoring Area	Location ID	Number
Powerhouse	MW017, MW019, MW027, MW101, MW102, MW103, MW104, MW213, MW214	9
POL Storage Area (Fuel Farm)	MW004, MW008, MW105, MW119, MW210, MW212, MW003	7
Powerhouse Pathway	MW113, MW114, MW115, MW116, MW117, MW217, MW218	7
POL Storage Area (Fuel Farm) Pathway	MW107, MW109, MW110, MW111, MW112, MW202	6
Broader Area	MW129, MW130, MW134, MW123	4

3.3 Seepage Water Sampling

Seepage water monitoring and sampling was performed in accordance with the SAQP (Cardno 2021c, 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 on Figure 3, Appendix A.

Table 3-3 Seepage Water Monitoring Locations

Monitoring Area	Location ID	Number
Powerhouse Pathway	OTH105, OTH106, OTH107, OTH108	4
POL Storage Area (Fuel Farm) Pathway	OTH101, OTH103, OTH104	3
Broader Area	OTH102, OTH109, OTH110, OTH113	4
Point Murat Pier saltwater discharge water	OTH002	1

3.4 Surface Water Sampling

Sampling of selected surface water monitoring locations was performed in accordance with the SAQP (Cardno 2021c, 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 on Figure 3, Appendix A.

Table 3-4 Surface Water Monitoring Locations

Monitoring Area	Location ID	Number
Broader Area	SW126, SW128, SW120, SW112, SW127	5
Powerhouse	SW113	1

3.5 Sediment Sampling

Sampling of selected sediment monitoring locations was performed in accordance with the SAQP (Cardno 2021c, Appendix B), applying methods set out in Section 6.4.4 of the SAQP. The sediment locations monitored as part of the OMP are presented in Table 3-5 and are shown on Figure 3, Appendix A.

Table 3-5 Sediment Monitoring Locations

Monitoring Area	Location ID	Number
Broader Area	SD126, SD128, SD120, SD112, SD127	5
Powerhouse	SD113	1

3.6 Deviations from the OMP SAQP

Deviations from the SAQP for the monitoring period are summarised in Table 3-6.

Table 3-6 Summary of Deviations from the OMP SAQP

Location	Deviation	Comments
		November 2021
MW213, MW214	Bailer used for sample collection	The HydraSleeve didn't fill up during recovery due to insufficient water column. Hand bailer used as alternative sampling methodology. Not expected to significantly impact outcome of monitoring event.
OTH113	Not analysed	Sample misplaced in transit to the laboratory. This location was re-sampled during the 2022 first flush sampling event. Not expected to significantly impact outcome of monitoring event.
SW120, SW126, SW127	Not sampled	These sampling locations were found dry.
SW112 and SD112		Access denied due to asbestos hazard. Not expected to significantly impact outcome of monitoring event.
MW003		Monitoring well was found blocked (well casing damaged) 1 mBGL. MW004 was sampled as a contingency location. MW004 is located 130m south/south-east of MW003 and has a similar screen depth (1.5-4.5mBGL).
All groundwater monitoring locations	Water quality meter not placed downhole	To prevent risks of cross contamination of the monitoring wells, the water quality parameters were taken from water collected from the HydraSleeves rather than placing the water quality meter inside the wells. No impact on the OMP.
		First Flush (May) 2022
SW126	Not sampled	This location was found dry. No impact – this location has never been sampled for surface water since the start of the OMP as it has always been dry (sediment sample collected)
SW112/SD112	Location moved 500m south	Access to low lying area around antenna field denied due to friable asbestos hazard. Limited impact – salt pan was flooded, water and sediment samples collected are representative of first flush conditions.
SW120/SD120	Location moved 500m north-east	
SW113, SW127, SW128	Incorrect field pH readings	pH probe faulty – no impact, parameter not influencing any key OMP decision.
OTH113	Sampled	This sample was lost during transport to the lab during the November 2021 monitoring event. No impact – the sample was collected again during first flush monitoring event, results were within historical range and consistent with June 2022 monitoring event. .
		June 2022
SW112/SD112 and SW120/SD120	Location moved 500m south	Access permanently denied due to asbestos hazard. Sampling location consistent with the previous monitoring event. No impact on the OMP.
MW003	Not Sampled	Monitoring well was found blocked (damaged) 1 mBGL. MW004 was sampled as a contingency location consistent with the previous monitoring event. No impact on the OMP.
MW123		Access permanently denied due to asbestos hazard. Area flooded. Limited impact on the OMP, no data collected for June 2022.
OTH002		Point Murat Pier saltwater discharge point not flowing. No impact on the OMP.
All groundwater monitoring locations	Water quality meter not placed downhole	To prevent risks of cross contamination of the monitoring wells, the water quality parameters were taken from water collected from the HydraSleeves rather than placing the water quality meter inside the wells. No impact on the OMP.

These minor deviations from the SAQP, are not considered to have impacted the data set obtained during the monitoring period or the interpretative assessment presented in this report.

3.7 Changes to the Monitoring Network Condition

Access to monitoring well MW123 and surface water/sediment sample locations SW/SD112 and SW/SD120 have been permanently denied due to an asbestos hazard. SD112/SW112 was moved 500 m south and SW120/SD120 was moved 500 m north-east.

Monitoring well MW004 was sampled instead of MW003, due to damaged well casing preventing further sampling.

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 (Cardno, 2021c, Appendix B):

- Quality Assurance (QA) documentation.
- Bias.
- Data Representativeness.
- Data Precision & Accuracy.
- Laboratory Performance.
- Data Comparability.
- 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.

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, seepage water and sediment assessment is considered valid and complete.

5 Assessment Criteria

5.1 Groundwater, Seepage Water and Surface Water

The adopted assessment criteria for groundwater, seepage water and surface water are detailed in Table 5-1.

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

Exposure Scenario	Adopted Assessment Criteria		Guidance
	Sum of PFOS and PFHxS (µg/L)	PFOA (µg/L)	
Human Health – Recreational Water	2[1]	10	National Health and Medical Research Council (NHMRC, 2019), HEPA (2020)
Ecological – 99% species protection	0.00023[2]	19	HEPA (2020)

1. Sum of PFOS and PFHxS.
2. PFOS only; 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.

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.

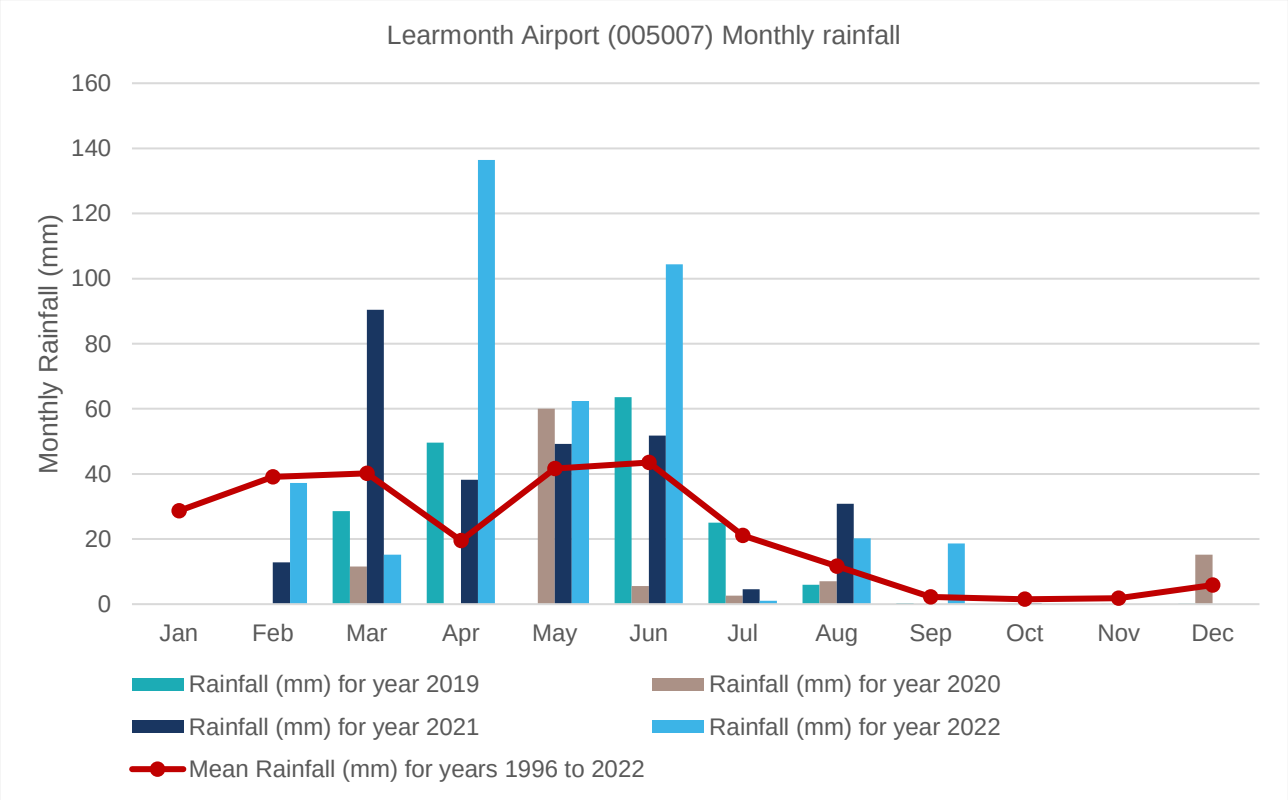
6.3 Climate

Rainfall can potentially influence the PFAS migration, and groundwater elevation and flow direction. Monthly rainfall for January 2019 to December 2022 obtained from the Bureau of Meteorology (BoM) station No 005007 (Learmonth Airport) is displayed in Figure 6-1.

The monthly rainfall amounts for the monitoring period were generally below average, with the exceptions of April to June 2022, August and September 2022 which reported higher than average monthly rainfall amounts. This could have influenced the groundwater elevations and inferred flow direction observed in the June 2022 monitoring event.

No rainfall occurred during the November 2021 monitoring event; however, 104 mm of rain was reported in June 2022, including 69 mm recorded two days before the biannual monitoring event on 20 June 2022. A total of 62.4 mm of rainfall was reported in May 2022, with 31.6 mm recorded on 13 May 2022, two days before the first flush monitoring event. Flooding was observed in the clay pan around the antenna field during both first flush and June 2022 monitoring events.

Figure 6-1 Monthly rainfall and long term mean monthly rainfall for Exmouth Airport (station 005007) (BoM, 2022)



7 Monitoring Data Summary

The November 2021, first flush 2022 (May 2022) and June 2022 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 2021 to October 2022 monitoring period.

7.1 Groundwater

7.1.1 Groundwater Geochemical Parameters

Groundwater geochemical parameters (dissolved oxygen [DO], electrical conductivity [EC], total dissolved solids [TDS] and oxidation-reduction potential [ORP]) recorded in the field during the November 2021 and June 2022 monitoring events are summarised in Table 7-1 and provided in Table 2, 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 for Contamination Assessment and Remediation of the Environment.
- 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. Slight seasonal variability was observed in the salinity parameters (EC and TDS) and DO, which can be attributed to the groundwater recharge from rainfall events.

Table 7-1 Groundwater Geochemical Parameters

Parameter	November 2021	June 2022
DO	0.01 mg/L (MW004) – 8.23 mg/L (MW109) *Aerobic conditions*	0.66 mg/L (MW101) – 4.37 mg/L (MW110) *Aerobic conditions*
EC	3,160 µS/cm (MW214) – 70,621 µS/cm (MW123)	682 µS/cm (MW114) – 53,371 µS/cm (MW112)
TDS	2,054 mg/L (MW214) – 45,890 mg/L (MW123) *Saline water to hypersaline conditions*	443 mg/L (MW114) – 34,691 mg/L (MW112) *Fresh to saline conditions*
pH	7.01 (MW202) – 8.33 (MW117) *Neutral to moderately alkaline conditions*	7.26 (MW027) – 8.42 (MW210) *Neutral to alkaline conditions*
ORP	-345.7 mV (MW104) – 133.6 mV (MW217) *Reducing to oxidising groundwater conditions.*	-262.2 mV (MW202) – 72.1 mV (MW027) *Reducing to oxidising conditions*

7.1.2 Groundwater Elevations and Migration Contours

Groundwater levels and flow directions recorded during the November 2021 and June 2022 monitoring events are summarised in Table 7-2 and gauging data is provided within Table 1, Appendix D. Figure 5, Appendix A, presents the inferred groundwater contours for the most recent monitoring event (June 2022).

Groundwater elevations and radial 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. This has been considered when interpreting the inferred groundwater contours and flow direction.

The groundwater flow direction was interpreted to be radial from the site sources, with groundwater flows observed towards the inland clay pan and the coast. Seasonal difference was observed in the average groundwater depth across the monitoring network, with a deeper groundwater table reported in the June 2022 monitoring event following the dry season. This is due to increased groundwater recharge by rainfall infiltration during the winter months.

Table 7-2 Groundwater Levels and Flow Direction

Item	November 2021	June 2022
Depths to groundwater (mbTOC)	0.48 (MW123) – 9.859 (MW134)	1.5 (MW130) – 9.42 (MW134)
Groundwater elevation (mAHD)	-0.0207 (MW104) – 1.471 (MW202)	0.404 (MW104) – 0.963 (MW210)
Inferred direction of groundwater flow	Groundwater was interpreted to be radial from the site sources, with groundwater flows observed towards the inland clay pan and the coast.	
Seasonal difference in groundwater elevation	Groundwater levels were on average 0.45 m deeper during the June 2022 monitoring event.	

7.1.3 Groundwater Results Summary

7.1.3.1 On-site Source Areas Summary Results

As indicated the on-site Source Areas consist of (refer to Figure 3 of Appendix A):

- The POL Storage Area;
- The Powerhouse; and
- Point Murat Pier to a lesser extent.

7.1.3.2 POL Storage Area

A summary of the PFOS, PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the POL Storage Area monitoring locations are presented in Table 7-3 and plotted on Figure 7-1.

Monitoring well MW119, located the furthest downgradient, reported the highest PFAS concentrations for the area, while up gradient wells MW210 and MW212 reported the lowest PFAS concentrations.

The PFOS concentrations at downgradient monitoring wells, MW004, MW008, MW105 and MW119 were above the HEPA (2020) Marine Water Criteria for 99% Species Protection (Marine 99%), consistent with historical results. The Sum of PFOS and PFHxS concentrations at downgradient well, MW119 exceeded the recreational criteria during both monitoring events, consistent with historical results. There were no exceedances of the Marine 99% or recreational water criteria for PFOA.

New maximums for PFOS, sum of PFOS and PFHxS, and PFOA concentrations were reported at MW004 in June 2022, noting this well has only been sampled twice as it is a replacement for monitoring well MW003. New maximums were also reported for PFOS at MW119 (November 2021), MW210 (November 2021) and MW212 (June 2022) and for Sum of PFOS and PFHxS at MW212 (June 2022). A new maximum for PFOS and PFOA were reported at MW210, one order of magnitude above the historical range. It is noted that the MW210 triplicate sample collected in November 2021 was adopted for data assessment as a conservative approach, while the primary and duplicate samples reported PFOS concentrations below the laboratory LOR. It is also noted that the PFOS concentration reported in June 2022 was below the LOR.

Table 7-3 POL Storage Area PFOS, Sum of PFOS and PFHxS, and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2021 (µg/L)	Jun 2022 (µg/L)
MW004*	PFOS	-	0.21	0.35
	Sum of PFOS and PFHxS	-	0.24	0.37
	PFOA	-	<0.01	0.02
MW008	PFOS	0.08 – 13.0	0.37	0.62
	Sum of PFOS and PFHxS	0.08 – 15.0	0.38	0.62
	PFOA	<0.01 – 0.51	<0.01	<0.01
MW105	PFOS	<0.01 – 0.68	0.05	0.14
	Sum of PFOS and PFHxS	<0.01 – 1.2	0.13	0.17
	PFOA	<0.01 – 0.29	<0.01	0.01
MW119	PFOS	0.067 – 0.19	0.24	0.17
	Sum of PFOS and PFHxS	4.24 – 12.6	11.0	8.56
	PFOA	0.04 – 0.22	0.21	0.15
MW210	PFOS	<0.01 – 0.003	0.02**	<0.01
	Sum of PFOS and PFHxS	<0.01 – 0.079	0.04**	0.03
	PFOA	<0.001 – 0.004	<0.01	0.04
MW212	PFOS	<0.001 – 0.02	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 – 0.03	0.01	0.041
	PFOA	<0.001 – <0.01	<0.01	<0.01

New Maximum | New Minimum | New Exceedance

Note:

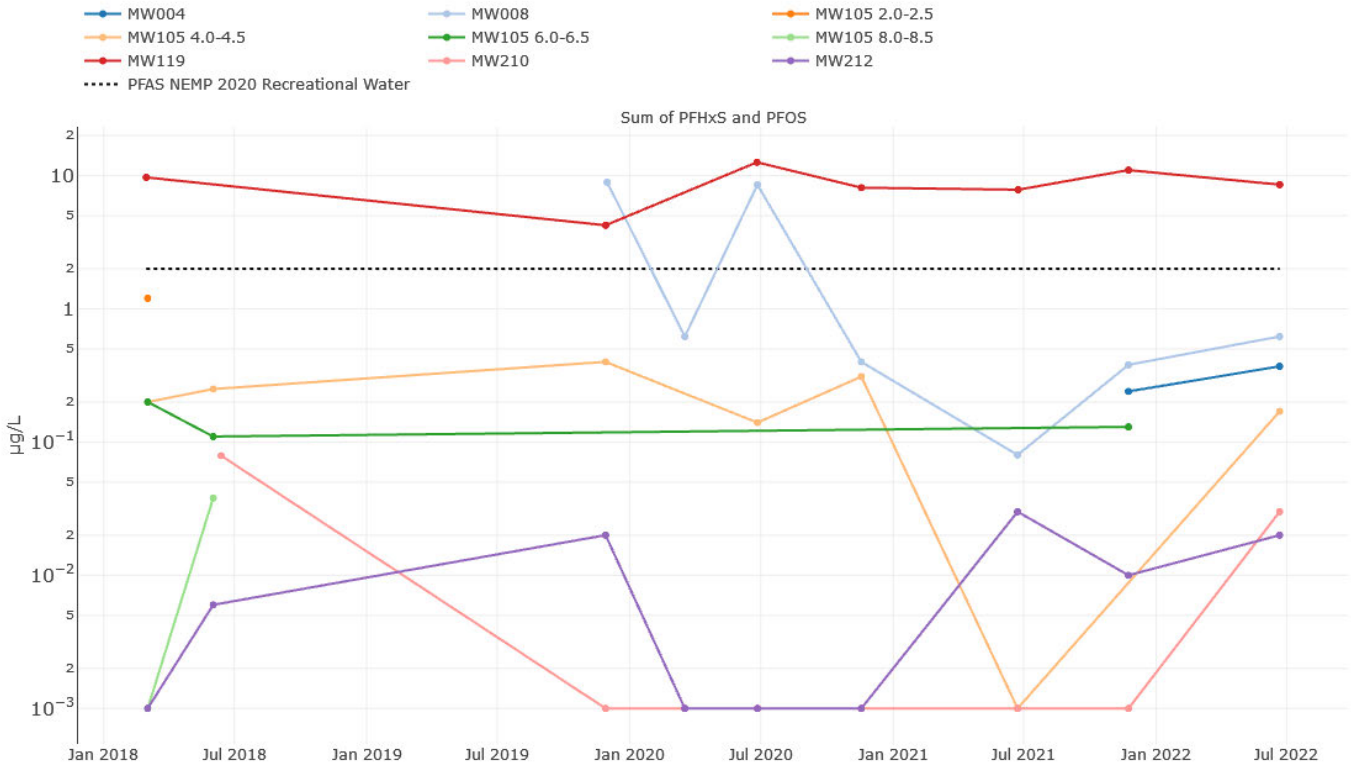
* First time sampled for PFAS in November 2021.

** Triplicate result adopted.

MW105 multilevel well

For multi-level wells, the shallowest non-dry screen interval is sampled during each monitoring event

Figure 7-1 POL Storage Area Sum of PFOS and PFHxS Concentrations Trends



Note: A logarithmic scale was used for the vertical axis. Values below LOR were replaced by the lowest LOR value (0.001 µg/L) for the purpose of graphical representation. Primary samples' results plotted.

7.1.3.3 Powerhouse

A summary of the PFOS, PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the Powerhouse monitoring locations are presented in Table 7-4 and plotted on Figure 7-2.

The PFAS concentrations were significantly greater at MW017, positioned downgradient, than the other monitoring wells within the area.

The PFOS concentrations were reported in exceedance of the Marine 99% criteria in all monitoring wells with the exception of MW101 and MW213 in November 2021 and MW104 in June 2022, consistent with historical results. The Sum of PFOS and PFHxS concentrations at downgradient well, MW017, exceeded the recreational criteria during both monitoring events, consistent with historical results. There were no exceedances of the Marine 99% or recreational water criteria for PFOA.

New maximum concentrations for PFOS, Sum of PFOS and PFHxS and PFOA were reported at MW027 and MW102 and for PFOS and Sum of PFOS and PFHxS at MW214. A new maximum was reported for PFOS at MW101 in June 2022. It is noted that an order of magnitude increase was observed at MW214 for Sum of PFOS and PFHxS in June 2022. The maximum concentrations were mostly recorded in the June 2022 monitoring event.

New minimum concentrations for PFOA were reported at MW017 in November 2021 and Sum of PFOS and PFHxS at MW103 in June 2022.

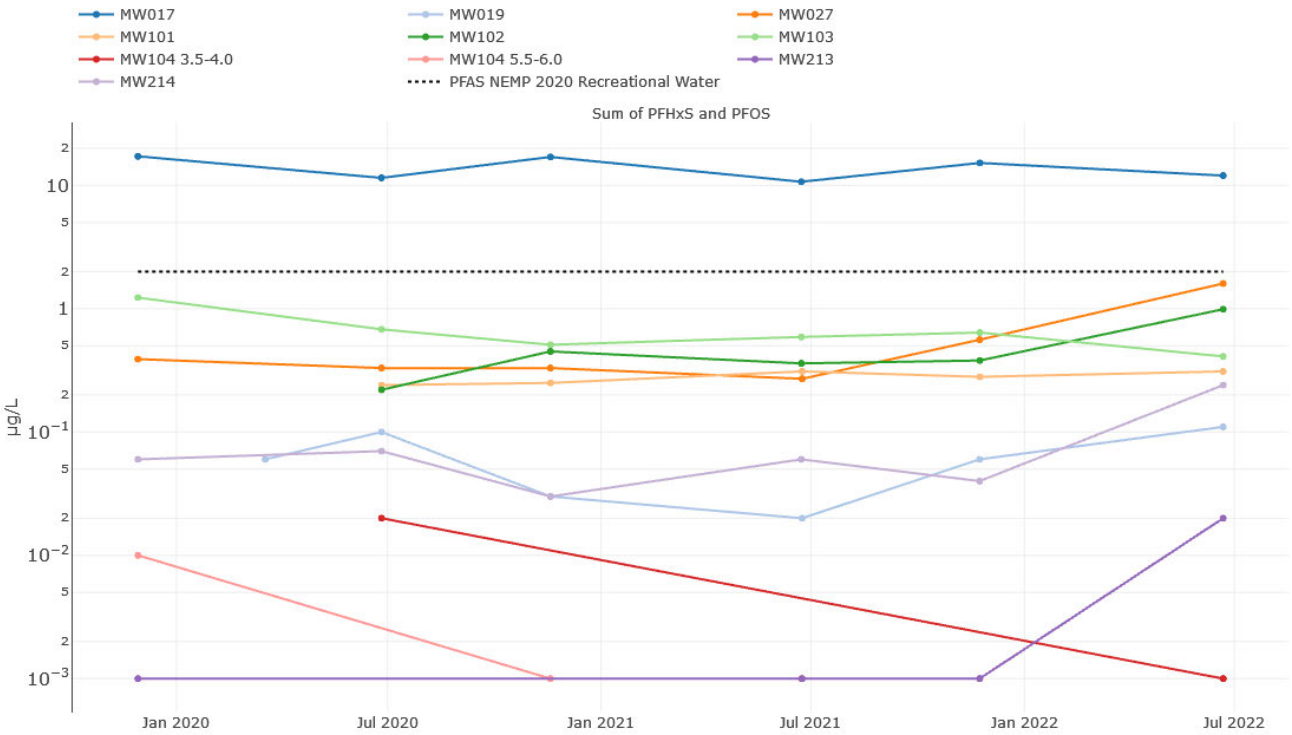
Table 7-4 Powerhouse Area PFOS, Sum of PFOS and PFHxS, and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2021 (µg/L)	Jun 2022 (µg/L)
MW017	PFOS	7.8 – 15.4	14.2	9.45
	Sum of PFOS and PFHxS	10.70 – 17.80	15.2	12.0
	PFOA	0.54 – 2.10	0.50	0.90
MW019	PFOS	<0.01 – 0.03	0.01	0.02
	Sum of PFOS and PFHxS	0.02 – 0.116	0.06	0.11
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW027	PFOS	0.088 – 0.10	0.12	0.94
	Sum of PFOS and PFHxS	0.27 – 0.53	0.56	1.60
	PFOA	<0.01 – 0.031	0.03	0.06
MW101	PFOS	<0.01 – 0.07	<0.01	0.11
	Sum of PFOS and PFHxS	0.24 – 0.537	0.28	0.31
	PFOA	0.02 – 0.11	0.02	0.04
MW102	PFOS	0.040 – 0.084	0.05	0.71
	Sum of PFOS and PFHxS	0.22 – 0.744	0.38	0.99
	PFOA	<0.01 – 0.13	0.06	0.36
MW103	PFOS	0.06 – 0.14	0.05	0.05
	Sum of PFOS and PFHxS	0.51 – 1.31	0.64	0.41
	PFOA	0.02 – 0.084	0.03	0.02
MW104	PFOS	<0.001 – 0.02	0.02	<0.01
	Sum of PFOS and PFHxS	<0.001 – 0.02	0.02	<0.01
	PFOA	<0.001 – 0.003	<0.01	<0.01
MW213	PFOS	<0.01 – 0.027	<0.01	0.01
	Sum of PFOS and PFHxS	<0.01 – 0.091	<0.01	0.02
	PFOA	<0.001 – 0.004	<0.01	<0.01
MW214	PFOS	0.011 – 0.05	0.02	0.22
	Sum of PFOS and PFHxS	0.028 – 0.07	0.04	0.24
	PFOA	<0.01 – 0.006	<0.01	<0.01

New Maximum | New Minimum | New Exceedance

Notes:
MW104 multilevel well
For multi-level wells, the shallowest non-dry screen interval is sampled during each monitoring event

Figure 7-2 Powerhouse Area Sum of PFOS and PFHxS Concentrations Trends



Note: A logarithmic scale was used for the vertical axis. Values below LOR were replaced by the lowest LOR value (0.001 µg/L) for the purpose of graphical representation.

7.1.3.4 POL Pathway Area

A summary of the PFOS, PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the POL Pathway Area monitoring locations are presented in Table 7-5 and plotted on Figure 7-3.

The PFAS concentrations were reported below the LOR for all pathway locations with exception of MW107 (PFOS and Sum of PFOS and PFHxS in November 2021) and MW111 (PFOS and Sum of PFOS and PFHxS in June 2022). However, these detections were consistent with the historical concentration ranges.

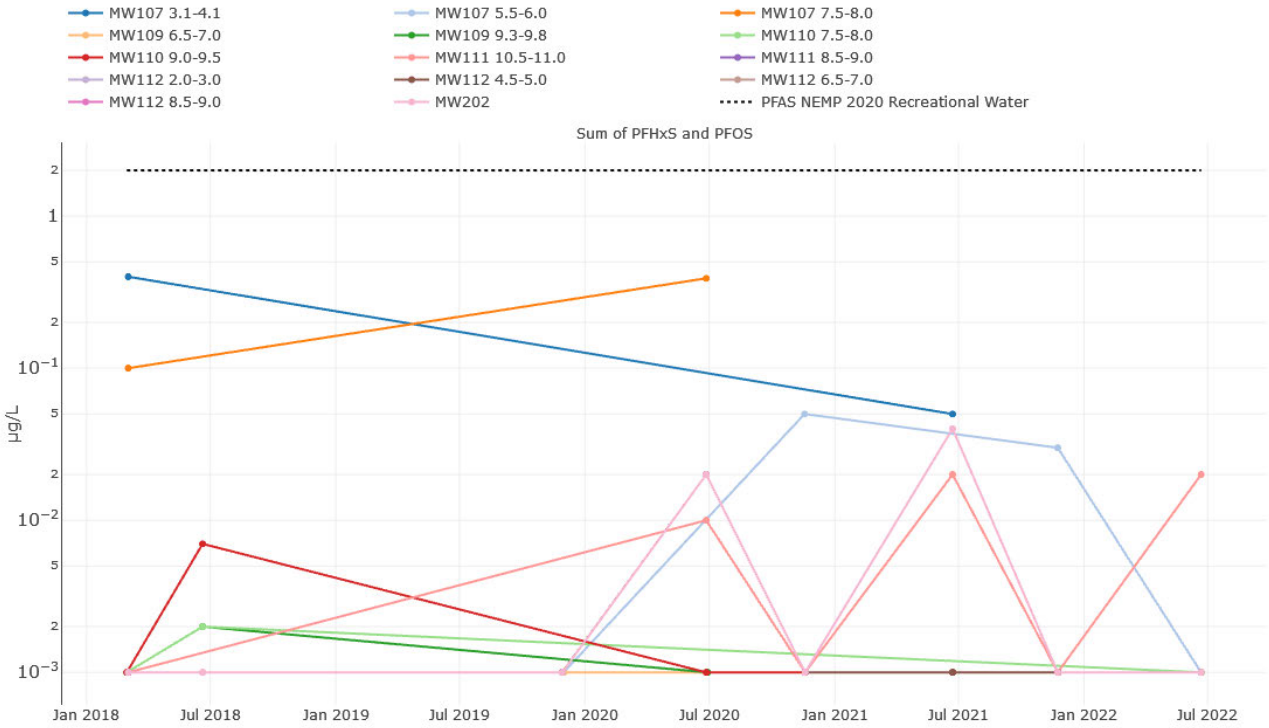
Table 7-5 POL Pathway Area Sum of PFOS and PFHxS, and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2021 (µg/L)	Jun 2022 (µg/L)
MW107	PFOS	<0.01 – 0.34	0.03	<0.01
	Sum of PFOS and PFHxS	<0.01 – 0.40	0.03	<0.01
	PFOA	<0.001 – 0.008	<0.01	<0.01
MW109	PFOS	<0.001 - <0.01	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW110	PFOS	<0.001 - <0.01	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 – 0.002	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW111	PFOS	<0.001 – 0.02	<0.01	0.02
	Sum of PFOS and PFHxS	<0.001 – 0.02	<0.01	0.02
	PFOA	<0.001 – <0.01	<0.01	<0.01
MW112	PFOS	<0.001 – 0.02	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 – 0.02	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW202	PFOS	<0.001 - 0.04	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 - 0.04	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01

New Maximum | New Minimum | New Exceedance

Notes:
MW000 multilevel well
For multi-level wells, the shallowest non-dry screen interval is sampled during each monitoring event

Figure 7-3 POL Pathway Area Sum of PFHxS and PFOS Concentrations Trends



Note: A logarithmic scale was used for the vertical axis. Values below LOR were replaced by the lowest LOR value (0.001 µg/L) for the purpose of graphical representation.

7.1.3.5 Powerhouse Pathway Area

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the Powerhouse Pathway Area monitoring locations are presented in Table 7-6. It is noted that the results are below the laboratory LOR and therefore the results have not been plotted.

Table 7-6 Powerhouse Pathway Area PFOS, Sum of PFHxS and PFOS, and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2021 (µg/L)	Jun 2022 (µg/L)
MW113	PFOS	<0.001 - <0.02	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW114	PFOS	<0.001 - <0.01	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW115	PFOS	<0.001 – 0.002	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW116	PFOS	<0.001 – 0.003	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 – 0.003	<0.01	<0.01
	PFOA	<0.001 – 0.001	<0.01	<0.01
MW117	PFOS	<0.001 - <0.01	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW217	PFOS	<0.001 – 0.004	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 – 0.005	<0.01	<0.01
	PFOA	<0.001 – 0.001	<0.01	<0.01
MW218	PFOS	<0.001 – 0.003	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 – 0.004	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01

New Maximum | New Minimum | New Exceedance

Notes
MW000 multilevel well
For multi-level wells, the shallowest non-dry screen interval is sampled during each monitoring event

7.1.3.6 Broader Area Wells

A summary of the PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the Broader Area monitoring locations are presented in Table 7-7. It is noted that the results are below the laboratory LOR and therefore the results have not been plotted.

All wells sampled during the November 2021 and June 2022 monitoring events recorded PFAS concentrations below the laboratory LOR.

Table 7-7 Broader Area PFOS, Sum of PFOS and PFHxS, and PFOA Concentrations

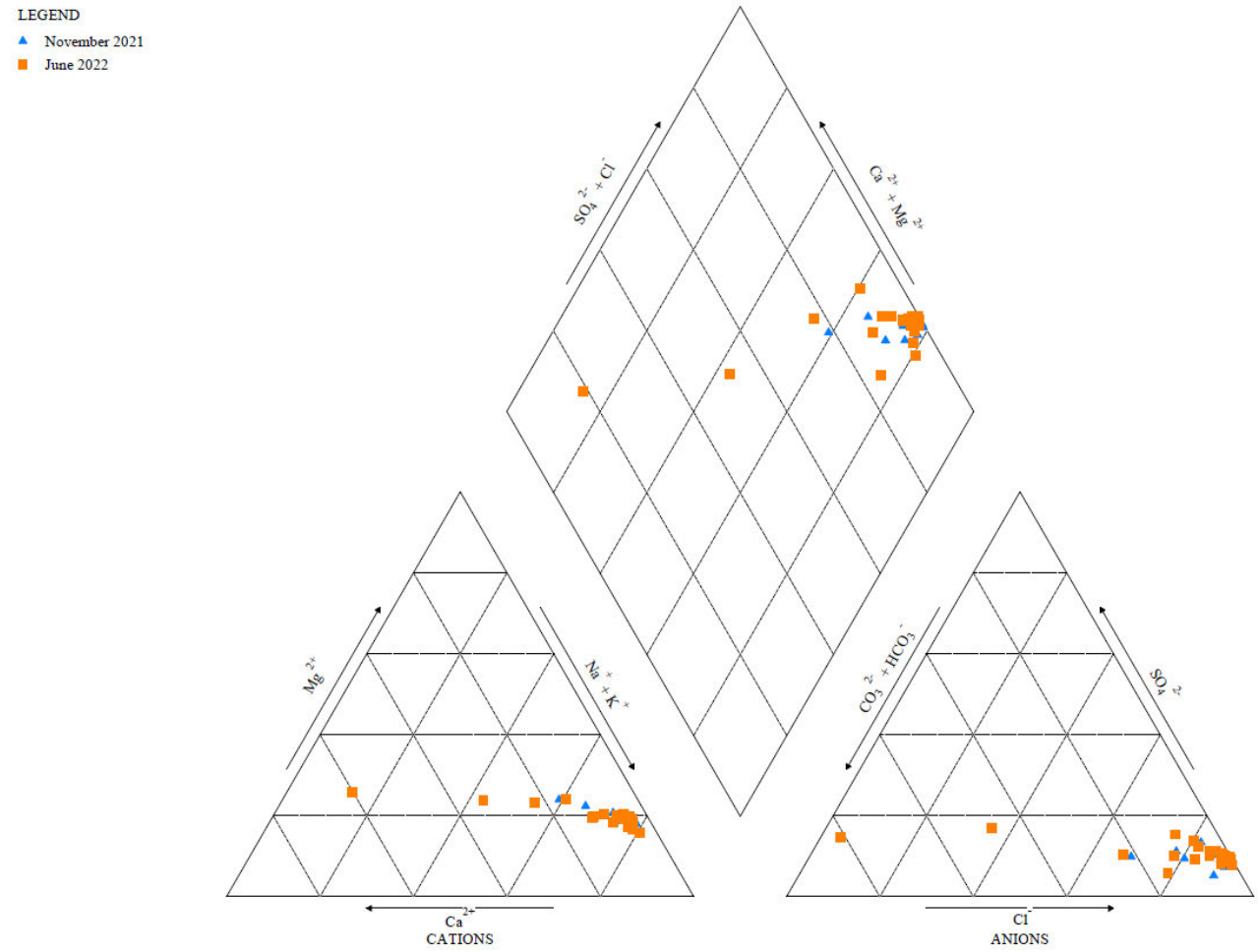
Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2021 (µg/L)	Jun 2022 (µg/L)
MW129	PFOS	<0.01 - 0.72	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.01 - 0.75	<0.01	<0.01
	PFOA	<0.01 - 0.007	<0.01	<0.01
MW130	PFOS	<0.001 - 0.01	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 - 0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
MW134	PFOS	<0.01 - 0.005	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.01 - 0.008	<0.01	<0.01
	PFOA	<0.01 - 0.003	<0.01	<0.01
MW123	PFOS	<0.001 - <0.01	<0.01	NS
	Sum of PFOS and PFHxS	<0.001 – 0.091	<0.01	NS
	PFOA	<0.001 – 0.004	<0.01	NS
New Maximum		New Minimum	New Exceedance	

Note:
MW000 multilevel well
For multi-level wells, the shallowest non-dry screen interval is sampled during each monitoring event'
NS=Not Sampled

7.1.4 Major Ions Analysis

Major ions analysis was conducted on the groundwater samples collected during each monitoring event to categorise the water type. The results of the major ion analysis are visually represented in a Piper Diagram shown in Figure 7-4. Groundwater hydrochemistry is within the sodium chloride water type, consistent with historical results, with exception of two groundwater wells in June 2022. MW213 and MW214 located at the Powerhouse displayed a slight variation, which can be related to the difference in salinity observed at these wells. A small fresher water lens could be present under this area.

Figure 7-4 Piper Diagram – Groundwater samples



7.2 Seepage Water

As part of the OMP, seepage water is sampled to assess the changes in PFAS concentrations at the receptor (Indian Ocean), downgradient of the identified source areas.

7.2.1 Seepage water geochemical parameters

Seepage water geochemical parameters recorded during the November 2021 and June 2022 monitoring events are summarised in Table 7-8 and provided Table 2 of Appendix D

Table 7-8 Seepage Water Geochemical Parameters

Parameter	November 2021	June 2022
DO	3.55 mg/L – 6.00 mg/L *Aerobic conditions.*	4.40 mg/L – 5.49 mg/L *Aerobic conditions.*
EC	54,368 µS/cm - 55,104 µS/cm	52,813 µS/cm - 54,977 µS/cm
TDS	35,354 mg/L – 35,818 mg/L *Highly saline conditions.*	34,328 mg/L – 35,735 mg/L *Highly saline conditions*
pH	8.00 – 8.03 *Neutral conditions.*	7.78 – 8.20 *Neutral conditions.*
ORP	-4.6 mV – 92.0 mV *Reducing to oxidising conditions.*	-181.7 mV – 50.1 mV *Reducing to oxidising conditions.*

7.2.2 Seepage water results summary

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 downgradient receptors. Here, receptors include sea life of the Exmouth Gulf, in particular prawns. Seepage water is sampled rather than surface water to identify the PFAS concentrations (if any) before dilution and dispersion with ocean water occurs.

Seepage water has been sampled since February 2018 with samples collected during an outgoing tide. A summary of the PFOA, PFOS, and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the seepage water monitoring locations are presented in Table 7-9. It is noted that the results are below laboratory LOR and therefore the results have not been plotted.

Table 7-9 Seepage Water PFOS, Sum of PFOS and PFHxS, and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2021 (µg/L)	Jun 2022 (µg/L)
OTH002	PFOS	<0.001	<0.01	NS
	Sum of PFOS and PFHxS	<0.001	<0.01	
	PFOA	<0.001	<0.01	
OTH101	PFOS	<0.001 – 0.003	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 – 0.004	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
OTH102	PFOS	<0.001 - <0.01	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
OTH103	PFOS	<0.001 – 0.004	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 – 0.006	<0.01	<0.01
	PFOA	<0.001 – 0.003	<0.01	<0.01
OTH104	PFOS	<0.001 - <0.01	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
OTH105	PFOS	<0.001 - <0.01	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 – 0.001	<0.01	<0.01
OTH106	PFOS	<0.001 – 0.003	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 – 0.005	<0.01	<0.01
	PFOA	<0.001 – 0.001	<0.01	<0.01
OTH107	PFOS	<0.0002 - <0.01	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.0002 - <0.01	<0.01	<0.01
	PFOA	<0.001 – 0.001	<0.01	<0.01
OTH108	PFOS	<0.001 - <0.01	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 – 0.001	<0.01	<0.01
OTH109	PFOS	<0.001 - <0.01	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.001 - <0.01	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
OTH110	PFOS	<0.01-0.003	<0.01	<0.01

Location ID	Analyte	Historical range	OMP Monitoring	
		Min – Max (µg/L)	Nov 2021 (µg/L)	Jun 2022 (µg/L)
	Sum of PFOS and PFHxS	<0.01-0.003	<0.01	<0.01
	PFOA	<0.001 - <0.01	<0.01	<0.01
OTH113	PFOS	<0.01-0.54	<0.01*	<0.01
	Sum of PFOS and PFHxS	<0.01-0.56	<0.01*	<0.01
	PFOA	<0.001 - <0.01	<0.01*	<0.01

New Maximum | New Minimum | New Exceedance

Notes: NS = Not Sampled.

* OTH113 sample collected in November 2021 was lost and not analysed. A replacement sample was collected during the first flush event.

7.3 Surface Water

Surface water is sampled across the Broader Area and in the Powerhouse to assess PFAS concentrations in surface water potentially discharging from the Powerhouse Area.

7.3.1 Surface Water Geochemical Parameters

Geochemical parameters recorded in the field are provided in Table 3, Appendix D. A summary of the geochemical parameters is presented in Table 7-10 below.

Table 7-10 Surface Water Geochemical Parameters

Parameter	November 2021	May 2022	June 2022
DO	0.17 mg/L (SW128) - 0.72 mg/L (SW113) *Aerobic conditions*	4.76 mg/L (SW112) - 6.06 mg/L (SW113) *Aerobic conditions*	*4.53 mg/L (SW113) - 7.98 mg/L (SW126)* *Aerobic conditions*
EC	1,507 mS/cm (SW113) – 233,502 mS/cm (SW128)	1,137 mS/cm (SW113) – 18,636 mS/cm (SW120)	663 mS/cm (SW113) – 23,388 mS/cm (SW120)
TDS	979 mg/L (SW113) – 151,776 mg/L (SW128) *Fresh to Hypersaline conditions*	739 mg/L (SW113) – 12,113 mg/L (SW120) *Fresh to Brackish conditions*	430 mg/L (SW113) – 15,202 mg/L (SW120) *Fresh to Brackish conditions*
pH	6.91 (SW113) - 7.71 (SW128) *Neutral conditions*	7.69 (SW120) - 7.9 (SW112) *Neutral conditions*	7.77 (SW113) - 8.45 (SW126) *Neutral conditions.*
ORP	92.7 mV (SW128) - 96.6 mV (SW113) *Oxidising conditions.*	62 mV (SW112) - 243.5 mV (SW127) *Oxidising conditions.*	13.4 mV (SW120) - 56.6 mV (SW128) *Oxidising conditions*

7.3.2 Surface water results summary

Surface water has been sampled since February 2018. In addition to the biannual monitoring events, a first flush event was also undertaken in May 2022. Surface water was observed pooling in the clay pan (low lying areas north, west, and south of the antenna field) during the May 2022 and June 2022 monitoring events.

A summary of the PFOS, PFOA and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the surface water monitoring locations are presented in Table 7-11. It is noted that a number of the sample locations were dry or predominantly below the laboratory LOR during the monitoring period and therefore the results have not been plotted.

PFAS was reported below the LOR at all surface water locations with exception of SW113, located within the powerhouse sump. PFOS was reported above the Marine 99% criteria at SW113 during all three monitoring events.

New minimum concentrations were reported for PFOA at SW113 and PFOS and Sum of PFOS and PFHxS at SW126, located within the clay pan area to the south of the site.

Table 7-11 Surface Water PFOS, Sum of PFOS and PFHxS, and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring		
		Min – Max (µg/L)	Nov 2021 (µg/L)	First Flush (May 2022) (µg/L)	Jun 2022 (µg/L)
SW112	PFOS	<0.01 - 0.05	NS*	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.01 - 0.05		<0.01	<0.01
	PFOA	<0.01		<0.01	<0.01
SW113	PFOS	0.10 – 1.1	0.54	0.22	0.12
	Sum of PFOS and PFHxS	0.13 – 2.4	0.84	0.30	0.17
	PFOA	0.07 – 0.86	0.12	0.06	0.04
SW120	PFOS	<0.01 - 0.002	NS**	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.01 - 0.002		<0.01	<0.01
	PFOA	<0.01		<0.01	<0.01
SW126	PFOS	0.003	NS**	NS**	<0.01
	Sum of PFOS and PFHxS	0.003			<0.01
	PFOA	<0.001			<0.01
SW127	PFOS	<0.01 - 0.002	NS**	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.01 - 0.002		<0.01	<0.01
	PFOA	<0.01		<0.01	<0.01
SW128	PFOS	<0.01	<0.01	<0.01	<0.01
	Sum of PFOS and PFHxS	<0.01	<0.01	<0.01	<0.01
	PFOA	<0.01	<0.01	<0.01	<0.01

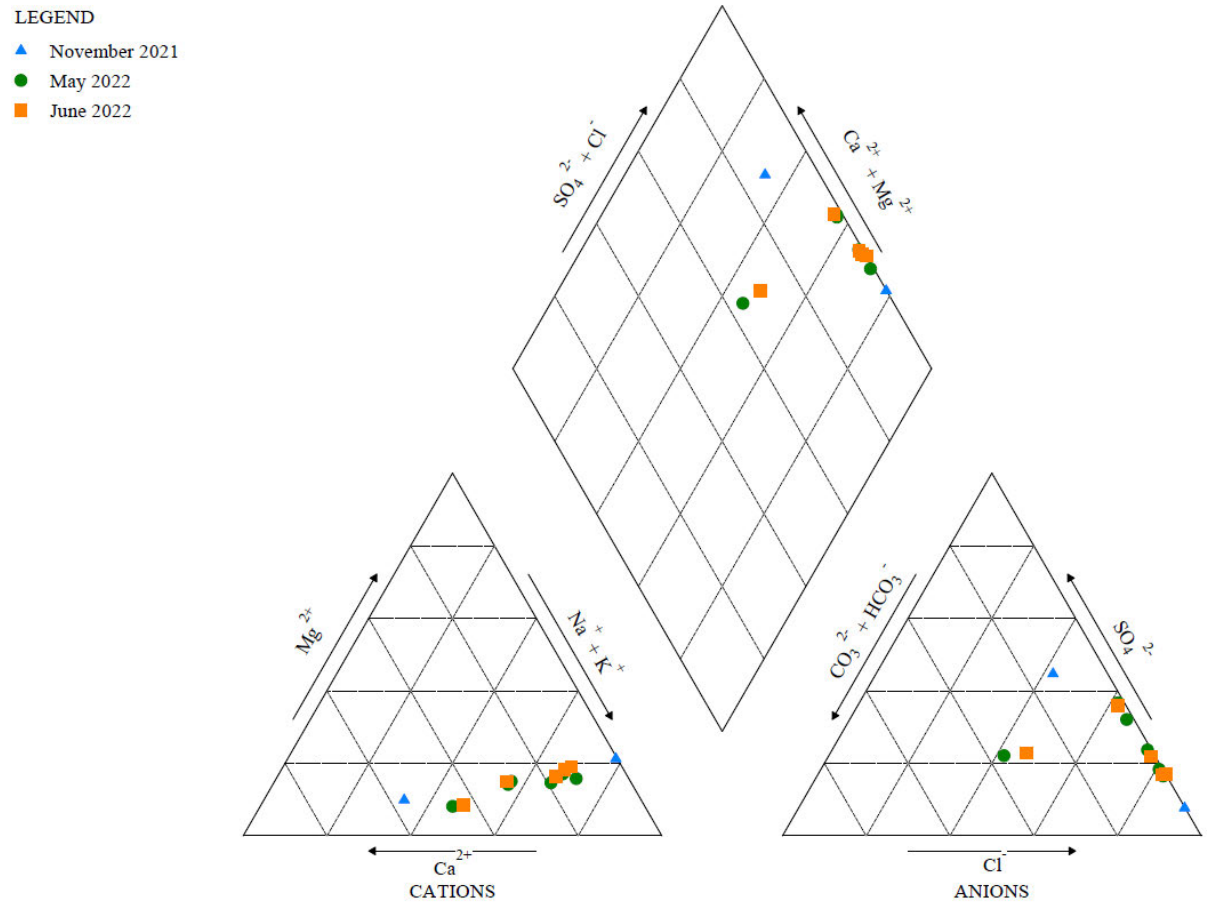
New Maximum | New Minimum | New Exceedance

Note:
NS* - Not sampled due to access restrictions at the time of sampling.
NS** - Not sampled as the location was found dry at the time of sampling.

7.3.3 Major Ions Analysis

Major ions analysis was conducted on the surface water samples collected during the monitoring period to categorise the water type. The results of the major ion analysis are visually represented in a Piper Diagram shown in Figure 7-5. With the exception of one location (SW113, collected from the Powerhouse sump), the samples all plotted in the sodium chloride water type, which is consistent with the previous major ion analysis.

Figure 7-5 Piper Diagram - Surface water samples



7.4 Sediment

Sediment has been sampled periodically since February 2018. In addition to the November 2021 and June 2022 monitoring events, sediment was also sampled during the first flush monitoring event in May 2022. The sediment analytical results are presented in Table 5 of Appendix D. A summary of the PFOA, PFOS, and Sum of PFOS and PFHxS concentrations for the monitoring period and the historical concentration ranges for the sediment sampling locations are presented in Table 7-12. It is noted that the results are predominantly below laboratory LOR and therefore the results have not been plotted.

All sediment samples reported PFAS below the LOR with exception of SD113, located in the Powerhouse sump, during all monitoring events. A new minimum concentration was reported at SD113 for PFOA during the first flush monitoring event.

Table 7-12 Sediment PFOS, Sum of PFOS and PFHxS, and PFOA Concentrations

Location ID	Analyte	Historical range	OMP Monitoring		
		Min – Max (mg/kg)	Nov 2021 (mg/kg)	First Flush (May 2022) (mg/kg)	Jun 2022 (mg/kg)
SD112	PFOS	<0.0002 - 0.0003	NS	<0.0002	<0.0002
	Sum of PFOS and PFHxS	<0.0002 - 0.0003		<0.0002	<0.0002
	PFOA	<0.0002		<0.0002	<0.0002
SD113	PFOS	0.0005 - 0.0082	0.0051	0.0012	0.0011
	Sum of PFOS and PFHxS	0.0011-0.0093	0.0063	0.0014	0.0011
	PFOA	0.0003-0.0009	0.0004	<0.0002	<0.0002
SD120	PFOS	<0.0002	<0.0002	<0.0002	<0.0002
	Sum of PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0001	<0.0002	<0.0002	<0.0002
SD126	PFOS	<0.0002 – 0.0003	<0.0002	<0.0002	<0.0002
	Sum of PFOS and PFHxS	<0.0002 – 0.0003	<0.0002	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002
SD127	PFOS	<0.0002 – 0.0001	<0.0002	<0.0002	<0.0002
	Sum of PFOS and PFHxS	<0.0002 – 0.0001	<0.0002	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002
SD128	PFOS	<0.0002	<0.0002	<0.0002	<0.0002
	Sum of PFOS and PFHxS	<0.0002	<0.0002	<0.0002	<0.0002
	PFOA	<0.0002	<0.0002	<0.0002	<0.0002

New Maximum | New Minimum | New Exceedance

Note:
NS - Not Sampled

8 Interpretive Analysis

This section provides a high-level interpretation of the nature and extent of PFAS at the site, 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

All 32 monitoring wells were gauged during the November 2021 monitoring event, and 29 monitoring wells were gauged during the June 2022 monitoring event. Groundwater flow direction was consistent between the two biannual monitoring events, indicating a radial flow from the site sources, with groundwater flows generally observed towards the inland clay pan and towards the marine environment in monitoring wells located along the coast. The groundwater flows appear to be consistent with the findings of the DSI (GHD, 2018).

It is noted that the groundwater flow interpretation is limited to spatial extent of the existing OMP monitoring network. The OMP includes a subset of the monitoring well network that was used to model groundwater flow during the DSI. The groundwater wells were gauged over multiple days and tide cycles, which limits the conclusions that can be drawn with respect to tidal influence on groundwater. However, the interpreted groundwater flow direction remains consistent with previous gauging events and the DSI findings.

The depth to groundwater was on average, shallower in the November 2021 event than in the June 2022 event. This is consistent with the seasonal changes in groundwater levels observed during previous monitoring periods (i.e. groundwater recharge occurring during the wet season).

A total of 31 monitoring wells were monitored for PFAS in the biannual monitoring events. The groundwater PFAS findings are discussed in the following sub-sections and results are displayed on the following figures in Appendix A:

- Figures 6 and 6B for Sum of PFOS and PFHxS in the November 2021 event;
- Figures 8 and 8B for Sum of PFOS and PFHxS in the June 2022 event;
- Figures 9 and 9B for PFOA in the November 2021 event; and
- Figures 11 and 11B for PFOA in the June 2022 event.

Trends in groundwater concentrations over time have been assessed using the Mann-Kendall trend test to assess the plume 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 test 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. "Possibly Decreasing" or "Increasing" vs. "Possibly Increasing". A CF between 90% and 95% indicate a "Possibly" 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 nor decreasing at the relevant sampling location, similar to a "Stable" trend result.

Mann Kendall test 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 plume stability. The overall plume stability condition can be characterised by looking at concentration trends at individual locations and plume length vs time (GSI, 2012).

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 ranges, indicating limited seasonal effects on the PFAS

concentrations in source area groundwater. The November 2021 to June 2022 monitoring data generally remained of the same order of magnitude as historical results at each monitoring well with the following exception:

- MW210 (POL Storage Area) reported new maximum concentrations for PFOS in November 2021 and PFOA in June 2022, one order of magnitude above the historical range. It is noted the concentration of PFOS was reported below the LOR in June 2022. Further monitoring will confirm these results, noting that these were the first detections above the current LOR (0.01 µg/L) in comparison to previous detections in 2018 above a 0.001 µg/L LOR.

The highest PFAS concentrations were reported downgradient of the two source areas, in monitoring well MW119, downgradient of the POL Storage Area, and MW017, downgradient of the Powerhouse Area. The concentrations of Sum of PFOS and PFHxS at these wells were above the HEPA (2020) recreational use criteria (see Table 7-3 and Table 7-4). All other on-site monitoring wells reported Sum of PFOS and PFHxS concentrations below the assessment criteria. PFOS was reported above the laboratory LOR (and therefore the Marine 99% criteria) in all source area monitoring wells sampled in the monitoring period. PFOA concentrations that were recorded across the on-site source areas were generally above the laboratory LOR, but below adopted human health and ecological assessment criteria.

Groundwater monitoring data recorded between February 2018 and June 2022 was used for PFAS concentration stability (Mann Kendall analysis) assessment, with outputs presented in Appendix D. Groundwater concentration trends with associated confidence factors for PFOA, PFOS and the Sum of PFOS and PFHxS across the on-site source areas are summarised in Table 8-1 and notable trends are discussed below.

Despite some new maximum and minimum PFAS concentrations reported during the monitoring period, most monitoring wells showed overall stable PFOS, PFOA and Sum of PFOS and PFHxS concentration trends. Statistically significant trends were reported for the following:

- A possibly decreasing trend for Sum of PFOS and PFHxS was reported at MW008 within the POL Storage area (CF=94%).
- A decreasing trend was reported for Sum of PFOS and PFHxS at MW103 within the Powerhouse Area (CF=98%).
- Decreasing trends for PFOA were reported with a high degree of confidence (CF>95%) for three monitoring wells, MW008 (POL Storage area), and MW103 and MW017 (Powerhouse Area).
- A possibly increasing trend for PFOS (CF=94%) was reported MW119, downgradient of the POL Storage Area.

It is noted that a new maximum PFOS concentration was reported at MW119 in November 2021 (0.24 µg/L, compared to historical maximum of 0.19 µg/L). However, the following monitoring event in June 2022 reported PFOS within the historical range (0.17 µg/L). No order of magnitude change was observed at this well since the start of monitoring in 2018.

The trend analysis found majority of on-site monitoring wells display stable or decreasing PFAS concentration trends (with exception of PFOS at downgradient well MW119). This indicates the PFAS source areas are not contributing to increased groundwater PFAS load, and the plume appears to be slowly diluted with rainfall recharge and groundwater migration. Given there are consistent exceedances of the adopted human health and ecological assessment criteria, it is interpreted that the on-site source areas continue to act as sources of PFAS, likely via leaching from soil to groundwater.

Table 8-1 Mann-Kendall Trend Analysis Summary – On-site Source Areas

Source Area	Location ID	PFOA Trend	Confidence Factor (%)	PFOS Trend	Confidence Factor (%)	Sum of PFOS and PFHxS Trend	Confidence Factor (%)
POL Storage Area	MW008	**Decreasing**	96	No Trend	88	**Possibly Decreasing**	94
	MW105	No Trend	75	No Trend	89	No Trend	89
	MW119	No Trend	79	**Possibly Increasing**	94	Stable	<1
	MW210	No Trend	23	No Trend	48	No Trend	38
	MW212	NA(1)	NA(1)	NA(1)	NA(1)	No Trend	73
Powerhouse Area	MW017	**Decreasing**	96	No Trend	<1	Stable	73
	MW019	NA(1)	NA(1)	Stable	<1	Stable	55
	MW027	Stable	<1	No Trend	93	No Trend	38
	MW101	Stable	71	No Trend	<1	Stable	12
	MW102	No Trend	12	No Trend	36	Stable	<1
	MW103	**Decreasing**	98	Stable	90	**Decreasing**	98
	MW104	Stable	81	No Trend	68	No Trend	86
	MW214	Stable	90	No Trend	74	No Trend	79
	MW213	Stable	44	No Trend	69	No Trend	45

Note:

(1) Trend Not Analysed – no detection above the laboratory LOR. Can be considered “stable” for the purpose of trend analysis.

8.1.2 Pathway Areas

A statistical analysis was not conducted for the pathway monitoring wells since a large majority of the results were below the laboratory LOR. It is also noted that a potential seasonal fluctuation is observed for the monitoring wells in the POL pathway area with detectable PFAS concentrations generally reported in the June monitoring events following the wet season in the Exmouth Peninsula. This could be related to increased groundwater gradient following recharge. The detected concentrations are however only marginally above LOR and generally return below the laboratory LOR during subsequent monitoring events in November. These observations support the theory of a potential plume dilution with concentrations generally becoming undetectable before reaching the sensitive receptors.

This monitoring period, the Pathway Areas reported PFAS below the LOR in all monitoring wells, with exception of:

- PFOS and Sum of PFOS and PFHxS were reported above the LOR at MW107 (POL Pathway) in November 2021. The detected concentrations were reported within the historical range.
- PFOS and Sum of PFOS and PFHxS were reported above the LOR at MW111 (POL Pathway) in June 2022. The detected concentrations were reported within the historical range.

The average and median PFAS concentrations for the monitoring wells within these areas remain within the same order of magnitude as the historical concentrations. None of the management response triggers presented in the OMP was exceeded during the monitoring period. The groundwater monitoring results for this monitoring period have not indicated any changes in the understanding of PFAS extent or the risk profile for the Management Area.

8.1.3 Broader Area Wells

The Broader Area monitoring wells have been sampled since June 2018, with three wells sampled as part of the OMP.

All three monitoring wells reported PFAS concentrations below the LOR during the biannual monitoring events, and Mann Kendal analysis reports stable or no trends in PFAS concentrations since commencement of monitoring in 2018. The average and median PFAS concentrations for the monitoring wells within this area remained within the same order of magnitude as the historical concentrations.

It is noted that during the previous monitoring period, monitoring well MW129, located between the site and the north-west coastline, reported a new maximum Sum of PFOS and PFHxS concentration (0.75 µg/L) in June 2021. The result was within the same order of magnitude as the historical data and the PFAS concentrations have been reported below the laboratory LOR in the November 2021 and June 2022 monitoring events. The Mann Kendall analysis for this monitoring well indicates no statistically significant trend. It is likely the June 2021 result is an outlier and not an indicator of a PFAS migration, however, ongoing monitoring of this well will confirm this.

Overall, the groundwater monitoring results do not suggest a change in the understanding of PFAS extent or risk within the Management Area.

Table 8-2 Mann-Kendall Trend Analysis Summary – Broader Area wells

Location	PFOA Trend	Confidence Factor (%)	PFOS Trend	Confidence Factor (%)	Sum of PFOS and PFHxS Trend	Confidence Factor (%)
MW129	No Trend	79	No Trend	57	No Trend	57
MW130	NA(1)	NA(1)	No Trend	55	No Trend	55
MW134	Stable	79	Stable	79	No Trend	79

Note:

(1) Trend Not Analysed – no detection above the laboratory LOR. Can be considered “stable” for the purpose of trend analysis.

8.2 Seepage Water

All seepage water monitoring locations reported PFAS concentrations below the laboratory LOR during the monitoring period. Considering the dilution factor when reaching the Exmouth Gulf, it is considered that the potential risk remains low and acceptable.

It is noted that during the previous monitoring period, OTH113, located on the north-west coastline, recorded a new maximum for Sum of PFOS and PFHxS (0.56 µg/L) during the June 2021 event, two orders of magnitude above historical data. Given the results in groundwater at the nearby broader area well MW130 were below the LOR, it was considered the concentration reported at OTH113 was likely an outlier. The PFAS results for OTH113 have been below the laboratory LOR in the November 2021 and June 2022 monitoring events, suggesting the June 2021 result is an outlier and does not indicate a PFAS migration. Further sampling will confirm potential trends and changes (if any) in PFAS concentrations.

8.3 Surface Water

Surface water is monitored within the wider environment across the Management Area and at one location within the Powerhouse Source Area (SW113). With the exception of SW113, which has consistently reported PFAS above the laboratory LOR, surface water results were below the laboratory LOR. This is consistent with historical results and suggests surface water is not the main pathway/transport mechanism for PFAS migration from the source areas.

8.4 Sediment

Sediment is monitored within the wider environment across the Management Area and at one location within the Powerhouse Source Area (SD113). With exception of SD113, which consistently reports PFAS above the laboratory LOR, sediment results were below the laboratory LOR. This is consistent with the co-located surface water results and suggests surface water is not the main pathway/transport mechanism for PFAS migration from the source areas.

9 Conceptual Site Model

The evaluation of analytical results within this report does not suggest the nature and extent of PFAS in groundwater, seepage water, surface water or sediment has significantly changed compared to that inferred from previous investigations and monitoring data.

The understanding of on-site sources and on-site pathway areas presented in the DSI (GHD, 2018) is supported by the OMP monitoring data presented in this OMR (and previous interpretative reports). The predominant stability in PFAS trends in groundwater at the on-site source area monitoring wells and boundary/Broader Area wells also suggests PFAS concentrations at these locations do not appear to be changing significantly.

The pathways for PFAS exposure and risks to human health and ecological receptors identified during the previous DSI (GHD, 2018) are considered to remain relevant and the monitoring data presented in this report does not suggest any significant changes to these mechanisms or risks. PFAS remains present in groundwater beneath the site's source areas and has the potential to be mobilised with groundwater flow.

The data presented in this OMR does not significantly change the understanding of the CSM presented in the DSI (GHD, 2018). Future monitoring will continue to contribute to an evaluation of any potential changes to the CSM and risk understanding.

10 Discussion

10.1 Risk Profile

The ERA conducted in 2019 (GHD, 2019) further assessed the risks identified in the DSI that were considered to be “elevated” and determined that:

- PFAS posed a low risk to lower trophic level terrestrial and aquatic organisms across the Management Area;
- PFAS posed a low risk with respect to the potential for bioaccumulation and biomagnification in avian food chains across the Management Area, including the terrestrial environments of the base, the ephemeral clay pan and Exmouth Gulf;
- PFAS posed a low risk with respect to the potential for bioaccumulation and biomagnification in aquatic mammals. While the PFAS concentrations estimated for fish in the nearshore environment of Exmouth Gulf using average detected beach seepage water PFAS concentrations marginally exceeded the NEMP mammalian wildlife diet guideline, the absence of PFOS in the majority (>80%) of beach seepage samples collected, the low rates of groundwater discharge into Exmouth Gulf and the resulting high levels of dilution and dispersion support the conclusion that the concentrations in fish will be much less than estimated; and
- PFAS posed a low risk to marine turtles that nest along the beaches of the Management Area. In particular, the DSI showed that PFAS is largely absent in the unsaturated surface soils of the sandy dune areas, where marine turtle eggs were buried.

It was concluded that the information gathered during the ERA supported the conclusion made in the DSI, that PFAS exposure risks to recreational anglers were low and acceptable across the Management Area. Site-derived PFAS was also found to be unlikely to harm prawn stocks within Exmouth Gulf or to bioaccumulate to potentially harmful levels within the commercial prawn catch of the Exmouth Gulf Managed Prawn Fishery (EGMPF).

The OMP outlines management response triggers to assess whether a more active response is required to manage changes in PFAS. The triggers include:

- Receptor Triggers for groundwater and seepage water:
  - PFAS is detected in a groundwater well location or seepage location where it was previously not detected.
  - Average and/or median PFAS in a monitoring zone (i.e. broader area monitoring wells) has increased by one or more orders of magnitude with a corresponding increase in the variance of the data.

The data obtained during the monitoring period has been reviewed against the management response triggers presented in the OMP. No triggers were exceeded during the monitoring period.

Based on the current available data there is no change to this risk profile, which remains low and acceptable. Potential changes in groundwater, surface water, seepage water and sediment PFAS concentrations will continue to be evaluated through future monitoring and reporting.

10.2 Triggers for OMP Review

The OMP is 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):

- Changes in our understanding of the risks that may inform an early warning that additional management of PFAS contamination may be warranted in areas not currently affected by PFAS.
- Changes to State/Territory advice on types of exposure-minimisation behaviours (e.g., consumption of home produce or seafood),
- Changes to State/Territory advice on boundaries of a designated management area and the management zones within,
- Changes or refinements to the monitoring network, frequency and parameters;
- Feedback and information received as part of community consultation;

- Significant changes of land use within the Management Area or at close proximity;
- Changes to Defence's strategic approach to managing PFAS contamination; and
- Changes detected through the implementation of the OMP may inform a number of risk-management decisions including:
  - Additional investigations,
  - Re-assessment of the risk profile,
  - Implementation of remediation or containment actions,
  - Changing risk management actions at receptor level.

The November 2021 – October 2022 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. However, changes to the existing monitoring network, specifically, MW123, SW/SD112 and SW/SD120 being inaccessible for future monitoring events, requires a review of the OMP and SAQP.

11 Conclusions

Groundwater, surface water, seepage water and sediment monitoring and sampling was conducted between November 2021 and October 2022 in accordance with the SAQP (Cardno, 2021c). Data from the DSI (GHD, 2018) and previous years of OMP implementation is also included and considered in this OMR to inform the understanding of the risk.

Overall, the concentrations of PFAS across the media and locations sampled are consistent and of the same order of magnitude as historical data. One location within the POL Storage Area (MW210) reported an order of magnitude changes in PFOS (November 2021) and PFOA (June 2022). Further monitoring will confirm any potential trend at this location noting that concentrations detected were of the same order of magnitude as the 0.01 µg/L LOR. Potential increasing and decreasing trends were observed at individual monitoring locations, noting that not all changes in PFAS concentrations were increases. Where there was sufficient data (i.e. a minimum of four results) to undertake statistical analysis on groundwater and surface water, the Mann Kendall trend analysis outcomes predominantly indicated that there were potentially stable trends or no statistically significant trends.

Groundwater monitoring wells at the on-site source areas displayed either decreasing, stable or the absence of a trend depending on the PFAS compound under review, with exception of MW119 at the POL Storage Area, which displayed a possibly increasing trend for PFOS. However, concentrations become undetectable (i.e. below the laboratory LOR) before reaching the marine environment. The pathway and receptor monitoring locations reported PFAS concentrations below the LOR, with exception of minor Sum of PFOS and PFHxS detections in POL Pathway monitoring wells MW107 and MW111.

The nature and extent of PFAS across all media has not changed from the understanding presented in the investigation phases, previous interpretative reports, and the PMAP. Based on the current available data, there is no significant change to the risk profile of the Management Area nor the understanding of the CSM.

The November 2021 – October 2022 monitoring results did not identify a change in the risk profile for the Management Area that would trigger the need for an OMP review or further management actions. However, the OMP will be revised due to changes in access to the existing monitoring network.

Given the remaining PFAS concentrations at the on-site source areas (POL Fuel Farm and Powerhouse), it is likely that these continue to act as sources. The ongoing monitoring program should be continued to provide additional temporal data and plume extent/behaviour information to further evaluate risk findings.

12 References

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APPENDIX

A

FIGURES

Cardno

now

Stantec

Ningaloo Marine Park

Harold E Holt Area A

North-West Cape

Bundegi Beach

Cape Range National Park

Exmouth

Exmouth Gulf

Legend

Management Area / Commonwealth boundary

HEHA Site Features

FIGURE 1

1:80,000 Scale at A3

Metres

0 1,500 3,000

Site Location

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2024-02-02 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-001_RegionalLocation 03.mxd
Aerial Imagery Supplied by Google Earth

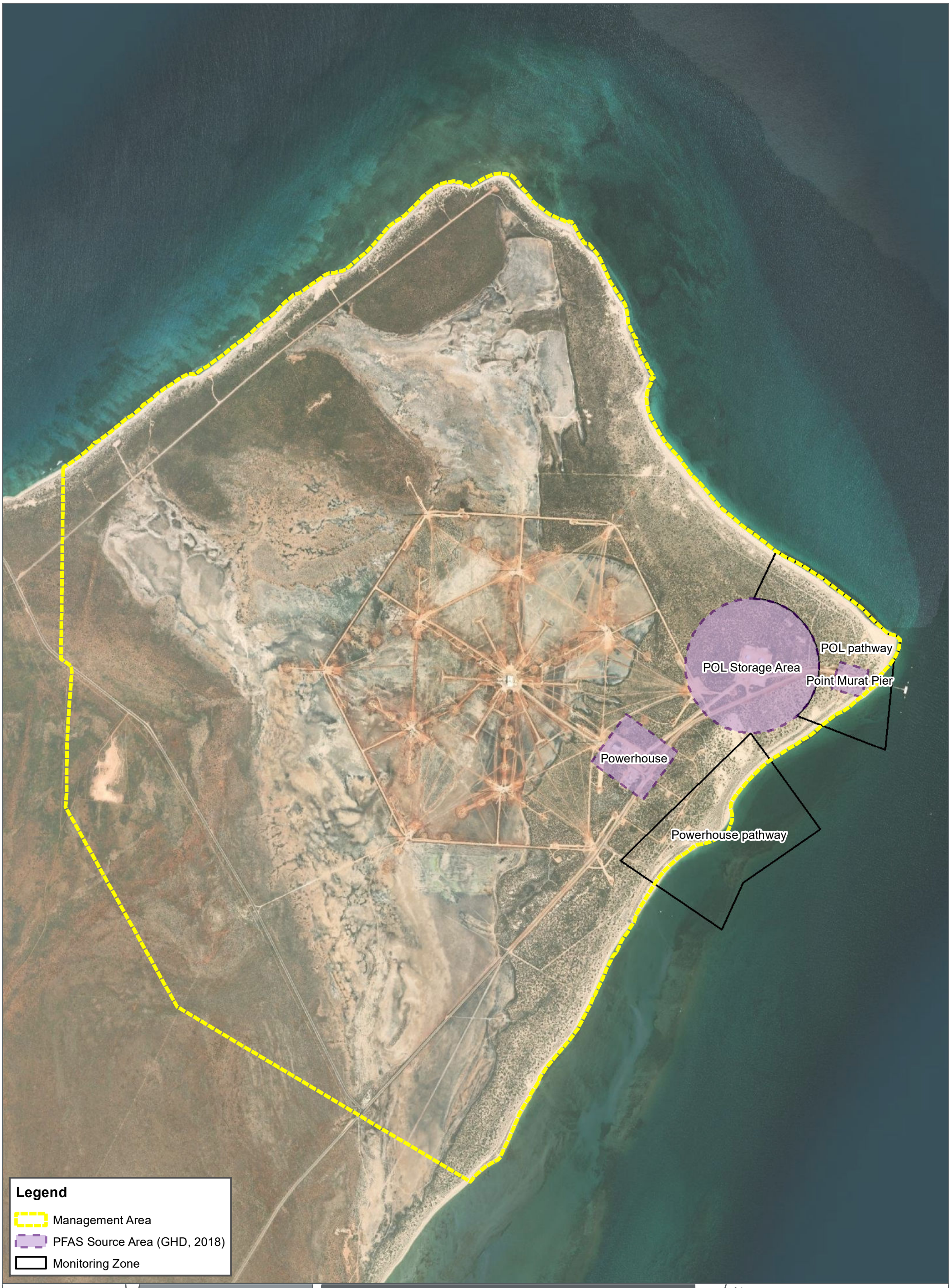


FIGURE 2

1:25,000 Scale at A3

Metres

0 500 1,000

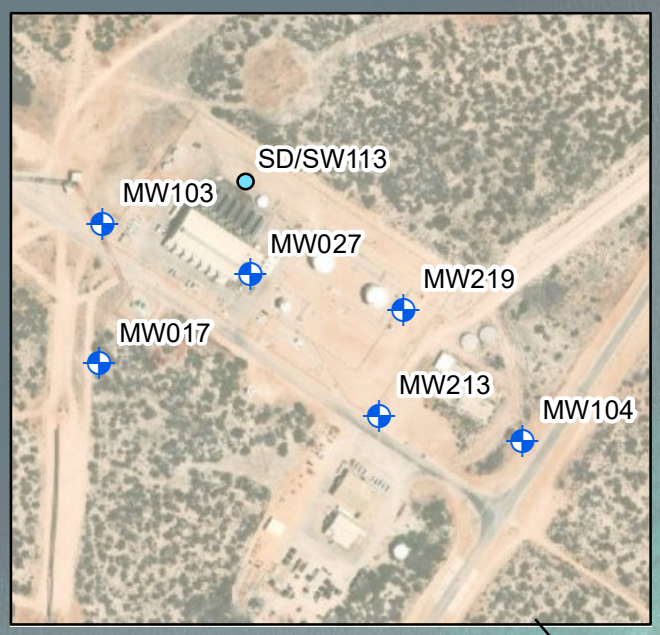
Management Area

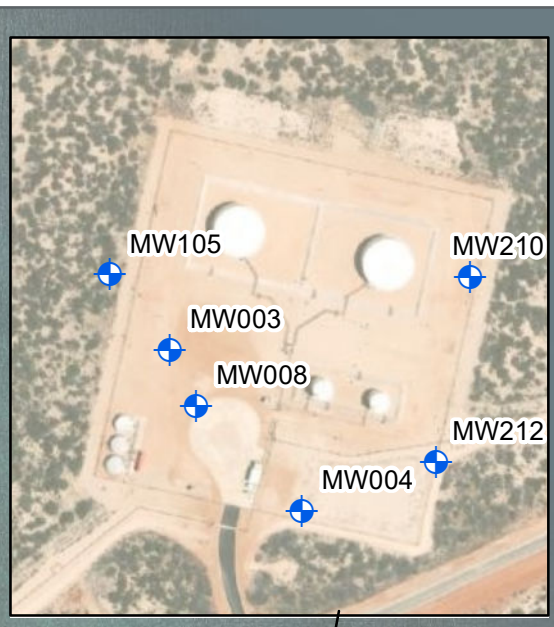
2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2024-02-02 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-002_ManagementAreas 03.mxd





MW129
OTH113
SD/SW120
OTH110
MW130
OTH109
OTH101
MW109
MW110
OTH102
MW202
MW119
MW105
MW111
MW134
OTH002
MW212
MW008
MW004
MW107
MW112
OTH104
MW027
MW017
MW104
MW113
MW114
OTH105
MW213
MW217
MW115
OTH106
MW218
MW116
OTH107
MW123
SD/SW112
OTH108
MW117
SD/SW126
SD/SW127
SD/SW128

Legend

- Management Area
- PFAS Source Area (GHD, 2018)

Sampling Locations

- Groundwater Monitoring Well
- Seepage Water Monitoring Location
- Surface Water / Sediment

FIGURE 3

1:25,000 Scale at A3

Metres

0 500 1,000

Monitoring Locations

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2024-07-11 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-003_MonitoringLocations 04.mxd

FIGURE 4

1:24,000 Scale at A3

Metres

0 500 1,000

Nov-21 Inferred Groundwater Contours

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2023-04-06 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-004_Nov-21_GWContours 01.mxd

FIGURE 5

1:24,000 Scale at A3

Metres

0 500 1,000

Jun-22 Inferred Groundwater Contours

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2023-04-06 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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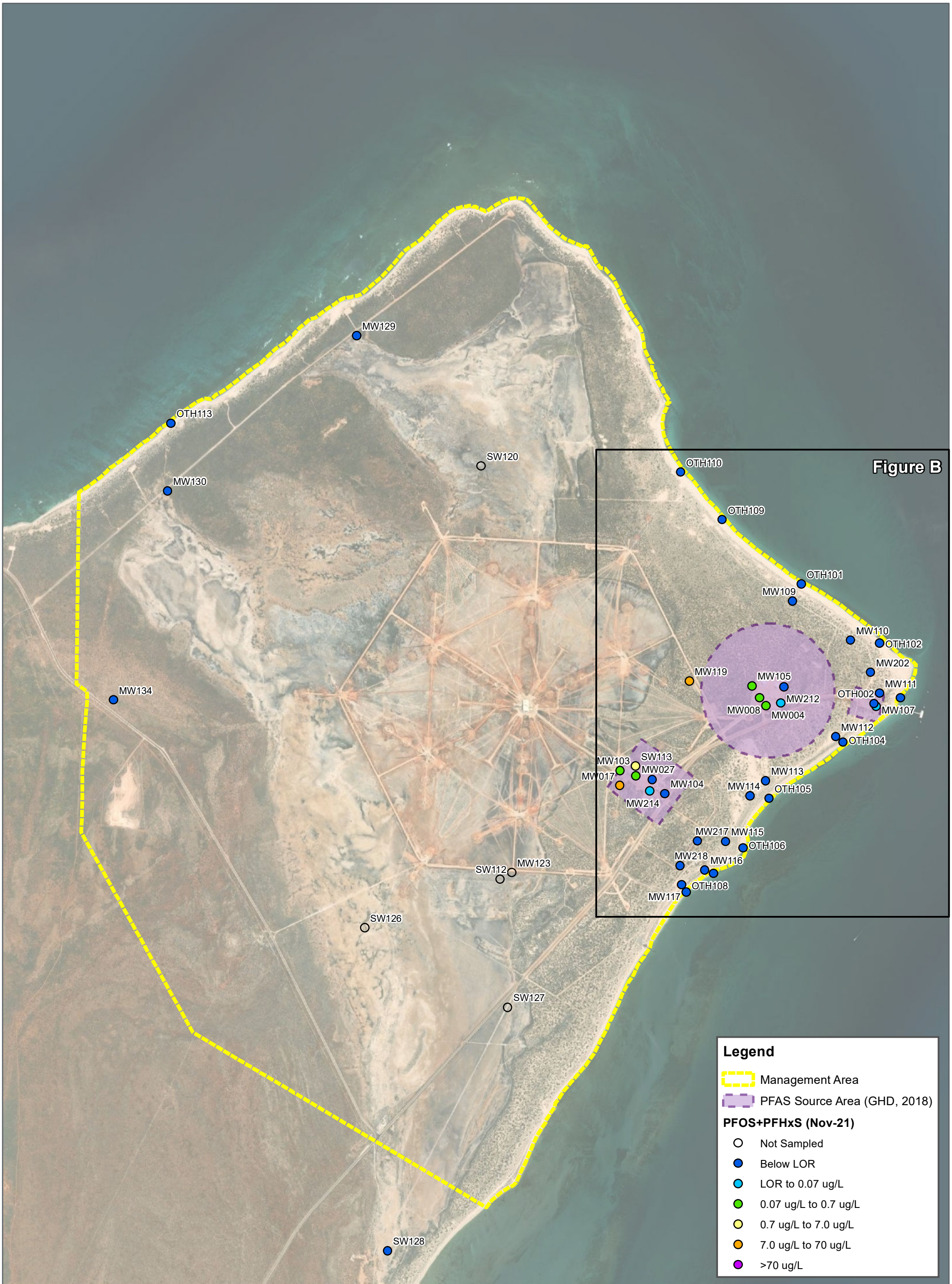
MW129
OTH113
SW120
OTH110
Figure B
MW130
OTH109
OTH101
MW109
MW110
OTH102
MW202
MW119
MW105
MW111
MW212
OTH002
MW008
MW004
MW107
MW112
OTH104
MW134
MW103
SW113
MW027
MW017
MW104
MW113
MW114
OTH105
MW214
MW217
MW115
OTH106
MW218
MW116
OTH108
MW117
SW112
MW123
SW126
SW127
SW128
Legend
Management Area
PFAS Source Area (GHD, 2018)
PFOS+PFHxS (Nov-21)
Not Sampled
Below LOR
LOR to 0.07 ug/L
0.07 ug/L to 0.7 ug/L
0.7 ug/L to 7.0 ug/L
7.0 ug/L to 70 ug/L
>70 ug/L
FIGURE 6
1:25,000 Scale at A3
Metres
0
500
1,000
PFOS+PFHxS Concentrations - Nov-21
2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
Cardno
Map Produced by Cardno WA
Date: 2023-04-06 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-006_PFOS+PFHxS_Nov21 01.mxd

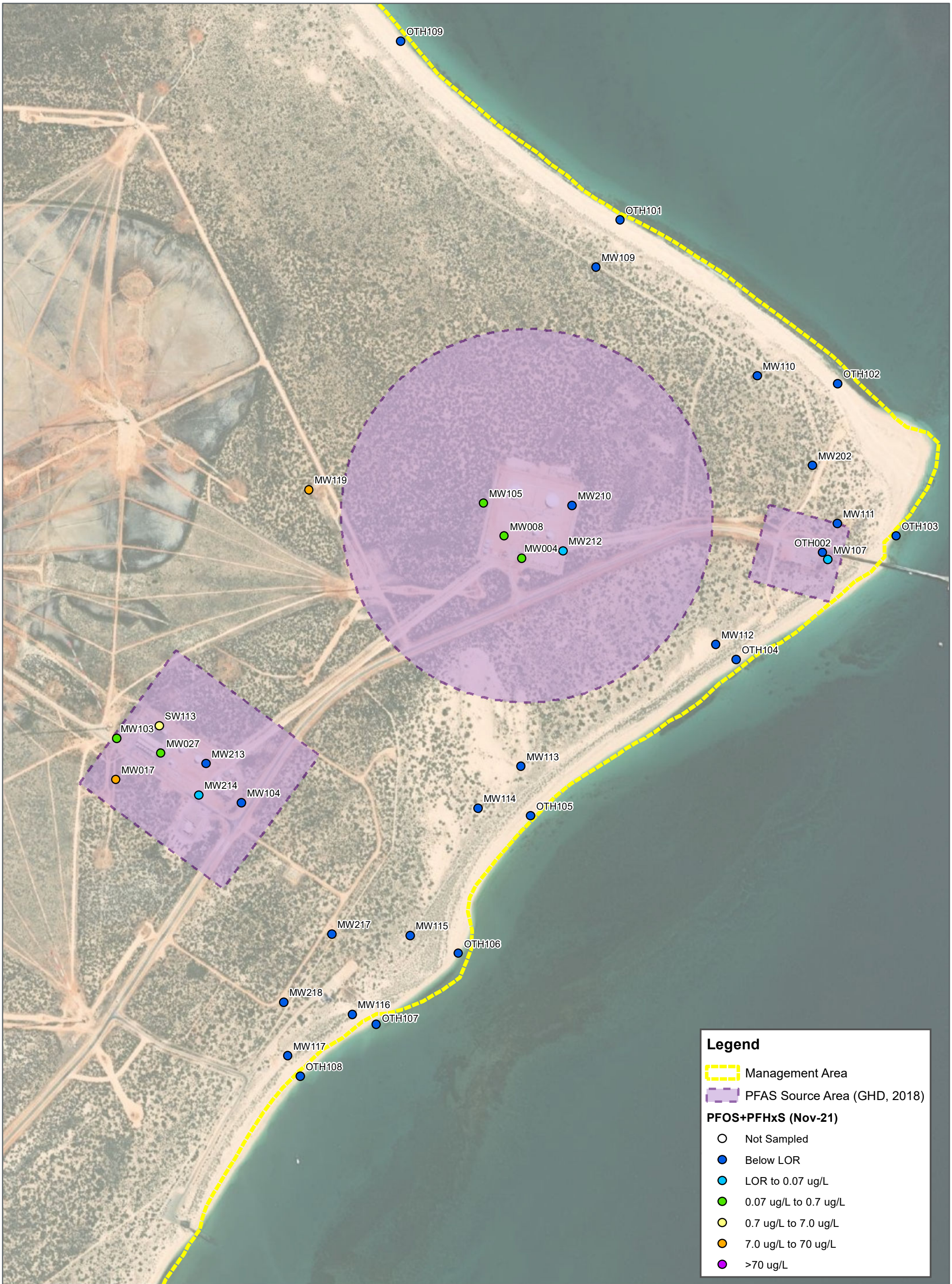

FIGURE 6B

1:9,000 Scale at A3

Metres

0 180 360

PFOS+PFHxS Concentrations - Nov-21

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2023-04-06 | Project: DEF19009
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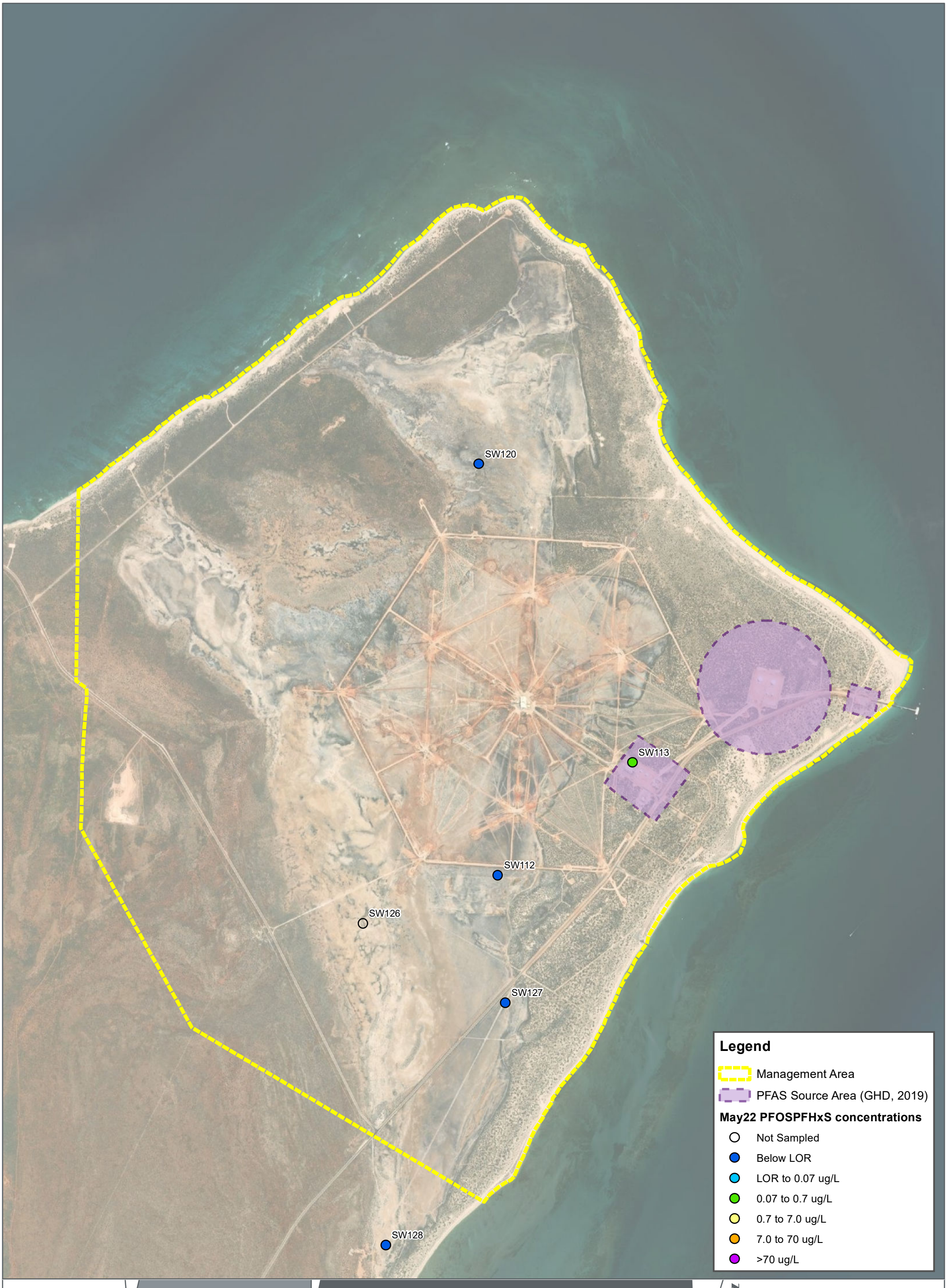

FIGURE 7

1:25,000 Scale at A3

Metres

0 500 1,000

PFOS+PFHxS Concentrations - May22

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2023-04-06 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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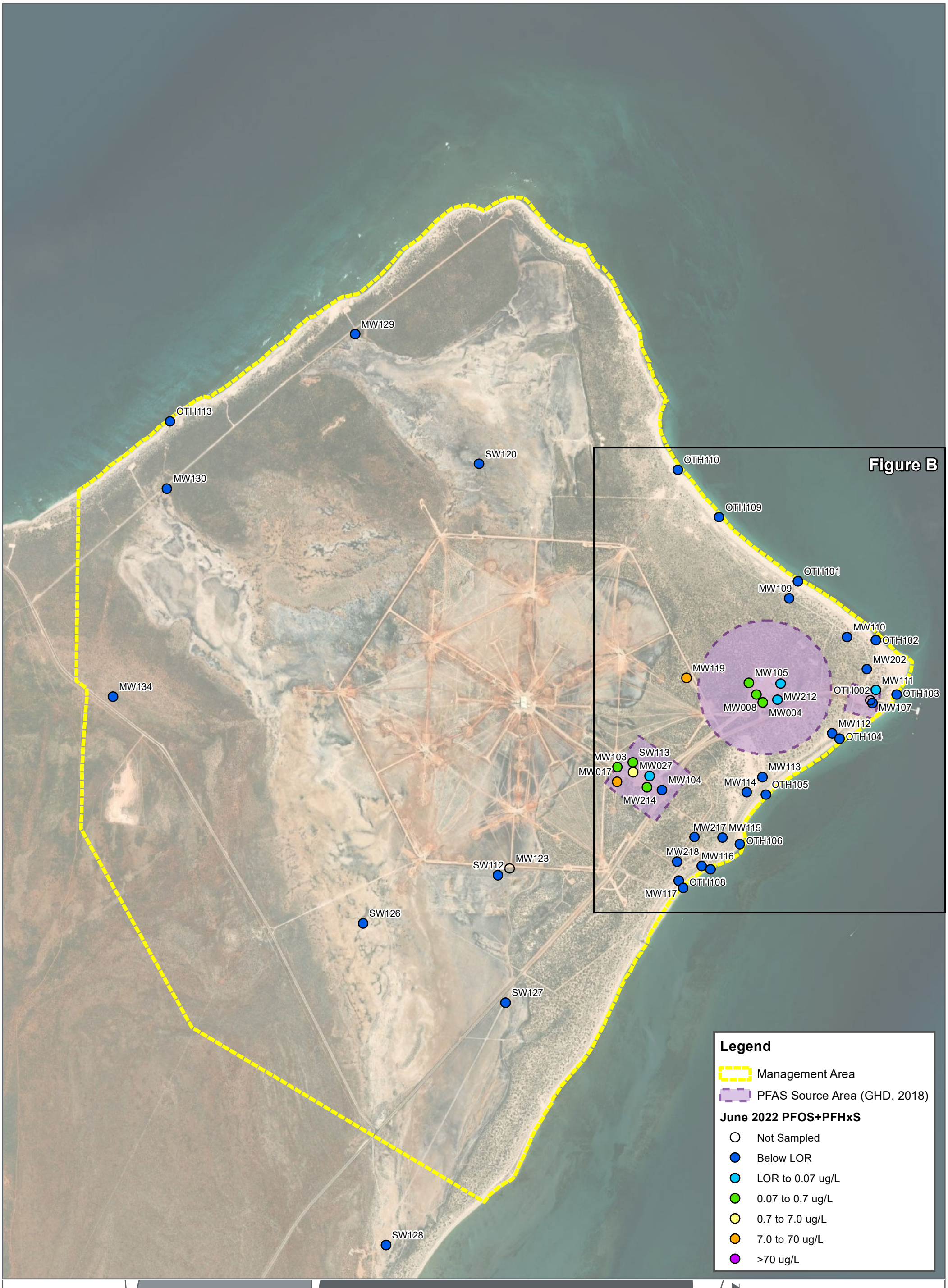

FIGURE 8

1:25,000 Scale at A3

Metres

0 500 1,000

PFOS+PFHxS Concentrations - Jun-22

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2023-04-06 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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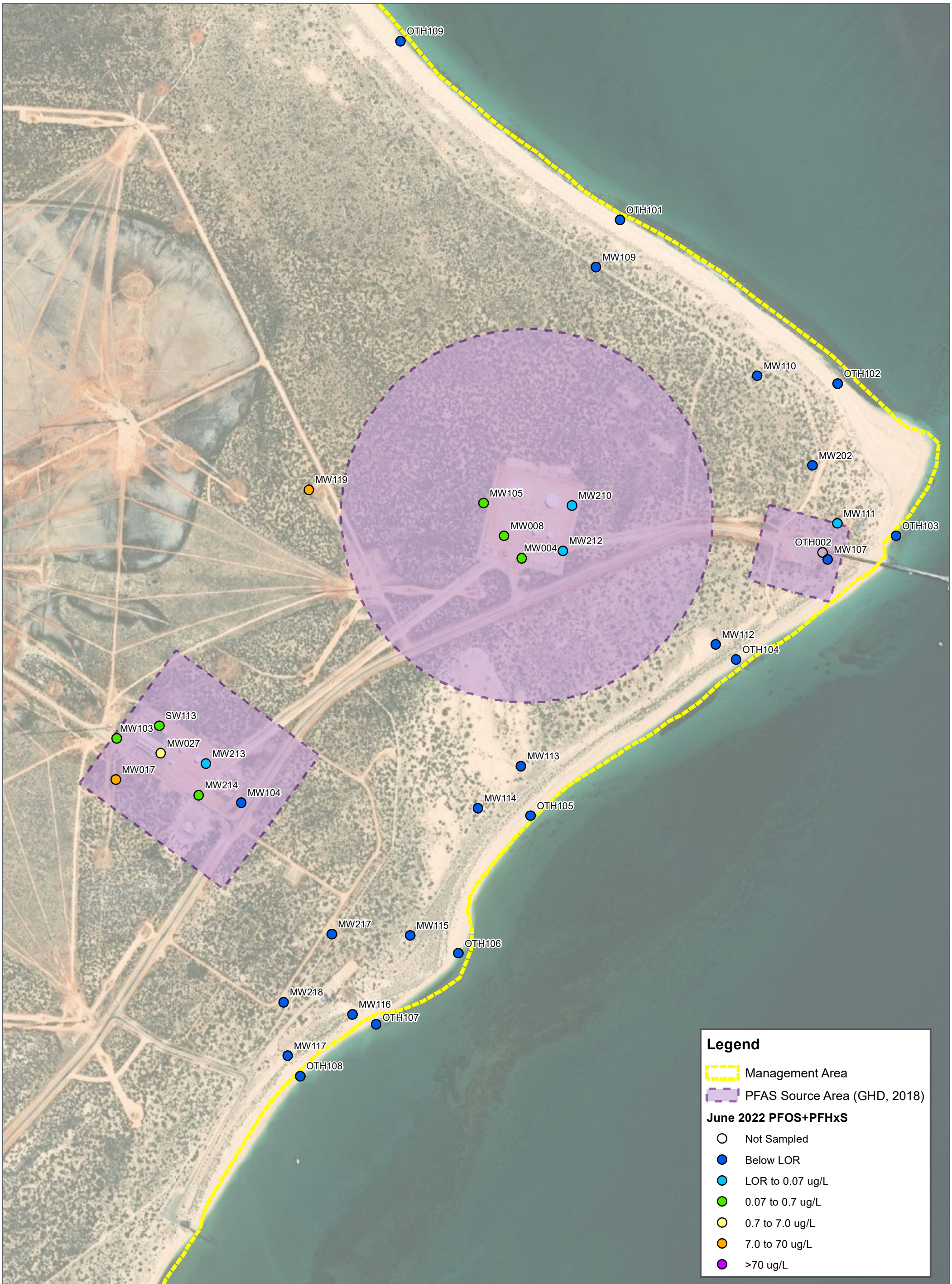

FIGURE 8B

1:9,000 Scale at A3

Metres

0 180 360

PFOS+PFHxS Concentrations - Jun-22

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2023-04-06 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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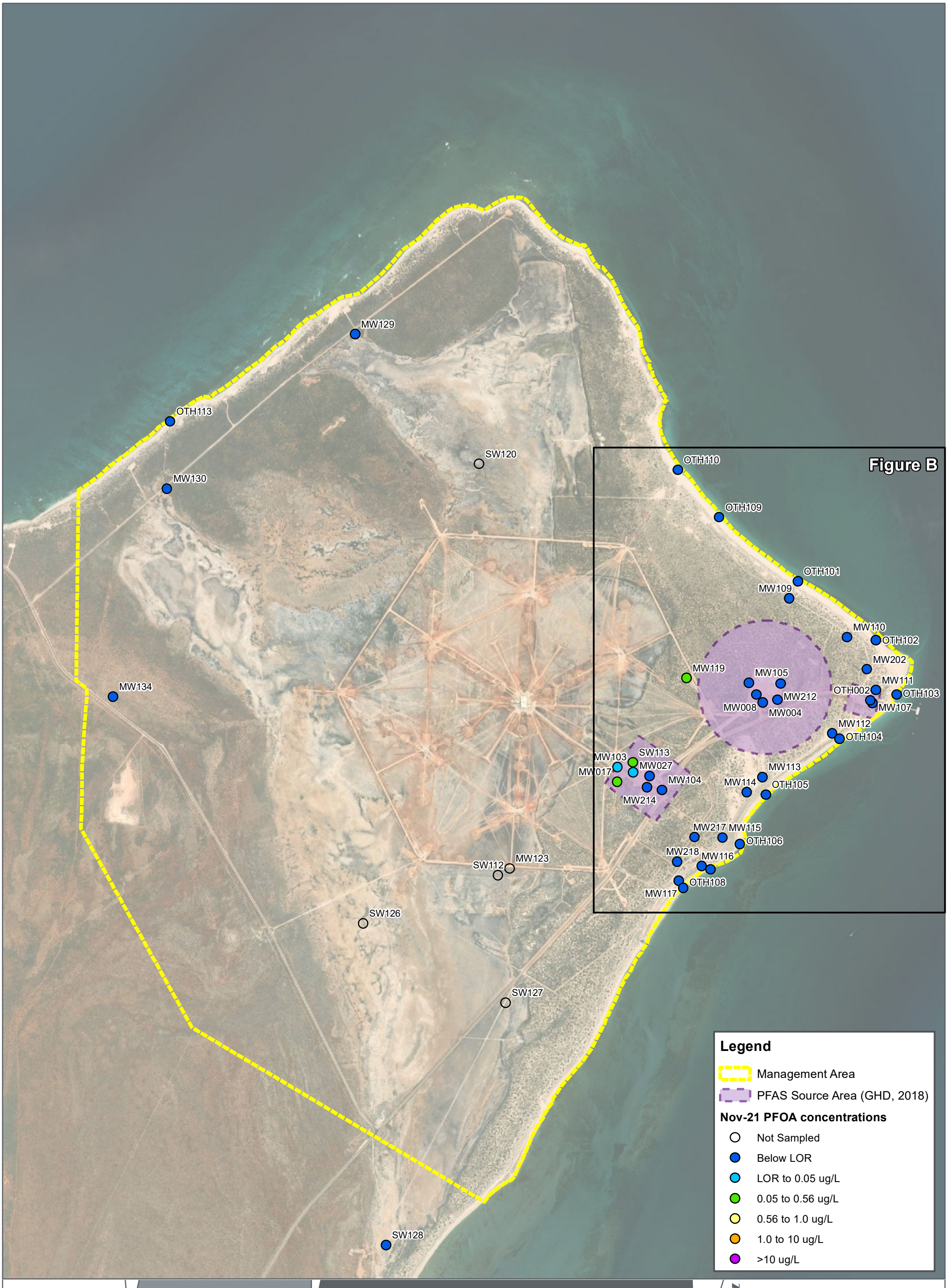

FIGURE 9

1:25,000 Scale at A3

Metres

0 500 1,000

PFOA Concentrations - Nov-21

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
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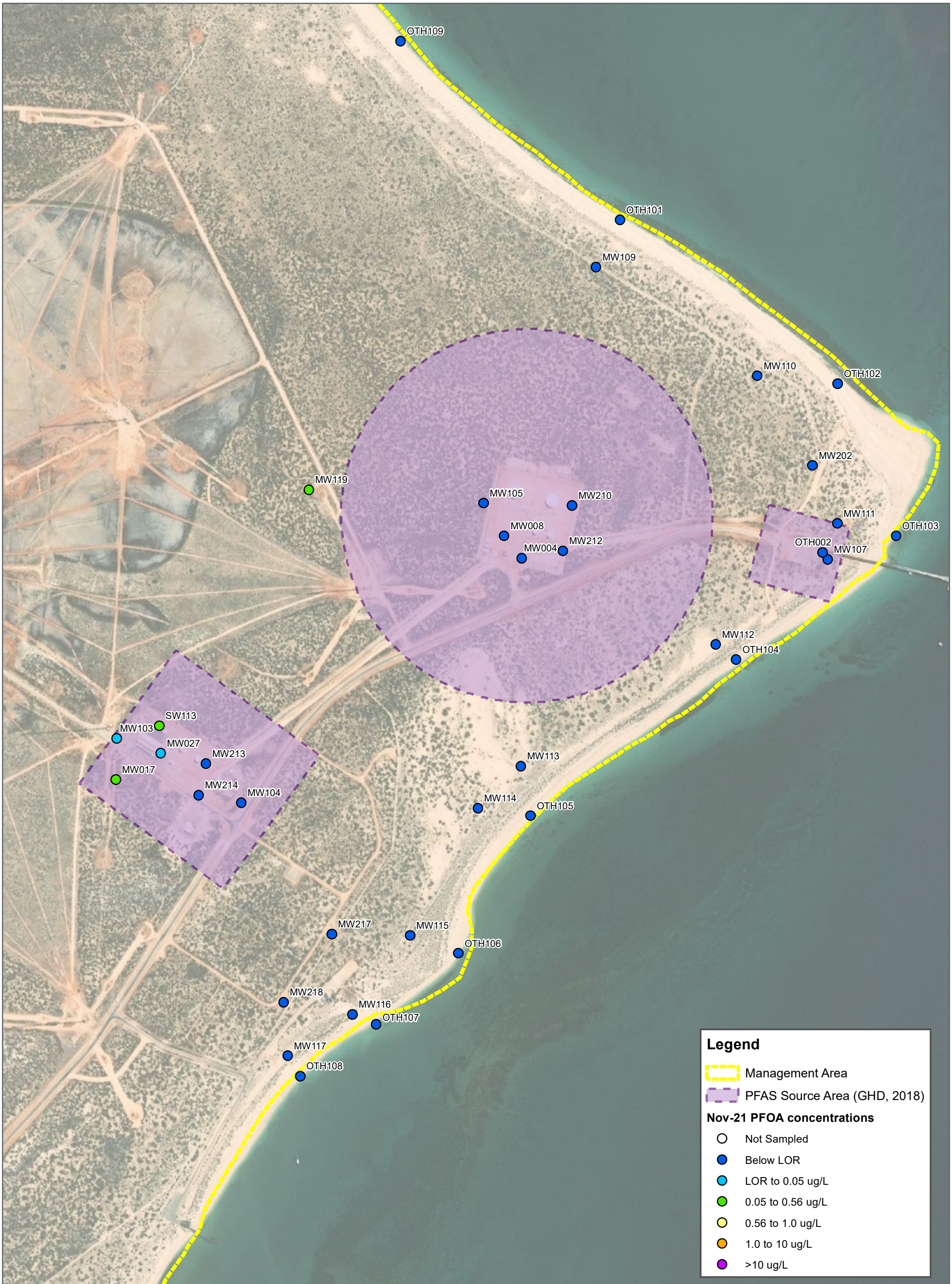

FIGURE 9B

1:9,000 Scale at A3

Metres

0 180 360

PFOA Concentrations - Nov-21

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
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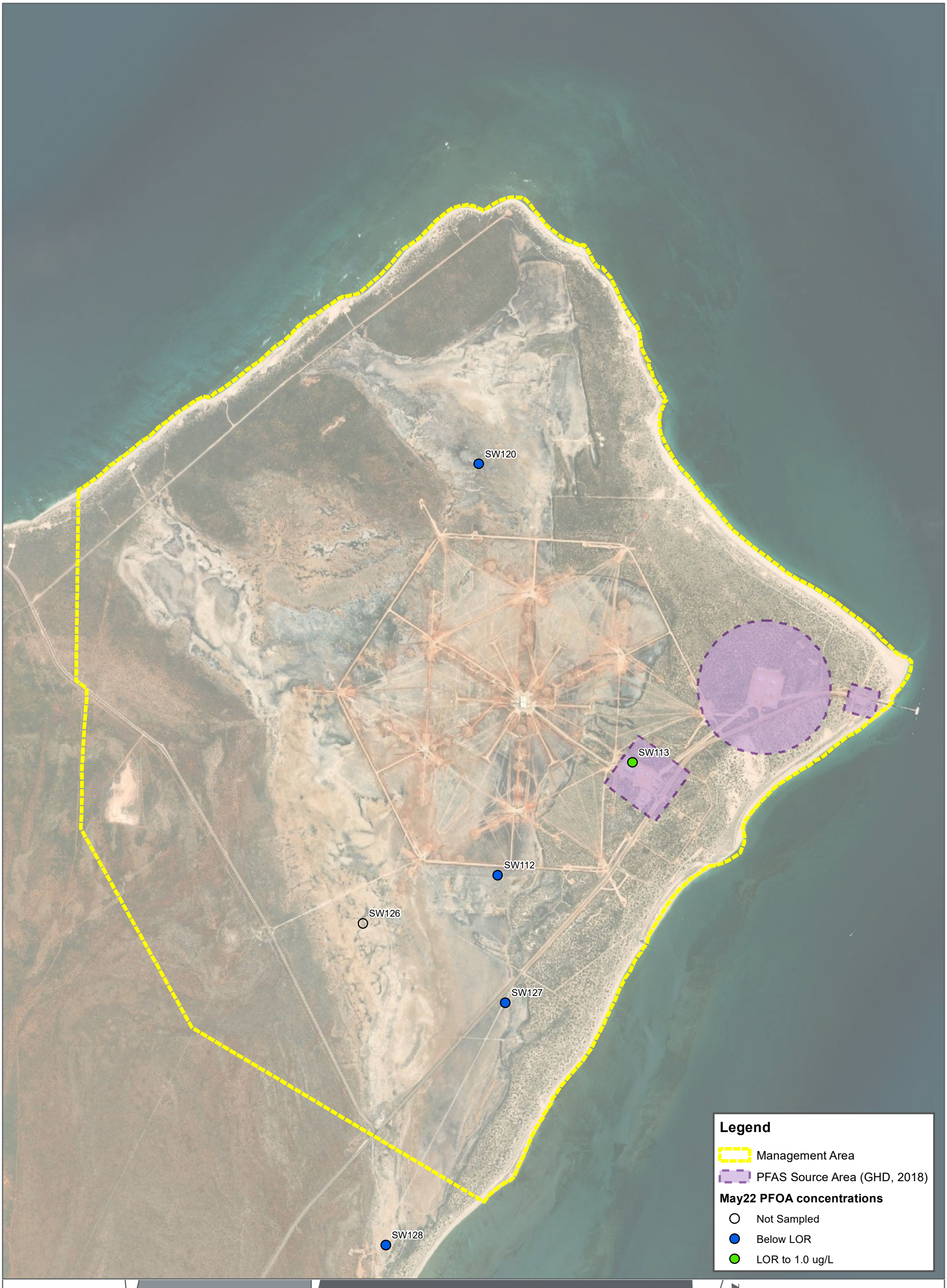

FIGURE 10

1:25,000 Scale at A3

Metres

0 500 1,000

PFOA Concentrations - May22

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2023-04-06 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
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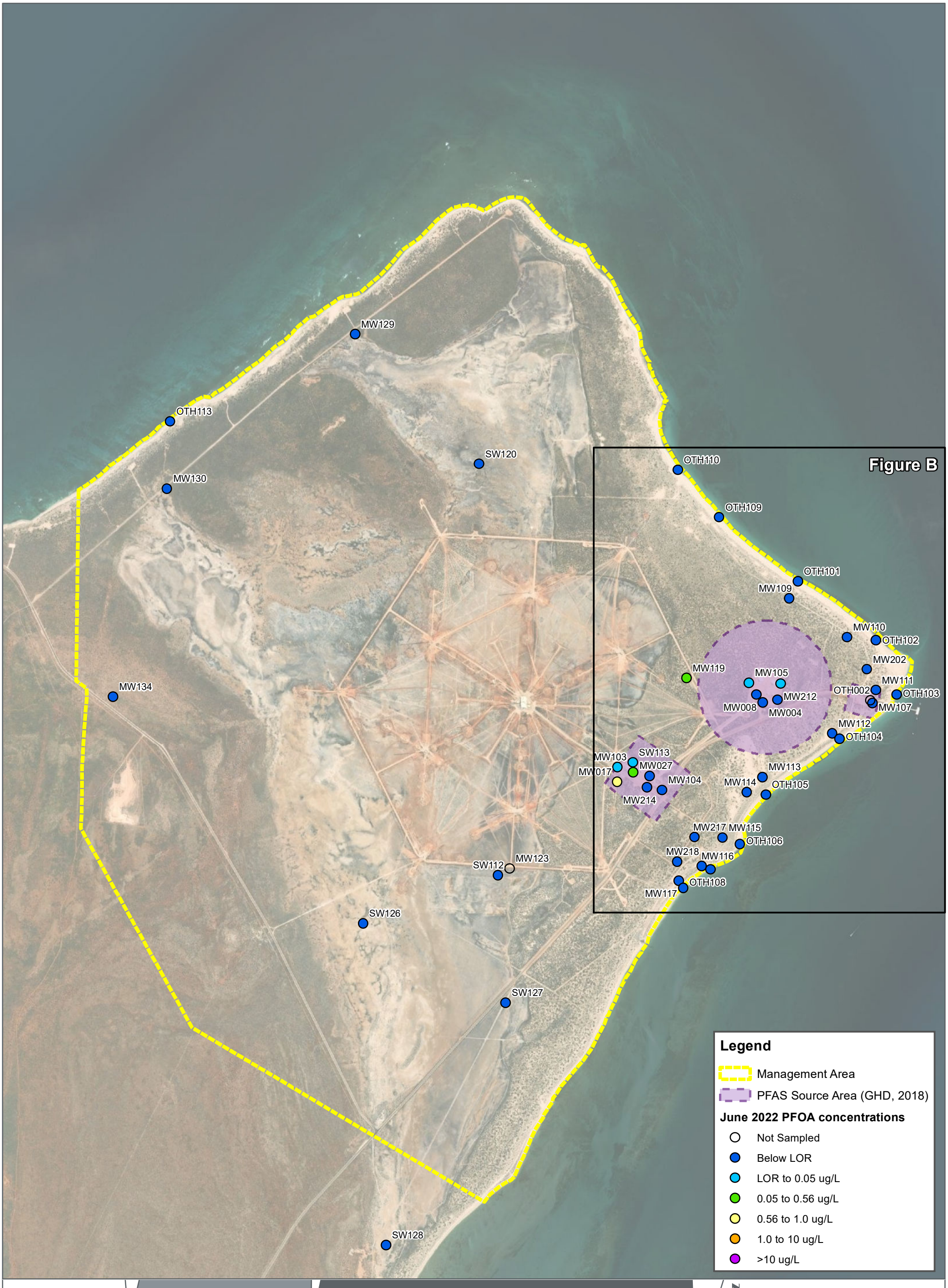
MW129
OTH113
MW130
MW134
SW120
OTH110
OTH109
OTH101
MW109
MW110
OTH102
MW202
MW119
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OTH002
OTH103
MW212
MW008
MW004
MW107
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OTH104
MW103
SW113
MW027
MW017
MW104
MW113
MW114
OTH105
MW214
MW217
MW115
OTH106
MW218
MW116
OTH108
MW117
SW112
MW123
SW126
SW127
SW128
Figure B
Legend
Management Area
PFAS Source Area (GHD, 2018)
June 2022 PFOA concentrations
Not Sampled
Below LOR
LOR to 0.05 ug/L
0.05 to 0.56 ug/L
0.56 to 1.0 ug/L
1.0 to 10 ug/L
>10 ug/L
FIGURE 11
1:25,000 Scale at A3
Metres
0
500
1,000
PFOA Concentrations - Jun-22
2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2023-04-06 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-011_PFOA_Jun22 01.mxd

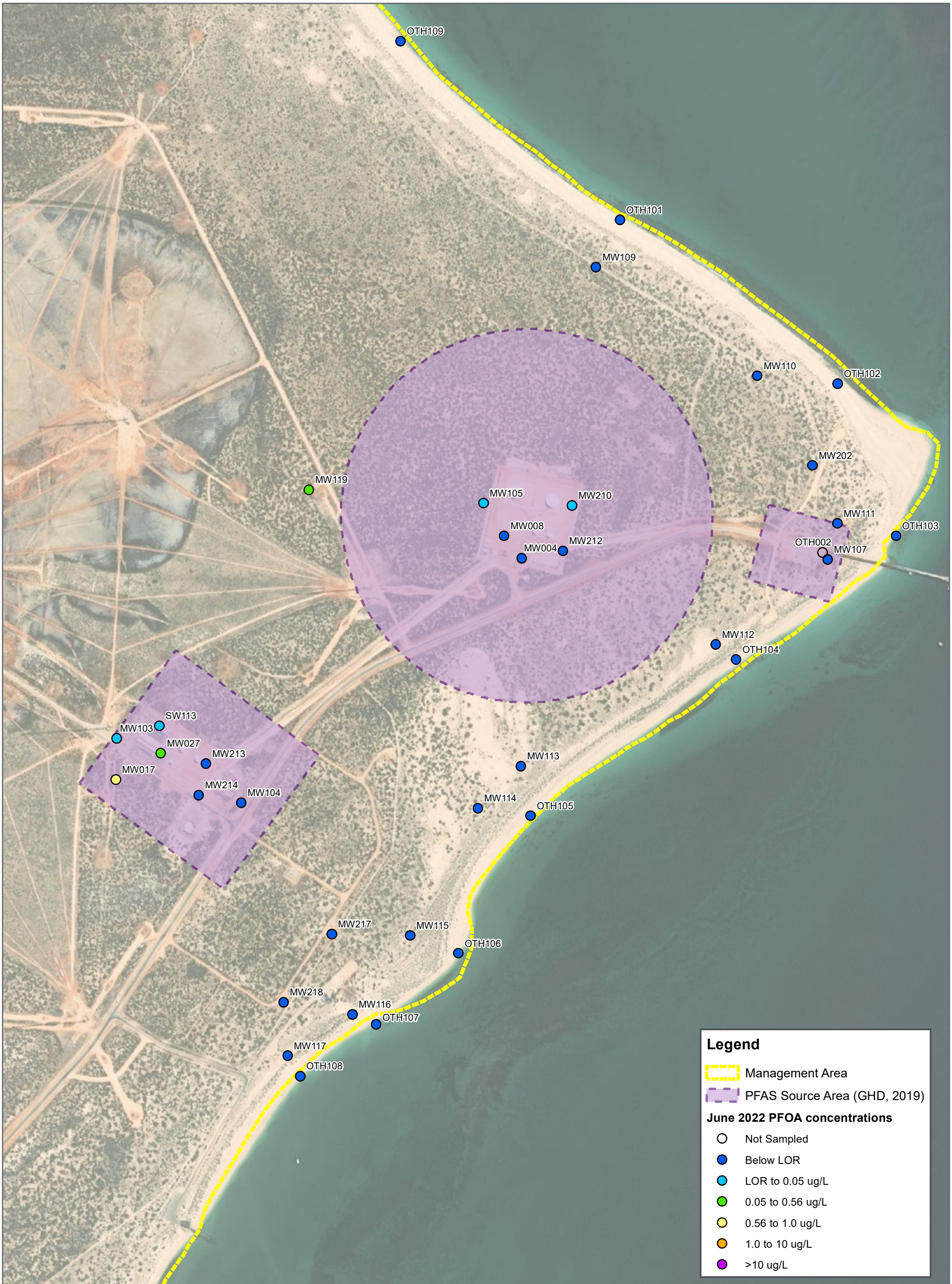

FIGURE 11B

1:9,000 Scale at A3

Metres

0 180 360

PFOA Concentrations - Jun-22

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

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Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-011B_PFOA_Jun22 01.mxd

SD120
SD113
SD112
SD126
SD127
SD128

Legend

- Management Area
- PFAS Source Area (GHD, 2018)

Nov21 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

1:25,000 Scale at A3

Metres

0 500 1,000

Sediment Concentrations - Nov-21

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2023-04-08 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-012_SD_Nov21 01.mxd

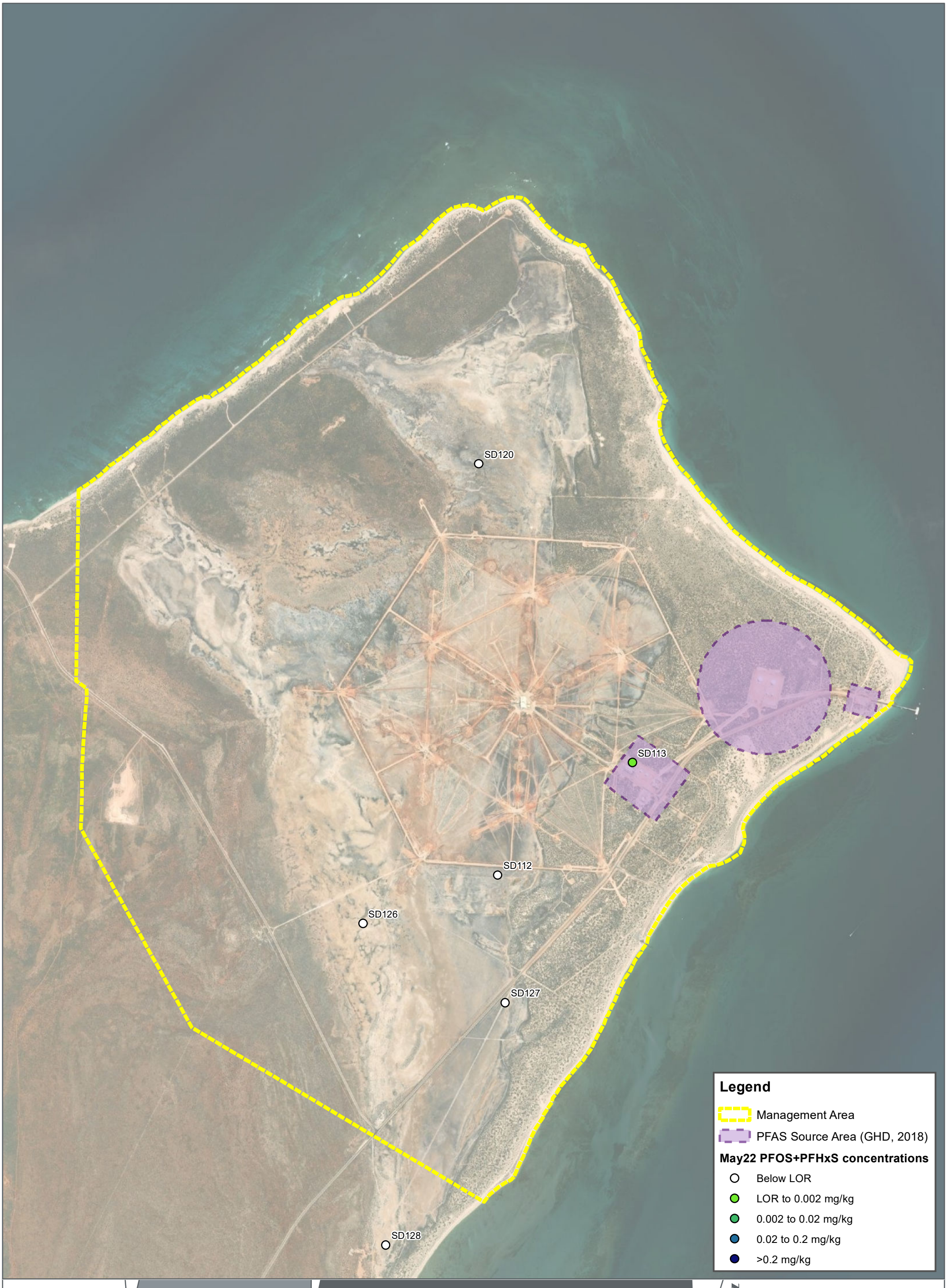

FIGURE 13

1:25,000 Scale at A3

Metres

0 500 1,000

Sediment Concentrations - May22

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2023-04-08 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-013_SD_May22 01.mxd

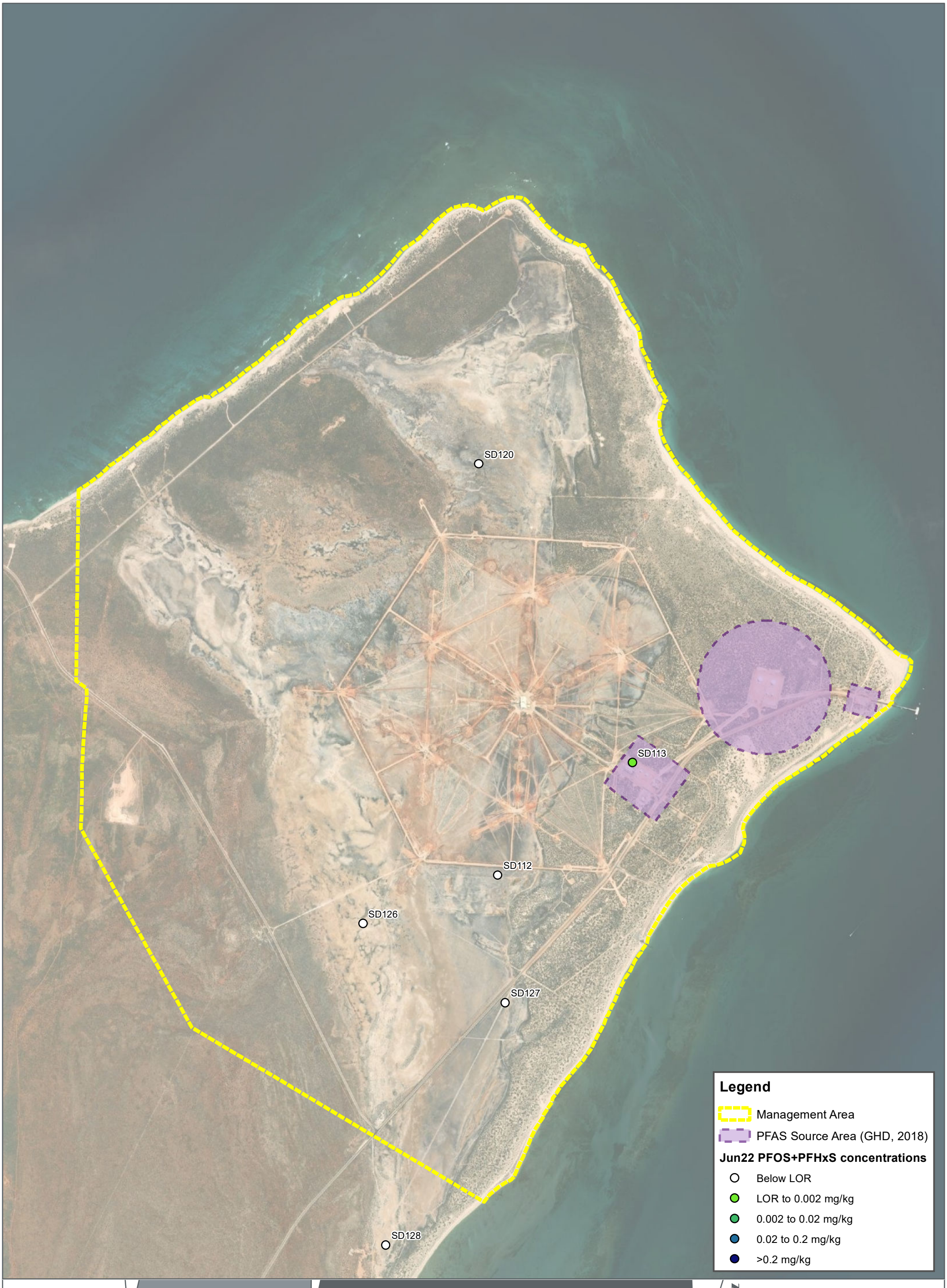

FIGURE 14

1:25,000 Scale at A3

Metres

0 500 1,000

Sediment Concentrations - Jun-22

2022 ONGOING MONITORING REPORT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2023-04-08 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-014_SD_Jun22 01.mxd

APPENDIX

B

SAQP

Cardno

now

Stantec

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

Naval Communication Station Harold Holt A

Prepared for

Department of Defence

14 June 2021

Cardno®

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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 the Naval Communication Station Harold E Holt - Area A (HEH-A), Exmouth, Western Australia (Figure 1, Appendix A).

The OMP SAQP applies to not only HEH-A, but also the surrounding areas that, together with the Base, make up the "Management Area" (Figure 2, Appendix A). For the purposes of this report:

> "the Site" was defined as Harold E Holt – Area A (Figure 1, Appendix A).

> "the Management Area" was defined as comprising the Site, plus the land extending to the Exmouth Gulf (to the east, north and north-west) (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, seepage water, surface water and sediment originating from the Site for an initial three-year monitoring period. The 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. An additional wet season sampling event will be undertaken near the start of the wet season in January or February. Only surface water and sediment will be obtained in the January/February event to attempt to obtain first flush samples. Groundwater and seepage water will not be sampled.

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, seepage water, 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 the nature and extent (spatial and temporal) of PFAS impact in groundwater and surface water pathways associated with Site sources of PFAS derived from AFFF;
2. Monitor the migration of PFAS in groundwater 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 HEH-A PFAS Investigation have been used as a basis to develop this SAQP:

> Department of Defence, March 2019, Naval Communication Station Harold E Holt – Area A 'PFAS Management Area Plan'.

> Department of Defence, May 2019, Naval Communication Station Harold E Holt – Area A 'PFAS Ongoing Monitoring Plan'

> GHD Pty Ltd, December 2018, reference: 3135526,'Naval Communication Station Harold E Holt – Area A PFAS Investigations Detailed Site Investigation Report'.

> GHD Pty Ltd, April 2019, reference: 3135526, 'Harold E Holt A Ecological Risk Assessment'.

> Cardno, April 2020, PFAS OMP Biannual Monitoring Factual Report, 2019 Post-Winter, HEH-A.

> Cardno, July 2020, PFAS OMP First Flush Sampling Event Factual Report HEH-A.

> Cardno, February 2021, PFAS OMP Biannual Monitoring Factual Report, 2020 Post-summer, HEH-A.

> Cardno, February 2021, PFAS OMP Biannual Monitoring Factual Report, 2020 Post-winter, HEH-A

> Cardno, April 2021, PFAS OMP First Flush Sampling Event Factual Report HEH-A.

> Cardno, April 2021, 2020 Annual Interpretive Report, HEH-A.

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 – Directorate of PFAS Remediation (DPFASR) – Environment & Engineering Branch	▪ Implement this OMP. ▪ Engage suitably qualified environmental consultants/contractors to carry out the works specified in the OMP
HEH-A – 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 HEH-A 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*.

> 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 Environment and Regulation (DER), 2014, *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

HEH-A is located approximately 1,250 km north of Perth, 14 kilometres north of Exmouth township, and covers an area of 2,310 hectares (ha). HEH-A was established in 1967 and is host to a VLF antenna field and associated infrastructure including a central transmitter building, power station, fuel farms, fuel pipelines, Murat Pier and saltwater bore field.

The Site is situated at the end of the North West Cape of WA, at the northern edge of Exmouth. HEH-A encompasses the waters extending 400 m around the Point Murat Pier. The majority of the buildings and associated infrastructure and support services are located in the eastern portion of the Site and include:

- VLF transmitter Station.
- Bulk fuel storage, referred to as the Petrol Oil Lubricants (POL) store.
- Bulk fuel storage at the ready use fuel farm (RUFF) above ground storage tanks (ASTs) at the power station
- Point Murat Pier – diesel fuel supplied by ships berthed at Point Murat Pier and transferred via pipeline (above and below ground) to the POL and ready storage facility adjacent to the power station
- Power station

2.1 Site Definition and Planning

For the purposes of this SAQP report, “the Site” is defined as comprising HEH-A. 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 locations.

Table 2-1 Site Identification Details

Details	Description
Site Address	Murat Rd, North West Cape, WA 6707
Land Description	Harold E Holt Area A
Owner	Commonwealth of Australia
Title Details	Lot 44 on Plan P209471
Planning Zone / Land use	Public Purposes – Government Services
Local Government Authority (LGA)	Shire of Exmouth
Boundary corner coordinate (1) **(eastings and northings in GDA94, Zone 50)**	▪ North corner: 201,817 mE, 7,588,922 mN ▪ East corner: 209,638 mE, 7,585,003 mN ▪ South corner: 206,410 mE, 7,581,168 mN ▪ West corner: 203,378 mE, 7,585,914 mN

(1) As determined by Cardno

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	Ningaloo Marine Park
West	Ningaloo Marine Park
East	Ningaloo Marine Park/Exmouth Gulf, commercial prawn fishing
South	Bundegi Coastal Park and vacant crown land (open space)

3 Environmental Setting

Key details defining the site are summarised 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 37.9ºC (January) and 24.2ºC (July) while minimum temperatures range between 11.4ºC (July) and 24.7ºC (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	Elevation across HEH-A typically range between 1 and 20 meters relative to the Australian Height Datum (m AHD). To the East of HEH-A, the coastline is comprised of sand dunes which have a maximum elevation of 20 mAHD. The dunes have a succession profile of primary and secondary dunes, which increase in elevation with distance from the coast.
Geology	**Regional Geology** The Site is underlain by the geological units of the Northwest Cape range primarily comprising carbonate sediments. The Cape Range Group consists in: ▪ Trealla Limestone: permeable, hard and tightly jointed limestone beneath unconsolidated Quaternary deposits. Contains both karst areas and areas of recrystallization.

Setting	Description
	▪ Tulki Limestone: relatively permeable, hard and tightly jointed. Encountered at depths of 50 to 100 m below ground level (mbgl). Karst features such as caves occur within the recrystallised limestone. ▪ Mandu Limestone: low permeability limestone encountered at greater than 150 mbgl. ▪ The Birdrong Sandstone which underlies the Cape Range Group, comprising a fine to coarse grained silty sandstone. **Site Specific Geology** Previous environmental investigations have reported that the geology at HEH-A is primarily a clay pan, comprising silt, sand and gravels. The clay pan encompasses the majority of the far north eastern tip of the peninsula and is fringed along the coast to the north and east of the Site by extensive beach and coastal dunes.
Acid Sulfate Soil	A review of the Acid Sulfate Soils (ASS) risk mapping, available on the WA Atlas online database indicates that most of the area encompassing the site is classified as having either a high to moderate or moderate to low risk of ASS occurring.
Hydrology	HEH-A can be inundated by sea water during extreme storm surges. Later evaporation of this water has left visible salt crusts and localised hypersaline conditions. The coastal send dunes and inland topographical depression that characterise HEH-A, effectively form a basin where, in the absence of drainage pathways to the coast, surface water can stand for up to several months following substantial rainfall events and storm surges. Site drainage primarily follows the local topography, prior to infiltration into the ground surface.
Hydrogeology	The Quaternary and Tertiary-aged sediments are hydraulically interconnected and together form the major, unconfined aquifer of the area. The superficial Quaternary layers (dunes, colluvium, alluvium) are considered to be no more than 20 m in thickness. ▪ **Groundwater Occurrence/Quality** – The main regional aquifer occurs predominantly within the Tulki Limestone (within permeable beds and the karst system) on the flanks of the Cape Range and the Mandu Limestone (within joints and minor permeable beds) on the crest of the Cape Range. The aquifer is unconfined and is recharged by rainfall. Groundwater in the Quaternary units is considered to be perched and discontinuous. The coastal dunes may also contain relatively fresh groundwater, however of limited extent (lenses), but may influence groundwater flow directions locally. The groundwater underlying the clay/salt pan is hypersaline due to the clay pan acting as an evaporation basin where salts are concentrated. Brackish groundwater conditions exist around the power station and POL areas, which may indicate an interaction with fresher recharge source. ▪ **Depth to Groundwater** – Groundwater has previously been recorded beneath the site at shallow levels of between -0.128 and 0.675 m AHD (i.e. less than 7 m below ground level) (GHD, 2018). The hydraulic gradient of the site is low (in the order of 0.0002 to 0.003 m/m). The groundwater is therefore likely to be vulnerable to local changes in flow direction through preferential recharge. ▪ **Groundwater Flow Direction** – The groundwater elevation contour pattern (GHD, 2018) indicated a generally consistent groundwater flow direction from the sand dunes towards the central clay pan area (i.e. westerly direction for eastern portions of the Base, and easterly flow direction on the west). ▪ **Groundwater Use** – No registered groundwater bores were identified within a 1 km radius of HEH-A. A number of unregistered extraction bores are understood to be present at residential properties within the township of Exmouth, located approximately 14 km south of the Site. – Saltwater production bores are installed within the Trealla Limestone to the south-east of the power plant compound area. Groundwater is continuously pumped from this borefield, which may be responsible for localised deviations in the groundwater elevation contours near the south-east portion of the site. ▪ **Protective Drinking Water Source Area (PDSA**) – The site is not located within a PDSA, The Exmouth Water Reserve drinking water source protection review Area, a Priority 1 area, is located approximately 12 km southwest of the Site at its closest point. Priority 1 areas are usually undeveloped and under state management.

Setting	Description
	▪ **Receiving Surface Water Body** – A component of flow from the sand dunes towards the coast is present on the eastern coats near Murat Pier, although this is reversed at high tide, such that groundwater discharges over full tidal cycles may be minimal. Previous investigations reported a very low hydraulic gradient for the Site.
Environmental Sensitive Areas	The Site occurs within an area that is included on the Register of the National Estate because of its natural heritage value, under the Australian Heritage Council Act 2003 of the Commonwealth. ▪ The Cape Range Subterranean Waterways wetlands occurs across the Site. ▪ The Cape Range National Park is located approximately 16 km to the southwest of the Site at its closest point. ▪ The Jurabi Coastal Park is adjacent to the west of the Site. ▪ The Bundegi Conservation Reserve is adjacent to the southeast of the Site. ▪ The Ningaloo Coast, a World Heritage listed site is located within 10km of HEH-A. The Ningaloo Coast is also listed on the National Heritage Property register.
Wetlands	▪ The Site occurs within the Cape Range subterranean Waterways wetland, listed under the Directory of Important Wetlands.
Further information can be found in the DSI report (GHD 2018).	

4 Source Areas and Risk

The Site has been subject of numerous PFAS investigation reports, including:

> Coffey 2011, limited Groundwater Monitoring Event Report - Naval Communication Harold E Holt: Area A and Area B,

> Aurecon 2016, limited Groundwater Monitoring Event Report - Naval Communication Harold E Holt: Area A and Area B.

> A Preliminary Site Investigation and Sampling Analytical and Quality Plan (GHD 2018 PFAS Site Investigations Naval Communication Station Harold E Holt – Preliminary Site Investigation and Sampling Analytical and Quality Plan);

> A Detailed Site Investigation (GHD December 2018, reference: 3135526,'Naval Communication Station Harold E Holt – Area A PFAS Investigations Detailed Site Investigation Report').

> An Ecological Risk Assessment (GHD 2019).

4.1 Source Areas

Three main source areas were identified at the Base. These included the Petrol Oil and Lubricant (POL) storage area, Powerhouse and, to a lesser extent, Murat Pier (Figure 2, Appendix A). Detectable concentrations of PFAS were identified in all environmental media tested – soils, sediments, surface water (where present) and groundwater.

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 'Naval Communication Station Harold E Holt Area A PFAS Ongoing Monitoring Plan' (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 highest concentrations were mostly contained to, around the source areas. The DSI together with the subsequent preliminary ERA (GHD, 2019) reported that the presence of PFAS on and in the areas surrounding the Base were of low risk to receptors. **Groundwater and seepage water** PFAS was detected in groundwater on both the north and the west site of the Site. PFAS concentrations in groundwater vary both vertically within the groundwater profile and laterally across the Site. Although groundwater flow is generally inland, radial flow to the coast may occur at times of flooding of the salt pan. PFAS **Surface Water** PFAS concentrations in surface water exceeding human health screening levels protective of recreational uses have been identified in a number of areas across the site including the powerhouse and POL fuel farm. **Sediment** In general, PFAS concentrations in surface soils were higher in the source areas; however, the concentrations were below the screening criteria relevant to ecological or human health risks with the exception of three sample locations at the POL Fuel farm. Sediment can however be mobilised into surface drains and can migrate off-site to Exmouth Gulf. PFAS sorbed to sediments are also prone to dissolution in surface waters. There are currently no Australian endorsed assessment levels for PFAS in sediment. 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 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 level of risk? ▪ Has the nature, extent and magnitude of PFAS concentrations changed significantly to warrant refinement of any existing management measures?
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, surface water and sediment 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).

Data Quality Step	Description
Study Boundaries	Ongoing monitoring will generally be undertaken within the boundaries of the Management Area (Figure 2, Appendix A) at the groundwater, surface water, seepage 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 post-summer (June) and one post-winter (November) during an initial implementation period of three years. 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 (January or February). Section 6.3 provides further detail on the monitoring frequency.
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 risk level 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 (e.g. local ecosystems) including associated risks that PFAS may present towards human receptors. 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 seepage water 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. Annual Interpretative Report will review the results obtained against these triggers/decisions.
Specify Limits on Decision Error	The potential for significant decision errors will be minimised by completing a robust QA/QC program in accordance with DER 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.

Data Quality Step	Description
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. PSI, 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 for the first three years of monitoring is outlined in Section 6. Following initial implementation (and review following each monitoring event), the available data will be reviewed 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 investigation/monitoring, it may be beneficial for the proposed scope of works to be altered from the initial design. Changes to the proposed monitoring, if considered necessary, will be made based on risk profile reviews and updated CSM and in consultation with the Client 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 2.0 (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.
Precision:	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:

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%

▪ 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).

Data Quality Indicator	Detail
	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).
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 [2] 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	18/06/2020	7	Update of assessment criteria and reference to HEPA (2020). Well ID update as per DCARM update	New guideline (HEPA, 2020) DCARM update
Rev 3	14/05/2021	6.3	Table 'Wells construction details' added.	Defence review
		6	Methodology tables updates	
Rev 4	14/06/2021	-	Correct typos throughout and minor updates	Defence review

6.2 Management Area Description

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

The 'Management Area' includes:

> The source Areas (as described in Section 4.1)

> Land surrounding the Base to the coastline.

[2] The NEPM Schedule B3 – *Guideline on Laboratory Analysis of Potentially Contaminated Soil* defines a laboratory process batch to consist of up to "*20 samples that are similar in term of matrix and test procedure, and are processed as one unit for the QC purposes*" (NEPC, 2013).

6.3 Groundwater Monitoring

6.3.1 Groundwater Monitoring Network

The groundwater monitoring network, sampled as part of the DSI (GHD 2018), includes 46 single level monitoring wells and 16 multilevel wells. The network of groundwater monitoring locations are summarised in Table 6-2 and Table 6-3.

Table 6-2 HEH-A Groundwater Monitoring Network (single-level)

Area	Average screen interval (mBGL)	Monitoring Well / Bore ID
Powerhouse	2.0 – 6.0	MW213; MW027; MW101; MW102; MW103; MW019; MW021; MW205; MW215; MW126;
Fuel Farm	2.0 – 5.0	MW218; MW210; MW211; MW212; MW003; MW006; MW007; MW008; MW023;
Powerhouse pathway	3.0 – 6.0	MW012; MW013; MW014 MW015; MW017 MW214; MW217; MW218;
Fuel farm pathway	2.0 – 5.0	MW202; MW010; MW020; MW024;
Broader area	2.0 – 5.0	MW001; MW009; MW118; MW119; MW120; MW121; MW122; MW123; MW124; MW125; MW127; MW128; MW131; MW133; MW134

Table 6-3 HEH-A Groundwater Monitoring Network (Multi - Level)

Well ID	Screen interval (mBGL)	Time Sampled	Concentration Range (GHD, 2018)		
			Sum of PFHxS + PFOS (µg/L)	PFOS (µg/L)	PFOA (µg/L)
0083_MW104	3.5 – 4.0	1	0.004	**0.001**	ND
	5.5 – 6.0	2	0.002 – 0.005	ND – **0.002**	ND – 0.003
	7.5 – 8.0	2	ND – 0.002	ND – **0.002**	ND – 0.001
	9.5 – 10.0	2	ND	ND	ND
0083_MW105	2.0 – 2.5	1	1.2	**0.68**	0.29
	4.0 – 4.5	2	0.2 – 0.25	**0.15** – **0.20**	0.007 – 0.021
	6.0 – 6.5	2	0.11 – 0.2	**0.040** – **0.067**	0.004 – 0.02
	8.0 – 8.5	2	ND – 0.038	**0.007** – **0.008**	0.002 – 0.003
0083_MW106	4.5 – 5.0	1	0.002	**0.002**	ND
	6.5 – 7.0	1	ND	ND	ND
	8.5 – 9.0	1	ND	ND	ND
0083_MW107	3.1 – 4.1	1	0.4	**0.22**	0.016
	5.5 – 6.0	2	ND – 0.004	**0.004** – **0.013**	ND
	7.5 – 8.0	2	0.1 – 0.177	**0.088** – **0.15**	0.003 – 0.008
0083_MW108	2.0 – 2.5	1	0.082	**0.028**	0.009
	3.7 – 4.2	2	0.521 – 0.6	**0.081** – **0.12**	0.032 – 0.037
	5.5 – 6.0	2	0.3 – 0.33	**0.020** – **0.04**	0.013 – 0.014

Well ID	Screen interval (mBGL)	Time Sampled	Concentration Range (GHD, 2018)		
			Sum of PFHxS + PFOS (µg/L)	PFOS (µg/L)	PFOA (µg/L)
0083_MW109	6.5 – 7.0	2	ND	<0.0002	ND
	9.3 – 9.8	2	ND – 0.002	<0.0002 – **0.002**	ND
0083_MW110	7.5 – 8.0	2	ND – 0.002	<0.0002	ND
	9.0 – 9.5	2	ND – 0.007	<0.0002 – **0.004**	ND – 0.002
0083_MW111	8.5 – 9.0	2	ND – 0.004	**0.002** – **0.007**	ND – 0.001
	10.5 – 11.0	2	ND – 0.009	**0.006** – **0.012**	ND
0083_MW112	2.0 – 3.0	2	ND – 0.009	**0.005** – **0.007**	ND
	4.5 – 5.0	2	ND	<0.0002	ND
	6.5 – 7.0	2	ND	<0.0002 – **0.002**	ND
	8.5 – 9.0	2	ND – 0.001	<0.0002 – **0.001**	ND
0083_MW113	2.5 – 3.5	2	ND	<0.0002	ND
	5.0 – 5.5	2	ND	<0.0002	ND
	7.0 – 7.5	2	ND	<0.0002	ND
0083_MW114	2.0 – 3.0	2	ND – 0.002	<0.0002	ND
	4.5 – 5.0	2	ND	<0.0002	ND
	6.5 – 7.0	2	ND – 0.002	<0.0002 – **0.002**	ND
	8.5 – 9.0	2	ND	<0.0002	ND
0083_MW115	2.0 – 3.0	2	ND – 0.002	<0.0002	ND
	4.5 – 5.0	2	ND	<0.0002	ND
	6.5 – 7.0	2	ND	<0.0002	ND
	8.5 – 9.0	2	ND	<0.0002	ND
0083_MW116	1.2 – 2.2	2	ND – 0.003	<0.0002 – **0.003**	ND – 0.001
	4.5 – 5.0	2	ND – 0.002	<0.0002 – **0.002**	ND – 0.001
	6.5 – 7.0	2	ND – 0.002	<0.0002 – **0.002**	ND – 0.001
	8.5 – 9.0	2	ND – 0.003	<0.0002 – **0.003**	ND
0083_MW117	2.0 – 2.5	2	ND	<0.0002	ND
	4.0 – 4.5	2	ND	<0.0002	ND
	6.0 – 6.5	2	ND – 0.002	<0.0002 – **0.002**	ND – 0.001
	7.4 – 7.9	2	ND	<0.0002	ND
0083_MW129	1.5 – 2.0	1	0.012	**0.008**	0.007
	5.5 – 6.0	1	0.016	**0.010**	0.011
	9.5 - 10	1	0.006	**0.018**	0.016
	13.5 – 14	1	0.03	**0.002**	0.014
0083_MW130	1.4 – 1.9	1	ND	<0.0002	ND
	3.4 – 3.9	1	0.007	**0.005**	ND
	5.4 – 5.9	1	0.005	**0.003**	ND

Well ID	Screen interval (mBGL)	Time Sampled	Concentration Range (GHD, 2018)		
			Sum of PFHxS + PFOS (µg/L)	PFOS (µg/L)	PFOA (µg/L)
	7.4 – 7.9	1	0.005	**0.005**	ND

Notes:

1. ND: Non Detected = concentration below laboratory limit of reporting
2. **Bold** = exceeds adopted assessment criteria (99% species protection level for fresh and marine water)

It is proposed to monitor a representative sub-set of the monitoring wells as part of the OMP. The groundwater wells and bores selected for 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, Appendix A.

Table 6-4 OMP Groundwater and Seepage water Monitoring Locations

Area	Monitoring Well / Bore ID	Rationale (OMP, 2019)
Powerhouse	0083_MW017; 0083_MW027; 0083_MW213; 0083_MW214; 0083_MW104; 0083_MW101; 0083_MW102; 0083_MW103; 0083_MW019; 0083_MW123	Monitoring of these wells will provide a 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.
Fuel Farm	0083_MW119; 0083_MW105; 0083_MW003; 0083_MW008; 0083_MW212; 0083_MW210	
Powerhouse pathway	0083_MW218; 0083_MW117; 0083_MW217; 0083_MW116; 0083_MW115; 0083_MW114; 0083_MW113 **Seepage water** 0083_OTH108; 0083_OTH107; 0083_OTH106; 0083_OTH105	Monitoring of these wells will provide a 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. **Seepage water** Assessment of changes in PFAS concentration at the receptor downgradient from the source area.
Fuel farm pathway	0083_MW109; 0083_MW112; 0083_MW110; 0083_MW202; 0083_MW107; 0083_MW111 **Seepage water** 0083_OTH101; 0083_OTH104; 0083_OTH103	
Broader area	0083_MW134; 0083_MW130; 0083_MW129 **Seepage water** 0083_OTH113; 0083_OTH110; 0083_OTH109; 0083_OTH102	Confirmation of the presence of low level PFAS in the wider environment.
Murat Pier salt water discharge water	**Seepage water** 0083_OTH002	Assessment of possible seasonal changes in water discharged to Exmouth Gulf, which comes from the salt water bore field and the powerhouse water treatment system.

Notes:

1. *Source: Defence, PFAS Investigation and Management Branch, May 2019, reference: Naval Communication Station Harold E Holt Area A PFAS Ongoing Monitoring Plan*

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)
MW003	2005	208545.27	7584922.39	3.263	5	2.0 – 5.0
MW008	2005	208561.35	7584889.07	2.846	5.5	2.5 – 5.5
MW017	2005	207623.43	7584280.07	3.421	6	3.0 – 6.0
MW019	2005	207775.71	7584407.8	2.955	4.5	1.5 – 4.5
MW027	2005	207731.82	7584346.08	4.499	6	3.0 – 6.0
MW101	2018	207761.021	7584439.324	2.4356	4.5	2.0 – 4.5
MW102	2018	207675.073	7584443.695	2.6924	6	1.0 – 6.0
MW103	2018	207623.767	7584380.205	2.7898	6	1.0 – 6.0
MW104	2018	207930.918	7584229.719	4.0042	4	3.5 – 4.0
				3.9903	6	5.5 – 6.0
				3.9853	8	7.5 – 8.0
				3.9635	10	9.5 – 10.0
MW105	2018	208509.293	7584967.659	3.1221	2.5	2.0 – 2.5
				3.1082	4.5	4.0 – 4.5
				3.0979	6.5	6.0 – 6.5
				3.1131	8.5	8.0 – 8.5
MW107	2018	209352.4198	7584846.3728	4.7144	4.1	3.1 – 4.1
				4.7014	6	5.5 – 6.0
				4.7447	8	7.5 – 8.0
MW109	2018	208773.8324	7585546.1806	7.0426	7	6.5 – 7.0
				7.0413	9.8	9.3 – 9.8
MW110	2018	209172.62	7585288.7584	8.2665	8	7.5 – 8.0
				8.2807	9.5	9.0 – 9.5
MW111	2018	209374.6344	7584934.0695	8.8279	11	10.5 – 11.0
				8.8159	9	8.5 – 9.0
MW112	2018	209082.826	7584635.075	3.0835	3	2.0 – 3.0
				3.0636	5	4.5 – 5.0
				3.0211	7	6.5 – 7.0
				3.0986	9	8.5 – 9.0
MW113	2018	208612.641	7584330.663	2.970	3.5	2.5 – 3.5
				2.9108	5.5	5.0 – 5.5
				2.9418	7.5	7.0 – 7.5
MW114	2018	208509.621	7584226.733	2.9356	3	2.0 – 3.0
				2.9516	5	4.5 – 5.0
				2.9674	7	6.5 – 7.0
				2.9852	9	8.5 – 9.0
MW115	2018	208349.605	7583914.745	2.6281	3	2.0 – 3.0

Well ID	Date drilled	Easting[1]	Northing[1]	RL TOC (mAHD)	Depth (mbgl)	Screen interval (mbgl)
				2.6415	5	4.5 – 5.0
				2.6786	7	6.5 – 7.0
				2.6909	9	8.5 – 9.0
MW116	2018	208211.574	7583720.685	2.3875	2.2	1.2 – 2.2
				2.3885	5	4.5 – 5.0
				2.4312	7	6.5 – 7.0
				2.4417	9	8.5 – 9.0
MW117	2018	208055.731	7583617.473	2.5910	2.5	2.0 – 2.5
				2.6554	4.5	4.0 – 4.5
				2.7296	6.5	6.0 – 6.5
				2.7619	7.9	7.4 – 7.9
MW119	2018	208082.439	7584992.646	3.5069	5.1	2.1 – 5.1
MW123	2018	206901.211	7583678.814	0.5356	4.5	0.5 – 4.5
MW129	2018	205780.981	7587282.904	2.0256	2	1.5 – 2.0
				2.0119	10	9.5 – 10.0
				2.0047	6	5.5 – 6.0
				1.9957	14	13.5 – 14.0
MW130	2018	204518.718	7586211.014	2.0160	1.9	1.4 – 1.9
				2.0555	3.9	3.4 – 3.9
				2.0791	5.9	5.4 – 5.9
				2.0866	7.9	7.4 – 7.9
MW134	2018	204175.564	7584792.928	10.0786	12.5	6.5 – 12.5
MW202	1995	209311.08	7585073.67	8.069	9.9	6.9 – 9.9
MW210	2011	208731.85	7584966.2	2.863	4	1.5 – 4.0
MW212	2011	208706.86	7584855.31	3.513	4	1.0 – 4.0
MW213	2011	207842.89	7584322.76	4.490	5.5	2.5 – 5.5
MW214	2011	207826.46	7584246.08	4.290	5.5	2.5 – 5.5
MW217	2011	208158.1	7583914.64	3.658	4.5	1.2 – 4.5
MW218	2011	208043.65	7583746.95	5.137	5.8	2.8 – 5.8

6.3.2 Monitoring Frequency

All groundwater monitoring locations listed in Table 6-4 will be sampled every six months for the three years initial implementation period. Sampling will be undertaken post-summer (June) and post-winter (November) to record the concentration and extent of PFAS and determine any seasonal fluctuations or trends.

6.3.3 Groundwater Sampling Methodology

Groundwater sampling methodology are detailed in the following sections.

6.3.3.1 Groundwater Monitoring Wells and Seepage Water

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. A sub-selection of wells will be gauged during the same tidal period for the purpose of generating the inferred groundwater contours.
Groundwater Field Parameters	For the single level wells, the field parameters will be recorded via a down-hole water quality meter (positioned within the mid screen interval) prior to deployment of HydraSleeves® or pre-sample collection. For the multilevel wells, the field parameters will be recorded with a flow through cell during purging. The following field parameters will be 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 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.
Deployment and Retrieval of HydraSleeves (single level well sample collection)	HydraSleeve 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 4 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 value into the sample sleeve. Samples will be discharged immediately (minimise changes in chemistry) via discharge tube.
Peristaltic pump (multi-level 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 0.2 L/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.
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 (removal of 3x well volume) will be undertaken prior to sampling to ensure that a sample representative of the aquifer is taken.
Seepage Water Sampling[1]	Sampling will be carried out in 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 parameters will be measured from water seeping into the excavation using a calibrated water quality meter following purging (using a dedicated syringe or jug). 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.

Activity	Details
	▪ Calibration and daily bump tests 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 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 will be labelled with the sample location, date, project identification number and sampler's initials. Samples will be 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 will be undertaken in accordance with those recommended by Standards Australia (AS/NZS 5667.1:1998 and AS 4482.1 as appropriate). ▪ All holding times will comply with the requirements set out in "Australian Standard AS/NZS 5567.1:1998 and AS 4482.1".
Laboratory Testing	▪ Full PFAS analytical suite (see Appendix B). ▪ Major anions and cations (include calcium, magnesium, sodium, potassium, chloride, sulfate, alkalinity and ionic balance) ▪ Dissolved Organic Carbon (DOC), Total suspended solids (TSS), total dissolved solids (TDS) and pH.
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 (Perth). Laboratory LORs will be suitable to meet the relevant adopted assessment levels (0.01 µg/L).

Notes:

1. Cardno notes that the seepage water sampling method detailed in the SAQP is not consistent with the OMP as per Defence directions (via email RE: Justification of time and costs for seepage and multi-level well sampling [SEC=UNCLASSIFIED] dated 11 November 2019)

6.4 Surface Water and Sediment Monitoring

6.4.1 Monitoring Locations

Several surface water and soil locations were sampled as part of the DSI (GHD 2018) on and off-site including:

> On-Base drainage channels.

> On-Base source areas.

> The clay pan areas

It is proposed to monitor a representative sub-set of the surface water and sediment locations as part of the OMP. The locations selected for monitoring are presented in Table 6-7 along with the rationale for the selection, and are highlighted on Figure 3, Appendix A.

Table 6-7 OMP Surface Water and Sediment Monitoring Locations

Area	Surface water Sampling Location ID	Sediment Sampling Location ID	Rationale (GHD, 2019b)
Broader area	0083_SW126; 0083_SW128; 0083_SW120; 0083_SW112; 0083_SW127	0083_SD126, 0083_SD128, 0083_SD120, 0083_SD112, 0083_SD127	Confirmation of the presence of low level PFAS in the wider environment.
Powerhouse	0083_SW113	0083_SD113	Confirmation and monitoring of the presence of PFAS in surface water overflowing on to the roadway.

Source: Defence, PFAS Investigation and Management Branch, May 2019, reference: Naval Communication Station Harold E Holt Area A PFAS Ongoing Monitoring Plan

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:

> Post-summer (June) and post-winter (November) 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/seepage 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, involving sampling of surface water and sediment locations described in Table 6-7. 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 6-8.

Table 6-8 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.

Item	Details
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 will be labelled with the sample location, date, project identification number and sampler's initials. 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 and AS 4482.1 as appropriate). ▪ All holding times will comply with the requirements set out in "Australian Standard AS/NZS 5567.1:1998 and AS 4482.1".
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 tests 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) ▪ DOC, TSS, TDS and pH.
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 (Perth). Laboratory LORs will be suitable to meet the relevant adopted assessment levels (0.01 µg/L).

6.4.4 Sediment Sampling Methodologies

The methodology for sediment sampling is detailed in Table 6-9.

Table 6-9 Sediment Investigation Methodology

Item	Details
Sample Collection	Sediment samples will be 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 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:

Item	Details
	▪ Sampling time, date and name of the sampler. ▪ 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.
Laboratory Testing	Sediment samples will be analysed for the following: ▪ Full PFAS analytical suite (see Appendix B). ▪ TOC, EC, CEC and pH
Laboratory Testing – Quality Control	Sediment QC samples will be collected at the following frequencies as detailed in the SAQP: ▪ Field duplicate (intra-laboratory) samples at 1 per 10 sediment samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 sediment samples should be sent to a secondary laboratory.
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 (Perth). Laboratory LORs will be suitable to meet the relevant adopted assessment levels (0.005 mg/kg).

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 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, seepage water and surface water are detailed in Table 7-1.

Table 7-1 Criteria for Groundwater and Surface Water

Location	Adopted Assessment Criteria	
Groundwater	**Human Health**	**Ecological**
On-Site and Off-Site	**Recreational Use:** ▪ PFOS + PFHxS – 2.0 µg/L ▪ PFOA – 10 µg/L	**99% species protection level for fresh and marine water:** ▪ PFOS – Laboratory LOR* ▪ PFOA – 19 µg/L
Surface Water	**Human Health**	**Ecological**
Off-Site	**Non potable use of groundwater (NPUG) and Recreational Use:** ▪ PFOS + PFHxS – 2.0 µg/L ▪ PFOA – 10 µg/L.	**99% species protection level for fresh and marine water:** ▪ PFOS – Laboratory LOR* ▪ PFOA – 19 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.

7.1.2 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. Sediments will therefore be assessed with reference to the soil assessment criteria detailed in the PFAS NEMP 2.0 (HEPA, 2020). The adopted assessment criteria for sediments are detailed in Table 7-2.

Table 7-2 Criteria for Sediment

Receptor	Adopted Assessment Criteria
Ecosystems	**Ecological direct exposure (interim guidelines)** ▪ PFOS – 1 mg/kg ▪ PFOA – 10 mg/kg
	Ecological indirect exposure (interim guidelines) ▪ PFOS – 0.01 mg/kg
Human Health	**Commercial / industrial (on-base activities)** ▪ PFOS + PFHxS – 20 mg/kg ▪ PFOA – 50 mg/kg

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 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 of 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 Interpretative Reporting

Upon completion of each year's monitoring period an interpretative report will be prepared. As a minimum, each interpretative 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.
- Assessment against the management triggers and contingencies listed in the OMP.
- 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 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. Australian Standard AS 4482-1999 Guide to the investigation and sampling of sites with potentially contaminated soils, Part 2 – Volatile substances.
3. Australian Water Quality Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ, 2000).
4. Contaminated Sites Act 2003, Western Australia.
5. 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.
6. Department of Environment Regulation (DER), 2014, Assessment and Management of Contaminated Sites.
7. Department of Water and Environment Regulation (DWER), 2018, Perth Groundwater Atlas, (https://maps.water.wa.gov.au/#/webmap/gwm).
8. Environmental Protection Agency (United States EPA), November 2002, Reference: EPA/240/R-02/004, 'Guidance on Environmental Data Verification and Data Validation'.
9. The Heads of EPAs Australia and New Zealand (HEPA; 2020) PFAS National Environmental Management Plan (NEMP) 2.0, January 2020.
10. National Environment Protection Council (NEPC), 1999, National Environmental Protection (Assessment of Site Contamination) Measure (as amended), registered May 2013.
11. National Health and Medical Research Council (NHMRC) (2011 – updated 2018) National Water Quality Management Strategy Australian Drinking Water Guidelines 6, August 2018
12. NHMRC, August 2019, Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water.
13. 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'*.
14. U.S. Environmental Protection Agency (EPA), 2000, 'Guidance for the Data Quality Objectives Process (EPA QA/G-4)'.
15. USEPA, 2002, 'Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.

Site Specific References

16. Cardno, April 2020, PFAS OMP Biannual Monitoring Factual Report, 2019 Post-Winter, HEH-A.
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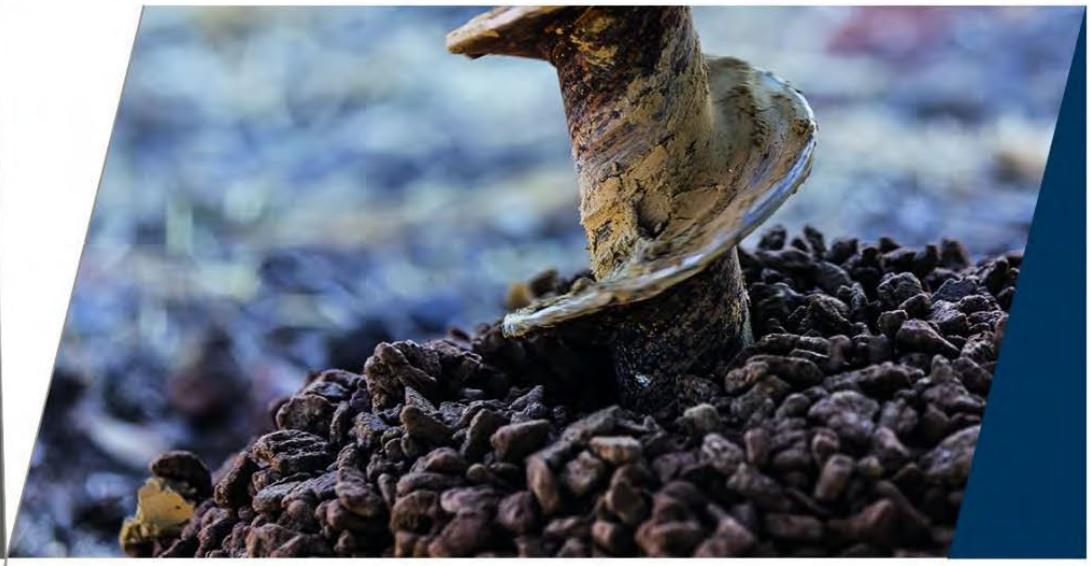
21. Cardno, April 2021, 2020 Annual Interpretive Report, HEH-A.
22. Department of Defence, March 2019, Naval Communication Station Harold E Holt – Area A 'Management Area Plan'.
23. Department of Defence, May 2019, Naval Communication Station Harold E Holt – Area A 'PFAS Ongoing Monitoring Plan'
24. GHD Pty Ltd, December 2018, reference: 3135526,'Naval Communication Station Harold E Holt – Area A PFAS Investigations Detailed Site Investigation Report'.
25. GHD Pty Ltd, April 2019, reference: 3135526, 'Harold E Holt A Ecological Risk Assessment'.



APPENDIX

A

Figures

FIGURE 1

1:100,000 Scale at A3

Meters

0 1,500 3,000

Site Location

SAMPLING AND ANALYSIS QUALITY PLAN
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2021-06-14 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-001_RegionalLocation 03.mxd
Aerial Imagery Supplied by Google Earth

FIGURE 2

1:25,000 Scale at A3

Meters

0 500 1,000

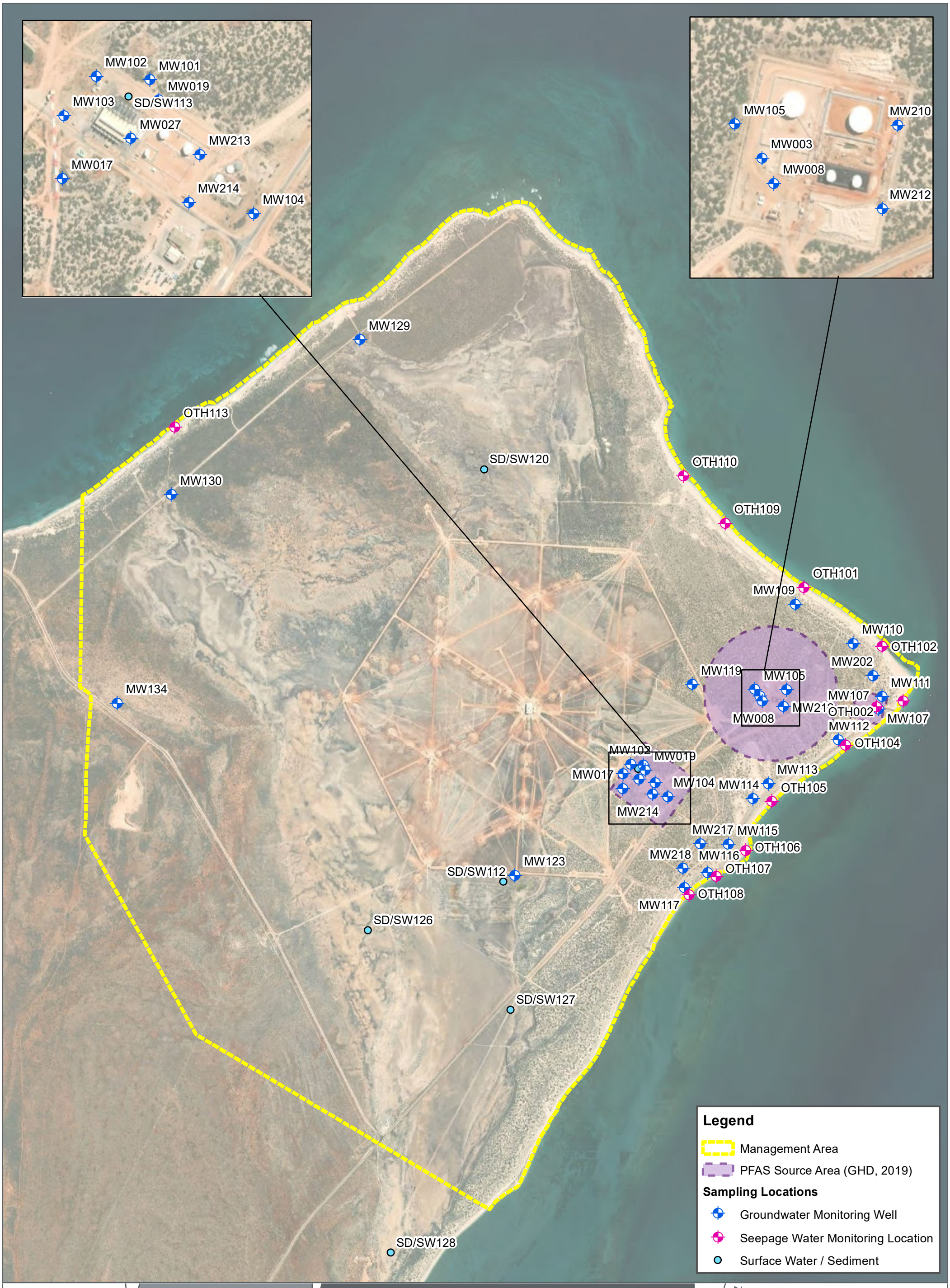
Management Area

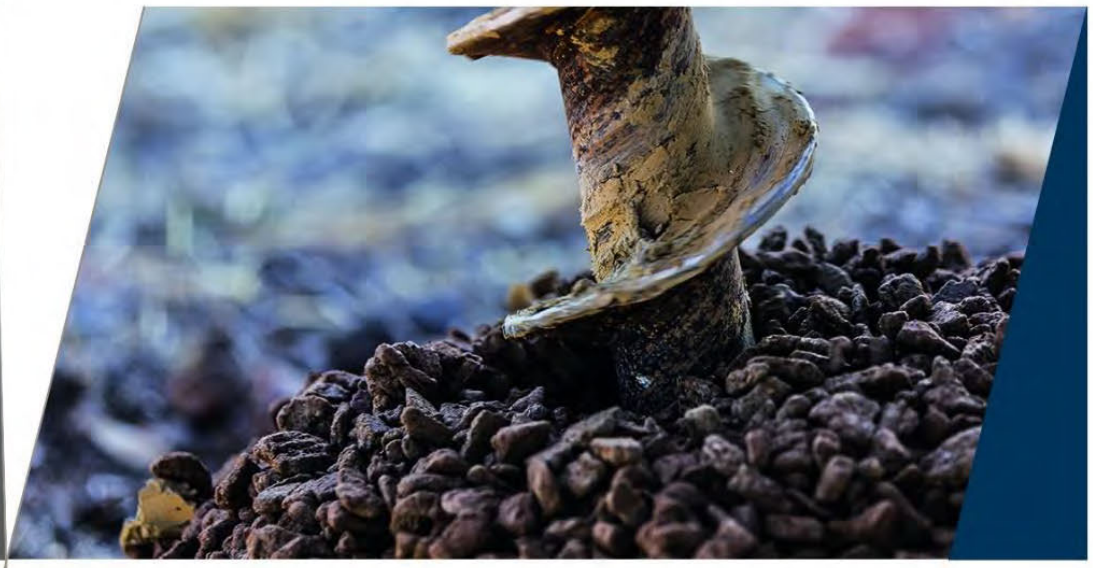
SAMPLING AND ANALYSIS QUALITY PLAN
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2021-06-14 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-002_ManagementAreas 02.mxd


MW102
MW101
MW019
MW103
SD/SW113
MW027
MW213
MW017
MW214
MW104
MW105
MW210
MW003
MW008
MW212
MW129
OTH113
SD/SW120
OTH110
MW130
OTH109
OTH101
MW109
MW110
OTH102
MW202
MW119
MW111
MW107
OTH002
MW107
MW112
OTH104
MW134
MW102
MW019
MW017
MW104
MW113
MW114
OTH105
MW214
MW217
MW115
OTH106
MW218
MW116
OTH107
MW123
SD/SW112
OTH108
MW117
SD/SW126
SD/SW127
SD/SW128
Legend
Management Area
PFAS Source Area (GHD, 2019)
Sampling Locations
Groundwater Monitoring Well
Seepage Water Monitoring Location
Surface Water / Sediment
FIGURE 3
1:25,000 Scale at A3
Meters
0
500
1,000
Monitoring Locations
SAMPLING AND ANALYSIS QUALITY PLAN
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
Cardno
Map Produced by Cardno WA
Date: 2021-06-14 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-003_MonitoringLocations 03.mxd



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

About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD

APPENDIX

C

FACTUAL REPORTS

Cardno

now

Stantec

PFAS OMP Biannual Monitoring Event Factual Report

November 2021

Naval Communication Station Harold E Holt Area A

Prepared for

Department of Defence

28 March 2022

Cardno

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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-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
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
BGL	Below Ground Level
COC	Chain of Custody
DQI	Data Quality Indicator
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA	Environment Protection Authority
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

Units

ha	Hectares
mBGL	Metres Below Ground Level
mbTOC	Metres below Top of Casing
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

HEH-A	Naval Communication Station Harold E Holt Area A
OMP	Ongoing Monitoring Plan
FTG	Fire Training Ground

1 Introduction

1.1 Background

Cardno was engaged by the Australian Department of Defence ("the Client") to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP) biannual sampling event at the Naval Communication Station Harold E Holt - Area A ("HEH-A" or "the Site"). The Site is situated at the end of the North West Cape of WA, at the northern edge of Exmouth (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, 14 June 2021, Reference: DEF19009, '*PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) Naval Communication Station Harold Holt A'*.

The SAQP was reviewed prior to the monitoring event and required no updates at the time.

For the purposes of this report:

> "the Site" was defined as Harold E Holt – Area A.

> "the Management Area" was defined as comprising the Site, plus the land extending to the Exmouth Gulf (to the east, north and north-west) The Monitoring Area is presented on 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 2021 sampling 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.

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> 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 bores was performed in accordance with the SAQP, applying methods set out in Section 3 of this report. The groundwater bores 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
Powerhouse	0083_MW017; 0083_MW027; 0083_MW213; 0083_MW214; 0083_MW104; 0083_MW101; 0083_MW102; 0083_MW103; 0083_MW019; 0083_MW123
Fuel Farm	0083_MW119; 0083_MW105; 0083_MW003; 0083_MW008; 0083_MW212; 0083_MW210
Powerhouse pathway	0083_MW218; 0083_MW117; 0083_MW217; 0083_MW116; 0083_MW115; 0083_MW114; 0083_MW113
Fuel farm pathway	0083_MW109; 0083_MW112; 0083_MW110; 0083_MW202; 0083_MW107; 0083_MW111
Broader area	0083_MW134; 0083_MW130; 0083_MW129

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
Powerhouse pathway	0083_OTH108; 0083_OTH107; 0083_OTH106; 0083_OTH105
Fuel farm pathway	0083_OTH101; 0083_OTH104; 0083_OTH103
Broader area	0083_OTH113; 0083_OTH110; 0083_OTH109; 0083_OTH102
Murat Pier salt water discharge water	0083_OTH002

[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.

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 4, Appendix A.

Table 2-3 Surface water Monitoring Locations

Monitoring Area	Location ID
Broader area	0083_SW126; 0083_SW128; 0083_SW120; 0083_SW112; 0083_SW127
Powerhouse	0083_SW113

2.4 Sediment Monitoring

Sampling of selected sediment 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 5, Appendix A.

Table 2-4 Sediment Monitoring Locations

Monitoring Area	Location ID
Broader area	0083_SD126, 0083_SD128, 0083_SD120, 0083_SD112, 0083_SD127
Powerhouse	0083_SD113

2.5 Data Management

All the data included in the Report has been collected, uploaded to the ESdat database and reviewed according to the data management requirements of the Defence Contamination Management Manual (DCMM) Annex L.

The sample naming convention detailed in the DCMM Annex L was used in the field.

2.5.1 Defence ESdat database

Data collected as part of the June 2021 OMP monitoring event was uploaded to the ESdat database according to the data management requirements of the DCMM Annex L, including:

- All field data collected was uploaded;
- Laboratory data was uploaded and approved; and
- QA/QC data was reconciled.

2.6 Deviations from the OMP SAQP

Deviations from the SAQP (Cardno, 2021) for the November 2021 monitoring event are presented in Table 2-5.

Table 2-5 Summary of deviations from the OMP SAQP

Location	Deviation	Comments
SW120, SW126, SW127	Not sampled	These surface water monitoring locations were found dry
SW112	Not sampled	Access denied due to asbestos hazard
SD112	Not sampled	Access denied due to asbestos hazard
MW003	Not Sampled	Monitoring well was found blocked (damaged) 1 mBGL. MW004 was sampled as a contingency location.
MW213, MW214	Bailer used for sample collection	hydrasleeve didn't fill up during recovery due to insufficient water column. Hand bailer used as alternative sampling methodology.
OTH113	Not Analysed	Sample misplaced in transit to the laboratory. It is proposed to re-sample this location during the 2022 first flush sampling event.

Location	Deviation	Comments
-	Blind duplicate required frequency (10%) not achieved for water samples.	Two blind duplicate QC samples were misplaced in transit to the laboratory. This is not considered to have compromised the validity of the dataset as the level of RPD was minor in QC samples analysed, and the split duplicates were received and analysed by the secondary laboratory (i.e. QC frequency achieved).

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 specified mark at the top of the well casing.
Groundwater Field Parameters	Groundwater field parameters were recorded via a down-hole water quality meter (positioned within the mid screen interval) 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 bump tested daily to optimise the accuracy of the measurements taken. Calibration certificates are provided in Appendix D.
Deployment and Retrieval of HydraSleeves (single level well sample collection)	HydraSleeve were deployed with top weight sample collection to begin at the lowest point. HydraSleeve sampling devices were left in wells for a minimum of 12 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 value 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 events (same depth of sampling i.e. within screen).
Peristaltic pump (multi-level well sample collection)	The shallowest (non-dry) wells 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 L/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 (removal of 3x well volume) was undertaken prior to sampling to ensure that a sample representative of the aquifer is taken.

Activity	Details
Decontamination procedure	Dedicated Hydrasleeves/tubing were used at each groundwater bore 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).
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), dissolved organic carbon (DOC), total suspended solids (TSS), total dissolved solids (TDS) and pH. The primary laboratory was ALS Global Laboratories (Perth), and the secondary laboratory (quality control) was Eurofins (Perth). Both laboratories are NATA-accredited for the parameters tested. Copies of the NATA stamped laboratory reports and Chain of Custody documentation are included in Appendix D.
Laboratory Testing – Quality Control	Groundwater QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, 2021): ▪ 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. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (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.

Activity	Details
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, 2021): ▪ 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. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (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 water body depth was sufficient, 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).

Activity	Details
	▪ 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, 2021): ▪ 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, shovel, 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: ▪ Sampling time, date and name of the sampler. ▪ 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, 2021): ▪ Field duplicate (intra-laboratory) samples at 1 per 10 sediment samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 sediment 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.

3.5 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	PFOA	
	µg/L		
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

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	PFOA	
	mg/kg		
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

1. Sum of PFOS and PFHxS.
2. PFOS only

4 Field Observations and Results

4.1 General Observations

The Site experienced above average rainfall for the month of November 2021, however, the majority of surface water sample collection points were found dry. None of the groundwater monitoring wells was found dry during the November 2021 monitoring event, conducted during 23-24 November 2021.

4.2 Groundwater

4.2.1 Summary of Field Observations

4.2.1.1 Physicochemical parameters

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the groundwater sampling program are presented in field sampling records, included in Appendix D. Groundwater was brackish to saline (TDS ranging from 2,054 mg/L to 45,890 mg/L), near neutral (pH 7.01 to 8.3). Groundwater temperature was on average 27^{o}C, DO readings mostly indicate aerobic groundwater condition with a small number of well indicating anaerobic conditions (DO ranging from 0.01mg/L to 8.23 mg/L). 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 elevation ranged from -0.0207 mAHD (MW104) to 1.471 mAHD (MW202). Depth to groundwater was observed to range approximately between 0.5 meters below ground level (mbgl) and 10 mbgl.

Groundwater flow direction was interpreted to follow the site topography and be radial from the sand dunes east of site, where mounding is occurring, which is consistent with the previous monitoring events.

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

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results including non-PFAS analytes 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 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 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]	0.5 (MW017)	32	0
PFOS	MW004, MW008, MW017, MW019, MW027, MW102, MW103, MW105, MW107,MW119, MW214.	0.01[3]	14.2 (MW017)	32	11
Sum of PFHxS and PFOS	MW017, MW119	2[2]	15.2 (MW017)	32	2

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 sum of PFOS and PFHxS or PFOA or new exceedance of guideline values for the groundwater monitoring locations during November 2021.

4.3 Seepage Water

4.3.1 Summary of Field Observations

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the seepage water sampling program are presented in field sampling records, included in Appendix D. Water temperature was on average 25.6ºC, water condition was slightly alkaline (pH 8.03 to 8.29), saline (TDS ranging from 35,353.5 to 35,817.6 mg/L) and DO readings ranging from 3.55 to 5.76 mg/L indicate aerobic conditions. Field parameters were generally consistent with the previous monitoring event.

4.3.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results including non-PFAS analytes are provided within Appendix B. A summary of results exceeding the adopted criteria is presented in Table 4-2. Laboratory results have also been compared to available historical data in order to identify monitoring locations 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	11	0
PFOS	-	0.01[3]	<0.01	11	0
Sum of PFHxS and PFOS	-	2[2]	<0.01	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 (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 seepage water monitoring locations during the November 2021 monitoring event.

> All samples analysed reported PFAS concentrations below the laboratory LOR.

4.4 Surface water

4.4.1 Summary of Field Observations

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the surface water sampling program are presented in field sampling records, included in Appendix D. Surface water temperature was on average 30.5 ºC. Surface water was near neutral (pH 6.91 to 7.71), fresh to hyper saline (TDS ranging from 981.5 to 51,970 mg/L) and DO readings indicate low aerobic conditions (0.17 to 0.72 mg/L). Field parameters were generally consistent with the previous monitoring event with exception of the DO readings, likely related to the reduced rainfall compared to the June 2021 monitoring event along with the limited data collected (two (2) surface water samples analysed).

4.4.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results including non-PFAS analytes 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 locations 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 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	2	0
PFOS	SW113	0.01[3]	0.54 (SW113)	2	1
Sum of PFHxS and PFOS	-	2[2]	<0.01	2	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:

- There was no first time detection of PFOA or Sum of PFOS and PFHxS, or new exceedance of guideline value at the surface water monitoring locations during the November 2021 monitoring event.
- One of two surface water samples reported PFAS concentrations below the laboratory LOR.

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 including non-PFAS analytes are provided within Appendix B. Soil criteria are adopted in the absence of criteria for sediment for consistency with the SAQP (Cardno, June 2021), DSI (GHD, 2018) and 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 in order to identify monitoring locations 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 sediment monitoring locations. The laboratory reports are provided in Appendix C.

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]	0.0004	5	0
PFOS	-	0.01[3]	0.0051 (SD113)	5	0
Sum of PFHxS and PFOS	-	20[4]	0.0063 (SD113)	5	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:

- There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the sediment monitoring locations during the November 2021 monitoring event.
- Four out of five sediment samples reported PFAS concentrations below the laboratory LOR.

4.6 Changes to the Monitoring Network Condition

During the November 2021 monitoring event, access was denied to SD112/SW112 monitoring location due to asbestos hazard within the area. It is understood remediation works are being completed.

Groundwater monitoring well MW003 at the POL storage area was found damaged at approximately 1 mBGL and was unable to be sampled. This well should be repaired

The gatic lid of groundwater monitoring well MW008 at the POL storage area was found to be destroyed and should be replaced to protect the monitoring well's PVC casing. A witch's hat cone was placed on top of the well as an interim protection.

5 Summary and Conclusions

Cardno undertook the November 2021 groundwater, seepage water, surface water and sediment biannual monitoring event at HEH-A as part of the PFAS OMP. Sampling and testing was undertaken at 32 groundwater monitoring bores, two surface water locations, 11 seepage water sampling locations and five sediment monitoring locations.

Groundwater levels were gauged in all wells before sampling. Groundwater flow direction was interpreted to be radial from the site, following the site's topography with mounding occurring beneath the sand dunes, which is consistent with the previous monitoring events.

The groundwater laboratory results reported the following:

- Of the 32 samples that were tested, PFOS (11 samples) and Sum of PFHxS and PFOS (2 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 detect of Sum of PFOS and PFHxS or PFOA or new exceedances of guideline values for the groundwater monitoring locations during November 2021.

The seepage water laboratory results reported the following:

- All 11 seepage water samples analysed reported PFAS concentrations below the laboratory LOR.
- There was no first-time detection of PFOA or Sum of PFOS and PFHxS, or new exceedance of guideline value at the seepage water monitoring locations during the November 2021 monitoring event.

The surface water laboratory results reported the following:

- One out of two surface water samples reported PFAS concentrations below the laboratory LOR.
- There was no first time detection of PFOA or Sum of PFOS and PFHxS, or new exceedance of guideline value at the surface water monitoring locations during the November 2021 monitoring event.

The sediment laboratory results reported the following:

- Four out of five sediment samples reported PFAS concentrations below the laboratory LOR.
- There was no first time detection of PFOA or Sum of PFOS and PFHxS at the sediment monitoring locations during the November 2021 monitoring event.

The next OMP sampling event for HEH-A will be the 2022 first flush monitoring event following the first heavy rainfall of the 2022 wet season.

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. Australian Water Quality Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ, 2000).
4. *Contaminated Sites Act 2003*, Western Australia.
5. Department of Defence, May 2021, PFAS OMP Factual Report Guidance Version 0.2.
6. Department of Defence, July 2018 amended August 2019, *Contamination Management Manual*, Annex L *Guidance on Data Management*.
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 Environment Regulation (DER), 2014, *Assessment and Management of Contaminated Sites*.
9. Department of Water and Environment Regulation (DWER), 2018, Perth Groundwater Atlas, (https://maps.water.wa.gov.au/#/webmap/gwm).
10. Environmental Protection Agency (United States EPA), November 2002, Reference: EPA/240/R-02/004, '*Guidance on Environmental Data Verification and Data Validation'.*
11. The Heads of EPAs Australia and New Zealand (HEPA; 2020) PFAS National Environmental Management Plan (NEMP) 2.0, January 2020.
12. National Environment Protection Council (NEPC), 1999, National Environmental Protection (Assessment of Site Contamination) Measure (as amended), registered May 2013.
13. National Health and Medical Research Council (NHMRC) (2011, as updated 2018) National Water Quality Management Strategy Australian Drinking Water Guidelines 6, August 2018
14. NHMRC, August 2019, Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water.
15. 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'*.
16. U.S. Environmental Protection Agency (EPA), 2000, 'Guidance for the Data Quality Objectives Process (EPA QA/G-4)'.
17. USEPA, 2002, 'Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.

Site Specific References

18. Cardno, June 2021, Reference: DEF19009, '*PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) Naval Communication Station Harold Holt A'*.
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21. Cardno, February 2021, PFAS OMP Biannual Monitoring Factual Report, 2020 Post Summer, HEH-A
22. Cardno, February 2021, PFAS OMP Biannual Monitoring Factual Report, 2020 Post Winter, HEH-A
23. Cardno, May 2021, PFAS OMP First Flush Sampling Event Factual Report, March 2021, HEH-A
24. Cardno, June 2021, PFAS OMP 2020 Annual Interpretive Report, HEH-A
25. Cardno, August 2021, PFAS OMP Biannual Monitoring Factual Report, June 2021, HEH-A
26. Department of Defence, March 2019, Naval Communication Station Harold E Holt – Area A 'PFAS Management Area Plan'.
27. Department of Defence, May 2019, Naval Communication Station Harold E Holt – Area A 'PFAS Ongoing Monitoring Plan'

28. GHD Pty Ltd, December 2018, Reference: 3135526,'Naval Communication Station Harold E Holt – Area A PFAS Investigations Detailed Site Investigation Report'.

29. GHD Pty Ltd, April 2019, Reference: 3135526, 'Harold E Holt A Ecological Risk Assessment'.

APPENDIX

A

FIGURES

Harold E Holt Area A

North West Cape

Exmouth

Legend

Monitoring Area / Commonwealth boundary

FIGURE 1

1:100,000 Scale at A3

Meters

0 1,500 3,000

Site Location

BIANNUAL SAMPLING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2022-01-12 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-001_RegionalLocation 03.mxd
Aerial Imagery Supplied by Google Earth

FIGURE 2

1:25,000 Scale at A3

Meters

0 500 1,000

Monitoring Area

BIANNUAL SAMPLING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2022-01-12 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-002_ManagementAreas 02.mxd

MW129 (0.1826)
MW130 (0.2935)
MW134 (0.2196)
0.2
0.2
MW109 (0.3406)
MW110 (0.2967)
0.6
MW202 (1.471)
MW119 (0.1569)
MW008 (0.336)
1
MW105 (0.2779)
MW210 (0.353)
0.8
MW111 (0.2849)
MW212 (0.523)
0.4
MW102 (0.0644)
0.2
MW019 (0.45)
MW113 (0.327)
MW101 (0.0716)
MW213 (0.02)
MW114 (0.4346)
MW027 (0.029)
MW104 (-0.0207)
0
MW115 (0.0601)
MW218 (0.217)
0.2
MW117 (0.1524)
Legend
Monitoring Wells (Nov-21 RWL, mAHD)
Inferred groundwater contours (mAHD)
groundwater flow direction
FIGURE 3
1:25,000 Scale at A3
Meters
0
500
1,000
Inferred Groundwater Contours
BIANNUAL SAMPLING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2022-01-12 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-003_Nov-21_GWContours 01.mxd

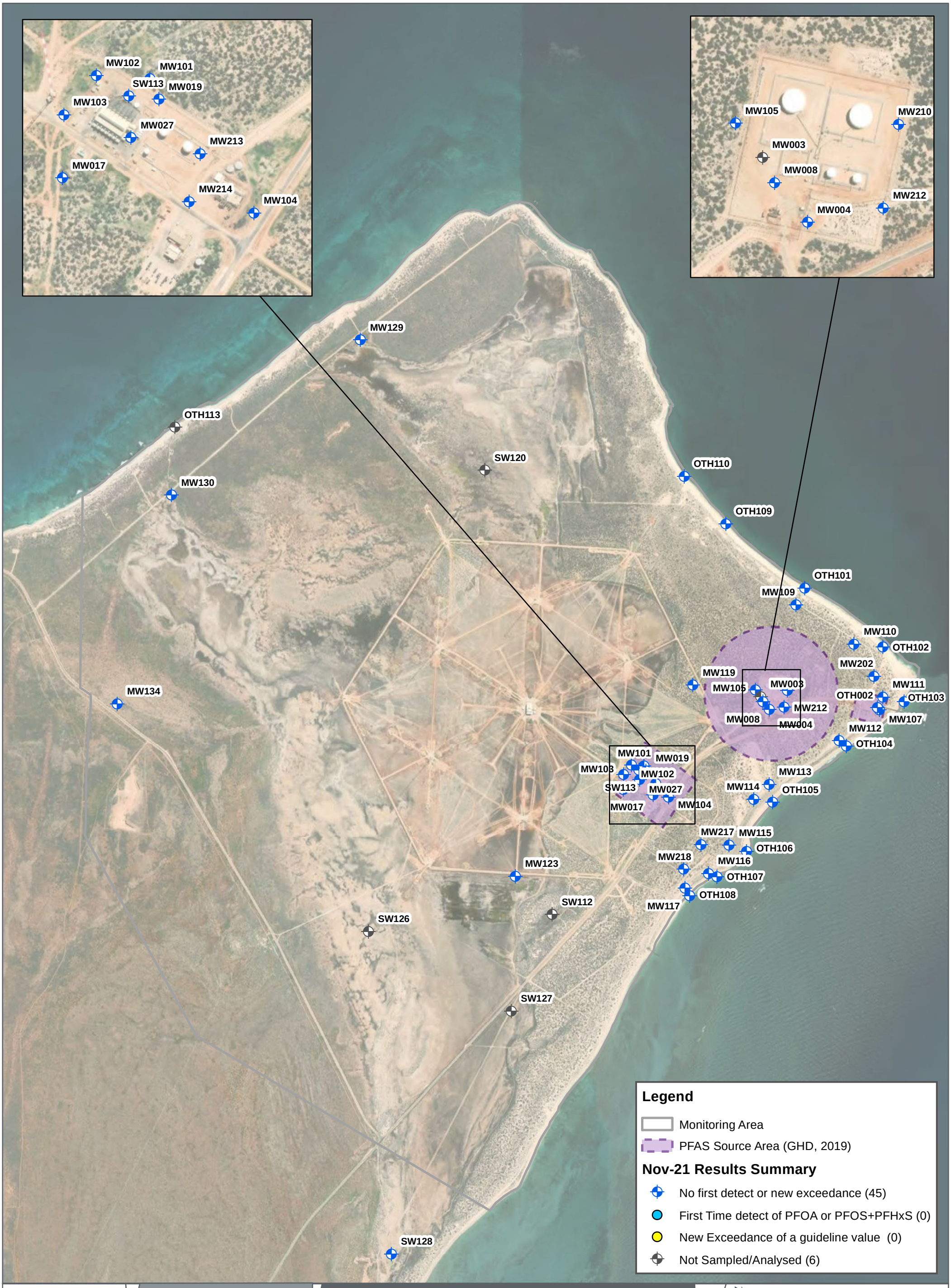
MW102
MW101
SW113
MW019
MW103
MW027
MW213
MW017
MW214
MW104
MW105
MW210
MW003
MW008
MW212
MW004
MW129
OTH113
SW120
MW130
OTH110
OTH109
OTH101
MW109
MW110
OTH102
MW202
MW119
MW111
MW134
OTH002
OTH103
MW107
MW112
OTH104
MW113
MW114
OTH105
MW217
MW115
OTH106
MW218
MW116
OTH107
OTH108
MW123
SW112
MW117
SW126
SW127
SW128
Legend
Monitoring Area
PFAS Source Area (GHD, 2019)
Nov-21 Results Summary
No first detect or new exceedance (45)
First Time detect of PFOA or PFOS+PFHxS (0)
New Exceedance of a guideline value (0)
Not Sampled/Analysed (6)
FIGURE 4
1:25,000 Scale at A3
Meters
0
500
1,000
Water Monitoring Locations & Results
BIANNUAL SAMPLING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
Cardno
Map Produced by Cardno WA
Date: 2022-03-27 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-004_Nov21_W_Results 02.mxd

FIGURE 5

1:25,000 Scale at A3

Meters

0 500 1,000

Sediment Monitoring Locations & Results

BIANNUAL SAMPLING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2022-01-12 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-005_Nov21_S_Results 01.mxd

APPENDIX B

DATA ASSESSMENT TABLES

				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				0.02	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
PFAS NEMP 2020 Interim Marine 99%								0.00023						19				
PFAS NEMP 2020 Recreational Water														10				
Location Code	Date	Field ID	Lab Report Number															
MW004	23/11/2021	0083_MW004_211123	EP2114296	<0.02	<0.02	0.03	<0.02	0.21	<0.02	<0.1	0.02	0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW008	23/11/2021	0083_MW008_211123	EP2114296	<0.02	<0.02	0.01	<0.02	0.37	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW017	23/11/2021	0083_MW017_211123	EP2114300	0.06	0.04	0.96	0.15	14.2	<0.02	0.6	1.93	2.38	0.77	0.5	0.05	<0.02	<0.02	<0.02
MW019	23/11/2021	0083_MW019_211123	EP2114296	<0.02	<0.02	0.05	<0.02	0.01	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW027	23/11/2021	0083_MW027_211123	EP2114296	<0.02	<0.02	0.44	<0.02	0.12	<0.02	<0.1	0.19	0.21	0.12	0.03	<0.02	<0.02	<0.02	<0.02
MW101	23/11/2021	0083_MW101_211123	EP2114295	<0.02	<0.02	0.28	<0.02	<0.01	<0.02	<0.1	<0.02	0.20	0.14	0.02	<0.02	<0.02	<0.02	<0.02
MW102	23/11/2021	0083_MW102_211123	EP2114295	<0.02	<0.02	0.33	<0.02	0.05	<0.02	<0.1	<0.02	0.35	0.30	0.06	<0.02	<0.02	<0.02	<0.02
MW103	23/11/2021	0083_MW103_211123	EP2114295	0.12	0.10	0.59	<0.02	0.05	<0.02	0.3	1.31	1.19	0.28	0.03	<0.02	<0.02	<0.02	<0.02
MW104	23/11/2021	0083_MW104_5.5-6_211123	EP2114300	<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
MW105	23/11/2021	0083_MW105_6-6.5_211123	EP2114296	<0.02	<0.02	0.08	<0.02	0.05	<0.02	<0.1	0.04	0.09	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW107	23/11/2021	0083_MW107_211123	EP2114295	<0.02	<0.02	<0.01	<0.02	0.03	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW109	24/11/2021	0083_MW109_211124	EP2114519	<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
MW110	24/11/2021	0083_MW110_211124	EP2114519	<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
MW111	23/11/2021	0083_MW111_211123	EP2114295	<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
MW112	23/11/2021	0083_MW112_211123	EP2114295	<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
MW113	23/11/2021	0083_MW113_2.5-3.5_211123	EP2114300	<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	23/11/2021	0083_MW114_2.0-3.0_211123	EP2114300	<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	23/11/2021	0083_MW115_2-3_211123	EP2114300	<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
MW116	23/11/2021	0083_MW116_4.5-5.0_211123	EP2114300	<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
MW117	23/11/2021	0083_MW117_4-4.5_211123	EP2114300	<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
MW119	23/11/2021	0083_MW119_211123	EP2114296	1.15	1.53	10.8	0.16	0.24	<0.02	0.4	1.48	5.60	0.26	0.21	<0.02	<0.02	<0.02	<0.02
MW123	23/11/2021	0083_MW123_211123	EP2114296	<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
MW129	23/11/2021	0083_MW129_1.5-2_211123	EP2114300	<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
MW130	23/11/2021	0083_MW130_3.4-3.9_211123	EP2114296	<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	23/11/2021	0083_MW134_211123	EP2114295	<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
MW202	23/11/2021	0083_MW202_211123	EP2114295	<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
MW210	23/11/2021	0083_MW210_211123	EP2114296	<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
MW212	23/11/2021	0083_MW212_211123	EP2114296	<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
MW213	23/11/2021	0083_MW213_211123	EP2114296	<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
MW214	23/11/2021	0083_MW214_211123	EP2114296	<0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.1	<0.02	<0.02	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02
MW217	23/11/2021	0083_MW217_211123	EP2114296	<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
MW218	23/11/2021	0083_MW218_211123	EP2114296	<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
OTH002	23/11/2021	0083_OTH002_211123	EP2114295	<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
OTH101	24/11/2021	0083_OTH101_211124	EP2114391	<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
OTH102	23/11/2021	0083_OTH102_211123	EP2114295	<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
OTH103	23/11/2021	0083_OTH103_211123	EP2114295	<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
OTH104	23/11/2021	0083_OTH104_211123	EP2114295	<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
OTH105	23/11/2021	0083_OTH105_211123	EP2114301	<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
OTH106	23/11/2021	0083_OTH106_211123	EP2114301	<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
OTH107	23/11/2021	0083_OTH107_211123	EP2114301	<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
OTH108	23/11/2021	0083_OTH108_211123	EP2114301	<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
OTH109	24/11/2021	0083_OTH109_211124	EP2114391	<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
OTH110	24/11/2021	0083_OTH110_211124	EP2114391	<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
SW113	23/11/2021	0083_SW113_211123	EP2114297	<0.02	<0.02	0.30	<0.02	0.54	<0.02	<0.1	0.87	0.96	0.39	0.12	0.05	<0.02	<0.02	<0.02
SW128	23/11/2021	0083_SW128_211123	EP2114297	<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

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						
				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)
				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	0.05	0.05	0.05	0.05	0.05	0.02	0.05	0.02	0.05	0.05	0.02	0.05
PFAS NEMP 2020 Interim Marine 99%																
PFAS NEMP 2020 Recreational Water																
Location Code	Date	Field ID	Lab Report Number													
MW004	23/11/2021	0083_MW004_211123	EP2114296	<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
MW008	23/11/2021	0083_MW008_211123	EP2114296	<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
MW017	23/11/2021	0083_MW017_211123	EP2114300	<0.02	<0.05	<0.05	5.2	0.88	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
MW019	23/11/2021	0083_MW019_211123	EP2114296	<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
MW027	23/11/2021	0083_MW027_211123	EP2114296	<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
MW101	23/11/2021	0083_MW101_211123	EP2114295	<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
MW102	23/11/2021	0083_MW102_211123	EP2114295	<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
MW103	23/11/2021	0083_MW103_211123	EP2114295	<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
MW104	23/11/2021	0083_MW104_5.5-6_211123	EP2114300	<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
MW105	23/11/2021	0083_MW105_6-6.5_211123	EP2114296	<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
MW107	23/11/2021	0083_MW107_211123	EP2114295	<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
MW109	24/11/2021	0083_MW109_211124	EP2114519	<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
MW110	24/11/2021	0083_MW110_211124	EP2114519	<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
MW111	23/11/2021	0083_MW111_211123	EP2114295	<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
MW112	23/11/2021	0083_MW112_211123	EP2114295	<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
MW113	23/11/2021	0083_MW113_2.5-3.5_211123	EP2114300	<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
MW114	23/11/2021	0083_MW114_2.0-3.0_211123	EP2114300	<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
MW115	23/11/2021	0083_MW115_2-3_211123	EP2114300	<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
MW116	23/11/2021	0083_MW116_4.5-5.0_211123	EP2114300	<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
MW117	23/11/2021	0083_MW117_4-4.5_211123	EP2114300	<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
MW119	23/11/2021	0083_MW119_211123	EP2114296	<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
MW123	23/11/2021	0083_MW123_211123	EP2114296	<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
MW129	23/11/2021	0083_MW129_1.5-2_211123	EP2114300	<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
MW130	23/11/2021	0083_MW130_3.4-3.9_211123	EP2114296	<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
MW134	23/11/2021	0083_MW134_211123	EP2114295	<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
MW202	23/11/2021	0083_MW202_211123	EP2114295	<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
MW210	23/11/2021	0083_MW210_211123	EP2114296	<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
MW212	23/11/2021	0083_MW212_211123	EP2114296	<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
MW213	23/11/2021	0083_MW213_211123	EP2114296	<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
MW214	23/11/2021	0083_MW214_211123	EP2114296	<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
MW217	23/11/2021	0083_MW217_211123	EP2114296	<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
MW218	23/11/2021	0083_MW218_211123	EP2114296	<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
OTH002	23/11/2021	0083_OTH002_211123	EP2114295	<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
OTH101	24/11/2021	0083_OTH101_211124	EP2114391	<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
OTH102	23/11/2021	0083_OTH102_211123	EP2114295	<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
OTH103	23/11/2021	0083_OTH103_211123	EP2114295	<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
OTH104	23/11/2021	0083_OTH104_211123	EP2114295	<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
OTH105	23/11/2021	0083_OTH105_211123	EP2114301	<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
OTH106	23/11/2021	0083_OTH106_211123	EP2114301	<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
OTH107	23/11/2021	0083_OTH107_211123	EP2114301	<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
OTH108	23/11/2021	0083_OTH108_211123	EP2114301	<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
OTH109	24/11/2021	0083_OTH109_211124	EP2114391	<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
OTH110	24/11/2021	0083_OTH110_211124	EP2114391	<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
SW113	23/11/2021	0083_SW113_211123	EP2114297	<0.02	<0.05	<0.05	1.58	0.56	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05
SW128	23/11/2021	0083_SW128_211123	EP2114297	<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

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

				PFAS			Inorganics									Metals			
				Sum of PFHxS and PFOS	Sum of PFAS (WA DER List)	Sum of PFAS	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)
				µg/L	µg/L	µg/L	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				0.01	0.01	0.01	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				2															
Location Code	Date	Field ID	Lab Report Number																
MW004	23/11/2021	0083_MW004_211123	EP2114296	0.24	0.28	0.28	<1	222	<1	222	297	323	9,400	4.11	1,340	272	765	265	5,510
MW008	23/11/2021	0083_MW008_211123	EP2114296	0.38	0.38	0.38	<1	204	<1	204	309	318	9,750	1.32	1,450	262	767	255	5,400
MW017	23/11/2021	0083_MW017_211123	EP2114300	15.2	27.5	27.7	<1	295	<1	295	277	279	8,600	0.36	1,370	300	647	265	4,690
MW019	23/11/2021	0083_MW019_211123	EP2114296	0.06	0.06	0.06	<1	208	<1	208	200	194	6,280	1.56	900	184	442	171	3,310
MW027	23/11/2021	0083_MW027_211123	EP2114296	0.56	1.11	1.11	<1	304	<1	304	132	140	3,840	2.85	848	198	316	117	2,320
MW101	23/11/2021	0083_MW101_211123	EP2114295	0.28	0.64	0.64	<1	762	<1	762	256	260	8,050	0.86	637	190	629	221	4,440
MW102	23/11/2021	0083_MW102_211123	EP2114295	0.38	1.09	1.09	<1	314	<1	314	246	235	7,700	2.28	1,080	234	542	201	3,990
MW103	23/11/2021	0083_MW103_211123	EP2114295	0.64	3.87	3.97	<1	297	<1	297	227	218	7,000	2.08	1,140	258	513	190	3,630
MW104	23/11/2021	0083_MW104_5.5-6_211123	EP2114300	<0.01	<0.01	<0.01	<1	925	<1	925	183	185	5,220	0.57	827	258	465	185	2,970
MW105	23/11/2021	0083_MW105_6-6.5_211123	EP2114296	0.13	0.26	0.26	<1	250	<1	250	324	341	10,200	2.52	1,530	280	814	283	5,820
MW107	23/11/2021	0083_MW107_211123	EP2114295	0.03	0.03	0.03	<1	201	<1	201	584	596	18,700	1.05	2,530	402	1,350	509	10,400
MW109	24/11/2021	0083_MW109_211124	EP2114519	<0.01	<0.01	<0.01	<1	104	<1	104	654	635	21,100	1.51	2,750	434	1,410	567	11,100
MW110	24/11/2021	0083_MW110_211124	EP2114519	<0.01	<0.01	<0.01	<1	112	<1	112	578	666	18,600	7.16	2,430	484	1,490	594	11,600
MW111	23/11/2021	0083_MW111_211123	EP2114295	<0.01	<0.01	<0.01	<1	305	<1	305	583	613	18,600	2.57	2,490	421	1,380	524	10,700
MW112	23/11/2021	0083_MW112_211123	EP2114295	<0.01	<0.01	<0.01	<1	111	<1	111	599	640	19,200	3.28	2,650	420	1,430	540	11,200
MW113	23/11/2021	0083_MW113_2.5-3.5_211123	EP2114300	<0.01	<0.01	<0.01	<1	131	<1	131	535	611	17,200	6.59	2,290	447	1,380	552	10,600
MW114	23/11/2021	0083_MW114_2.0-3.0_211123	EP2114300	<0.01	<0.01	<0.01	<1	143	<1	143	558	646	17,900	7.24	2,440	470	1,460	589	11,200
MW115	23/11/2021	0083_MW115_2-3_211123	EP2114300	<0.01	<0.01	<0.01	<1	167	<1	167	510	576	16,300	6.05	2,270	436	1,290	518	10,000
MW116	23/11/2021	0083_MW116_4.5-5.0_211123	EP2114300	<0.01	<0.01	<0.01	<1	116	<1	116	585	703	18,800	9.14	2,520	498	1,590	643	12,200
MW117	23/11/2021	0083_MW117_4-4.5_211123	EP2114300	<0.01	<0.01	<0.01	<1	154	<1	154	398	444	12,800	5.38	1,650	349	1,030	399	7,620
MW119	23/11/2021	0083_MW119_211123	EP2114296	11	20.1	21.8	<1	282	<1	282	253	258	8,050	0.97	998	209	602	244	4,420
MW123	23/11/2021	0083_MW123_211123	EP2114296	<0.01	<0.01	<0.01	<1	163	<1	163	776	898	24,800	7.29	3,500	592	1,960	769	15,800
MW129	23/11/2021	0083_MW129_1.5-2_211123	EP2114300	<0.01	<0.01	<0.01	<1	296	<1	296	555	624	17,800	5.84	2,270	540	1,390	513	10,800
MW130	23/11/2021	0083_MW130_3.4-3.9_211123	EP2114296	<0.01	<0.01	<0.01	<1	309	<1	309	548	571	17,500	2.04	2,310	422	1,320	474	9,860
MW134	23/11/2021	0083_MW134_211123	EP2114295	<0.01	<0.01	<0.01	<1	193	<1	193	474	459	15,200	1.61	2,000	394	965	390	8,050
MW202	23/11/2021	0083_MW202_211123	EP2114295	<0.01	<0.01	<0.01	<1	608	<1	608	467	450	14,900	1.79	1,640	309	988	400	7,890
MW210	23/11/2021	0083_MW210_211123	EP2114296	<0.01	<0.01	<0.01	<1	225	<1	225	200	182	6,270	4.70	879	183	445	147	3,040
MW212	23/11/2021	0083_MW212_211123	EP2114296	0.01	0.01	0.01	<1	224	<1	224	333	354	10,600	3.10	1,420	281	832	291	6,080
MW213	23/11/2021	0083_MW213_211123	EP2114296	<0.01	<0.01	<0.01	<1	385	<1	385	36.1	34.7	881	2.02	171	117	101	32	453
MW214	23/11/2021	0083_MW214_211123	EP2114296	0.04	0.04	0.04	<1	171	<1	171	31.2	30.9	861	0.48	168	74	84	30	449
MW217	23/11/2021	0083_MW217_211123	EP2114296	<0.01	<0.01	<0.01	<1	190	<1	190	363	415	11,600	6.67	1,540	331	908	361	7,230
MW218	23/11/2021	0083_MW218_211123	EP2114296	<0.01	<0.01	<0.01	<1	192	<1	192	244	246	7,760	0.54	1,000	218	574	211	4,200
OTH002	23/11/2021	0083_OTH002_211123	EP2114295	<0.01	<0.01	<0.01	<1	118	<1	118	593	623	19,000	2.50	2,620	409	1,400	529	10,900
OTH101	24/11/2021	0083_OTH101_211124	EP2114391	<0.01	<0.01	<0.01	<1	116	<1	116	579	610	18,600	2.55	2,510	436	1,370	547	10,600
OTH102	23/11/2021	0083_OTH102_211123	EP2114295	<0.01	<0.01	<0.01	<1	116	<1	116	598	611	19,200	1.05	2,620	399	1,370	512	10,700
OTH103	23/11/2021	0083_OTH103_211123	EP2114295	<0.01	<0.01	<0.01	<1	112	<1	112	588	631	18,800	3.55	2,640	418	1,430	536	11,000
OTH104	23/11/2021	0083_OTH104_211123	EP2114295	<0.01	<0.01	<0.01	<1	118	<1	118	600	619	19,300	1.49	2,580	407	1,400	523	10,800
OTH105	23/11/2021	0083_OTH105_211123	EP2114301	<0.01	<0.01	<0.01	<1	108	<1	108	582	616	18,700	2.78	2,540	442	1,390	549	10,700
OTH106	23/11/2021	0083_OTH106_211123	EP2114301	<0.01	<0.01	<0.01	<1	117	<1	117	582	593	18,700	0.89	2,530	424	1,340	528	10,300
OTH107	23/11/2021	0083_OTH107_211123	EP2114301	<0.01	<0.01	<0.01	<1	117	<1	117	580	644	18,600	5.24	2,550	460	1,450	580	11,200
OTH108	23/11/2021	0083_OTH108_211123	EP2114301	<0.01	<0.01	<0.01	<1	117	<1	117	582	633	18,700	4.20	2,520	455	1,430	569	11,000
OTH109	24/11/2021	0083_OTH109_211124	EP2114391	<0.01	<0.01	<0.01	<1	115	<1	115	591	610	19,000	1.64	2,520	436	1,380	546	10,600
OTH110	24/11/2021	0083_OTH110_211124	EP2114391	<0.01	<0.01	<0.01	<1	117	<1	117	585	586	18,800	0.10	2,530	418	1,320	523	10,200
SW113	23/11/2021	0083_SW113_211123	EP2114297	0.84	5.32	5.37	<1	77	<1	77	11.7	12.5	176	3.17	252	142	15	6	93
SW128	23/11/2021	0083_SW128_211123	EP2114297	<0.01	<0.01	<0.01	<1	352	<1	352	5,320	5,510	174,000	1.72	19,600	422	14,200	4,970	96,400

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

	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)	Perfluorotetradecanoic acid (PFTeDA)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	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	0.0002	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	0.0002	0.0005
PFAS NEMP 2020 Ecological direct exposure					*1*						*10*						
PFAS NEMP 2020 Ecological indirect exposure					0.01												
PFAS NEMP 2020 Industrial/ commercial (HIL D)											50						
Location Code	Date	Field ID	Lab Report Number															
SD113	23/11/2021	0083_SD113_211123	EP2114299	<0.0002	<0.0002	0.0012	<0.0002	0.0051	<0.0002	<0.001	0.0019	0.0015	0.0008	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
SD120	23/11/2021	0083_SD120_211123	EP2114302	<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	<0.0002	<0.0005
SD126	23/11/2021	0083_SD126_211123	EP2114299	<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	<0.0002	<0.0005
SD127	23/11/2021	0083_SD127_211123	EP2114299	<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	<0.0002	<0.0005
SD128	23/11/2021	0083_SD128_211123	EP2114299	<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	<0.0002	<0.0005

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Ecological direct exposure
HEPA, January 2020, PFAS NEMP 2020 Ecological indirect exposure
HEPA, January 2020, PFAS NEMP 2020 Industrial/ commercial (HIL D)

	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
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting	0.0005	0.0005	0.0005	0.0005	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	Lab Report Number											
SD113	23/11/2021	0083_SD113_211123	EP2114299	<0.0005	0.0066	0.0088	0.0006	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0063	0.0263	0.0269
SD120	23/11/2021	0083_SD120_211123	EP2114302	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD126	23/11/2021	0083_SD126_211123	EP2114299	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD127	23/11/2021	0083_SD127_211123	EP2114299	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
SD128	23/11/2021	0083_SD128_211123	EP2114299	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002

Environmental Standards
HEPA, January 2020, PFAS NEMP 2020 Ecological direct exposure
HEPA, January 2020, PFAS NEMP 2020 Ecological indirect exposure
HEPA, January 2020, PFAS NEMP 2020 Industrial/ commercial (HIL D)

				PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											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 (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)
				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				0.02	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
PFAS NEMP 2020 Interim Marine 99%								0.00023						19							
PFAS NEMP 2020 Recreational Water														10							
Date	Field ID	Sample Type	Lab Report Number																		
23/11/2021	0083_QC304_211123	Rinsate	EP2114295	<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
23/11/2021	0083_QC305_211123	Rinsate	EP2114295	<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
23/11/2021	0083_QC306_211123	Rinsate	EP2114295	<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
23/11/2021	0083_QC404_211123	Blank	EP2114295	<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
23/11/2021	0083_QC405_211123	Blank	EP2114295	<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
23/11/2021	0083_QC406_211123	Blank	EP2114295	<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
24/11/2021	0083_QC301_211124	Rinsate	EP2114519	<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
24/11/2021	0083_QC302_211124	Rinsate	EP2114519	<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
24/11/2021	0083_QC401_211124	Blank	EP2114519	<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
24/11/2021	0083_QC402_211124	Blank	EP2114519	<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

				n:2) Fluorotelomer Sulfonic Acids			PFAS - Perfluoroalkyl Sulfonamides							PFAS		
				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
LOR - Limit of Reporting				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 Number													
23/11/2021	0083_QC304_211123	Rinsate	EP2114295	<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
23/11/2021	0083_QC305_211123	Rinsate	EP2114295	<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
23/11/2021	0083_QC306_211123	Rinsate	EP2114295	<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
23/11/2021	0083_QC404_211123	Blank	EP2114295	<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
23/11/2021	0083_QC405_211123	Blank	EP2114295	<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
23/11/2021	0083_QC406_211123	Blank	EP2114295	<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
24/11/2021	0083_QC301_211124	Rinsate	EP2114519	<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
24/11/2021	0083_QC302_211124	Rinsate	EP2114519	<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
24/11/2021	0083_QC401_211124	Blank	EP2114519	<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
24/11/2021	0083_QC402_211124	Blank	EP2114519	<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

Date			23/11/2021	23/11/2021		23/11/2021	23/11/2021		23/11/2021	23/11/2021		23/11/2021	23/11/2021		23/11/2021	23/11/2021	
Field ID			0083_SW113_211123	0083_QC108_211123		0083_SW113_211123	0083_QC208_211123		0083_MW117_4-4.5_211123	0083_QC210_211123		0083_MW214_211123	0083_QC111_211123		0083_MW214_211123	0083_QC211_211123	
Matrix Type			Water	Water		Water	Water		Water	Water		Water	Water		Water	Water	
Lab Report Number			EP2114297	EP2114297	RPD	EP2114297	844500	RPD	EP2114300	844500	RPD	EP2114296	EP2114296	RPD	EP2114296	844500	RPD
	Unit	LOR															
PFAS - Perfluoroalkyl Sulfonic Acids																	
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01					<0.01			<0.01						<0.01	
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	0	<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	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	0.30	0.32	6	0.30	0.32	6	<0.01	<0.01	0	0.02	0.02	0	0.02	<0.01	67
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	0	<0.02	0.01	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.54	0.53	2	0.54	0.45	18	<0.01	<0.01	0	0.02	0.02	0	0.02	<0.01	67
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01					<0.01			<0.01						<0.01	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	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	0.33	107	<0.1	<0.05	0	<0.1	<0.1	0	<0.1	<0.05	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	0.87	0.89	2	0.87	0.94	8	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	0.96	0.94	2	0.96	0.44	74	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	0.39	0.40	3	0.39	0.39	0	<0.02	<0.01	0	<0.02	<0.02	0	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.12	0.12	0	0.12	0.13	8	<0.01	<0.01	0	<0.01	<0.01	0	<0.01	<0.01	0
Perfluorononanoic acid (PFNA)	µg/L	0.01	0.05	0.05	0	0.05	0.06	18	<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	<0.01	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	<0.01	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	<0.01	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	<0.01	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	<0.01	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	<0.01	0	<0.05	<0.05	0	<0.05	<0.01	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	1.58	1.53	3	1.58	1.7	7	<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	0.56	0.55	2	0.56	0.97	54	<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	<0.01	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	<0.05	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	<0.02	0	<0.02	<0.05	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	<0.02	0	<0.02	<0.05	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	0.84	0.85	1	0.84	0.77	9	<0.01	<0.01	0	0.04	0.04	0	0.04	<0.01	120
Sum of PFAS (WA DER List)	µg/L	0.01	5.32	5.28	1	5.32	5.69	7	<0.01	<0.05	0	0.04	0.04	0	0.04	<0.05	0
Sum of PFAS	µg/L	0.01	5.37	5.33	1	5.37	5.77	7	<0.01	<0.1	0	0.04	0.04	0	0.04	<0.1	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01					0.9			<0.01						<0.01	
Sum of PFAS (PFOS + PFOA)	µg/L	0.01					0.58			<0.01						<0.01	
Inorganics																	
Carbonate Alkalinity (as CaCO3)	mg/L	1	<1			<1			<1			<1			<1		
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	77			77			154			171			171		
Alkalinity (Hydroxide) as CaCO3	mg/L	1	<1			<1			<1			<1			<1		
Alkalinity (total) as CaCO3	mg/L	1	77			77			154			171			171		
Anions Total	meq/L	0.01	11.7			11.7			398			31.2			31.2		
Cations Total	meq/L	0.01	12.5			12.5			444			30.9			30.9		
Chloride	mg/L	1	176			176			12,800			861			861		
Ionic Balance	%	0.01	3.17			3.17			5.38			0.48			0.48		
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1	252			252			1,650			168			168		
Metals																	
Calcium (filtered)	mg/L	1	142			142			349			74			74		
Magnesium (filtered)	mg/L	1	15			15			1,030			84			84		
Potassium (filtered)	mg/L	1	6			6			399			30			30		
Sodium (filtered)	mg/L	1	93			93			7,620			449			449		

*RPDs have only been considered where a concentration is greater than 1 times the EQL.
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: No Limit (1 - 10 x EQL); 50 (10 - 20 x EQL); 20 (> 20 x EQL))
***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			23/11/2021	23/11/2021		23/11/2021	23/11/2021		23/11/2021	23/11/2021		23/11/2021	23/11/2021		23/11/2021	23/11/2021	
Field ID			0083_MW210_211123	0083_QC112_211123		0083_MW210_211123	0083_QC212_211123		0083_MW119_211123	0083_QC113_211123		0083_MW119_211123	0083_QC213_211123		0083_MW104_5.5-6_211123	0083_QC214_211123	
Matrix Type			Water	Water		Water	Water		Water	Water		Water	Water		Water	Water	
Lab Report Number			EP2114296	EP2114296	RPD	EP2114296	844500	RPD	EP2114296	EP2114296	RPD	EP2114296	844500	RPD	EP2114300	844500	RPD
	Unit	LOR															
PFAS - Perfluoroalkyl Sulfonic Acids																	
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.01					<0.01						<0.01			<0.01	
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	1.15	0.78	38	1.15	<0.01	197	<0.02	<0.01	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	1.53	0.97	45	1.53	<0.01	197	<0.02	<0.01	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	<0.01	<0.01	0	<0.01	0.02	67	10.8	7.66	34	10.8	<0.01	200	<0.01	<0.01	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	0.16	0.10	46	0.16	<0.01	176	<0.02	<0.01	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	<0.01	<0.01	0	<0.01	0.02	67	0.24	0.17	34	0.24	<0.01	184	<0.01	0.02	67
Perfluorononanesulfonic acid (PFNS)	µg/L	0.01					<0.01						<0.01			<0.01	
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	<0.01	0
PFAS - Perfluoroalkyl Carboxylic Acids																	
Perfluorobutanoic acid (PFBA)	µg/L	0.05	<0.1	<0.1	0	<0.1	<0.05	0	0.4	0.3	29	0.4	<0.05	156	<0.1	<0.05	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	1.48	0.94	45	1.48	<0.01	197	<0.02	<0.01	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	5.60	3.88	36	5.60	<0.01	199	<0.02	<0.01	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.01	<0.02	<0.02	0	<0.02	<0.01	0	0.26	0.19	31	0.26	<0.01	185	<0.02	<0.01	0
Perfluorooctanoic acid (PFOA)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.01	0	0.21	0.12	55	0.21	<0.01	182	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<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	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	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	<0.02	0	<0.02	<0.05	0	<0.02	<0.02	0	<0.02	<0.05	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	<0.01	<0.01	0	<0.01	0.04	120	11.0	7.83	34	11.0	<0.01	200	<0.01	0.02	67
Sum of PFAS (WA DER List)	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.05	0	20.1	14.0	36	20.1	<0.05	199	<0.01	<0.05	0
Sum of PFAS	µg/L	0.01	<0.01	<0.01	0	<0.01	<0.1	0	21.8	15.1	36	21.8	<0.1	198	<0.01	<0.1	0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.01					0.04						<0.01			0.02	
Sum of PFAS (PFOS + PFOA)	µg/L	0.01					0.02						<0.01			0.02	
Inorganics																	
Carbonate Alkalinity (as CaCO3)	mg/L	1	<1			<1			<1			<1			<1		
Alkalinity (Bicarbonate as CaCO3)	mg/L	1	225			225			282			282			925		
Alkalinity (Hydroxide) as CaCO3	mg/L	1	<1			<1			<1			<1			<1		
Alkalinity (total) as CaCO3	mg/L	1	225			225			282			282			925		
Anions Total	meq/L	0.01	200			200			253			253			183		
Cations Total	meq/L	0.01	182			182			258			258			185		
Chloride	mg/L	1	6,270			6,270			8,050			8,050			5,220		
Ionic Balance	%	0.01	4.70			4.70			0.97			0.97			0.57		
Sulphate as SO4 - Turbidimetric (filtered)	mg/L	1	879			879			998			998			827		
Metals																	
Calcium (filtered)	mg/L	1	183			183			209			209			258		
Magnesium (filtered)	mg/L	1	445			445			602			602			465		
Potassium (filtered)	mg/L	1	147			147			244			244			185		
Sodium (filtered)	mg/L	1	3,040			3,040			4,420			4,420			2,970		

*RPDs have only been considered where a concentration is greater than 1 tim
**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPD
***Interlab Duplicates are matched on a per compound basis as methods vary

			Date	23/11/2021	23/11/2021		23/11/2021	23/11/2021	
			Field ID	0083_SD113_211123	0083_QC108_211123		0083_SD113_211123	0083_QC209_211123	
			Matrix Type	Sediment	Sediment		Sediment	Sediment	
			Lab Report Number	EP2114299	EP2114299	RPD	EP2114299	844500	RPD
	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
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005		0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	0.0012	0.0012	0	0.0012	<0.005		0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.005		0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	0.0051	0.0046	10	0.0051	<0.005		2
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
PFAS - Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	mg/kg	0.001	<0.001	<0.001	0	<0.001	<0.005		0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002	0.0019	0.0011	53	0.0019	<0.005		0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002	0.0015	0.0008	61	0.0015	<0.005		0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002	0.0008	0.0005	46	0.0008	<0.005		0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	0.0004	0.0002	67	0.0004	<0.005		0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002	<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
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002	<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
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002	<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
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
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	0.0066	0.0059	11	0.0066	<0.01		0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005	0.0088	0.0080	10	0.0088	<0.005		55
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	0.0006	<0.0005	18	0.0006	<0.005		0
PFAS - Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	<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
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002	<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
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005	<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
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.005		0
PFAS									
Sum of PFHxS and PFOS	mg/kg	0.0002	0.0063	0.0058	8	0.0063	<0.005		23
Sum of PFAS (WA DER List)	mg/kg	0.0002	0.0263	0.0223	16	0.0263	<0.01		90
Sum of PFAS	mg/kg	0.0002	0.0269	0.0223	19	0.0269	<0.05		0
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	mg/kg	0.005					<0.005		
Sum of PFAS (PFOS + PFOA)	mg/kg	0.005					<0.005		

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: No Limit (1 - 10 x EQL); 50 (10 - 20 x EQL); 20 (> 20 x EQL))

***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

APPENDIX C

LABORATORY CERTIFICATES

CHAIN OF CUSTODY

(ALS) COC#: 30521 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: NO 18:30 25/11/21	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MG - DEF19009/HEHB GW - TEMPLATE

ORDER NO: DEF19009/0082

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters Primary WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0082_MW122_211123	Extra PFAS for QC	23/11/2021 07:18 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8			
002	0082_MW103D 211123		23/11/2021 08:22 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
003	0082_MW326_211123		23/11/2021 09:05 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
004	0083_MW202_211123		23/11/2021 10:17 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
005	0083_MW107_211123		23/11/2021 11:08 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
006	0083_OTH002_211123		23/11/2021 11:33 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
007	0083_OTH103_211123		23/11/2021 11:52 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
008	0083_MW111_211123		23/11/2021 12:19 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
009	0083_MW112_211123		23/11/2021 12:47 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			

CHAIN OF CUSTODY

COC#: 30521 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MG - DEF19009/HEHB GW - TEMPLATE

ORDER NO: DEF19009/0082

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters Primary WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0083_OTH104_211123		23/11/2021 12:55 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
011	0083_OTH102_211123		23/11/2021 01:34 PM	Water	ALS: 4 Non ALS: 0	No	Partial 4/8			
012	0083_MW101_211123		23/11/2021 02:17 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
013	0083_MW102_211123		23/11/2021 02:33 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
014	0083_MW103_211123		23/11/2021 02:53 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
015	0083_MW134_211123		23/11/2021 03:27 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
016	0082_QC401_211123		23/11/2021 04:37 PM	Water	ALS: 2 Non ALS: 0	No		X		
017	0082_QC301_211123		23/11/2021 04:39 PM	Water	ALS: 2 Non ALS: 0	No		X		
018	0082_QC302_211123		23/11/2021 04:41 PM	Water	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

(ALS) COC#: 30521 *ALS Laboratory:* EP Perth

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

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MG - DEF19009/HEHB GW - TEMPLATE

ORDER NO: DEF19009/0082

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters Primary WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
019	0082_QC402_211123		23/11/2021 04:42 PM	Water	ALS: 2 Non ALS: 0	No		X		
020	0082_QC303_211123		23/11/2021 04:43 PM	Water	ALS: 2 Non ALS: 0	No		X		
021	0082_QC403_211123		23/11/2021 04:45 PM	Water	ALS: 2 Non ALS: 0	No		X		
022	0083_QC404_211123		23/11/2021 04:46 PM	Water	ALS: 2 Non ALS: 0	No		X		
023	0083_QC304_211123		23/11/2021 04:47 PM	Water	ALS: 2 Non ALS: 0	No		X		
024	0083_QC405_211123		23/11/2021 04:48 PM	Water	ALS: 2 Non ALS: 0	No		X		
025	0083_QC305_211123		23/11/2021 04:49 PM	Water	ALS: 2 Non ALS: 0	No		X		
026	0083_QC406_211123		23/11/2021 04:51 PM	Water	ALS: 2 Non ALS: 0	No		X		
027	0083_QC306_211123		23/11/2021 04:51 PM	Water	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

(ALS) COC#: 30521 *ALS Laboratory:* EP Perth

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

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MG - DEF19009/HEHB GW - TEMPLATE

ORDER NO: DEF19009/0082

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0082_MW122_211123	Ground Waters Primary 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	0082_MW103D_211123	Ground Waters Primary 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	0082_MW326_211123	Ground Waters Primary 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	0083_MW202_211123	Ground Waters Primary 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	0083_MW107_211123	Ground Waters Primary 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	0083_OTH002_211123	Ground Waters Primary 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	0083_OTH103_211123	Ground Waters Primary 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	0083_MW111_211123	Ground Waters Primary 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	0083_MW112_211123	Ground Waters Primary 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

COC#: 30521 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MG - DEF19009/HEHB GW - TEMPLATE

ORDER NO: DEF19009/0082

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

010	0083_OTH104_211123	Ground Waters Primary 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)
011	0083_OTH102_211123	Ground Waters Primary 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	0083_MW101_211123	Ground Waters Primary 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	0083_MW102_211123	Ground Waters Primary 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)
014	0083_MW103_211123	Ground Waters Primary 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)
015	0083_MW134_211123	Ground Waters Primary 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#: 30521 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MG - DEF19009/HEHB GW - TEMPLATE

ORDER NO: DEF19009/0082

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0082_MW122_211123	Clear Plastic Bottle - Natural	250 mL	00070621189990	Green	No	
001	0082_MW122_211123	HDPE (no PTFE)	20 mL	00352101071170	Grey	No	
001	0082_MW122_211123	HDPE (no PTFE)	20 mL	00350019030635	Grey	No	
001	0082_MW122_211123	HDPE (no PTFE)	20 mL	00350019008252	Grey	No	
002	0082_MW103D_211123	HDPE (no PTFE)	20 mL	00352101070894	Grey	No	
002	0082_MW103D_211123	HDPE (no PTFE)	20 mL	00352101070770	Grey	No	
002	0082_MW103D_211123	Clear Plastic Bottle - Natural	250 mL	00070621051555	Green	No	
003	0082_MW326_211123	Clear Plastic Bottle - Natural	250 mL	00070621197251	Green	No	
003	0082_MW326_211123	HDPE (no PTFE)	20 mL	00352101071817	Grey	No	
003	0082_MW326_211123	HDPE (no PTFE)	20 mL	00352101070929	Grey	No	
004	0083_MW202_211123	Clear Plastic Bottle - Natural	250 mL	00070621197331	Green	No	
004	0083_MW202_211123	HDPE (no PTFE)	20 mL	00352101071102	Grey	No	
004	0083_MW202_211123	HDPE (no PTFE)	20 mL	00352101071035	Grey	No	
005	0083_MW107_211123	Clear Plastic Bottle - Natural	250 mL	00070621197274	Green	No	
005	0083_MW107_211123	HDPE (no PTFE)	20 mL	00352101071322	Grey	No	
005	0083_MW107_211123	HDPE (no PTFE)	20 mL	00352101070767	Grey	No	
006	0083_OTH002_211123	HDPE (no PTFE)	20 mL	00352101071433	Grey	No	
006	0083_OTH002_211123	HDPE (no PTFE)	20 mL	00352101070915	Grey	No	
006	0083_OTH002_211123	Clear Plastic Bottle - Natural	250 mL	00070621197332	Green	No	
007	0083_OTH103_211123	HDPE (no PTFE)	20 mL	00352101071306	Grey	No	
007	0083_OTH103_211123	Clear Plastic Bottle - Natural	250 mL	00070621197306	Green	No	
007	0083_OTH103_211123	HDPE (no PTFE)	20 mL	00352101071341	Grey	No	
008	0083_MW111_211123	Clear Plastic Bottle - Natural	250 mL	00070621189979	Green	No	
008	0083_MW111_211123	HDPE (no PTFE)	20 mL	00352101071124	Grey	No	
008	0083_MW111_211123	HDPE (no PTFE)	20 mL	00352101038036	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: 30521 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MG - DEF19009/HEHB GW - TEMPLATE

ORDER NO: DEF19009/0082

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

009	0083_MW112_211123	HDPE (no PTFE)	20 mL	00352101071992	Grey	No	
009	0083_MW112_211123	Clear Plastic Bottle - Natural	250 mL	00070621197263	Green	No	
009	0083_MW112_211123	HDPE (no PTFE)	20 mL	00352101070924	Grey	No	
010	0083_OTH104_211123	Clear Plastic Bottle - Natural	250 mL	00070621190160	Green	No	
010	0083_OTH104_211123	HDPE (no PTFE)	20 mL	00352101071276	Grey	No	
010	0083_OTH104_211123	HDPE (no PTFE)	20 mL	00352101071614	Grey	No	
011	0083_OTH102_211123	Clear Plastic Bottle - Natural	250 mL	00070220142896	Green	No	
011	0083_OTH102_211123	Clear Plastic Bottle - Natural	250 mL	00070220142744	Green	No	
011	0083_OTH102_211123	HDPE (no PTFE)	20 mL	00352010040491	Grey	No	
011	0083_OTH102_211123	HDPE (no PTFE)	20 mL	00352010040113	Grey	No	
012	0083_MW101_211123	HDPE (no PTFE)	20 mL	00352101070746	Grey	No	
012	0083_MW101_211123	HDPE (no PTFE)	20 mL	00352101071376	Grey	No	
012	0083_MW101_211123	Clear Plastic Bottle - Natural	250 mL	00070621051504	Green	No	
013	0083_MW102_211123	HDPE (no PTFE)	20 mL	00352101071181	Grey	No	
013	0083_MW102_211123	HDPE (no PTFE)	20 mL	00352101071695	Grey	No	
013	0083_MW102_211123	Clear Plastic Bottle - Natural	250 mL	00070621197301	Green	No	
014	0083_MW103_211123	Clear Plastic Bottle - Natural	250 mL	00070621197300	Green	No	
014	0083_MW103_211123	HDPE (no PTFE)	20 mL	00352101071391	Grey	No	
014	0083_MW103_211123	HDPE (no PTFE)	20 mL	00352101071413	Grey	No	
015	0083_MW134_211123	Clear Plastic Bottle - Natural	250 mL	00070621197271	Green	No	
015	0083_MW134_211123	HDPE (no PTFE)	20 mL	00352101071325	Grey	No	
015	0083_MW134_211123	HDPE (no PTFE)	20 mL	00352101071369	Grey	No	
016	0082_QC401_211123	HDPE (no PTFE)	20 mL	00350019177319	Grey	No	
016	0082_QC401_211123	HDPE (no PTFE)	20 mL	00350019177409	Grey	No	
017	0082_QC301_211123	HDPE (no PTFE)	20 mL	00350019177422	Grey	No	
017	0082_QC301_211123	HDPE (no PTFE)	20 mL	00350019177610	Grey	No	
018	0082_QC302_211123	HDPE (no PTFE)	20 mL	00350019177603	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: **30521** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MG - DEF19009/HEHB GW - TEMPLATE

ORDER NO: DEF19009/0082

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

018	0082_QC302_211123	HDPE (no PTFE)	20 mL	00350019177512	Grey	No	
019	0082_QC402_211123	HDPE (no PTFE)	20 mL	00350019177437	Grey	No	
019	0082_QC402_211123	HDPE (no PTFE)	20 mL	00350019177469	Grey	No	
020	0082_QC303_211123	HDPE (no PTFE)	20 mL	00350019177353	Grey	No	
020	0082_QC303_211123	HDPE (no PTFE)	20 mL	00350019177387	Grey	No	
021	0082_QC403_211123	HDPE (no PTFE)	20 mL	00350019177510	Grey	No	
021	0082_QC403_211123	HDPE (no PTFE)	20 mL	00350019177355	Grey	No	
022	0083_QC404_211123	HDPE (no PTFE)	20 mL	00350019035135	Grey	No	
022	0083_QC404_211123	HDPE (no PTFE)	20 mL	00350019035144	Grey	No	
023	0083_QC304_211123	HDPE (no PTFE)	20 mL	00350019177416	Grey	No	
023	0083_QC304_211123	HDPE (no PTFE)	20 mL	00350019177351	Grey	No	
024	0083_QC405_211123	HDPE (no PTFE)	20 mL	00350019034980	Grey	No	
024	0083_QC405_211123	HDPE (no PTFE)	20 mL	00350019026852	Grey	No	
025	0083_QC305_211123	HDPE (no PTFE)	20 mL	00350019177430	Grey	No	
025	0083_QC305_211123	HDPE (no PTFE)	20 mL	00350019177503	Grey	No	
026	0083_QC406_211123	HDPE (no PTFE)	20 mL	00350019177445	Grey	No	
026	0083_QC406_211123	HDPE (no PTFE)	20 mL	00350019177365	Grey	No	
027	0083_QC306_211123	HDPE (no PTFE)	20 mL	00350019177364	Grey	No	
027	0083_QC306_211123	HDPE (no PTFE)	20 mL	00350019177429	Grey	No	

Total Bottle Count: ALS: 72, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2114295**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]cardno.com.au	E-mail	: ALSEnviro.Perth@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 3
Order number	: DEF19009/0082	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 30521	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/HEHB		
Sampler	: [redacted]		

Dates

Date Samples Received	: 25-Nov-2021 11:50	Issue Date	: 26-Nov-2021
Client Requested Due Date	: 08-Dec-2021	Scheduled Reporting Date	: **08-Dec-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 21.8 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 27 / 27

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 discrepencies: 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.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **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)
EP2114295-001	23-Nov-2021 07:18	0082_MW122_211123	✓	✓	✓	✓
EP2114295-002	23-Nov-2021 08:22	0082_MW103D_211123	✓	✓	✓	✓
EP2114295-003	23-Nov-2021 09:05	0082_MW326_211123	✓	✓	✓	✓
EP2114295-004	23-Nov-2021 10:17	0083_MW202_211123	✓	✓	✓	✓
EP2114295-005	23-Nov-2021 11:08	0083_MW107_211123	✓	✓	✓	✓
EP2114295-006	23-Nov-2021 11:33	0083_OTH002_211123	✓	✓	✓	✓
EP2114295-007	23-Nov-2021 11:52	0083_OTH103_211123	✓	✓	✓	✓
EP2114295-008	23-Nov-2021 12:19	0083_MW111_211123	✓	✓	✓	✓
EP2114295-009	23-Nov-2021 12:47	0083_MW112_211123	✓	✓	✓	✓
EP2114295-010	23-Nov-2021 12:55	0083_OTH104_211123	✓	✓	✓	✓
EP2114295-011	23-Nov-2021 13:34	0083_OTH102_211123	✓	✓	✓	✓
EP2114295-012	23-Nov-2021 14:17	0083_MW101_211123	✓	✓	✓	✓
EP2114295-013	23-Nov-2021 14:33	0083_MW102_211123	✓	✓	✓	✓
EP2114295-014	23-Nov-2021 14:53	0083_MW103_211123	✓	✓	✓	✓
EP2114295-015	23-Nov-2021 15:27	0083_MW134_211123	✓	✓	✓	✓
EP2114295-016	23-Nov-2021 16:37	0082_QC401_211123		✓		
EP2114295-017	23-Nov-2021 16:39	0082_QC301_211123		✓		
EP2114295-018	23-Nov-2021 16:41	0082_QC302_211123		✓		
EP2114295-019	23-Nov-2021 16:42	0082_QC402_211123		✓		
EP2114295-020	23-Nov-2021 16:43	0082_QC303_211123		✓		
EP2114295-021	23-Nov-2021 16:45	0082_QC403_211123		✓		
EP2114295-022	23-Nov-2021 16:46	0083_QC404_211123		✓		
EP2114295-023	23-Nov-2021 16:47	0083_QC304_211123		✓		
EP2114295-024	23-Nov-2021 16:48	0083_QC405_211123		✓		
EP2114295-025	23-Nov-2021 16:49	0083_QC305_211123		✓		
EP2114295-026	23-Nov-2021 16:51	0083_QC406_211123		✓		
EP2114295-027	23-Nov-2021 16:51	0083_QC306_211123		✓		

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

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]cardno.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]cardno.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]cardno.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]cardno.com.au

Perth
- A4 - AU Tax Invoice (INV) — Email — perth@cardno.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2114295-AB**	Page	: 1 of 19
Amendment	: **1**		
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021 11:50
Order number	: DEF19009/0082	Date Analysis Commenced	: 27-Nov-2021
C-O-C number	: 30521	Issue Date	: 07-Dec-2021 17:19
Sampler	: [redacted] [redacted]		
Site	: DEF19009/HEHB		
Quote number	: SY/139/19		
No. of samples received	: 18		
No. of samples analysed	: 18		

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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	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 Contact 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.
- Amendment (07/12/2021): This report has been amended as a result of a request to split various samples onto a seperate COA report. Samples EP2114295_001-003 & 016-021 are now reported on COA Report EP2114295-AA and samples EP2114295_004-015 & 022-027 are now reported on COA Report EP2114295-AB.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_MW202_211123	0083_MW107_211123	0083_OTH103_211123	0083_MW111_211123	0083_MW112_211123
				Sampling date / time	23-Nov-2021 10:17	23-Nov-2021 11:08	23-Nov-2021 11:52	23-Nov-2021 12:19	23-Nov-2021 12:47
					EP2114295-004	EP2114295-005	EP2114295-007	EP2114295-008	EP2114295-009
					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		**608**	**201**	**112**	**305**	**111**
Total Alkalinity as CaCO3	----	1	mg/L		**608**	**201**	**112**	**305**	**111**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**1640**	**2530**	**2640**	**2490**	**2650**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**14900**	**18700**	**18800**	**18600**	**19200**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**309**	**402**	**418**	**421**	**420**
Magnesium	7439-95-4	1	mg/L		**988**	**1350**	**1430**	**1380**	**1430**
Sodium	7440-23-5	1	mg/L		**7890**	**10400**	**11000**	**10700**	**11200**
Potassium	7440-09-7	1	mg/L		**400**	**509**	**536**	**524**	**540**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**467**	**584**	**588**	**583**	**599**
ø Total Cations	----	0.01	meq/L		**450**	**596**	**631**	**613**	**640**
ø Ionic Balance	----	0.01	%		**1.79**	**1.05**	**3.55**	**2.57**	**3.28**
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	**0.03**	<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	0083_MW202_211123	0083_MW107_211123	0083_OTH103_211123	0083_MW111_211123	0083_MW112_211123
				Sampling date / time	23-Nov-2021 10:17	23-Nov-2021 11:08	23-Nov-2021 11:52	23-Nov-2021 12:19	23-Nov-2021 12:47
Compound	CAS Number	LOR	Unit		EP2114295-004	EP2114295-005	EP2114295-007	EP2114295-008	EP2114295-009
					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	0083_MW202_211123	0083_MW107_211123	0083_OTH103_211123	0083_MW111_211123	0083_MW112_211123
				Sampling date / time	23-Nov-2021 10:17	23-Nov-2021 11:08	23-Nov-2021 11:52	23-Nov-2021 12:19	23-Nov-2021 12:47
Compound	CAS Number	LOR	Unit		EP2114295-004	EP2114295-005	EP2114295-007	EP2114295-008	EP2114295-009
					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	**0.03**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**0.03**	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**0.03**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**100**	**104**	**103**	**90.8**	**104**
13C8-PFOA	----	0.02	%		**118**	**108**	**112**	**115**	**119**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_OTH104_211123	0083_OTH102_211123	0083_MW101_211123	0083_MW102_211123	0083_MW103_211123
				Sampling date / time	23-Nov-2021 12:55	23-Nov-2021 13:34	23-Nov-2021 14:17	23-Nov-2021 14:33	23-Nov-2021 14:53
Compound	CAS Number	LOR	Unit		EP2114295-010	EP2114295-011	EP2114295-012	EP2114295-013	EP2114295-014
					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		118	116	762	314	297
Total Alkalinity as CaCO3	----	1	mg/L		118	116	762	314	297
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2580	2620	637	1080	1140
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		19300	19200	8050	7700	7000
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		407	399	190	234	258
Magnesium	7439-95-4	1	mg/L		1400	1370	629	542	513
Sodium	7440-23-5	1	mg/L		10800	10700	4440	3990	3630
Potassium	7440-09-7	1	mg/L		523	512	221	201	190
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		600	598	256	246	227
ø Total Cations	----	0.01	meq/L		619	611	260	235	218
ø Ionic Balance	----	0.01	%		1.49	1.05	0.86	2.28	2.08
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	0.12
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	0.10
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	<0.01	0.28	0.33	0.59
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	0.05	0.05
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	0.3
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	1.31
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	<0.02	0.20	0.35	1.19

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_OTH104_211123	0083_OTH102_211123	0083_MW101_211123	0083_MW102_211123	0083_MW103_211123
				Sampling date / time	23-Nov-2021 12:55	23-Nov-2021 13:34	23-Nov-2021 14:17	23-Nov-2021 14:33	23-Nov-2021 14:53
Compound	CAS Number	LOR	Unit		EP2114295-010	EP2114295-011	EP2114295-012	EP2114295-013	EP2114295-014
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	<0.02	**0.14**	**0.30**	**0.28**
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.02**	**0.06**	**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	0083_OTH104_211123	0083_OTH102_211123	0083_MW101_211123	0083_MW102_211123	0083_MW103_211123
				Sampling date / time	23-Nov-2021 12:55	23-Nov-2021 13:34	23-Nov-2021 14:17	23-Nov-2021 14:33	23-Nov-2021 14:53
Compound	CAS Number	LOR	Unit		EP2114295-010	EP2114295-011	EP2114295-012	EP2114295-013	EP2114295-014
					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	**0.64**	**1.09**	**3.97**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	**0.28**	**0.38**	**0.64**
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	**0.64**	**1.09**	**3.87**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**98.3**	**97.7**	**90.9**	**92.9**	**104**
13C8-PFOA	----	0.02	%		**108**	**104**	**73.7**	**96.4**	**119**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW134_211123	----	----	----	----
				Sampling date / time	23-Nov-2021 15:27	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2114295-015	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**193**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**193**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2000**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**15200**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**394**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**965**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**8050**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**390**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**474**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**459**	----	----	----	----
ø Ionic Balance	----	0.01	%		**1.61**	----	----	----	----
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	----	----	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW134_211123	----	----	----	----
				Sampling date / time	23-Nov-2021 15:27	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2114295-015	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
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	----	----	----	----
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	0083_MW134_211123	----	----	----	----
				Sampling date / time	23-Nov-2021 15:27	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2114295-015	--------	--------	--------	--------
					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	%		**102**	----	----	----	----
13C8-PFOA	----	0.02	%		**116**	----	----	----	----

Analytical Results

Sub-Matrix: **RINSATE** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_QC404_211123	0083_QC304_211123	0083_QC405_211123	0083_QC305_211123	0083_QC406_211123
				Sampling date / time	23-Nov-2021 16:46	23-Nov-2021 16:47	23-Nov-2021 16:48	23-Nov-2021 16:49	23-Nov-2021 16:51
					EP2114295-022	EP2114295-023	EP2114295-024	EP2114295-025	EP2114295-026
					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	0083_QC404_211123	0083_QC304_211123	0083_QC405_211123	0083_QC305_211123	0083_QC406_211123
				Sampling date / time	23-Nov-2021 16:46	23-Nov-2021 16:47	23-Nov-2021 16:48	23-Nov-2021 16:49	23-Nov-2021 16:51
Compound	CAS Number	LOR	Unit		EP2114295-022	EP2114295-023	EP2114295-024	EP2114295-025	EP2114295-026
					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	%		**97.4**	**117**	**112**	**106**	**107**
13C8-PFOA	----	0.02	%		**105**	**114**	**117**	**111**	**104**

Analytical Results

Sub-Matrix: **RINSATE** (Matrix: **WATER**)				Sample ID	**0083_QC306_211123**	----	----	----	----
				Sampling date / time	23-Nov-2021 16:51	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EP2114295-027**	--------	--------	--------	--------
					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	0083_QC306_211123	----	----	----	----
				Sampling date / time	23-Nov-2021 16:51	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2114295-027	--------	--------	--------	--------
					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	%		**104**	----	----	----	----
13C8-PFOA	----	0.02	%		**103**	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH002_211123	----	----	----	----
				Sampling date / time	23-Nov-2021 11:33	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2114295-006	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**118**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**118**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2620**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**19000**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**409**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**1400**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**10900**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**529**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**593**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**623**	----	----	----	----
ø Ionic Balance	----	0.01	%		**2.50**	----	----	----	----
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: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH002_211123	----	----	----	----
				Sampling date / time	23-Nov-2021 11:33	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2114295-006	--------	--------	--------	--------
					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 (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	----	----	----	----
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: SURFACE WATER (Matrix: WATER)			Sample ID	0083_OTH002_211123	----	----	----	----
			Sampling date / time	23-Nov-2021 11:33	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2114295-006	--------	--------	--------	--------
				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	%	**114**	----	----	----	----
13C8-PFOA	----	0.02	%	**117**	----	----	----	----

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

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2114295-AB**	Page	: 1 of 7
Amendment	: **1**		
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
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Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021
Order number	: DEF19009/0082	Date Analysis Commenced	: 27-Nov-2021
C-O-C number	: 30521	Issue Date	: 07-Dec-2021
Sampler	: [redacted]		
Site	: DEF19009/HEHB		
Quote number	: SY/139/19		
No. of samples received	: 18		
No. of samples analysed	: 18		

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 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	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**

				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: 4041368)									
EP2114295-003	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	478	481	0.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	478	481	0.6	0% - 20%
EP2114295-013	0083_MW102_211123	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	314	314	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	314	314	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4040944)									
EP2114295-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	593	598	0.8	0% - 20%
EP2114295-011	0083_OTH102_211123	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2620	2580	1.4	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4040943)									
EP2114295-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2060	2080	0.6	0% - 20%
EP2114295-011	0083_OTH102_211123	ED045G: Chloride	16887-00-6	1	mg/L	19200	18900	1.4	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4042963)									
EP2114293-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	13	17	26.8	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	22	26	14.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	650	639	1.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	40	40	0.0	0% - 20%
EP2114295-005	0083_MW107_211123	ED093F: Calcium	7440-70-2	1	mg/L	402	410	1.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1350	1370	1.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10400	10600	1.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	509	511	0.4	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 4042964)									
EP2114295-015	0083_MW134_211123	ED093F: Calcium	7440-70-2	1	mg/L	394	401	1.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	965	978	1.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	8050	8180	1.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	390	396	1.5	0% - 20%
EP2114296-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	272	256	5.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	765	717	6.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	5510	5170	6.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	265	246	7.6	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4053403)									
EP2114295-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	2.80	2.58	8.4	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.39	0.36	7.4	0% - 20%
		EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	0.29	0.25	14.9	0% - 50%
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	0.27	0.25	7.7	0% - 50%
		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
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4053403)									
EP2114295-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.28	0.26	6.6	0% - 20%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.68	0.63	7.1	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	1.06	0.97	8.6	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.37	0.36	4.5	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 (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	0.2	0.2	0.0	No Limit
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4053403)									
EP2114295-001	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

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: 4053403) - continued									
EP2114295-001	Anonymous	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: 4053403)									
EP2114295-001	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	0.16	0.16	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: 4053403)									
EP2114295-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	6.55	6.07	7.6	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4041368)								
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	105	81.2	126
				<1	200 mg/L	99.9	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4040944)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.6	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 4040943)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	94.4	87.9	114
				<1	1000 mg/L	102	87.9	114
ED093F: Dissolved Major Cations (QCLot: 4042963)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	93.1	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.4	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	91.1	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	90.9	89.7	108
ED093F: Dissolved Major Cations (QCLot: 4042964)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	92.5	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.1	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	90.5	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.0	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4053403)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	126	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	124	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	109	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	115	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	116	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4053416)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	122	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	123	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	116	69.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4053416) - continued								
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	123	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	121	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4053403)								
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	119	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	129	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	130	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	127	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	119	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	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
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4053416)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	128	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	129	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	129	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	132	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	118	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	123	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	120	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	129	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	126	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	122	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4053403)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	129	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	111	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	104	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	111	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	118	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	133	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	115	61.0	135

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4053416)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	133	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	117	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	123	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	121	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	121	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	132	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	123	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4053403)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	136	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	129	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	111	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	89.2	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4053416)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	134	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	127	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	132	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	92.2	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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4040944)							
EP2114295-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4040943)							
EP2114295-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	94.5	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2114295**	Page	: 1 of 8
Amendment	: **1**		
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021
Site	: DEF19009/HEHB	Issue Date	: 07-Dec-2021
Sampler	: [redacted]	No. of samples received	: 27
Order number	: DEF19009/0082	No. of samples analysed	: 27

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

- **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	EP2114295--001	0082_MW122_211123	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

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	1	39	2.56	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	39	0.00	5.00	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 / ***Container*** / *Client Sample ID(s)*	***Sample Date***	*Extraction / Preparation*			*Analysis*		
		Date extracted	*Due for extraction*	*Evaluation*	***Date analysed***	*Due for analysis*	*Evaluation*
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0082_MW122_211123, 0082_MW103D_211123, 0082_MW326_211123, 0083_MW202_211123, 0083_MW107_211123, 0083_OTH002_211123, 0083_OTH103_211123, 0083_MW111_211123, 0083_MW112_211123, 0083_OTH104_211123, 0083_OTH102_211123, 0083_MW101_211123, 0083_MW102_211123, 0083_MW103_211123, 0083_MW134_211123	**23-Nov-2021**	**----**	----	----	**27-Nov-2021**	07-Dec-2021	✓

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)							
0082_MW122_211123, 0082_MW103D_211123, 0082_MW326_211123, 0083_MW202_211123, 0083_MW107_211123, 0083_OTH002_211123, 0083_OTH103_211123, 0083_MW111_211123, 0083_MW112_211123, 0083_OTH104_211123, 0083_OTH102_211123, 0083_MW101_211123, 0083_MW102_211123, 0083_MW103_211123, 0083_MW134_211123	**23-Nov-2021**	**----**	----	----	**01-Dec-2021**	21-Dec-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0082_MW122_211123, 0082_MW103D_211123, 0082_MW326_211123, 0083_MW202_211123, 0083_MW107_211123, 0083_OTH002_211123, 0083_OTH103_211123, 0083_MW111_211123, 0083_MW112_211123, 0083_OTH104_211123, 0083_OTH102_211123, 0083_MW101_211123, 0083_MW102_211123, 0083_MW103_211123, 0083_MW134_211123	**23-Nov-2021**	**----**	----	----	**01-Dec-2021**	21-Dec-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0082_MW122_211123, 0082_MW103D_211123, 0082_MW326_211123, 0083_MW202_211123, 0083_MW107_211123, 0083_OTH002_211123, 0083_OTH103_211123, 0083_MW111_211123, 0083_MW112_211123, 0083_OTH104_211123, 0083_OTH102_211123, 0083_MW101_211123, 0083_MW102_211123, 0083_MW103_211123, 0083_MW134_211123	**23-Nov-2021**	**----**	----	----	**30-Nov-2021**	30-Nov-2021	✓

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)							
0082_MW122_211123, 0082_MW103D_211123, 0082_MW326_211123, 0083_MW202_211123, 0083_MW107_211123, 0083_OTH002_211123, 0083_OTH103_211123, 0083_MW111_211123, 0083_MW112_211123, 0083_OTH104_211123, 0083_OTH102_211123, 0083_MW101_211123, 0083_MW102_211123, 0083_MW103_211123, 0083_MW134_211123, 0082_QC401_211123, 0082_QC301_211123, 0082_QC302_211123, 0082_QC402_211123, 0082_QC303_211123, 0082_QC403_211123, 0083_QC404_211123, 0083_QC304_211123, 0083_QC405_211123, 0083_QC305_211123, 0083_QC406_211123, 0083_QC306_211123	**23-Nov-2021**	**03-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0082_MW122_211123, 0082_MW103D_211123, 0082_MW326_211123, 0083_MW202_211123, 0083_MW107_211123, 0083_OTH002_211123, 0083_OTH103_211123, 0083_MW111_211123, 0083_MW112_211123, 0083_OTH104_211123, 0083_OTH102_211123, 0083_MW101_211123, 0083_MW102_211123, 0083_MW103_211123, 0083_MW134_211123, 0082_QC401_211123, 0082_QC301_211123, 0082_QC302_211123, 0082_QC402_211123, 0082_QC303_211123, 0082_QC403_211123, 0083_QC404_211123, 0083_QC304_211123, 0083_QC405_211123, 0083_QC305_211123, 0083_QC406_211123, 0083_QC306_211123	**23-Nov-2021**	**03-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-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
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0082_MW122_211123, 0082_MW103D_211123, 0082_MW326_211123, 0083_MW202_211123, 0083_MW107_211123, 0083_OTH002_211123, 0083_OTH103_211123, 0083_MW111_211123, 0083_MW112_211123, 0083_OTH104_211123, 0083_OTH102_211123, 0083_MW101_211123, 0083_MW102_211123, 0083_MW103_211123, 0083_MW134_211123, 0082_QC401_211123, 0082_QC301_211123, 0082_QC302_211123, 0082_QC402_211123, 0082_QC303_211123, 0082_QC403_211123, 0083_QC404_211123, 0083_QC304_211123, 0083_QC405_211123, 0083_QC305_211123, 0083_QC406_211123, 0083_QC306_211123	**23-Nov-2021**	**03-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0082_MW122_211123, 0082_MW103D_211123, 0082_MW326_211123, 0083_MW202_211123, 0083_MW107_211123, 0083_OTH002_211123, 0083_OTH103_211123, 0083_MW111_211123, 0083_MW112_211123, 0083_OTH104_211123, 0083_OTH102_211123, 0083_MW101_211123, 0083_MW102_211123, 0083_MW103_211123, 0083_MW134_211123, 0082_QC401_211123, 0082_QC301_211123, 0082_QC302_211123, 0082_QC402_211123, 0082_QC303_211123, 0082_QC403_211123, 0083_QC404_211123, 0083_QC304_211123, 0083_QC405_211123, 0083_QC305_211123, 0083_QC406_211123, 0083_QC306_211123	**23-Nov-2021**	**03-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-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
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0082_MW122_211123, 0082_MW103D_211123, 0082_MW326_211123, 0083_MW202_211123, 0083_MW107_211123, 0083_OTH002_211123, 0083_OTH103_211123, 0083_MW111_211123, 0083_MW112_211123, 0083_OTH104_211123, 0083_OTH102_211123, 0083_MW101_211123, 0083_MW102_211123, 0083_MW103_211123, 0083_MW134_211123, 0082_QC401_211123, 0082_QC301_211123, 0082_QC302_211123, 0082_QC402_211123, 0082_QC303_211123, 0082_QC403_211123, 0083_QC404_211123, 0083_QC304_211123, 0083_QC405_211123, 0083_QC305_211123, 0083_QC406_211123, 0083_QC306_211123	**23-Nov-2021**	**03-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓

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 PC 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	4	37	**10.81**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	39	**2.56**	**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 PC 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	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	**5.13**	**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 PC 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	2	37	**5.41**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	39	**5.13**	**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	0	39	**0.00**	**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 PC 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 SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. 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 BaSO4 suspension is measured by a photometer and the SO4-2 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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
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 SO4 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.

CHAIN OF CUSTODY

ALS COC#: 30540 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 1150 25/11/21	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MB_DEF19009/HEHA SW

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters Primary WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SW113		23/11/2021 09:34 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		Extra PFAS bottles for lab QC
002	0083_QC108		23/11/2021 09:36 AM	Water	ALS: 5 Non ALS: 0	No	Partial 1/8		Extra PFAS bottles for lab QC
003	0083_SW128		23/11/2021 02:53 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

Environmental Division Perth

Work Order Reference

EP2114297

Telephone : +61-8-9406 1301

Tuesday, November 23, 2021 9:03:47 AM

CHAIN OF CUSTODY

(ALS) COC#: **30540** *ALS Laboratory:* EP Perth

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

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MB_DEF19009/HEHA SW

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:			

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_SW113	Surface Waters Primary 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	0083_QC108	Surface Waters Primary WATER	Water	- EP231X PFAS - Full Suite (28 analytes)
003	0083_SW128	Surface Waters Primary 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#: **30540** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MB_DEF19009/HEHA SW

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_SW113	Clear Plastic Bottle - Natural	250 mL	00070621191264	Green	No	
001	0083_SW113	HDPE (no PTFE)	20 mL	00352101071784	Grey	No	
001	0083_SW113	HDPE (no PTFE)	20 mL	00352101071452	Grey	No	
001	0083_SW113	HDPE (no PTFE)	20 mL	00352101071261	Grey	No	
001	0083_SW113	HDPE (no PTFE)	20 mL	00352101071590	Grey	No	
002	0083_QC108	Clear Plastic Bottle - Natural	250 mL	00070621191132	Green	No	
002	0083_QC108	HDPE (no PTFE)	20 mL	00352101071069	Grey	No	
002	0083_QC108	HDPE (no PTFE)	20 mL	00352101070969	Grey	No	
002	0083_QC108	HDPE (no PTFE)	20 mL	00352101070787	Grey	No	
002	0083_QC108	HDPE (no PTFE)	20 mL	00352101071676	Grey	No	
003	0083_SW128	Clear Plastic Bottle - Natural	250 mL	00070621190901	Green	No	
003	0083_SW128	HDPE (no PTFE)	20 mL	00352101071878	Grey	No	
003	0083_SW128	HDPE (no PTFE)	20 mL	00352101071839	Grey	No	

Total Bottle Count: ALS: 13, Non ALS: 0

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2114297**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]cardno.com.au	E-mail	: nick.courts@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/0083	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 30540	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/HEHA		
Sampler	: [redacted]		

Dates

Date Samples Received	: 25-Nov-2021 11:50	Issue Date	: 26-Nov-2021
Client Requested Due Date	: 07-Dec-2021	Scheduled Reporting Date	: **07-Dec-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 21.8 - Ice present
Receipt Detail	:	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
- EP231X conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: 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.
- **EP231X analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **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)
EP2114297-001	23-Nov-2021 09:34	0083_SW113_211123	✓	✓	✓	✓
EP2114297-002	23-Nov-2021 09:36	0083_QC108_211123		✓		
EP2114297-003	23-Nov-2021 14:53	0083_SW128_211123	✓	✓	✓	✓

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

[redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]cardno.com.au
- Chain of Custody (CoC) (COC) Email [redacted]cardno.com.au
- EDI Format - ESDAT (ESDAT) Email [redacted]cardno.com.au
- EDI Format - XTab (XTAB) Email [redacted]cardno.com.au

Perth
- A4 - AU Tax Invoice (INV) Email perth@cardno.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2114297**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021 11:50
Order number	: DEF19009/0083	Date Analysis Commenced	: 27-Nov-2021
C-O-C number	: 30540	Issue Date	: 07-Dec-2021 10:59
Sampler	: [redacted]		
Site	: DEF19009/HEHA		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	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 Contact 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 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.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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	0083_SW113_211123	0083_QC108_211123	0083_SW128_211123	----	----
				Sampling date / time	23-Nov-2021 09:34	23-Nov-2021 09:36	23-Nov-2021 14:53	----	----
Compound	CAS Number	LOR	Unit		EP2114297-001	EP2114297-002	EP2114297-003	--------	--------
					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		<1	----	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**77**	----	**352**	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**77**	----	**352**	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**252**	----	**19600**	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**176**	----	**174000**	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**142**	----	**422**	----	----
Magnesium	7439-95-4	1	mg/L		**15**	----	**14200**	----	----
Sodium	7440-23-5	1	mg/L		**93**	----	**96400**	----	----
Potassium	7440-09-7	1	mg/L		**6**	----	**4970**	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**11.7**	----	**5320**	----	----
ø Total Cations	----	0.01	meq/L		**12.5**	----	**5510**	----	----
ø Ionic Balance	----	0.01	%		**3.17**	----	**1.72**	----	----
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		**0.30**	**0.32**	<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		**0.54**	**0.53**	<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		**0.87**	**0.89**	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.96**	**0.94**	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.39**	**0.40**	<0.02	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW113_211123	0083_QC108_211123	0083_SW128_211123	----	----
				Sampling date / time	23-Nov-2021 09:34	23-Nov-2021 09:36	23-Nov-2021 14:53	----	----
Compound	CAS Number	LOR	Unit		EP2114297-001	EP2114297-002	EP2114297-003	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.12**	**0.12**	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**0.05**	**0.05**	<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		**1.58**	**1.53**	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		**0.56**	**0.55**	<0.05	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW113_211123	0083_QC108_211123	0083_SW128_211123	----	----
				Sampling date / time	23-Nov-2021 09:34	23-Nov-2021 09:36	23-Nov-2021 14:53	----	----
Compound	CAS Number	LOR	Unit		EP2114297-001	EP2114297-002	EP2114297-003	--------	--------
					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		**5.37**	**5.33**	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.84**	**0.85**	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		**5.32**	**5.28**	<0.01	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**115**	**114**	**104**	----	----
13C8-PFOA	----	0.02	%		**103**	**104**	**103**	----	----

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) EP231C: Perfluoroalkyl Sulfonamides

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

(WATER) EP231P: PFAS Sums

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2114297**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021
Order number	: DEF19009/0083	Date Analysis Commenced	: 27-Nov-2021
C-O-C number	: 30540	Issue Date	: 07-Dec-2021
Sampler	: [redacted]		
Site	: DEF19009/HEHA		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
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 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	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**

				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: 4041369)									
EP2114296-009	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	250	254	1.5	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	250	254	1.5	0% - 20%
EP2114300-003	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	116	116	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	116	116	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4040524)									
EP2114294-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2230	2250	0.9	0% - 20%
EP2114296-009	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1530	1530	0.0	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4040523)									
EP2114294-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	16000	15900	0.2	0% - 20%
EP2114296-009	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	10200	10100	0.2	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4042964)									
EP2114295-015	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	394	401	1.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	965	978	1.4	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	8050	8180	1.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	390	396	1.5	0% - 20%
EP2114296-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	272	256	5.7	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	765	717	6.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	5510	5170	6.3	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	265	246	7.6	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: 4050916)									
EP2114297-001	0083_SW113_211123	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.30	0.30	0.0	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.54	0.49	11.5	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
EP2114300-004	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
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4050916)									
EP2114297-001	0083_SW113_211123	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.12	0.11	0.0	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.87	0.76	13.3	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.96	0.92	3.9	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.39	0.37	6.1	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.05	0.05	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
EP2114300-004	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 (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: 4050916)									
EP2114297-001	0083_SW113_211123	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: 4050916) - continued									
EP2114297-001	0083_SW113_211123	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
EP2114300-004	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4050916)									
EP2114297-001	0083_SW113_211123	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	1.58	1.44	9.2	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	0.56	0.49	12.3	0% - 50%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2114300-004	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
EP231P: PFAS Sums (QC Lot: 4050916)									

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: 4050916) - continued									
EP2114297-001	0083_SW113_211123	EP231X: Sum of PFAS	----	0.01	µg/L	5.37	4.93	8.5	0% - 20%
EP2114300-004	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4041369)								
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	107	81.2	126
				<1	200 mg/L	102	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4040524)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.9	87.7	113
				<1	500 mg/L	102	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 4040523)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.1	87.9	114
				<1	1000 mg/L	103	87.9	114
ED093F: Dissolved Major Cations (QCLot: 4042964)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	92.5	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.1	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	90.5	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.0	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4050916)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	92.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	101	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	100	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	111	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	83.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	95.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4050916)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	89.4	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	84.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	108	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	98.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	91.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	92.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	88.6	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4050916) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	89.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	81.8	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4050916)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	86.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	81.5	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	79.0	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	77.8	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	82.5	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	95.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	102	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4050916)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	85.4	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	86.2	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	106	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	95.4	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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4040524)							
EP2114294-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4040523)							
EP2114294-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4050916)							
EP2114296-014	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	# Not Determined	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	# Not Determined	71.0	127

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: 4050916) - continued							
EP2114296-014	Anonymous	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	126	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	114	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	111	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4050916)							
EP2114296-014	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	106	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	# Not Determined	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	# Not Determined	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	119	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	120	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	108	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	119	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	104	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	111	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	99.2	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	103	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4050916)							
EP2114296-014	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	89.3	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	97.0	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	87.8	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	95.0	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	115	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	118	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4050916)							
EP2114296-014	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	98.2	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	103	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	104	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	106	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2114297**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021
Site	: DEF19009/HEHA	Issue Date	: 07-Dec-2021
Sampler	: [redacted]	No. of samples received	: 3
Order number	: DEF19009/0083	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

- **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 SO4 2- by DA	EP2114294--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	EP2114294--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	EP2114296--014	Anonymous	**Perfluorobutane sulfonic acid (PFBS)**	375-73-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2114296--014	Anonymous	**Perfluoropentane sulfonic acid (PFPeS)**	2706-91-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2114296--014	Anonymous	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2114296--014	Anonymous	**Perfluoropentanoic acid (PFPeA)**	2706-90-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2114296--014	Anonymous	**Perfluorohexanoic acid (PFHxA)**	307-24-4	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 / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0083_SW113_211123,	0083_SW128_211123	**23-Nov-2021**	**----**	----	----	**27-Nov-2021**	07-Dec-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0083_SW113_211123,	0083_SW128_211123	**23-Nov-2021**	**----**	----	----	**02-Dec-2021**	21-Dec-2021	✓

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)								
0083_SW113_211123,	0083_SW128_211123	**23-Nov-2021**	**----**	----	----	**02-Dec-2021**	21-Dec-2021	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0083_SW113_211123,	0083_SW128_211123	**23-Nov-2021**	**----**	----	----	**30-Nov-2021**	30-Nov-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0083_SW113_211123, 0083_SW128_211123	0083_QC108_211123,	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0083_SW113_211123, 0083_SW128_211123	0083_QC108_211123,	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0083_SW113_211123, 0083_SW128_211123	0083_QC108_211123,	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0083_SW113_211123, 0083_SW128_211123	0083_QC108_211123,	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0083_SW113_211123, 0083_SW128_211123	0083_QC108_211123,	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓

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 PC 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	17	**11.76**	**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 PC 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	17	**5.88**	**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 PC 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	17	**5.88**	**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 PC 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 SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. 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 BaSO4 suspension is measured by a photometer and the SO4-2 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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
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 SO4 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.

CHAIN OF CUSTODY

COC#: **30541** *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 10 1150 25/11/21	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MB_DEF19009/HEHA SED

ORDER NO: DEF19009/0083

PROJECT MANAGER: Maelle Bourdais CONTACT PH: SAMPLER MOBILE:

PRIMARY SAMPLER: Maelle Bourdais QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: derp.labreports@esdat.com.au, maelle.bourdais@cardno.com.au

EMAIL INVOICES TO: claire.armstrong@cardno.com.au, perth@cardno.com.au

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	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SD113		23/11/2021 09:37 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
002	0083_QC108		23/11/2021 09:38 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
003	0083_SD127		23/11/2021 02:29 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
004	0083_SD128		23/11/2021 02:40 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
005	0083_SD126		23/11/2021 03:10 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		

Environmental Division
Perth
Work Order Reference
EP2114299

Telephone : +61-8-9406 1301

CHAIN OF CUSTODY

(ALS) COC#: **30541** *ALS Laboratory:* EP Perth

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

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MB_DEF19009/HEHA SED

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_SD113	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
002	0083_QC108	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
003	0083_SD127	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
004	0083_SD128	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
005	0083_SD126	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

COC#: **30541** *ALS Laboratory:* EP Perth

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

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MB_DEF19009/HEHA SED

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_SD113	HDPE Soil Jar	200 mL	00621019074661	Grey	No	
002	0083_QC108	HDPE Soil Jar	200 mL	00621019074670	Grey	No	
003	0083_SD127	HDPE Soil Jar	200 mL	00621019074664	Grey	No	
004	0083_SD128	HDPE Soil Jar	200 mL	00621019074689	Grey	No	
005	0083_SD126	HDPE Soil Jar	200 mL	00621019074699	Grey	No	

Total Bottle Count: ALS: 5, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2114299**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]cardno.com.au	E-mail	: ALSEnviro.Perth@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/0083	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 30541	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/HEHA		
Sampler	: [redacted]		

Dates

Date Samples Received	: 25-Nov-2021 11:00	Issue Date	: 26-Nov-2021
Client Requested Due Date	: 07-Dec-2021	Scheduled Reporting Date	: **07-Dec-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 21.8 - Ice present
Receipt Detail	:	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 discrepencies: 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.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **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)
EP2114299-001	23-Nov-2021 09:37	0083_SD113_211123	✓	✓
EP2114299-002	23-Nov-2021 09:38	0083_QC108_211123	✓	✓
EP2114299-003	23-Nov-2021 14:29	0083_SD127_211123	✓	✓
EP2114299-004	23-Nov-2021 14:40	0083_SD128_211123	✓	✓
EP2114299-005	23-Nov-2021 15:10	0083_SD126_211123	✓	✓

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

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]cardno.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]cardno.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]cardno.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]cardno.com.au

Perth
- A4 - AU Tax Invoice (INV) — Email — perth@cardno.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2114299**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021 11:00
Order number	: DEF19009/0083	Date Analysis Commenced	: 02-Dec-2021
C-O-C number	: 30541	Issue Date	: 07-Dec-2021 10:58
Sampler	: [redacted]		
Site	: DEF19009/HEHA		
Quote number	: SY/139/19		
No. of samples received	: 5		
No. of samples analysed	: 5		

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*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	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 Contact 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**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_SD113_211123	0083_QC108_211123	0083_SD127_211123	0083_SD128_211123	0083_SD126_211123
				Sampling date / time	23-Nov-2021 09:37	23-Nov-2021 09:38	23-Nov-2021 14:29	23-Nov-2021 14:40	23-Nov-2021 15:10
					EP2114299-001	EP2114299-002	EP2114299-003	EP2114299-004	EP2114299-005
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**14.1**	**9.5**	**15.6**	**22.4**	**16.0**
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		**0.0012**	**0.0012**	<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		**0.0051**	**0.0046**	<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		**0.0019**	**0.0011**	<0.0002	<0.0002	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		**0.0015**	**0.0008**	<0.0002	<0.0002	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		**0.0008**	**0.0005**	<0.0002	<0.0002	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		**0.0004**	**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	0083_SD113_211123	0083_QC108_211123	0083_SD127_211123	0083_SD128_211123	0083_SD126_211123
				Sampling date / time	23-Nov-2021 09:37	23-Nov-2021 09:38	23-Nov-2021 14:29	23-Nov-2021 14:40	23-Nov-2021 15:10
Compound	CAS Number	LOR	Unit		EP2114299-001	EP2114299-002	EP2114299-003	EP2114299-004	EP2114299-005
					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		**0.0066**	**0.0059**	<0.0005	<0.0005	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		**0.0088**	**0.0080**	<0.0005	<0.0005	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		**0.0006**	<0.0005	<0.0005	<0.0005	<0.0005
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		**0.0269**	**0.0223**	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0063**	**0.0058**	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0263**	**0.0223**	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**112**	**96.0**	**115**	**94.0**	**106**
13C8-PFOA	----	0.0002	%		**93.0**	**88.0**	**97.0**	**96.0**	**93.0**

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)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2114299**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021
Order number	: DEF19009/0083	Date Analysis Commenced	: 02-Dec-2021
C-O-C number	: 30541	Issue Date	: 07-Dec-2021
Sampler	: [redacted]		
Site	: DEF19009/HEHA		
Quote number	: SY/139/19		
No. of samples received	: 5		
No. of samples analysed	: 5		

ilac-MRA NATA
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 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*
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	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: 4052950)									
EM2123919-001	Anonymous	EA055: Moisture Content	----	0.1	%	18.0	19.6	8.7	0% - 20%
EM2123919-011	Anonymous	EA055: Moisture Content	----	0.1	%	20.3	20.3	0.0	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4052951)									
EP2114299-004	0083_SD128_211123	EA055: Moisture Content	----	0.1	%	22.4	22.9	2.2	0% - 20%
ES2143515-005	Anonymous	EA055: Moisture Content	----	0.1	%	12.0	12.2	1.3	0% - 50%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4050038)									
EP2114299-001	0083_SD113_211123	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	0.0012	0.0009	22.3	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	0.0051	0.0051	0.0	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
ES2143536-027	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	0.0005	0.0005	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: 4050038)									
EP2114299-001	0083_SD113_211123	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0019	0.0017	8.1	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0015	0.0014	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0008	0.0007	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0004	0.0004	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: 4050038) - continued									
EP2114299-001	0083_SD113_211123	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
ES2143536-027	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 (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: 4050038)									
EP2114299-001	0083_SD113_211123	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
ES2143536-027	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

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: 4050038) - continued									
ES2143536-027	Anonymous	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: 4050038)									
EP2114299-001	0083_SD113_211123	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	0.0066	0.0076	13.7	0% - 50%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	0.0088	0.0099	11.8	0% - 50%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	0.0006	0.0006	0.0	No Limit
ES2143536-027	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4050038)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4050038)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	94.2	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	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	114	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	119	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4050038)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	100	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	128	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	118	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	124	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4050038)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	109	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	118	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	114	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4050038) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	75.6	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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4050038)							
EP2114299-001	0083_SD113_211123	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	126	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	116	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	97.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	119	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	73.2	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	118	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4050038)							
EP2114299-001	0083_SD113_211123	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	99.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	104	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	121	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	110	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	122	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	113	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	119	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	124	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	115	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	98.8	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	122	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4050038)							
EP2114299-001	0083_SD113_211123	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	128	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	96.5	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	120	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	101	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	101	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	119	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: 4050038) - continued							
EP2114299-001	0083_SD113_211123	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	123	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4050038)							
EP2114299-001	0083_SD113_211123	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	107	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	# Not Determined	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	# Not Determined	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	73.2	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2114299**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021
Site	: DEF19009/HEHA	Issue Date	: 07-Dec-2021
Sampler	: [redacted]	No. of samples received	: 5
Order number	: DEF19009/0083	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.**
- **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							
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EP2114299--001	0083_SD113_211123	**6:2 Fluorotelomer sulfonic acid (6:2 FTS)**	27619-97-2	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EP2114299--001	0083_SD113_211123	**8:2 Fluorotelomer sulfonic acid (8:2 FTS)**	39108-34-4	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 / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055)							
0083_SD113_211123, 0083_QC108_211123, 0083_SD127_211123, 0083_SD128_211123, 0083_SD126_211123	**23-Nov-2021**	**----**	----	----	**03-Dec-2021**	07-Dec-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0083_SD113_211123, 0083_QC108_211123, 0083_SD127_211123, 0083_SD128_211123, 0083_SD126_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	11-Jan-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0083_SD113_211123, 0083_QC108_211123, 0083_SD127_211123, 0083_SD128_211123, 0083_SD126_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	11-Jan-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0083_SD113_211123, 0083_QC108_211123, 0083_SD127_211123, 0083_SD128_211123, 0083_SD126_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	11-Jan-2022	✓

Matrix: **SOIL**

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
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0083_SD113_211123, 0083_QC108_211123, 0083_SD127_211123, 0083_SD128_211123, 0083_SD126_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	11-Jan-2022	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0083_SD113_211123, 0083_QC108_211123, 0083_SD127_211123, 0083_SD128_211123, 0083_SD126_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	11-Jan-2022	✓

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	40	**10.00**	**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
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**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#: 30539 *ALS Laboratory:* EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: NW 1150 25/11/21	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: CG - DEF19009/HEHA GW

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters Primary WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW117_4-4.5_211123		23/11/2021 09:46 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0083_QC110_211123	Duplicate PFAS only	23/11/2021 09:49 AM	Water	ALS: 2 Non ALS: 0	No	Partial 1/8		
003	0083_MW116_4.5-5.0_211123		23/11/2021 10:50 AM	Water	ALS: 6 Non ALS: 0	No	Partial 4/8	Extra lab QC PFAS	Extra lab QC PFAS
004	0083_MW115_2-3_211123		23/11/2021 11:29 AM	Water	ALS: 6 Non ALS: 0	No	Partial 4/8	Extra lab QC PFAS	Extra lab QC PFAS
005	0083_MW114_2.0-3.0_211123		23/11/2021 11:34 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0083_MW113_2.5-3.5_211123		23/11/2021 11:41 AM	Water	ALS: 6 Non ALS: 0	No	Partial 4/8	Extra lab QC PFAS	Extra lab QC PFAS
007	0083_MW104_5.5-6_211123		23/11/2021 01:47 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
008	0083_QC114_211123		23/11/2021 01:58 PM	Water	ALS: 2 Non ALS: 0	No	Partial 1/8		
009	0083_MW017_211123		23/11/2021 02:27 PM	Water	ALS: 6 Non ALS: 0	No	Partial 4/8	Extra lab QC PFAS	Extra lab QC PFAS

Environmental Division
Perth
Work Order Reference
EP2114300

Telephone : - 61-8-9406 1301

CHAIN OF CUSTODY

(ALS) COC#: **30539** *ALS Laboratory:* EP Perth

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

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: CG - DEF19009/HEHA GW

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters Primary WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0083_MW129_1.5-2_211123		23/11/2021 03:07 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

(ALS) COC#: 30539 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: CG - DEF19009/HEHA GW

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH: SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_MW117_4-4.5_211123	Ground Waters Primary 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	0083_QC110_211123	Ground Waters Primary WATER	Water	- EP231X PFAS - Full Suite (28 analytes)
003	0083_MW116_4.5-5.0_211123	Ground Waters Primary 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	0083_MW115_2-3_211123	Ground Waters Primary 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	0083_MW114_2.0-3.0_211123	Ground Waters Primary 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	0083_MW113_2.5-3.5_211123	Ground Waters Primary 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	0083_MW104_5.5-6_211123	Ground Waters Primary 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	0083_QC114_211123	Ground Waters Primary WATER	Water	- EP231X PFAS - Full Suite (28 analytes)
009	0083_MW017_211123	Ground Waters Primary 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)
010	0083_MW129_1.5-2_211123	Ground Waters Primary 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#: 30539 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: CG - DEF19009/HEHA GW

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19 / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_MW117_4-	Clear Plastic Bottle - Natural	250 mL	00070719042738	Green	No	
001	0083_MW117_4-	HDPE (no PTFE)	20 mL	00352005005085	Grey	No	
001	0083_MW117_4-	HDPE (no PTFE)	20 mL	00350019164378	Grey	No	
002	0083_QC110_211123	HDPE (no PTFE)	20 mL	00352005005150	Grey	No	
002	0083_QC110_211123	HDPE (no PTFE)	20 mL	00350019164172	Grey	No	
003	0083_MW116_4.5-	Clear Plastic Bottle - Natural	250 mL	00070220142719	Green	No	
003	0083_MW116_4.5-	Clear Plastic Bottle - Natural	250 mL	00070220142821	Green	No	
003	0083_MW116_4.5-	HDPE (no PTFE)	20 mL	00350019164227	Grey	No	
003	0083_MW116_4.5-	HDPE (no PTFE)	20 mL	00350019164001	Grey	No	
003	0083_MW116_4.5-	HDPE (no PTFE)	20 mL	00352010040052	Grey	No	
003	0083_MW116_4.5-	HDPE (no PTFE)	20 mL	00352010040140	Grey	No	
004	0083_MW115_2-3_211123	Clear Plastic Bottle - Natural	250 mL	00070220142643	Green	No	
004	0083_MW115_2-3_211123	Clear Plastic Bottle - Natural	250 mL	00070220142898	Green	No	
004	0083_MW115_2-3_211123	HDPE (no PTFE)	20 mL	00350019164212	Grey	No	
004	0083_MW115_2-3_211123	HDPE (no PTFE)	20 mL	00352010039958	Grey	No	
004	0083_MW115_2-3_211123	HDPE (no PTFE)	20 mL	00352010039970	Grey	No	
004	0083_MW115_2-3_211123	HDPE (no PTFE)	20 mL	00350019164311	Grey	No	
005	0083_MW114_2.0-	Clear Plastic Bottle - Natural	250 mL	00070719042947	Green	No	
005	0083_MW114_2.0-	HDPE (no PTFE)	20 mL	00350019106666	Grey	No	
005	0083_MW114_2.0-	HDPE (no PTFE)	20 mL	00350019106676	Grey	No	
006	0083_MW113_2.5-	Clear Plastic Bottle - Natural	250 mL	00070220142892	Green	No	
006	0083_MW113_2.5-	Clear Plastic Bottle - Natural	250 mL	00070220142883	Green	No	
006	0083_MW113_2.5-	HDPE (no PTFE)	20 mL	00350019163946	Grey	No	
006	0083_MW113_2.5-	HDPE (no PTFE)	20 mL	00352010040081	Grey	No	
006	0083_MW113_2.5-	HDPE (no PTFE)	20 mL	00350019164214	Grey	No	
006	0083_MW113_2.5-	HDPE (no PTFE)	20 mL	00352010040495	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: **30539** *ALS Laboratory:* EP Perth

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

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: CG - DEF19009/HEHA GW

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

007	0083_MW104_5.5-	Clear Plastic Bottle - Natural	250 mL	00070519143690	Green	No	
007	0083_MW104_5.5-	HDPE (no PTFE)	20 mL	00350019164389	Grey	No	
007	0083_MW104_5.5-	HDPE (no PTFE)	20 mL	00350019164094	Grey	No	
008	0083_QC114_211123	HDPE (no PTFE)	20 mL	00352010040263	Grey	No	
008	0083_QC114_211123	HDPE (no PTFE)	20 mL	00352010040033	Grey	No	
009	0083_MW017_211123	Clear Plastic Bottle - Natural	250 mL	00070220142728	Green	No	
009	0083_MW017_211123	Clear Plastic Bottle - Natural	250 mL	00070220142891	Green	No	
009	0083_MW017_211123	HDPE (no PTFE)	20 mL	00352005019723	Grey	No	
009	0083_MW017_211123	HDPE (no PTFE)	20 mL	00350019164250	Grey	No	
009	0083_MW017_211123	HDPE (no PTFE)	20 mL	00352005019730	Grey	No	
009	0083_MW017_211123	HDPE (no PTFE)	20 mL	00350019164035	Grey	No	
010	0083_MW129_1.5-	Clear Plastic Bottle - Natural	250 mL	00071119012744	Green	No	
010	0083_MW129_1.5-	HDPE (no PTFE)	20 mL	00350019165783	Grey	No	
010	0083_MW129_1.5-	HDPE (no PTFE)	20 mL	00350019112544	Grey	No	

Total Bottle Count: ALS: 40, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2114300**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]cardno.com.au	E-mail	: nick.courts@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/0083	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 30539	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/HEHA		
Sampler	: [redacted]		

Dates

Date Samples Received	: 25-Nov-2021 11:50	Issue Date	: 26-Nov-2021
Client Requested Due Date	: 07-Dec-2021	Scheduled Reporting Date	: **07-Dec-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 21.8 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 10 / 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 discrepencies: 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.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **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.

EP2114300-001	: 23-Nov-2021 09:46	: 0083_MW117_4-4.5_211123
EP2114300-002	: 23-Nov-2021 09:49	: 0083_QC110_211123 - Duplicate PFAS only
EP2114300-003	: 23-Nov-2021 10:50	: 0083_MW116_4.5-5.0_211123
EP2114300-004	: 23-Nov-2021 11:29	: 0083_MW115_2-3_211123
EP2114300-005	: 23-Nov-2021 11:34	: 0083_MW114_2.0-3.0_211123
EP2114300-006	: 23-Nov-2021 11:41	: 0083_MW113_2.5-3.5_211123
EP2114300-007	: 23-Nov-2021 13:47	: 0083_MW104_5.5-6_211123
EP2114300-010	: 23-Nov-2021 15:07	: 0083_MW129_1.5-2_211123

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*	(On Hold) WATER No analysis requested	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)
EP2114300-001	23-Nov-2021 09:46	0083_MW117_4-4.5_211...		✓	✓	✓	✓
EP2114300-002	23-Nov-2021 09:49	0083_QC110_211123 D...	✓				
EP2114300-003	23-Nov-2021 10:50	0083_MW116_4.5-5.0_2...		✓	✓	✓	✓
EP2114300-004	23-Nov-2021 11:29	0083_MW115_2-3_211123		✓	✓	✓	✓
EP2114300-005	23-Nov-2021 11:34	0083_MW114_2.0-3.0_2...		✓	✓	✓	✓
EP2114300-006	23-Nov-2021 11:41	0083_MW113_2.5-3.5_2...		✓	✓	✓	✓
EP2114300-007	23-Nov-2021 13:47	0083_MW104_5.5-6_211...		✓	✓	✓	✓
EP2114300-008	23-Nov-2021 13:58	0083_QC114_211123	✓				
EP2114300-009	23-Nov-2021 14:27	0083_MW017_211123		✓	✓	✓	✓
EP2114300-010	23-Nov-2021 15:07	0083_MW129_1.5-2_211...		✓	✓	✓	✓

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

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]cardno.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]cardno.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]cardno.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]cardno.com.au

Perth
- A4 - AU Tax Invoice (INV) — Email — perth@cardno.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2114300**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021 11:50
Order number	: DEF19009/0083	Date Analysis Commenced	: 27-Nov-2021
C-O-C number	: 30539	Issue Date	: 07-Dec-2021 11:00
Sampler	: [redacted]		
Site	: DEF19009/HEHA		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 8		

ilac-MRA NATA
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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	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 Contact 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.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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	0083_MW117_4-4.5_211123	0083_MW116_4.5-5.0_211123	0083_MW115_2-3_211123	0083_MW114_2.0-3.0_211123	0083_MW113_2.5-3.5_211123
				Sampling date / time	23-Nov-2021 09:46	23-Nov-2021 10:50	23-Nov-2021 11:29	23-Nov-2021 11:34	23-Nov-2021 11:41
Compound	CAS Number	LOR	Unit		EP2114300-001	EP2114300-003	EP2114300-004	EP2114300-005	EP2114300-006
					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		**154**	**116**	**167**	**143**	**131**
Total Alkalinity as CaCO3	----	1	mg/L		**154**	**116**	**167**	**143**	**131**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**1650**	**2520**	**2270**	**2440**	**2290**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**12800**	**18800**	**16300**	**17900**	**17200**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**349**	**498**	**436**	**470**	**447**
Magnesium	7439-95-4	1	mg/L		**1030**	**1590**	**1290**	**1460**	**1380**
Sodium	7440-23-5	1	mg/L		**7620**	**12200**	**10000**	**11200**	**10600**
Potassium	7440-09-7	1	mg/L		**399**	**643**	**518**	**589**	**552**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**398**	**585**	**510**	**558**	**535**
ø Total Cations	----	0.01	meq/L		**444**	**703**	**576**	**646**	**611**
ø Ionic Balance	----	0.01	%		**5.38**	**9.14**	**6.05**	**7.24**	**6.59**
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**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_MW117_4-4.5_211123	0083_MW116_4.5-5.0_211123	0083_MW115_2-3_211123	0083_MW114_2.0-3.0_211123	0083_MW113_2.5-3.5_211123
				Sampling date / time	23-Nov-2021 09:46	23-Nov-2021 10:50	23-Nov-2021 11:29	23-Nov-2021 11:34	23-Nov-2021 11:41
					EP2114300-001	EP2114300-003	EP2114300-004	EP2114300-005	EP2114300-006
					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**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_MW117_4-4.5_211123	0083_MW116_4.5-5.0_211123	0083_MW115_2-3_211123	0083_MW114_2.0-3.0_211123	0083_MW113_2.5-3.5_211123
				Sampling date / time	23-Nov-2021 09:46	23-Nov-2021 10:50	23-Nov-2021 11:29	23-Nov-2021 11:34	23-Nov-2021 11:41
					EP2114300-001	EP2114300-003	EP2114300-004	EP2114300-005	EP2114300-006
					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	%		**110**	**101**	**110**	**105**	**113**
13C8-PFOA	----	0.02	%		**110**	**107**	**104**	**107**	**108**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW104_5.5-6_211123	0083_MW017_211123	0083_MW129_1.5-2_211123	----	----
				Sampling date / time	23-Nov-2021 13:47	23-Nov-2021 14:27	23-Nov-2021 15:07	----	----
Compound	CAS Number	LOR	Unit		EP2114300-007	EP2114300-009	EP2114300-010	--------	--------
					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		925	295	296	----	----
Total Alkalinity as CaCO3	----	1	mg/L		925	295	296	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		827	1370	2270	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		5220	8600	17800	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		258	300	540	----	----
Magnesium	7439-95-4	1	mg/L		465	647	1390	----	----
Sodium	7440-23-5	1	mg/L		2970	4690	10800	----	----
Potassium	7440-09-7	1	mg/L		185	265	513	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		183	277	555	----	----
ø Total Cations	----	0.01	meq/L		185	279	624	----	----
ø Ionic Balance	----	0.01	%		0.57	0.36	5.84	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	0.06	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	0.04	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	0.96	<0.01	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	0.15	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	14.2	<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	0.6	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	1.93	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	2.38	<0.02	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW104_5.5-6_211123	0083_MW017_211123	0083_MW129_1.5-2_211123	----	----
				Sampling date / time	23-Nov-2021 13:47	23-Nov-2021 14:27	23-Nov-2021 15:07	----	----
Compound	CAS Number	LOR	Unit		EP2114300-007	EP2114300-009	EP2114300-010	--------	--------
					Result	Result	Result	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.77**	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.50**	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<0.02	**0.05**	<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	**5.20**	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	**0.88**	<0.05	----	----

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW104_5.5-6_211123	0083_MW017_211123	0083_MW129_1.5-2_211123	----	----
				Sampling date / time	23-Nov-2021 13:47	23-Nov-2021 14:27	23-Nov-2021 15:07	----	----
Compound	CAS Number	LOR	Unit		EP2114300-007	EP2114300-009	EP2114300-010	--------	--------
					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	**27.7**	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**15.2**	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**27.5**	<0.01	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**112**	**109**	**111**	----	----
13C8-PFOA	----	0.02	%		**105**	**102**	**105**	----	----

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2114300**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021
Order number	: DEF19009/0083	Date Analysis Commenced	: 27-Nov-2021
C-O-C number	: 30539	Issue Date	: 07-Dec-2021
Sampler	: [redacted]		
Site	: DEF19009/HEHA		
Quote number	: SY/139/19		
No. of samples received	: 10		
No. of samples analysed	: 8		

ilac-MRA NATA
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 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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	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**

				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: 4041369)									
EP2114296-009	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	250	254	1.5	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	250	254	1.5	0% - 20%
EP2114300-003	0083_MW116_4.5-5.0_211123	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	116	116	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	116	116	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4040534)									
EP2114300-001	0083_MW117_4-4.5_211123	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1650	1660	0.2	0% - 20%
EP2114301-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2530	2540	0.5	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4040533)									
EP2114300-001	0083_MW117_4-4.5_211123	ED045G: Chloride	16887-00-6	1	mg/L	12800	12800	0.2	0% - 20%
EP2114301-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	18700	18600	0.1	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4042966)									
EP2114258-007	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	20	20	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	32	31	3.8	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	197	192	2.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	10	9	0.0	No Limit
EP2114300-007	0083_MW104_5.5-6_211123	ED093F: Calcium	7440-70-2	1	mg/L	258	247	4.2	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: 4042966) - continued									
EP2114300-007	0083_MW104_5.5-6_211123	ED093F: Magnesium	7439-95-4	1	mg/L	465	444	4.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2970	2800	5.9	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	185	170	8.1	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4050916)									
EP2114297-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.30	0.30	0.0	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.54	0.49	11.5	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
EP2114300-004	0083_MW115_2-3_211123	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: 4050916)									
EP2114297-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.12	0.11	0.0	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.87	0.76	13.3	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.96	0.92	3.9	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.39	0.37	6.1	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.05	0.05	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
EP2114300-004	0083_MW115_2-3_211123	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

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: 4050916)									
EP2114297-001	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
EP2114300-004	0083_MW115_2-3_211123	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: 4050916)									
EP2114297-001	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	1.58	1.44	9.2	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	0.56	0.49	12.3	0% - 50%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2114300-004	0083_MW115_2-3_211123	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: 4050916) - continued									
EP2114300-004	0083_MW115_2-3_211123	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: 4050916)									
EP2114297-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	5.37	4.93	8.5	0% - 20%
EP2114300-004	0083_MW115_2-3_211123	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4041369)								
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	107	81.2	126
				<1	200 mg/L	102	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4040534)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 4040533)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	87.9	114
				<1	1000 mg/L	103	87.9	114
ED093F: Dissolved Major Cations (QCLot: 4042966)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100.0	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.1	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4050916)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	92.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	101	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	100	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	111	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	83.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	95.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4050916)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	89.4	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	84.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	108	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	98.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	91.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	92.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	88.6	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4050916) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	89.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	81.8	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4050916)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	86.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	81.5	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	79.0	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	77.8	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	82.5	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	95.0	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	102	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4050916)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	85.4	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	86.2	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	106	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	95.4	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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4040534)							
EP2114300-001	0083_MW117_4-4.5_211123	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4040533)							
EP2114300-001	0083_MW117_4-4.5_211123	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4050916)							
EP2114296-014	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	# Not Determined	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	# Not Determined	71.0	127

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: 4050916) - continued							
EP2114296-014	Anonymous	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	126	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	114	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	111	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4050916)							
EP2114296-014	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	106	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	# Not Determined	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	# Not Determined	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	119	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	120	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	108	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	119	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	104	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	111	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	99.2	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	103	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4050916)							
EP2114296-014	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	89.3	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	97.0	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	87.8	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	95.0	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	115	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	118	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4050916)							
EP2114296-014	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	98.2	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	103	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	104	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	106	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2114300**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021
Site	: DEF19009/HEHA	Issue Date	: 07-Dec-2021
Sampler	: [redacted]	No. of samples received	: 10
Order number	: DEF19009/0083	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.**

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	EP2114300--001	0083_MW117_4-4.5_211123	**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	EP2114300--001	0083_MW117_4-4.5_211123	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2114296--014	Anonymous	**Perfluorobutane sulfonic acid (PFBS)**	375-73-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2114296--014	Anonymous	**Perfluoropentane sulfonic acid (PFPeS)**	2706-91-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2114296--014	Anonymous	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2114296--014	Anonymous	**Perfluoropentanoic acid (PFPeA)**	2706-90-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2114296--014	Anonymous	**Perfluorohexanoic acid (PFHxA)**	307-24-4	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 / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0083_MW117_4-4.5_211123,	0083_MW116_4.5-5.0_211123,	**23-Nov-2021**	**----**	----	----	**27-Nov-2021**	07-Dec-2021	✓
0083_MW115_2-3_211123,	0083_MW114_2.0-3.0_211123,							
0083_MW113_2.5-3.5_211123,	0083_MW104_5.5-6_211123,							
0083_MW017_211123,	0083_MW129_1.5-2_211123							

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)							
0083_MW117_4-4.5_211123, 0083_MW116_4.5-5.0_211123, 0083_MW115_2-3_211123, 0083_MW114_2.0-3.0_211123, 0083_MW113_2.5-3.5_211123, 0083_MW104_5.5-6_211123, 0083_MW017_211123, 0083_MW129_1.5-2_211123	**23-Nov-2021**	**----**	----	----	**06-Dec-2021**	21-Dec-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_MW117_4-4.5_211123, 0083_MW116_4.5-5.0_211123, 0083_MW115_2-3_211123, 0083_MW114_2.0-3.0_211123, 0083_MW113_2.5-3.5_211123, 0083_MW104_5.5-6_211123, 0083_MW017_211123, 0083_MW129_1.5-2_211123	**23-Nov-2021**	**----**	----	----	**06-Dec-2021**	21-Dec-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_MW117_4-4.5_211123, 0083_MW116_4.5-5.0_211123, 0083_MW115_2-3_211123, 0083_MW114_2.0-3.0_211123, 0083_MW113_2.5-3.5_211123, 0083_MW104_5.5-6_211123, 0083_MW017_211123, 0083_MW129_1.5-2_211123	**23-Nov-2021**	**----**	----	----	**30-Nov-2021**	30-Nov-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW117_4-4.5_211123, 0083_MW116_4.5-5.0_211123, 0083_MW115_2-3_211123, 0083_MW114_2.0-3.0_211123, 0083_MW113_2.5-3.5_211123, 0083_MW104_5.5-6_211123, 0083_MW017_211123, 0083_MW129_1.5-2_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW117_4-4.5_211123, 0083_MW116_4.5-5.0_211123, 0083_MW115_2-3_211123, 0083_MW114_2.0-3.0_211123, 0083_MW113_2.5-3.5_211123, 0083_MW104_5.5-6_211123, 0083_MW017_211123, 0083_MW129_1.5-2_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_MW117_4-4.5_211123, 0083_MW116_4.5-5.0_211123, 0083_MW115_2-3_211123, 0083_MW114_2.0-3.0_211123, 0083_MW113_2.5-3.5_211123, 0083_MW104_5.5-6_211123, 0083_MW017_211123, 0083_MW129_1.5-2_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW117_4-4.5_211123, 0083_MW116_4.5-5.0_211123, 0083_MW115_2-3_211123, 0083_MW114_2.0-3.0_211123, 0083_MW113_2.5-3.5_211123, 0083_MW104_5.5-6_211123, 0083_MW017_211123, 0083_MW129_1.5-2_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-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
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_MW117_4-4.5_211123, 0083_MW116_4.5-5.0_211123, 0083_MW115_2-3_211123, 0083_MW114_2.0-3.0_211123, 0083_MW113_2.5-3.5_211123, 0083_MW104_5.5-6_211123, 0083_MW017_211123, 0083_MW129_1.5-2_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓

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 PC 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	15	**13.33**	**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 PC 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	15	**6.67**	**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 PC 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	15	**6.67**	**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 PC 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 SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. 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 BaSO4 suspension is measured by a photometer and the SO4-2 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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
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 SO4 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.

CHAIN OF CUSTODY

(ALS) COC#: 30545 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: CG - DEF19009/HEHA SW -

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: 13:50 23/11/21	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 DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters Primary WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_OTH108_211123	Seepage water sample	23/11/2021 10:21 AM	Water	ALS: 6 Non ALS: 0	No	Partial 4/8	Extra lab QC PFAS	Extra lab QC PFAS
002	0083_OTH107_211123	Seepage water	23/11/2021 11:09 AM	Water	ALS: 6 Non ALS: 0	No	Partial 4/8	Extra lab QC PFAS	Extra lab QC PFAS
003	0083_OTH106_211123	Seepage water	23/11/2021 11:32 AM	Water	ALS: 4 Non ALS: 0	No	Partial 4/8		
004	0083_OTH105_211123		23/11/2021 11:36 AM	Water	ALS: 4 Non ALS: 0	No	Partial 4/8		

Environmental Division Perth

Work Order Reference

EP2114301

Telephone : +61-8-9406 1301

Tuesday, November 23, 2021 9:04:18 AM

CHAIN OF CUSTODY

(ALS) COC#: 30545 *ALS Laboratory:* EP Perth

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

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: CG - DEF19009/HEHA SW -

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [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	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_OTH108_211123	Surface Waters Primary 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	0083_OTH107_211123	Surface Waters Primary 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	0083_OTH106_211123	Surface Waters Primary 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	0083_OTH105_211123	Surface Waters Primary 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#: 30545 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: CG - DEF19009/HEHA SW -

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

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? 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	0083_OTH108_211123	Clear Plastic Bottle - Natural	250 mL	00070220143013	Green	No	
001	0083_OTH108_211123	Clear Plastic Bottle - Natural	250 mL	00070220143140	Green	No	
001	0083_OTH108_211123	HDPE (no PTFE)	20 mL	00350019154360	Grey	No	
001	0083_OTH108_211123	HDPE (no PTFE)	20 mL	00350019163896	Grey	No	
001	0083_OTH108_211123	HDPE (no PTFE)	20 mL	00352010040041	Grey	No	
002	0083_OTH107_211123	Clear Plastic Bottle - Natural	250 mL	00070220142771	Green	No	
002	0083_OTH107_211123	Clear Plastic Bottle - Natural	250 mL	00070220142884	Green	No	
002	0083_OTH107_211123	HDPE (no PTFE)	20 mL	00350019164295	Grey	No	
002	0083_OTH107_211123	HDPE (no PTFE)	20 mL	00352010040365	Grey	No	
002	0083_OTH107_211123	HDPE (no PTFE)	20 mL	00350019164022	Grey	No	
003	0083_OTH106_211123	Clear Plastic Bottle - Natural	250 mL	00070220142560	Green	No	
003	0083_OTH106_211123	Clear Plastic Bottle - Natural	250 mL	00070220142901	Green	No	
003	0083_OTH106_211123	HDPE (no PTFE)	20 mL	00352010040066	Grey	No	
004	0083_OTH105_211123	Clear Plastic Bottle - Natural	250 mL	00070220142754	Green	No	
004	0083_OTH105_211123	Clear Plastic Bottle - Natural	250 mL	00070220142002	Green	No	
004	0083_OTH105_211123	HDPE (no PTFE)	20 mL	00352010040375	Grey	No	

Total Bottle Count: ALS: 20, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2114301**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]cardno.com.au	E-mail	: nick.courts@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/0083	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 30545	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/HEHA		
Sampler	: [redacted]		

Dates

Date Samples Received	: 25-Nov-2021 11:50	Issue Date	: 26-Nov-2021
Client Requested Due Date	: 07-Dec-2021	Scheduled Reporting Date	: **07-Dec-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 21.8 - Ice present
Receipt Detail	:	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 discrepencies: 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.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **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.

EP2114301-001 : 23-Nov-2021 10:21 : 0083_OTH108_211123 - Seepage water sample
EP2114301-002 : 23-Nov-2021 11:09 : 0083_OTH107_211123 - Seepage water
EP2114301-003 : 23-Nov-2021 11:32 : 0083_OTH106_211123 - Seepage water

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)
EP2114301-001	23-Nov-2021 10:21	0083_OTH108_211123 ...	✓	✓	✓	✓
EP2114301-002	23-Nov-2021 11:09	0083_OTH107_211123 ...	✓	✓	✓	✓
EP2114301-003	23-Nov-2021 11:32	0083_OTH106_211123 ...	✓	✓	✓	✓
EP2114301-004	23-Nov-2021 11:36	0083_OTH105_211123	✓	✓	✓	✓

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

[redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]cardno.com.au
- Chain of Custody (CoC) (COC) Email [redacted]cardno.com.au
- EDI Format - ESDAT (ESDAT) Email [redacted]cardno.com.au
- EDI Format - XTab (XTAB) Email [redacted]cardno.com.au

Perth
- A4 - AU Tax Invoice (INV) Email perth@cardno.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2114301**	Page	: 1 of 9
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021 11:50
Order number	: DEF19009/0083	Date Analysis Commenced	: 27-Nov-2021
C-O-C number	: 30545	Issue Date	: 07-Dec-2021 11:00
Sampler	: [redacted] [redacted]		
Site	: DEF19009/HEHA		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	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 Contact 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.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_OTH108_211123 Seepage water sample	0083_OTH105_211123	----	----	----
				Sampling date / time	23-Nov-2021 10:21	23-Nov-2021 11:36	----	----	----
					EP2114301-001	EP2114301-004	--------	--------	--------
					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		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**117**	**108**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**117**	**108**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2520**	**2540**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**18700**	**18700**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**455**	**442**	----	----	----
Magnesium	7439-95-4	1	mg/L		**1430**	**1390**	----	----	----
Sodium	7440-23-5	1	mg/L		**11000**	**10700**	----	----	----
Potassium	7440-09-7	1	mg/L		**569**	**549**	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**582**	**582**	----	----	----
ø Total Cations	----	0.01	meq/L		**633**	**616**	----	----	----
ø Ionic Balance	----	0.01	%		**4.20**	**2.78**	----	----	----
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	----	----	----

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_OTH108_211123 Seepage water sample	0083_OTH105_211123	----	----	----
				Sampling date / time	23-Nov-2021 10:21	23-Nov-2021 11:36	----	----	----
					EP2114301-001	EP2114301-004	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
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	----	----	----
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									

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

				Sample ID	0083_OTH108_211123 Seepage water sample	0083_OTH105_211123	----	----	----
				Sampling date / time	23-Nov-2021 10:21	23-Nov-2021 11:36	----	----	----
Compound	CAS Number	LOR	Unit		EP2114301-001	EP2114301-004	--------	--------	--------
					Result	Result	----	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
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	----	----	----
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	%		**110**	**106**	----	----	----
13C8-PFOA	----	0.02	%		**105**	**107**	----	----	----

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_OTH107_211123 Seepage water	0083_OTH106_211123 Seepage water	----	----	----
				Sampling date / time	23-Nov-2021 11:09	23-Nov-2021 11:32	----	----	----
					EP2114301-002	EP2114301-003	--------	--------	--------
					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		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**117**	**117**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**117**	**117**	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2550**	**2530**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**18600**	**18700**	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**460**	**424**	----	----	----
Magnesium	7439-95-4	1	mg/L		**1450**	**1340**	----	----	----
Sodium	7440-23-5	1	mg/L		**11200**	**10300**	----	----	----
Potassium	7440-09-7	1	mg/L		**580**	**528**	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**580**	**582**	----	----	----
ø Total Cations	----	0.01	meq/L		**644**	**593**	----	----	----
ø Ionic Balance	----	0.01	%		**5.24**	**0.89**	----	----	----
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	----	----	----

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_OTH107_211123 Seepage water	0083_OTH106_211123 Seepage water	----	----	----
				Sampling date / time	23-Nov-2021 11:09	23-Nov-2021 11:32	----	----	----
					EP2114301-002	EP2114301-003	--------	--------	--------
					Result	Result	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
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	----	----	----
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	----	----	----

Analytical Results

Sub-Matrix: **WATER**
(Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_OTH107_211123 Seepage water	0083_OTH106_211123 Seepage water	----	----	----
				Sampling date / time	23-Nov-2021 11:09	23-Nov-2021 11:32	----	----	----
					EP2114301-002	EP2114301-003	--------	--------	--------
					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	----	----	----
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	%		**114**	**115**	----	----	----
13C8-PFOA	----	0.02	%		**106**	**108**	----	----	----

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

Sub-Matrix: **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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2114301**	Page	: 1 of 13
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021
Order number	: DEF19009/0083	Date Analysis Commenced	: 27-Nov-2021
C-O-C number	: 30545	Issue Date	: 07-Dec-2021
Sampler	: [redacted]		
Site	: DEF19009/HEHA		
Quote number	: SY/139/19		
No. of samples received	: 4		
No. of samples analysed	: 4		

ilac-MRA NATA
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 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	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**

				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: 4041369)									
EP2114296-009	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	250	254	1.5	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	250	254	1.5	0% - 20%
EP2114300-003	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	116	116	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	116	116	0.0	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4041370)									
EP2114301-004	0083_OTH105_211123	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	108	118	9.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	108	118	9.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4040534)									
EP2114300-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1650	1660	0.2	0% - 20%
EP2114301-003	0083_OTH106_211123 Seepage water	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2530	2540	0.5	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4040533)									
EP2114300-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	12800	12800	0.2	0% - 20%
EP2114301-003	0083_OTH106_211123 Seepage water	ED045G: Chloride	16887-00-6	1	mg/L	18700	18600	0.1	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4042966)									
EP2114258-007	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	20	20	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 (%)*
ED093F: Dissolved Major Cations (QC Lot: 4042966) - continued									
EP2114258-007	Anonymous	ED093F: Magnesium	7439-95-4	1	mg/L	32	31	3.8	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	197	192	2.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	10	9	0.0	No Limit
EP2114300-007	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	258	247	4.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	465	444	4.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2970	2800	5.9	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	185	170	8.1	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4050916)									
EP2114297-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.30	0.30	0.0	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.54	0.49	11.5	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
EP2114300-004	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: 4051169)									
EP2114394-005	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
EP2114394-008	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: 4050916)									
EP2114297-001	Anonymous	EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	0.12	0.11	0.0	0% - 50%
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	0.87	0.76	13.3	0% - 20%
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	0.96	0.92	3.9	0% - 20%
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	0.39	0.37	6.1	0% - 50%
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	0.05	0.05	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: 4050916) - continued									
EP2114297-001	Anonymous	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
EP2114300-004	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 (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: 4051169)									
EP2114394-005	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
EP2114394-008	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4050916)									

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: 4050916) - continued									
EP2114297-001	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
EP2114300-004	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: 4051169)									
EP2114394-005	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
EP2114394-008	Anonymous	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: 4051169) - continued									
EP2114394-008	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4050916)									
EP2114297-001	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	1.58	1.44	9.2	0% - 20%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	0.56	0.49	12.3	0% - 50%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	0.0	No Limit
EP2114300-004	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: 4051169)									
EP2114394-005	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
EP2114394-008	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: 4051169) - continued									
EP2114394-008	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
EP231P: PFAS Sums (QC Lot: 4050916)									
EP2114297-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	5.37	4.93	8.5	0% - 20%
EP2114300-004	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4051169)									
EP2114394-005	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2114394-008	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4041369)								
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	107	81.2	126
				<1	200 mg/L	102	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 4041370)								
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	107	81.2	126
				<1	200 mg/L	99.8	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4040534)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 4040533)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	87.9	114
				<1	1000 mg/L	103	87.9	114
ED093F: Dissolved Major Cations (QCLot: 4042966)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100.0	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.1	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4050916)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	92.6	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	101	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	100	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	111	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	83.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	95.6	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4051169)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	112	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	99.8	71.0	127

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4051169) - continued								
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	99.4	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	105	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	91.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4050916)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	89.4	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	84.6	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	108	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	98.2	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	91.4	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	92.6	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	88.2	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	88.6	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	89.2	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	81.8	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4051169)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	91.4	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	120	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	118	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	116	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	107	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	101	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: 4050916)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	86.2	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	81.5	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	79.0	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	77.8	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	82.5	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	95.0	65.0	136

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4050916) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	102	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4051169)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	105	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	79.1	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	86.4	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.7	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	95.5	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	123	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4050916)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	85.4	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	86.2	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	106	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	95.4	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4051169)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	106	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	114	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	100	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	81.6	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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4040534)							
EP2114300-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4040533)							
EP2114300-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4050916)							
EP2114296-014	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	# Not Determined	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	# Not Determined	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	126	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	114	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	111	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4051169)							
EP2114394-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	120	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	102	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	106	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	106	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	111	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	100	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4050916)							
EP2114296-014	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	106	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	# Not Determined	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	# Not Determined	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	119	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	120	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	108	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	119	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	104	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	111	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	99.2	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	103	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4051169)							
EP2114394-006	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	113	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	119	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	124	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	126	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	112	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	123	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	122	69.0	133

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: 4051169) - continued							
EP2114394-006	Anonymous	EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	115	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	108	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	112	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4050916)							
EP2114296-014	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	89.3	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	97.0	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	87.8	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	95.0	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	115	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	118	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4051169)							
EP2114394-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	111	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	74.4	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	88.6	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	106	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	101	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	115	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	129	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4050916)							
EP2114296-014	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	98.2	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	103	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	104	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	106	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4051169)							
EP2114394-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	110	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	131	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	118	67.0	138

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: 4051169) - continued							
EP2114394-006	Anonymous	EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	92.8	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2114301**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021
Site	: DEF19009/HEHA	Issue Date	: 07-Dec-2021
Sampler	: [redacted]	No. of samples received	: 4
Order number	: DEF19009/0083	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: **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	EP2114300--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	EP2114300--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	EP2114296--014	Anonymous	**Perfluorobutane sulfonic acid (PFBS)**	375-73-5	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2114296--014	Anonymous	**Perfluoropentane sulfonic acid (PFPeS)**	2706-91-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231A: Perfluoroalkyl Sulfonic Acids	EP2114296--014	Anonymous	**Perfluorohexane sulfonic acid (PFHxS)**	355-46-4	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2114296--014	Anonymous	**Perfluoropentanoic acid (PFPeA)**	2706-90-3	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231B: Perfluoroalkyl Carboxylic Acids	EP2114296--014	Anonymous	**Perfluorohexanoic acid (PFHxA)**	307-24-4	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 / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0083_OTH108_211123 - Seepage water sample, 0083_OTH107_211123 - Seepage water, 0083_OTH106_211123 - Seepage water, 0083_OTH105_211123	**23-Nov-2021**	**----**	----	----	**27-Nov-2021**	07-Dec-2021	✓

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)							
0083_OTH108_211123 - Seepage water sample, 0083_OTH107_211123 - Seepage water, 0083_OTH106_211123 - Seepage water, 0083_OTH105_211123	**23-Nov-2021**	**----**	----	----	**06-Dec-2021**	21-Dec-2021	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_OTH108_211123 - Seepage water sample, 0083_OTH107_211123 - Seepage water, 0083_OTH106_211123 - Seepage water, 0083_OTH105_211123	**23-Nov-2021**	**----**	----	----	**06-Dec-2021**	21-Dec-2021	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_OTH108_211123 - Seepage water sample, 0083_OTH107_211123 - Seepage water, 0083_OTH106_211123 - Seepage water, 0083_OTH105_211123	**23-Nov-2021**	**----**	----	----	**30-Nov-2021**	30-Nov-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH105_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**03-Dec-2021**	22-May-2022	✓
HDPE (no PTFE) (EP231X)							
0083_OTH108_211123 - Seepage water sample, 0083_OTH107_211123 - Seepage water, 0083_OTH106_211123 - Seepage water	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH105_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**03-Dec-2021**	22-May-2022	✓
HDPE (no PTFE) (EP231X)							
0083_OTH108_211123 - Seepage water sample, 0083_OTH107_211123 - Seepage water, 0083_OTH106_211123 - Seepage water	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_OTH105_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**03-Dec-2021**	22-May-2022	✓
HDPE (no PTFE) (EP231X)							
0083_OTH108_211123 - Seepage water sample, 0083_OTH107_211123 - Seepage water, 0083_OTH106_211123 - Seepage water	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH105_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**03-Dec-2021**	22-May-2022	✓
HDPE (no PTFE) (EP231X)							
0083_OTH108_211123 - Seepage water sample, 0083_OTH107_211123 - Seepage water, 0083_OTH106_211123 - Seepage water	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_OTH105_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**03-Dec-2021**	22-May-2022	✓
HDPE (no PTFE) (EP231X)							
0083_OTH108_211123 - Seepage water sample, 0083_OTH107_211123 - Seepage water, 0083_OTH106_211123 - Seepage water	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	22-May-2022	✓

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 PC Titrator	ED037-P	3	30	**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	15	**13.33**	**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 PC Titrator	ED037-P	4	30	**13.33**	**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	15	**6.67**	**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 PC Titrator	ED037-P	2	30	**6.67**	**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	15	**6.67**	**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 PC 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 SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. 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 BaSO4 suspension is measured by a photometer and the SO4-2 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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
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 SO4 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.

CHAIN OF CUSTODY

ALS COC#: 30581 ALS Laboratory: EP Perth

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
DATE TIME:	DATE TIME: WO 11:50 25/11/21	DATE TIME:	DATE TIME:

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: CG - DEF19009/HEHA SED

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SD120_211123		23/11/2021 03:32 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		

Environmental Division Perth

Work Order Reference

EP2114302

Telephone : -- 61-8-9406 1301

CHAIN OF CUSTODY

COC#: **30581** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: CG - DEF19009/HEHA SED

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_SD120_211123	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 30581 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: CG - DEF19009/HEHA SED

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_SD120_211123	HDPE Soil Jar	200 mL	00621019097753	Grey	No	

Total Bottle Count: ALS: 1, Non ALS: 0

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2114302**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]cardno.com.au	E-mail	: ALSEnviro.Perth@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/0083	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 30581	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/HEHA		
Sampler	: [redacted]		

Dates

Date Samples Received	: 25-Nov-2021 11:50	Issue Date	: 26-Nov-2021
Client Requested Due Date	: 07-Dec-2021	Scheduled Reporting Date	: **07-Dec-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 21.8 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

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 discrepencies: 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.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **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)
EP2114302-001	23-Nov-2021 15:32	0083_SD120_211123	✓	✓

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

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]cardno.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]cardno.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]cardno.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]cardno.com.au

Perth
- A4 - AU Tax Invoice (INV) — Email — perth@cardno.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2114302**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021 11:50
Order number	: DEF19009/0083	Date Analysis Commenced	: 02-Dec-2021
C-O-C number	: 30581	Issue Date	: 07-Dec-2021 11:00
Sampler	: [redacted]		
Site	: DEF19009/HEHA		
Quote number	: SY/139/19		
No. of samples received	: 1		
No. of samples analysed	: 1		

ilac-MRA NATA
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*
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	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 Contact 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	0083_SD120_211123	----	----	----	----
			Sampling date / time	23-Nov-2021 15:32	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2114302-001	--------	--------	--------	--------
				Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**29.6**	----	----	----	----
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	0083_SD120_211123	----	----	----	----
				Sampling date / time	23-Nov-2021 15:32	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2114302-001	--------	--------	--------	--------
					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	%		**104**	----	----	----	----
13C8-PFOA	----	0.0002	%		**99.5**	----	----	----	----

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)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2114302**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Customer Services EP
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021
Order number	: DEF19009/0083	Date Analysis Commenced	: 02-Dec-2021
C-O-C number	: 30581	Issue Date	: 07-Dec-2021
Sampler	: [redacted]		
Site	: DEF19009/HEHA		
Quote number	: SY/139/19		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 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*
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	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: 4052951)									
EP2114299-004	Anonymous	EA055: Moisture Content	----	0.1	%	22.4	22.9	2.2	0% - 20%
ES2143515-005	Anonymous	EA055: Moisture Content	----	0.1	%	12.0	12.2	1.3	0% - 50%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4050038)									
EP2114299-001	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	0.0012	0.0009	22.3	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	0.0051	0.0051	0.0	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
ES2143536-027	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	0.0005	0.0005	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: 4050038)									
EP2114299-001	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	0.0019	0.0017	8.1	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0015	0.0014	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	0.0008	0.0007	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0004	0.0004	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: 4050038) - continued									
EP2114299-001	Anonymous	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
ES2143536-027	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 (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: 4050038)									
EP2114299-001	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
ES2143536-027	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

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: 4050038)									
EP2114299-001	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	0.0066	0.0076	13.7	0% - 50%
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	0.0088	0.0099	11.8	0% - 50%
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	0.0006	0.0006	0.0	No Limit
ES2143536-027	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4050038)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	114	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	115	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4050038)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	94.2	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	120	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	70.0	132
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	117	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	124	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	114	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	119	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4050038)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	122	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	100	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	128	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	118	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	124	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4050038)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	109	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	118	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	114	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4050038) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	75.6	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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4050038)							
EP2114299-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	126	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	116	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	97.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	119	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	73.2	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	118	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4050038)							
EP2114299-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	99.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	104	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	121	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	110	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	122	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	113	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	119	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	124	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	115	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	98.8	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	122	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4050038)							
EP2114299-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	128	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	96.5	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	120	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	101	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	101	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	119	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: 4050038) - continued							
EP2114299-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	123	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4050038)							
EP2114299-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	107	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	# Not Determined	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	# Not Determined	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	73.2	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2114302**	Page	: 1 of 4
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 25-Nov-2021
Site	: DEF19009/HEHA	Issue Date	: 07-Dec-2021
Sampler	: [redacted]	No. of samples received	: 1
Order number	: DEF19009/0083	No. of samples analysed	: 1

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							
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EP2114299--001	Anonymous	**6:2 Fluorotelomer sulfonic acid (6:2 FTS)**	27619-97-2	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**
EP231D: (n:2) Fluorotelomer Sulfonic Acids	EP2114299--001	Anonymous	**8:2 Fluorotelomer sulfonic acid (8:2 FTS)**	39108-34-4	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 / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055) 0083_SD120_211123	**23-Nov-2021**	**----**	----	----	**03-Dec-2021**	07-Dec-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X) 0083_SD120_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	11-Jan-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X) 0083_SD120_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	11-Jan-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) 0083_SD120_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	11-Jan-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) 0083_SD120_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	11-Jan-2022	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) 0083_SD120_211123	**23-Nov-2021**	**02-Dec-2021**	22-May-2022	✓	**06-Dec-2021**	11-Jan-2022	✓

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	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**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#: **30601** *ALS Laboratory:* EP Perth

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

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: CG - DEF19009/HEHA SW

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters Primary WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_OTH101_211124		24/11/2021 07:08 AM	Water	ALS: 6 Non ALS: 0	No	Partial 4/8	Extra lab QC PFAS	Extra lab QC PFAS
002	0083_OTH109_211124		24/11/2021 07:10 AM	Water	ALS: 4 Non ALS: 0	No	Partial 4/8		
003	0083_OTH110_211124		24/11/2021 07:12 AM	Water	ALS: 4 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: 30601 ALS Laboratory: EP Perth

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

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: CG - DEF19009/HEHA SW

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_OTH101_211124	Surface Waters Primary 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	0083_OTH109_211124	Surface Waters Primary 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	0083_OTH110_211124	Surface Waters Primary 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#: **30601** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: CG - DEF19009/HEHA SW

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE:

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_OTH101_211124	Clear Plastic Bottle - Natural	250 mL	00070220143208	Green	No	
001	0083_OTH101_211124	Clear Plastic Bottle - Natural	250 mL	00070220143215	Green	No	
001	0083_OTH101_211124	HDPE (no PTFE)	20 mL	00350019164209	Grey	No	
001	0083_OTH101_211124	HDPE (no PTFE)	20 mL	00350019164334	Grey	No	
001	0083_OTH101_211124	HDPE (no PTFE)	20 mL	00352010039908	Grey	No	
001	0083_OTH101_211124	HDPE (no PTFE)	20 mL	00352010040022	Grey	No	
002	0083_OTH109_211124	Clear Plastic Bottle - Natural	250 mL	00070220142830	Green	No	
002	0083_OTH109_211124	Clear Plastic Bottle - Natural	250 mL	00070220142735	Green	No	
002	0083_OTH109_211124	HDPE (no PTFE)	20 mL	00352005019738	Grey	No	
002	0083_OTH109_211124	HDPE (no PTFE)	20 mL	00352005019525	Grey	No	
003	0083_OTH110_211124	Clear Plastic Bottle - Natural	250 mL	00070220142697	Green	No	
003	0083_OTH110_211124	Clear Plastic Bottle - Natural	250 mL	00070220142718	Green	No	
003	0083_OTH110_211124	HDPE (no PTFE)	20 mL	00352010039909	Grey	No	
003	0083_OTH110_211124	HDPE (no PTFE)	20 mL	00352010039945	Grey	No	

Total Bottle Count: ALS: 14, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2114391**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]cardno.com.au	E-mail	: nick.courts@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/0083	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 30601	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/HEHA		
Sampler	: [redacted]		

Dates

Date Samples Received	: 26-Nov-2021 09:55	Issue Date	: 26-Nov-2021
Client Requested Due Date	: 07-Dec-2021	Scheduled Reporting Date	: **07-Dec-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 24.8 - Ice present
Receipt Detail	: Ice Melted	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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: 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.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **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)
EP2114391-001	24-Nov-2021 07:08	0083_OTH101_211124	✓	✓	✓	✓
EP2114391-002	24-Nov-2021 07:10	0083_OTH109_211124	✓	✓	✓	✓
EP2114391-003	24-Nov-2021 07:12	0083_OTH110_211124	✓	✓	✓	✓

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

[redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]cardno.com.au
- Chain of Custody (CoC) (COC) Email [redacted]cardno.com.au
- EDI Format - ESDAT (ESDAT) Email [redacted]cardno.com.au
- EDI Format - XTab (XTAB) Email [redacted]cardno.com.au

Perth
- A4 - AU Tax Invoice (INV) Email perth@cardno.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2114391**	Page	: 1 of 6
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 26-Nov-2021 09:55
Order number	: DEF19009/0083	Date Analysis Commenced	: 27-Nov-2021
C-O-C number	: 30601	Issue Date	: 07-Dec-2021 11:00
Sampler	: [redacted]		
Site	: DEF19009/HEHA		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	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 Contact 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.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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: MARINE WATER (Matrix: WATER)				Sample ID	0083_OTH101_211124	0083_OTH109_211124	0083_OTH110_211124	----	----
				Sampling date / time	24-Nov-2021 07:08	24-Nov-2021 07:10	24-Nov-2021 07:12	----	----
Compound	CAS Number	LOR	Unit		EP2114391-001	EP2114391-002	EP2114391-003	--------	--------
					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		116	115	117	----	----
Total Alkalinity as CaCO3	----	1	mg/L		116	115	117	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2510	2520	2530	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		18600	19000	18800	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		436	436	418	----	----
Magnesium	7439-95-4	1	mg/L		1370	1380	1320	----	----
Sodium	7440-23-5	1	mg/L		10600	10600	10200	----	----
Potassium	7440-09-7	1	mg/L		547	546	523	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		579	591	585	----	----
ø Total Cations	----	0.01	meq/L		610	610	586	----	----
ø Ionic Balance	----	0.01	%		2.55	1.64	0.10	----	----
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: MARINE WATER (Matrix: WATER)				Sample ID	0083_OTH101_211124	0083_OTH109_211124	0083_OTH110_211124	----	----
				Sampling date / time	24-Nov-2021 07:08	24-Nov-2021 07:10	24-Nov-2021 07:12	----	----
Compound	CAS Number	LOR	Unit		EP2114391-001	EP2114391-002	EP2114391-003	--------	--------
					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	----	----
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: **MARINE WATER** (Matrix: **WATER**)				Sample ID	0083_OTH101_211124	0083_OTH109_211124	0083_OTH110_211124	----	----
				Sampling date / time	24-Nov-2021 07:08	24-Nov-2021 07:10	24-Nov-2021 07:12	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**EP2114391-001**	**EP2114391-002**	**EP2114391-003**	**--------**	**--------**
					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	%		**118**	**114**	**115**	**----**	**----**
13C8-PFOA	----	0.02	%		**107**	**109**	**108**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **MARINE 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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2114391**	Page	: 1 of 7
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 26-Nov-2021
Order number	: DEF19009/0083	Date Analysis Commenced	: 27-Nov-2021
C-O-C number	: 30601	Issue Date	: 07-Dec-2021
Sampler	: [redacted]		
Site	: DEF19009/HEHA		
Quote number	: SY/139/19		
No. of samples received	: 3		
No. of samples analysed	: 3		

ilac-MRA NATA
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 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Franco Lentini	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**

				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: 4041370)									
EP2114301-004	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	108	118	9.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	108	118	9.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4040534)									
EP2114300-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1650	1660	0.2	0% - 20%
EP2114301-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2530	2540	0.5	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4040533)									
EP2114300-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	12800	12800	0.2	0% - 20%
EP2114301-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	18700	18600	0.1	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4042966)									
EP2114258-007	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	20	20	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	32	31	3.8	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	197	192	2.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	10	9	0.0	No Limit
EP2114300-007	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	258	247	4.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	465	444	4.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2970	2800	5.9	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	185	170	8.1	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4051169)									
EP2114394-005	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: 4051169) - continued									
EP2114394-005	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
EP2114394-008	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: 4051169)									
EP2114394-005	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
EP2114394-008	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4051169)									
EP2114394-005	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

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: 4051169) - continued									
EP2114394-005	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
EP2114394-008	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: 4051169)									
EP2114394-005	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
EP2114394-008	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: 4051169)									
EP2114394-005	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2114394-008	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4041370)								
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	107	81.2	126
				<1	200 mg/L	99.8	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4040534)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 4040533)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	87.9	114
				<1	1000 mg/L	103	87.9	114
ED093F: Dissolved Major Cations (QCLot: 4042966)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100.0	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.1	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4051169)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	112	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	99.8	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	99.4	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	105	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	91.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4051169)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	91.4	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	120	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	118	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	103	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	116	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	107	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4051169) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	101	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: 4051169)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	105	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	79.1	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	86.4	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	99.7	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	95.5	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	103	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	123	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4051169)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	106	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	114	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	100	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	81.6	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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4040534)							
EP2114300-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4040533)							
EP2114300-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4051169)							
EP2114394-006	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	120	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	102	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	106	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	106	69.0	134

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: 4051169) - continued							
EP2114394-006	Anonymous	EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	111	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	100	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4051169)							
EP2114394-006	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	113	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	119	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	124	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	126	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	112	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	123	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	122	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	115	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	108	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	112	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4051169)							
EP2114394-006	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	111	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	74.4	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	88.6	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	106	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	101	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	115	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	129	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4051169)							
EP2114394-006	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	110	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	131	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	118	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	92.8	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2114391**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 26-Nov-2021
Site	: DEF19009/HEHA	Issue Date	: 07-Dec-2021
Sampler	: [redacted]	No. of samples received	: 3
Order number	: DEF19009/0083	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

- **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 SO4 2- by DA	EP2114300--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	EP2114300--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 / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0083_OTH101_211124, 0083_OTH110_211124	0083_OTH109_211124,	**24-Nov-2021**	**----**	----	----	**27-Nov-2021**	08-Dec-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0083_OTH101_211124, 0083_OTH110_211124	0083_OTH109_211124,	**24-Nov-2021**	**----**	----	----	**06-Dec-2021**	22-Dec-2021	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0083_OTH101_211124, 0083_OTH110_211124	0083_OTH109_211124,	**24-Nov-2021**	**----**	----	----	**06-Dec-2021**	22-Dec-2021	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0083_OTH101_211124, 0083_OTH110_211124	0083_OTH109_211124,	**24-Nov-2021**	**----**	----	----	**30-Nov-2021**	01-Dec-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0083_OTH101_211124, 0083_OTH110_211124	0083_OTH109_211124,	**24-Nov-2021**	**02-Dec-2021**	23-May-2022	✓	**03-Dec-2021**	23-May-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
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH101_211124, 0083_OTH109_211124, 0083_OTH110_211124	**24-Nov-2021**	**02-Dec-2021**	23-May-2022	✓	**03-Dec-2021**	23-May-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_OTH101_211124, 0083_OTH109_211124, 0083_OTH110_211124	**24-Nov-2021**	**02-Dec-2021**	23-May-2022	✓	**03-Dec-2021**	23-May-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH101_211124, 0083_OTH109_211124, 0083_OTH110_211124	**24-Nov-2021**	**02-Dec-2021**	23-May-2022	✓	**03-Dec-2021**	23-May-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_OTH101_211124, 0083_OTH109_211124, 0083_OTH110_211124	**24-Nov-2021**	**02-Dec-2021**	23-May-2022	✓	**03-Dec-2021**	23-May-2022	✓

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 PC Titrator	ED037-P	1	10	**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	15	**13.33**	**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 PC Titrator	ED037-P	2	10	**20.00**	**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	15	**6.67**	**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 PC Titrator	ED037-P	1	10	**10.00**	**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	15	**6.67**	**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 PC 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 SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. 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 BaSO4 suspension is measured by a photometer and the SO4-2 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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
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 SO4 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.

CHAIN OF CUSTODY

ALS COC#: 30598 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MG - DEF19009/HEHA GW

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters Primary WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW110_211125		24/11/2021 07:06 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
002	0083_MW109_211124		24/11/2021 07:08 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
003	0083_QC301		24/11/2021 04:52 PM	Water	ALS: 2 Non ALS: 0	No		X		
004	0083_QC302		24/11/2021 04:53 PM	Water	ALS: 2 Non ALS: 0	No		X		
005	0083_QC401		24/11/2021 04:55 PM	Water	ALS: 2 Non ALS: 0	No		X		
006	0083_QC402		24/11/2021 04:56 PM	Water	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

(ALS) COC#: **30598** *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MG - DEF19009/HEHA GW

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

SAMPLER MOBILE:

QUOTE NO: SY/139/19

/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_MW110_211125	Ground Waters Primary 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	0083_MW109_211124	Ground Waters Primary 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#: 30598 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: MG - DEF19009/HEHA GW

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

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? 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	0083_MW110_211125	Clear Plastic Bottle - Natural	250 mL	00070621197276	Green	No	
001	0083_MW110_211125	HDPE (no PTFE)	20 mL	00352101071721	Grey	No	
001	0083_MW110_211125	HDPE (no PTFE)	20 mL	00352101071059	Grey	No	
002	0083_MW109_211124	HDPE (no PTFE)	20 mL	00352101071562	Grey	No	
002	0083_MW109_211124	Clear Plastic Bottle - Natural	250 mL	00070621197310	Green	No	
002	0083_MW109_211124	HDPE (no PTFE)	20 mL	00352101071505	Grey	No	
003	0083_QC301	HDPE (no PTFE)	20 mL	00350019177455	Grey	No	
003	0083_QC301	HDPE (no PTFE)	20 mL	00350019177379	Grey	No	
004	0083_QC302	HDPE (no PTFE)	20 mL	00350019177552	Grey	No	
004	0083_QC302	HDPE (no PTFE)	20 mL	00350019177427	Grey	No	
005	0083_QC401	HDPE (no PTFE)	20 mL	00350019177514	Grey	No	
005	0083_QC401	HDPE (no PTFE)	20 mL	00350019026850	Grey	No	
006	0083_QC402	HDPE (no PTFE)	20 mL	00350019042135	Grey	No	
006	0083_QC402	HDPE (no PTFE)	20 mL	00350019177318	Grey	No	

Total Bottle Count: ALS: 14, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2114519**

Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: [redacted]cardno.com.au	E-mail	: nick.courts@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/0083	Quote number	: ES2019CARBSD0002 (SY/139/19)
C-O-C number	: 30598	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/HEHA		
Sampler	: [redacted]		

Dates

Date Samples Received	: 26-Nov-2021 09:55	Issue Date	: 26-Nov-2021
Client Requested Due Date	: 08-Dec-2021	Scheduled Reporting Date	: **08-Dec-2021**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 3	Temperature	: 24.8 - Ice present
Receipt Detail	: Ice Melted	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 discrepencies: 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.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **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)
EP2114519-001	24-Nov-2021 07:06	0083_MW110_211124	✓	✓	✓	✓
EP2114519-002	24-Nov-2021 07:08	0083_MW109_211124	✓	✓	✓	✓
EP2114519-003	24-Nov-2021 16:52	0083_QC301_211124		✓		
EP2114519-004	24-Nov-2021 16:53	0083_QC302_211124		✓		
EP2114519-005	24-Nov-2021 16:55	0083_QC401_211124		✓		
EP2114519-006	24-Nov-2021 16:56	0083_QC402_211124		✓		

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

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]cardno.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]cardno.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]cardno.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]cardno.com.au

Perth
- A4 - AU Tax Invoice (INV) — Email — perth@cardno.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2114519**	Page	: 1 of 8
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 26-Nov-2021 09:55
Order number	: DEF19009/0083	Date Analysis Commenced	: 27-Nov-2021
C-O-C number	: 30598	Issue Date	: 08-Dec-2021 12:35
Sampler	: [redacted]		
Site	: DEF19009/HEHA		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	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 Contact 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.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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	0083_MW110_211124	0083_MW109_211124	----	----	----
				Sampling date / time	24-Nov-2021 07:06	24-Nov-2021 07:08	----	----	----
Compound	CAS Number	LOR	Unit		EP2114519-001	EP2114519-002	--------	--------	--------
					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		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		112	104	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		112	104	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2430	2750	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		18600	21100	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		484	434	----	----	----
Magnesium	7439-95-4	1	mg/L		1490	1410	----	----	----
Sodium	7440-23-5	1	mg/L		11600	11100	----	----	----
Potassium	7440-09-7	1	mg/L		594	567	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		578	654	----	----	----
ø Total Cations	----	0.01	meq/L		666	635	----	----	----
ø Ionic Balance	----	0.01	%		7.16	1.51	----	----	----
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: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW110_211124	0083_MW109_211124	----	----	----
				Sampling date / time	24-Nov-2021 07:06	24-Nov-2021 07:08	----	----	----
Compound	CAS Number	LOR	Unit		EP2114519-001	EP2114519-002	--------	--------	--------
					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: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW110_211124	0083_MW109_211124	----	----	----
				Sampling date / time	24-Nov-2021 07:06	24-Nov-2021 07:08	----	----	----
Compound	CAS Number	LOR	Unit		EP2114519-001	EP2114519-002	--------	--------	--------
					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	%		**101**	**103**	----	----	----
13C8-PFOA	----	0.02	%		**99.7**	**103**	----	----	----

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0083_QC301_211124	0083_QC302_211124	0083_QC401_211124	0083_QC402_211124	----
				Sampling date / time	24-Nov-2021 16:52	24-Nov-2021 16:53	24-Nov-2021 16:55	24-Nov-2021 16:56	----
Compound	CAS Number	LOR	Unit		EP2114519-003	EP2114519-004	EP2114519-005	EP2114519-006	--------
					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	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<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	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<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	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<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	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<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	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<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	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		<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	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L		<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	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L		<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	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L		<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	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L		<0.05	<0.05	<0.05	<0.05	----

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0083_QC301_211124	0083_QC302_211124	0083_QC401_211124	0083_QC402_211124	----
				Sampling date / time	24-Nov-2021 16:52	24-Nov-2021 16:53	24-Nov-2021 16:55	24-Nov-2021 16:56	----
Compound	CAS Number	LOR	Unit		EP2114519-003	EP2114519-004	EP2114519-005	EP2114519-006	--------
					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	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		<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	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		<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	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<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	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<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	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<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	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**112**	**116**	**108**	**99.3**	----
13C8-PFOA	----	0.02	%		**108**	**111**	**109**	**106**	----

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2114519**	Page	: 1 of 4
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Nick Courts
Address	: 11 HARVEST TERRACE PO BOX 155 WEST PERTH WA, AUSTRALIA 6006	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 26-Nov-2021
Order number	: DEF19009/0083	Date Analysis Commenced	: 27-Nov-2021
C-O-C number	: 30598	Issue Date	: 08-Dec-2021
Sampler	: [redacted]		
Site	: DEF19009/HEHA		
Quote number	: SY/139/19		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
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 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	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**

				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: 4041370)									
EP2114301-004	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	108	118	9.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	108	118	9.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4040543)									
EP2114392-012	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2560	2620	2.3	0% - 20%
EP2114392-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3550	3540	0.3	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4040544)									
EP2114392-012	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	18900	19300	2.1	0% - 20%
EP2114392-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	28400	28700	0.9	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4042973)									
EP2114519-001	0083_MW110_211124	ED093F: Calcium	7440-70-2	1	mg/L	484	476	1.6	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1490	1460	1.9	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11600	11400	2.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	594	582	2.0	0% - 20%
EP2114520-009	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	7	7	0.0	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	8	8	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	71	71	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4041370)								
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	107	81.2	126
				<1	200 mg/L	99.8	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4040543)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.6	87.7	113
				<1	500 mg/L	101	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 4040544)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	94.9	87.9	114
				<1	1000 mg/L	103	87.9	114
ED093F: Dissolved Major Cations (QCLot: 4042973)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	107	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	110	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	97.3	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4054342)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	117	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	104	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	101	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	94.8	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4054342)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	118	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	125	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	124	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	121	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	121	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	121	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4054342) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	123	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	129	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4054342)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	126	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	132	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	107	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	121	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	125	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	123	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	107	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4054342)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	127	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	136	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	126	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	118	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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4040543)							
EP2114161-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	100	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4040544)							
EP2114392-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2114519**	Page	: 1 of 5
Client	: **CARDNO (WA) PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 26-Nov-2021
Site	: DEF19009/HEHA	Issue Date	: 08-Dec-2021
Sampler	: [redacted]	No. of samples received	: 6
Order number	: DEF19009/0083	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

- **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							
ED045G: Chloride by Discrete Analyser	EP2114392--001	Anonymous	**Chloride**	16887-00-6	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

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	0	13	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	13	0.00	5.00	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 / *Container* / Client Sample ID(s)		*Sample Date*	*Extraction / Preparation*			*Analysis*		
			Date extracted	*Due for extraction*	*Evaluation*	*Date analysed*	*Due for analysis*	*Evaluation*
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0083_MW110_211124,	0083_MW109_211124	**24-Nov-2021**	**----**	----	----	**27-Nov-2021**	08-Dec-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0083_MW110_211124,	0083_MW109_211124	**24-Nov-2021**	**----**	----	----	**06-Dec-2021**	22-Dec-2021	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0083_MW110_211124,	0083_MW109_211124	**24-Nov-2021**	**----**	----	----	**06-Dec-2021**	22-Dec-2021	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0083_MW110_211124,	0083_MW109_211124	**24-Nov-2021**	**----**	----	----	**29-Nov-2021**	01-Dec-2021	✓

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)							
0083_MW110_211124, 0083_MW109_211124, 0083_QC301_211124, 0083_QC302_211124, 0083_QC401_211124, 0083_QC402_211124	**24-Nov-2021**	**06-Dec-2021**	23-May-2022	✓	**07-Dec-2021**	23-May-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW110_211124, 0083_MW109_211124, 0083_QC301_211124, 0083_QC302_211124, 0083_QC401_211124, 0083_QC402_211124	**24-Nov-2021**	**06-Dec-2021**	23-May-2022	✓	**07-Dec-2021**	23-May-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_MW110_211124, 0083_MW109_211124, 0083_QC301_211124, 0083_QC302_211124, 0083_QC401_211124, 0083_QC402_211124	**24-Nov-2021**	**06-Dec-2021**	23-May-2022	✓	**07-Dec-2021**	23-May-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW110_211124, 0083_MW109_211124, 0083_QC301_211124, 0083_QC302_211124, 0083_QC401_211124, 0083_QC402_211124	**24-Nov-2021**	**06-Dec-2021**	23-May-2022	✓	**07-Dec-2021**	23-May-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_MW110_211124, 0083_MW109_211124, 0083_QC301_211124, 0083_QC302_211124, 0083_QC401_211124, 0083_QC402_211124	**24-Nov-2021**	**06-Dec-2021**	23-May-2022	✓	**07-Dec-2021**	23-May-2022	✓

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 PC Titrator	ED037-P	1	10	**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	4	**50.00**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	13	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	10	**20.00**	**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	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	**11.11**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	10	**10.00**	**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	4	**25.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	13	**7.69**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**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	0	13	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**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 PC 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 SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. 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 BaSO4 suspension is measured by a photometer and the SO4-2 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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
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 SO4 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.

CHAIN OF CUSTODY RECORD

Eurofins | Environment Testing | ABN 50 005 085 521

☐ Sydney Laboratory
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02 9900 8400 EnviroSampleNSW@eurofins.com

☐ Brisbane Laboratory
Unit 1 21 Smallwood Place Murarrie QLD 4172
07 3902 4600 EnviroSampleQLD@eurofins.com

☐ Perth Laboratory
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08 9251 9600 EnviroSampleWA@eurofins.com

☐ Melbourne Laboratory
6 Monterey Road Dandenong South VIC 3175
03 8564 5000 EnviroSampleVic@eurofins.com

Company	CARDNO	Project №	WA_0082_PFASOMP	Project Manager	[redacted]
Address	11 harvest Tce WEST PERTH	Project Name	HEH-A	EDD Format (ESdat, EQuIS etc)	ESdat
Contact Name	[redacted]				
Phone №	[redacted]				
Special Directions	Please send ESdat report to [redacted] with the project No in the header file.				
Purchase Order	DEF19009/530				
Quote ID №					

Sampler(s)	[redacted]				
Handed over by	Toll				
Email for Invoice	[redacted]				
Email for Results	[redacted]				

Analyses (Where metals are required, please specify 'Total' or 'Filtered'. SUITE codes must be used to detail SUITE pricing)

№	Client Sample ID	Sampled Date/Time dd/mm/yy hh:mm	Matrix Solid (S) Water (W)	Full PFAS suite	(water) Major anions & cations	(water) DOC, TSS, TDS, pH	(sediment) TOC, CEC, pH	Containers: 500mL Plastic	250mL Plastic	125mL Plastic	200mL Amber Glass	40mL VOA vial	500mL PFAS Bottle	Jar (Glass or HDPE)	Other (Asbestos AS4964, WA Guidelines)	Sample Comments / Dangerous Goods Hazard Warning
1	0083_QC208_211123	23/11/21	W	X												
2	0083_QC209_211123	23/11/21	S	X												
3	0083_QC210_211123	23/11/21	W	X												
4	0083_QC211_211123	23/11/21	W	X												
5	0083_QC212_211123	23/11/21	W	X												
6	0083_QC213_211123	23/11/21	W	X												
7	0083_QC214_211123	23/11/21	W	X												
8																
9																
10																
	Total Counts															

Required Turnaround Time (TAT) — Default will be 5 days if not ticked

*Surcharge will apply

☐ Overnight (reporting by 9am)*
☐ Same day* ☐ 1 day*
☐ 2 days* ☐ 3 days*
☒ 5 days (Standard)
☐ Other( )

Date/Time: 25/11/21 10:00
Chilled: ○ / No
Temp: 20.1 20.3 21.5
Correction:
Final Temp: 20.6

Method of Shipment		Name		Signature		Date		Time	
	☐ Courier (#) ☐ Hand Delivered ☐ Postal								

Laboratory Use Only									
Received By	Lillies Luis	SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature	Lillies	Date	25/11/21	Time	10:00	Temperature	20.6
Received By		SYD | BNE | MEL | PER | ADL | NTL | DRW	Signature		Date		Time		Report №	844500

Eurofins Environment Testing Australia Pty Ltd

*Submission of samples to the laboratory will be deemed as acceptance of Eurofins | Environment Testing Standard Terms and Conditions unless agreed otherwise. A copy is available on request.

DS0009_R19 Authorised by: D. R Symons Approved by: G. Jackson Approved on: 6 August 2015

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: HEH-B
Project ID: WA_0082_PFASOMP

Order No.: DEF19009/630
Report #: 844500
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Nov 25, 2021 10:00 AM
Due: Dec 2, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Perth Laboratory - NATA # 2377 Site # 2370							
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217							
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
Mayfield Laboratory - NATA # 1261 Site # 25079							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0082_QC201_211122	Nov 22, 2021		Water	L21-No63883		X
2	0082_QC202_211122	Nov 22, 2021		Soil	L21-No63884	X	X
3	0082_QC203_211122	Nov 22, 2021		Soil	L21-No63885	X	X
4	0082_QC204_211122	Nov 22, 2021		Water	L21-No63886		X
5	0082_QC205_211122	Nov 22, 2021		Water	L21-No63887		X
6	0082_QC206_	Nov 22, 2021		Water	L21-No63888		X

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Company Name: Cardno (WA)
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WA 6005

Project Name: HEH-B
Project ID: WA_0082_PFASOMP

Order No.: DEF19009/630
Report #: 844500
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Nov 25, 2021 10:00 AM
Due: Dec 2, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Perth Laboratory - NATA # 2377 Site # 2370							
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217							
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
Mayfield Laboratory - NATA # 1261 Site # 25079							
External Laboratory							
	211122						
7	0082_QC207_211123	Nov 23, 2021		Water	L21-No63889		X
8	0083_QC208_211123	Nov 23, 2021		Water	L21-No63890		X
9	0083_QC209_211123	Nov 23, 2021		Soil	L21-No63891	X	X
10	0083_QC210_211123	Nov 23, 2021		Water	L21-No63892		X
11	0083_QC211_211123	Nov 23, 2021		Water	L21-No63893		X
12	0083_QC212_211123	Nov 23, 2021		Water	L21-No63894		X

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Company Name:	Cardno (WA)	**Order No.:**	DEF19009/630	**Received:**	Nov 25, 2021 10:00 AM
Address:	11 Harvest Terrace West Perth WA 6005	**Report #:**	844500	**Due:**	Dec 2, 2021
		Phone:	08 9273 3888	**Priority:**	5 Day
		Fax:	08 9388 3831	**Contact Name:**	[redacted]
Project Name:	HEH-B				
Project ID:	WA_0082_PFASOMP				

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Perth Laboratory - NATA # 2377 Site # 2370							
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217							
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
Mayfield Laboratory - NATA # 1261 Site # 25079							
External Laboratory							
13	0083_QC213_211123	Nov 23, 2021		Water	L21-No63895		X
14	0083_QC214_211123	Nov 23, 2021		Water	L21-No63896		X
Test Counts						3	14

Cardno Consulting WA
11 Harvest Terrace
West Perth
WA 6005

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: [redacted]

Report **844500-S**
Project name HEH-B
Project ID WA_0082_PFASOMP
Received Date Nov 25, 2021

Client Sample ID			**0082_QC202_211122**	**0082_QC203_211122**	**0083_QC209_211123**
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**L21-No63884**	**L21-No63885**	**L21-No63891**
Date Sampled			**Nov 22, 2021**	**Nov 22, 2021**	**Nov 23, 2021**
Test/Reference	LOR	Unit			
% Moisture	1	%	41	2.2	9.5
Perfluoroalkyl carboxylic acids (PFCAs)					
Perfluorobutanoic acid (PFBA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluoropentanoic acid (PFPeA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorohexanoic acid (PFHxA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluoroheptanoic acid (PFHpA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorooctanoic acid (PFOA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorononanoic acid (PFNA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorodecanoic acid (PFDA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluoroundecanoic acid (PFUnDA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorododecanoic acid (PFDoDA)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorotridecanoic acid (PFTrDA)[N15]	5	ug/kg	< 5	< 5	< 5
Perfluorotetradecanoic acid (PFTeDA)[N11]	5	ug/kg	< 5	< 5	< 5
13C4-PFBA (surr.)	1	%	INT	62	88
13C5-PFPeA (surr.)	1	%	28	88	88
13C5-PFHxA (surr.)	1	%	39	85	109
13C4-PFHpA (surr.)	1	%	33	76	101
13C8-PFOA (surr.)	1	%	31	93	114
13C5-PFNA (surr.)	1	%	42	98	104
13C6-PFDA (surr.)	1	%	72	131	114
13C2-PFUnDA (surr.)	1	%	81	146	122
13C2-PFDoDA (surr.)	1	%	80	110	104
13C2-PFTeDA (surr.)	1	%	85	116	117
Perfluoroalkyl sulfonamido substances					
Perfluorooctane sulfonamide (FOSA)[N11]	5	ug/kg	< 5	< 5	< 5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	5	ug/kg	< 5	< 5	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	5	ug/kg	< 5	< 5	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	5	ug/kg	< 5	< 5	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	5	ug/kg	< 5	< 5	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	10	ug/kg	< 10	< 10	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	10	ug/kg	< 10	< 10	< 10

Client Sample ID			0082_QC202_211122	0082_QC203_211122	0083_QC209_211123
Sample Matrix			**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**L21-No63884**	**L21-No63885**	**L21-No63891**
Date Sampled			**Nov 22, 2021**	**Nov 22, 2021**	**Nov 23, 2021**
Test/Reference	LOR	Unit			
Perfluoroalkyl sulfonamido substances					
13C8-FOSA (surr.)	1	%	67	97	80
D3-N-MeFOSA (surr.)	1	%	60	94	80
D5-N-EtFOSA (surr.)	1	%	52	89	74
D7-N-MeFOSE (surr.)	1	%	72	118	90
D9-N-EtFOSE (surr.)	1	%	76	97	83
D5-N-EtFOSAA (surr.)	1	%	54	144	131
D3-N-MeFOSAA (surr.)	1	%	41	102	72
Perfluoroalkyl sulfonic acids (PFSAs)					
Perfluorobutanesulfonic acid (PFBS)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorononanesulfonic acid (PFNS)[N15]	5	ug/kg	< 5	< 5	< 5
Perfluoropropanesulfonic acid (PFPrS)[N15]	5	ug/kg	< 5	< 5	< 5
Perfluoropentanesulfonic acid (PFPeS)[N15]	5	ug/kg	< 5	< 5	< 5
Perfluorohexanesulfonic acid (PFHxS)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluoroheptanesulfonic acid (PFHpS)[N15]	5	ug/kg	< 5	< 5	< 5
Perfluorooctanesulfonic acid (PFOS)[N11]	5	ug/kg	< 5	< 5	< 5
Perfluorodecanesulfonic acid (PFDS)[N15]	5	ug/kg	< 5	< 5	< 5
13C3-PFBS (surr.)	1	%	59	103	112
18O2-PFHxS (surr.)	1	%	58	101	102
13C8-PFOS (surr.)	1	%	68	101	95
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	5	ug/kg	< 5	< 5	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	10	ug/kg	< 10	< 10	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	5	ug/kg	< 5	< 5	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N11]	5	ug/kg	< 5	< 5	< 5
13C2-4:2 FTSA (surr.)	1	%	22	28	116
13C2-6:2 FTSA (surr.)	1	%	18	42	152
13C2-8:2 FTSA (surr.)	1	%	48	112	129
13C2-10:2 FTSA (surr.)	1	%	94	122	84
PFASs Summations					
Sum (PFHxS + PFOS)*	5	ug/kg	< 5	< 5	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5	< 5	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5	< 5	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10	< 10	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50	< 50	< 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	Brisbane	Nov 26, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Dec 02, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Dec 02, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Dec 02, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Dec 02, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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WA 6005

Project Name: HEH-B
Project ID: WA_0082_PFASOMP

Order No.: DEF19009/630
Report #: 844500
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Nov 25, 2021 10:00 AM
Due: Dec 2, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Perth Laboratory - NATA # 2377 Site # 2370							
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217							
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
Mayfield Laboratory - NATA # 1261 Site # 25079							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0082_QC201_211122	Nov 22, 2021		Water	L21-No63883		X
2	0082_QC202_211122	Nov 22, 2021		Soil	L21-No63884	X	X
3	0082_QC203_211122	Nov 22, 2021		Soil	L21-No63885	X	X
4	0082_QC204_211122	Nov 22, 2021		Water	L21-No63886		X
5	0082_QC205_211122	Nov 22, 2021		Water	L21-No63887		X
6	0082_QC206_	Nov 22, 2021		Water	L21-No63888		X

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Company Name: Cardno (WA)
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West Perth
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Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217							
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
Mayfield Laboratory - NATA # 1261 Site # 25079							
External Laboratory							
	211122						
7	0082_QC207_211123	Nov 23, 2021		Water	L21-No63889		X
8	0083_QC208_211123	Nov 23, 2021		Water	L21-No63890		X
9	0083_QC209_211123	Nov 23, 2021		Soil	L21-No63891	X	X
10	0083_QC210_211123	Nov 23, 2021		Water	L21-No63892		X
11	0083_QC211_211123	Nov 23, 2021		Water	L21-No63893		X
12	0083_QC212_211123	Nov 23, 2021		Water	L21-No63894		X

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Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217							
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
Mayfield Laboratory - NATA # 1261 Site # 25079							
External Laboratory							
13	0083_QC213_211123	Nov 23, 2021		Water	L21-No63895		X
14	0083_QC214_211123	Nov 23, 2021		Water	L21-No63896		X
Test Counts						3	14

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
ug/L: micrograms per litre
ppm: Parts per million
ppb: Parts per billion
%: Percentage
org/100mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - 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.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version
CP	Client Parent - QC was performed on samples pertaining to this report
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.
TEQ	Toxic Equivalency Quotient
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% Phenols & 50-150% PFASs..

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM where no positive PFAS results have been reported have been reviewed and no data was affected.

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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 (PFTrDA)	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 (PFSAs)							
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 FTSAs)							
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)	%	85			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	97			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	84			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	102			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	104			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	100			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	99			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	81			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	84			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	80			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)	%	81			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	88			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	93			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)	%	82			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	82			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	87			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	77			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	117			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	74			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	72			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	85			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	86			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	87			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	109			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	90			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)	%	75			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	89			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)	B21-No64692	NCP	%	83			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	B21-No64692	NCP	%	99			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	B21-No64692	NCP	%	79			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	B21-No64692	NCP	%	82			50-150	Pass	
Perfluorooctanoic acid (PFOA)	B21-No64692	NCP	%	101			50-150	Pass	
Perfluorononanoic acid (PFNA)	B21-No64692	NCP	%	84			50-150	Pass	
Perfluorodecanoic acid (PFDA)	B21-No64692	NCP	%	85			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	B21-No64692	NCP	%	77			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	B21-No64692	NCP	%	85			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	B21-No64692	NCP	%	84			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B21-No64692	NCP	%	86			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	B21-No64692	NCP	%	79			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B21-No64692	NCP	%	99			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B21-No64692	NCP	%	88			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B21-No64692	NCP	%	88			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B21-No64692	NCP	%	77			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B21-No64692	NCP	%	88			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B21-No64692	NCP	%	85			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	B21-No64692	NCP	%	78			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	B21-No64692	NCP	%	103			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	B21-No64692	NCP	%	75			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B21-No64692	NCP	%	79			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B21-No64692	NCP	%	90			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B21-No64692	NCP	%	99			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	B21-No64692	NCP	%	88			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	B21-No64692	NCP	%	100			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B21-No64692	NCP	%	85			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	B21-No64692	NCP	%	96			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B21-No64692	NCP	%	93			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B21-No64692	NCP	%	77			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	S21-No72447	NCP	%	6.1	6.3	3.0	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	B21-No64666	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	B21-No64666	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	B21-No64666	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	B21-No64666	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	B21-No64666	NCP	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
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:

Robert Johnston	Analytical Services Manager
Sarah McCallion	Senior Analyst-PFAS (QLD)

Kim Rodgers
Business Unit Manager

Final Report – this report replaces any previously issued Report

- 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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NATA Accredited
Accreditation Number 2377
Site Number 2370

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Attention: [redacted]

Report **844500-W**
Project name HEH-B
Project ID WA_0082_PFASOMP
Received Date Nov 25, 2021

Client Sample ID			**0082_QC201_211122**	**0082_QC204_211122**	**0082_QC205_211122**	**0082_QC206_211122**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**L21-No63883**	**L21-No63886**	**L21-No63887**	**L21-No63888**
Date Sampled			**Nov 22, 2021**	**Nov 22, 2021**	**Nov 22, 2021**	**Nov 22, 2021**
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	0.19	< 0.05	1.2
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	0.37	0.04	2.7
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	0.34	0.04	2.0
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	0.14	0.04	1.1
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	[N09]0.12	[N09]0.02	[N09]0.75
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	0.02	< 0.01	0.04
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	%	87	117	120	131
13C5-PFPeA (surr.)	1	%	93	105	128	118
13C5-PFHxA (surr.)	1	%	95	98	115	146
13C4-PFHpA (surr.)	1	%	134	123	140	142
13C8-PFOA (surr.)	1	%	144	113	124	72
13C5-PFNA (surr.)	1	%	127	142	135	140
13C6-PFDA (surr.)	1	%	125	69	133	61
13C2-PFUnDA (surr.)	1	%	102	105	117	99
13C2-PFDoDA (surr.)	1	%	104	102	112	92
13C2-PFTeDA (surr.)	1	%	49	52	88	42
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	%	103	133	140	132
D3-N-MeFOSA (surr.)	1	%	INT	INT	INT	INT

Client Sample ID			0082_QC201_211122	0082_QC204_211122	0082_QC205_211122	0082_QC206_211122
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L21-No63883	L21-No63886	L21-No63887	L21-No63888
Date Sampled			Nov 22, 2021	Nov 22, 2021	Nov 22, 2021	Nov 22, 2021
Test/Reference	LOR	Unit				
Perfluoroalkyl sulfonamido substances						
D5-N-EtFOSA (surr.)	1	%	INT	INT	INT	INT
D7-N-MeFOSE (surr.)	1	%	58	88	79	90
D9-N-EtFOSE (surr.)	1	%	42	58	56	66
D5-N-EtFOSAA (surr.)	1	%	85	61	51	51
D3-N-MeFOSAA (surr.)	1	%	81	65	65	58
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	0.05	< 0.01	0.25
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	0.02	< 0.01	0.06
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	[N09]0.07	< 0.01	[N09]0.37
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	< 0.01	[N09]0.61	[N09]0.08	[N09]3.8
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	[N09]0.11	< 0.01	[N09]0.28
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	< 0.01	[N09]6.2	[N09]0.05	[N09]15
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	168	137	137	120
18O2-PFHxS (surr.)	1	%	129	89	111	114
13C8-PFOS (surr.)	1	%	127	113	137	73
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
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	0.64	< 0.05	6.8
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	%	135	125	109	139
13C2-6:2 FTSA (surr.)	1	%	INT	109	114	65
13C2-8:2 FTSA (surr.)	1	%	171	150	170	144
13C2-10:2 FTSA (surr.)	1	%	174	130	166	126
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	< 0.01	6.81	0.13	18.8
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 0.01	6.32	0.07	15.75
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 0.01	6.93	0.15	19.55
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	8.66	0.27	33.6
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	8.88	0.27	34.35

Client Sample ID			0082_QC207_211123	0083_QC208_211123	0083_QC210_211123	0083_QC211_211123
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L21-No63889	L21-No63890	L21-No63892	L21-No63893
Date Sampled			Nov 23, 2021	Nov 23, 2021	Nov 23, 2021	Nov 23, 2021
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	0.33	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	0.02	0.94	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	0.03	0.44	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	0.01	0.39	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	[N09]0.01	[N09]0.13	< 0.01	< 0.01

Client Sample ID			0082_QC207_211123	0083_QC208_211123	0083_QC210_211123	0083_QC211_211123
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L21-No63889	L21-No63890	L21-No63892	L21-No63893
Date Sampled			Nov 23, 2021	Nov 23, 2021	Nov 23, 2021	Nov 23, 2021
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	0.06	< 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	%	130	111	124	128
13C5-PFPeA (surr.)	1	%	140	103	130	139
13C5-PFHxA (surr.)	1	%	121	154	129	115
13C4-PFHpA (surr.)	1	%	151	50	154	122
13C8-PFOA (surr.)	1	%	119	74	133	142
13C5-PFNA (surr.)	1	%	133	101	134	118
13C6-PFDA (surr.)	1	%	123	129	129	127
13C2-PFUnDA (surr.)	1	%	102	93	109	101
13C2-PFDoDA (surr.)	1	%	98	133	112	91
13C2-PFTeDA (surr.)	1	%	67	163	89	51
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	%	120	91	121	120
D3-N-MeFOSA (surr.)	1	%	13	44	11	INT
D5-N-EtFOSA (surr.)	1	%	INT	32	INT	INT
D7-N-MeFOSE (surr.)	1	%	85	69	74	70
D9-N-EtFOSE (surr.)	1	%	64	64	57	54
D5-N-EtFOSAA (surr.)	1	%	28	54	82	48
D3-N-MeFOSAA (surr.)	1	%	36	60	85	56
Perfluoroalkyl sulfonic acids (PFSAs)						
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	0.03	0.02	< 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	0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	[N09]0.03	[N09]0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	[N09]0.28	[N09]0.32	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	[N09]0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]0.04	[N09]0.45	< 0.01	< 0.01
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	143	134	131	139
18O2-PFHxS (surr.)	1	%	101	94	131	116
13C8-PFOS (surr.)	1	%	117	111	127	122

Client Sample ID			0082_QC207_211123	0083_QC208_211123	0083_QC210_211123	0083_QC211_211123
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			L21-No63889	L21-No63890	L21-No63892	L21-No63893
Date Sampled			Nov 23, 2021	Nov 23, 2021	Nov 23, 2021	Nov 23, 2021
Test/Reference	LOR	Unit				
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)						
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	1.7	< 0.05	< 0.05
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 0.01	0.97	< 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	%	119	74	116	129
13C2-6:2 FTSA (surr.)	1	%	150	150	143	118
13C2-8:2 FTSA (surr.)	1	%	139	101	152	131
13C2-10:2 FTSA (surr.)	1	%	110	INT	183	131
PFASs Summations						
Sum (PFHxS + PFOS)*	0.01	ug/L	0.32	0.77	< 0.01	< 0.01
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.05	0.58	< 0.01	< 0.01
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.33	0.9	< 0.01	< 0.01
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	0.42	5.69	< 0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	0.46	5.77	< 0.1	< 0.1

Client Sample ID			0083_QC212_211123	0083_QC213_211123	0083_QC214_211123
Sample Matrix			Water	Water	Water
Eurofins Sample No.			L21-No63894	L21-No63895	L21-No63896
Date Sampled			Nov 23, 2021	Nov 23, 2021	Nov 23, 2021
Test/Reference	LOR	Unit			
Perfluoroalkyl carboxylic acids (PFCAs)					
Perfluorobutanoic acid (PFBA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorononanoic acid (PFNA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	126	117	98
13C5-PFPeA (surr.)	1	%	143	139	123
13C5-PFHxA (surr.)	1	%	113	127	95
13C4-PFHpA (surr.)	1	%	130	146	137
13C8-PFOA (surr.)	1	%	156	130	135
13C5-PFNA (surr.)	1	%	152	125	141
13C6-PFDA (surr.)	1	%	164	112	149
13C2-PFUnDA (surr.)	1	%	115	97	125
13C2-PFDoDA (surr.)	1	%	100	83	149
13C2-PFTeDA (surr.)	1	%	68	37	122

Client Sample ID			0083_QC212_211123	0083_QC213_211123	0083_QC214_211123
Sample Matrix			**Water**	**Water**	**Water**
Eurofins Sample No.			**L21-No63894**	**L21-No63895**	**L21-No63896**
Date Sampled			**Nov 23, 2021**	**Nov 23, 2021**	**Nov 23, 2021**
Test/Reference	LOR	Unit			
Perfluoroalkyl sulfonamido substances					
Perfluorooctane sulfonamide (FOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.05	ug/L	< 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
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.05	ug/L	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	140	107	122
D3-N-MeFOSA (surr.)	1	%	INT	INT	45
D5-N-EtFOSA (surr.)	1	%	INT	INT	30
D7-N-MeFOSE (surr.)	1	%	74	63	96
D9-N-EtFOSE (surr.)	1	%	59	47	74
D5-N-EtFOSAA (surr.)	1	%	36	80	74
D3-N-MeFOSAA (surr.)	1	%	49	93	87
Perfluoroalkyl sulfonic acids (PFSAs)					
Perfluorobutanesulfonic acid (PFBS)[N11]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorononanesulfonic acid (PFNS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.01	ug/L	[N09]0.02	< 0.01	< 0.01
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorooctanesulfonic acid (PFOS)[N11]	0.01	ug/L	[N09]0.02	< 0.01	[N09]0.02
Perfluorodecanesulfonic acid (PFDS)[N15]	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	164	133	153
18O2-PFHxS (surr.)	1	%	124	118	110
13C8-PFOS (surr.)	1	%	145	115	120
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.01	ug/L	< 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
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.01	ug/L	< 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
13C2-4:2 FTSA (surr.)	1	%	160	112	127
13C2-6:2 FTSA (surr.)	1	%	INT	125	192
13C2-8:2 FTSA (surr.)	1	%	INT	129	176
13C2-10:2 FTSA (surr.)	1	%	156	118	187
PFASs Summations					
Sum (PFHxS + PFOS)*	0.01	ug/L	0.04	< 0.01	0.02
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.02	< 0.01	0.02
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.04	< 0.01	0.02
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 0.05	< 0.05	< 0.05
Sum of PFASs (n=30)*	0.1	ug/L	< 0.1	< 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)	Brisbane	Nov 30, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Nov 30, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Nov 30, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Nov 30, 2021	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name: HEH-B
Project ID: WA_0082_PFASOMP

Order No.: DEF19009/630
Report #: 844500
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: Nov 25, 2021 10:00 AM
Due: Dec 2, 2021
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Perth Laboratory - NATA # 2377 Site # 2370							
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217							
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
Mayfield Laboratory - NATA # 1261 Site # 25079							
External Laboratory							
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**		
1	0082_QC201_211122	Nov 22, 2021		Water	L21-No63883		X
2	0082_QC202_211122	Nov 22, 2021		Soil	L21-No63884	X	X
3	0082_QC203_211122	Nov 22, 2021		Soil	L21-No63885	X	X
4	0082_QC204_211122	Nov 22, 2021		Water	L21-No63886		X
5	0082_QC205_211122	Nov 22, 2021		Water	L21-No63887		X
6	0082_QC206_	Nov 22, 2021		Water	L21-No63888		X

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Perth Laboratory - NATA # 2377 Site # 2370							
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217							
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
Mayfield Laboratory - NATA # 1261 Site # 25079							
External Laboratory							
	211122						
7	0082_QC207_211123	Nov 23, 2021		Water	L21-No63889		X
8	0083_QC208_211123	Nov 23, 2021		Water	L21-No63890		X
9	0083_QC209_211123	Nov 23, 2021		Soil	L21-No63891	X	X
10	0083_QC210_211123	Nov 23, 2021		Water	L21-No63892		X
11	0083_QC211_211123	Nov 23, 2021		Water	L21-No63893		X
12	0083_QC212_211123	Nov 23, 2021		Water	L21-No63894		X

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Sample Detail						Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)
Perth Laboratory - NATA # 2377 Site # 2370							
Melbourne Laboratory - NATA # 1261 Site # 1254							
Sydney Laboratory - NATA # 1261 Site # 18217							
Brisbane Laboratory - NATA # 1261 Site # 20794						X	X
Mayfield Laboratory - NATA # 1261 Site # 25079							
External Laboratory							
13	0083_QC213_211123	Nov 23, 2021		Water	L21-No63895		X
14	0083_QC214_211123	Nov 23, 2021		Water	L21-No63896		X
Test Counts						3	14

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
ug/L: micrograms per litre
ppm: Parts per million
ppb: Parts per billion
%: Percentage
org/100mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - 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.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version
CP	Client Parent - QC was performed on samples pertaining to this report
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.
TEQ	Toxic Equivalency Quotient
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% Phenols & 50-150% PFASs..

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM where no positive PFAS results have been reported have been reviewed and no data was affected.

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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 (PFTrDA)	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 (PFSAs)							
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 FTSAs)							
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)	%	114			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	121			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	128			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	121			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	142			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	135			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	120			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	124			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	135			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	64			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	139			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	128			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	109			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	119			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	122			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	128			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	123			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	104			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	105			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	136			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	141			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	121			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	90			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	115			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	82			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	131			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	128			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	130			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	137			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)	S21-No67547	NCP	%	130			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	L21-No68679	NCP	%	120			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	L21-No68679	NCP	%	69			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S21-No67547	NCP	%	78			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S21-No67547	NCP	%	107			50-150	Pass	
Perfluorononanoic acid (PFNA)	S21-No67547	NCP	%	125			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S21-No67547	NCP	%	124			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	S21-No67547	NCP	%	124			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	S21-No67547	NCP	%	121			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	S21-No67547	NCP	%	76			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S21-No67547	NCP	%	127			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	S21-No67547	NCP	%	129			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S21-No67547	NCP	%	107			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S21-No67547	NCP	%	108			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S21-No67547	NCP	%	113			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S21-No67547	NCP	%	127			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S21-No67547	NCP	%	124			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S21-No67547	NCP	%	121			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	L21-No68679	NCP	%	113			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	L21-No68679	NCP	%	84			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S21-No67547	NCP	%	149			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	L21-No68679	NCP	%	133			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	L21-No68679	NCP	%	99			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	L21-No68679	NCP	%	129			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	L21-No68679	NCP	%	107			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	L21-No68679	NCP	%	109			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S21-No67547	NCP	%	129			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S21-No67547	NCP	%	81			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S21-No67547	NCP	%	130			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S21-No67547	NCP	%	115			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)	L21-No63886	CP	ug/L	0.19	0.20	7.0	30%	Pass	
Perfluoropentanoic acid (PFPeA)	L21-No63886	CP	ug/L	0.37	0.37	1.0	30%	Pass	
Perfluorohexanoic acid (PFHxA)	L21-No63886	CP	ug/L	0.34	0.35	4.0	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	L21-No63886	CP	ug/L	0.14	0.14	1.0	30%	Pass	
Perfluorooctanoic acid (PFOA)	L21-No63886	CP	ug/L	0.12	0.12	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	L21-No63886	CP	ug/L	0.02	0.02	1.0	30%	Pass	
Perfluorodecanoic acid (PFDA)	L21-No63886	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	L21-No63886	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	L21-No63886	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	L21-No63886	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L21-No63886	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	L21-No63886	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	L21-No63886	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	L21-No63886	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	L21-No63886	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	L21-No63886	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	L21-No63886	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	L21-No63886	CP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	L21-No63886	CP	ug/L	0.05	0.04	10	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	L21-No63886	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	L21-No63886	CP	ug/L	0.02	0.02	3.0	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	L21-No63886	CP	ug/L	0.07	0.08	3.0	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	L21-No63886	CP	ug/L	0.61	0.60	2.0	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	L21-No63886	CP	ug/L	0.11	0.10	1.0	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	L21-No63886	CP	ug/L	6.2	6.4	4.0	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	L21-No63886	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	L21-No63886	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	L21-No63886	CP	ug/L	0.64	0.63	1.0	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	L21-No63886	CP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	L21-No63886	CP	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
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:

Robert Johnston	Analytical Services Manager
Sarah McCallion	Senior Analyst-PFAS (QLD)

Kim Rodgers
Business Unit Manager

Final Report – this report replaces any previously issued Report

- 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

Monitoring Date	Monitoring Location ID	Sample ID	Screen Interval	Screen Level	TOC (mAHD)	Well Depth (m)	SWL Time	SWL (mbTOC)	RWL (mAHD)	Comments	Sampling Method	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	QC Dup Sample #	Odour Comments	What colour is the Sample
23/11/2021	MW003		2-5_	Single_Level			11:59			Bore damaged at 1mbTOC. unable to sample										
23/11/2021	MW004	0083_MW004_211123	1.5-4.5	Single_Level	2.989	4.5	12:32	2.62	0.369	Sampled instead of MW003	Hydrasleeve	28.3	0.01	17164	11161	7.49	-187.6		Sewage odour	Cloudy,Brown
23/11/2021	MW008	0083_MW008_211123	2.5-5.5_	Single_Level	2.846	5.5	12:11	2.51	0.336	Gatic lid destroyed	Hydrasleeve	28.1	0.7	30158	19610	7.58	-43.9			Clear
23/11/2021	MW017	0083_MW017_211123	3-6_	Single_Level	3.421		14:25	3.428	-0.007		Hydrasleeve	28.9	1.63	27429	17829	7.92	-164			Clear
23/11/2021	MW019	0083_MW019_211123	1.5-4.5_	Single_Level	2.955	4.5	09:48	2.91	0.045		Hydrasleeve	25.8	1.85	21802	14176	7.3	118.9			Cloudy
23/11/2021	MW027	0083_MW027_211123	3-6_	Single_Level	4.499	6	09:12	4.47	0.029	Ant nest in well	Hydrasleeve	27.6	1.9	12126	7898	7.32	87.1			Clear
23/11/2021	MW101	0083_MW101_211123	2-4.5_	Single_Level	2.4356	4.5	14:14	2.364	0.0716		Hydrasleeve	29.6	0.56	20043	13045	7.3	-231.4			Cloudy
23/11/2021	MW102	0083_MW102_211123	1-6_	Single_Level	2.6924		14:31	2.628	0.0644		Hydrasleeve	28	0.64	24717	16068	7.31	-80.1			Clear
23/11/2021	MW103	0083_MW103_211123	1-6_	Single_Level	2.7898	6	14:51	2.742	0.0478		Hydrasleeve	28.9	0.79	22702	14755	7.32	-42.2			Clear
23/11/2021	MW104	0083_MW104_5.5-6_211123	5.5-6_	Multi_level	3.9903		13:42	4.011	-0.0207	QC114 lost in transit to lab	Hydrasleeve	29.9	1.02	18842	12247	7.62	-345.7	114/214		Clear
23/11/2021	MW105	0083_MW105_6-6.5_211123	6-6.5_	Multi_level	3.0979	6.5	11:46	2.82	0.2779		Peristaltic Pump	28.9	1.05	31853	20715	7.63	-55.8			Clear
23/11/2021	MW107	0083_MW107_211123	5.5-6_	Multi_level	4.7014	6	11:04	4.246	0.4554		Peristaltic Pump	27.8	0.71	52824	34320	7.38	-243.2			Clear,Black,Cloudy
24/11/2021	MW109	0083_MW109_6.5-7_211124	6.5-7_	Multi_level	7.0426	7	07:43	6.702	0.3406		Peristaltic Pump	26.3	8.23	48490	33454	7.74	5.6			Clear
24/11/2021	MW110	0083_MW110_9-9.5_211124	9-9.5_	Multi_level	8.2807	9.5	07:31	7.984	0.2967		Peristaltic Pump	26.9	3.02	27565	17917	7.63	-43.2			Clear
23/11/2021	MW111	0083_MW111_211123	10.5-11_	Multi_level	8.8279	11	12:17	8.543	0.2849		Peristaltic Pump	30.2	0.39	53016	34450	7.34	-281.8		sulphur	Clear
23/11/2021	MW112	0083_MW112_211123	4.5-5_	Multi_level	3.0636	5	12:45	2.592	0.4716		Peristaltic Pump	28.7	2.63	53831	34970	7.74	17.4			Clear
23/11/2021	MW113	0083_MW113_2.5-3.5_211123	2.5-3.5_	Multi_level	2.97		12:55	2.643	0.327		Peristaltic Pump	28.6	5.39	29068	18894	7.61	-22.5			Clear
23/11/2021	MW114	0083_MW114_2.0-3.0_211123	2-3_	Multi_level	2.9356		12:45	2.501	0.4346		Peristaltic Pump	29.4	5.17	29104	18918	7.58	-18.2			Clear
23/11/2021	MW115	0083_MW115_2-3_211123	2-3_	Multi_level	2.6281		11:26	2.568	0.0601		Peristaltic Pump	31.4	4.31	16767	10899	8.13	3.7			Clear
23/11/2021	MW116	0083_MW116_4.5-5.0_211123	4.5-5.0_	Multi_level	2.3885		10:41	2.277	0.1115		Peristaltic Pump	24.6	4.83	55074	35798	7.81	54.3			Clear
23/11/2021	MW117	0083_MW117_211123	4-4.5_	Single_Level	2.6554		09:46	2.503	0.1524	QC110 lost in transit to lab	Hydrasleeve	25.6	6.96	6465	4202	8.33	-26.1	110/210		Clear
23/11/2021	MW119	0083_MW119_211123	2.1-5.1_	Single_Level	3.5069	5.1	13:29	3.35	0.1569		Hydrasleeve	28.7	0.94	25175	16373	7.44	-26.2	113/213		Clear
23/11/2021	MW123	0083_MW123_211123	0.5-4.5_	Single_Level	0.5356	4.5	14:12	0.48	0.0556		Hydrasleeve	28.3	0.42	70621	45890	7.35	-56.7			Cloudy
23/11/2021	MW129	0083_MW129_1.5-2_211123	1.5-2_	Multi_level	2.0256		15:00	1.843	0.1826		Peristaltic Pump	28.5	2	49658	32278	7.37	-103.3			Clear
23/11/2021	MW130	0083_MW130_3.4-3.9_211123	3.4-3.9_	Multi_level	2.0555	3.9	15:51	1.762	0.2935		Peristaltic Pump	27.5	3.9	48679	31655	7.51	62			Cloudy
23/11/2021	MW134	0083_MW134_211123	6.5-12.5_	Single_Level	10.0786	12.5	15:23	9.859	0.2196		Hydrasleeve	30.2	1.74	43202	28080	7.45	41.5			Clear,Brown
23/11/2021	MW202	0083_MW202_211123	6.9-9.9_	Single_Level	8.069		10:15	6.598	1.471		Hydrasleeve	28.1	0.02	42415	27567	7.01	-326.3		dead mouse	Clear
23/11/2021	MW210	0083_MW210_211123	1.5-4_	Single_Level	2.863	4	12:56	2.51	0.353		Hydrasleeve	28.1	2.58	12272	7976	7.84	-10.7	112/212		Clear
23/11/2021	MW212	0083_MW212_211123	1-4_	Single_Level	3.513	4	11:28	2.99	0.523		Hydrasleeve	27.4	1.1	27271	17745	7.49	131.5			Clear
23/11/2021	MW213	0083_MW213_211123	2.5-5.5_	Single_Level	4.49	5.5	10:01	4.47	0.02	Not enough water to fill hydrasleeve.	HandBailing	26.7	1.65	3647	2373	7.49	79.5			Cloudy
23/11/2021	MW214	0083_MW214_211123	2.5-5.5_	Single_Level	4.29	5.5	10:17	4.3	-0.01	Not enough water to fill hydrasleeve.	HandBailing	27.1	1.56	3160	2054	7.9	90.4	111/211		Clear
23/11/2021	MW217	0083_MW217_211123	1.2-4.5_	Single_Level	3.658	4.5	10:44	2.9	0.758		Hydrasleeve	26	1.94	39274	25545	7.3	133.6			Clear
23/11/2021	MW218	0083_MW218_211123	2.8-5.8_	Single_Level	5.137	5.8	10:59	4.92	0.217		Hydrasleeve	26.7	3.74	19129	12428	7.66	124.4			Clear
23/11/2021	OTH002	0083_OTH002_211123									Direct into bottle	25.7	4.38	54923	35685	8.11	18.8			Clear
24/11/2021	OTH101	0083_OTH101_211124									Direct into bottle	24.2	5.56	54645	35519	8.17	18			Clear
23/11/2021	OTH102	0083_OTH102_211123									Direct into bottle	26.8	4.68	54368	35360	8.25	91.6			Clear
23/11/2021	OTH103	0083_OTH103_211123									Direct into bottle	26.9	3.55	55057	35815	8.11	35.2			Clear
23/11/2021	OTH104	0083_OTH104_211123									Direct into bottle	26.1	4.82	54374	35360	8.07	36.6			Clear
23/11/2021	OTH105	0083_OTH105_211123									Direct into bottle	25.9	5.58	55072	35797	8.04	2.5			clear
23/11/2021	OTH106	0083_OTH106_211123									Direct into bottle	26.8	5.54	55104	35818	8.05	-3			Clear
23/11/2021	OTH107	0083_OTH107_211123									Direct into bottle	26.1	5.76	55084	35805	8.03	-2.2			clear
23/11/2021	OTH108	0083_OTH108_211123									Direct into bottle	24.5	5.55	54390	35354	8.03	51			Clear
24/11/2021	OTH109	0083_OTH109_211124									Direct into bottle	24.2	5.55	54800	35620	8.18	-4.6			Clear
24/11/2021	OTH110	0083_OTH110_211124									Direct into bottle	24.4	5.49	54795	35620	8.15	-3.5			Clear
23/11/2021	OTH113	0083_OTH113_211123								sample lost in transit to lab	Direct into bottle	26.3	4.37	54459	35425	8.29	61			Clear

Date	Monitoring Location ID	Sample ID	Sampling Method	Sample Depth (m)	WaterBody Depth (m)	Flow Rate	SW Site Comments ?	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	Water Colour	Turbidity	Comments
23/11/2021	SW112						Access denied due to Asbestos hazard									
23/11/2021	SW113	0083_SW113_211123	Direct_into_Bottle	0.1	0.5			24.4	0.72	1507	981.5	6.91	96.6	clear yellow	Low	QC108/208
23/11/2021	SW120			0	0		Dry. No water sampled.									
23/11/2021	SW126						Dry									
23/11/2021	SW127						Dry									
23/11/2021	SW128	0083_SW128_211123	Direct_into_Bottle	0.05	0.1	Slow		36.5	0.17	233502	51970	7.71	92.7	Clear, salt cristals	Low	

Date	Monitoring Location ID	Sample ID	Depth of Sediment Sampling (m)	Sampling Method	Sample Condition	Sample Description	Comments
23/11/2021	SD112	0083_SD112_211123					Access denied due to Asbestos hazard
23/11/2021	SD113	0083_SD113_211123	0.1	Shovel_Trowel	Dry	Dark brown silty sand	QC109/209
23/11/2021	SD120	0083_SD120_211123	0.1	Direct_into_Bottle	Moist	Grey brown sediment.	
23/11/2021	SD126	0083_SD126_211123	0.1	Shovel_Trowel	Dry	Brown silty sand	
23/11/2021	SD127	0083_SD127_211123	0.1	Shovel_Trowel	Dry	Beige clayey sand	
23/11/2021	SD128	0083_SD128_211123	0.1	Shovel_Trowel	Wet	Black clay	

Date of Bump Test	Project 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)
22/11/21	~~DEFOAM~~ HEH-B	YSI #14E102 596	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: 2,760µS/cm (Y) / N	29.8	pH 4.00: 4.01 pH 7.00: 7.03 ~~Temp:~~ EC: 2781	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N ~~Temp: (± 2°C)~~ Y / N EC: (± 150µS/cm) (Y) / N		[redacted]	
22/11/21	HEH-B	YSI #19K102 536	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: 2,760µS/cm (Y) / N	30.2	pH 4.00: 3.98 pH 7.00: 6.99 ~~Temp:~~ EC: 2859	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N ~~Temp: (± 2°C)~~ Y / N EC: (± 150µS/cm) (Y) / N Y / N		[redacted]	
22/11/21	HEH-B	YSI #21C105 522	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: 2,760µS/cm (Y) / N	31.0	pH 4.00: 4.00 pH 7.00: 7.04 ~~Temp:~~ EC: 2750	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N ~~Temp: (± 2°C)~~ Y / N EC: (± 150µS/cm) (Y) / N Y / N		[redacted]	
23/11/21	HEH-B	YSI #14E102 596	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 Y / N EC: 2,760µS/cm Y / N	30.8	pH 4.00: 4.03 pH 7.00: 7.05 ~~Temp:~~ EC: 2801	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N ~~Temp: (± 2°C)~~ Y / N EC: (± 150µS/cm) (Y) / N Y / N		[redacted]	
23/11/21	HEH-B	YSI #19K102 536	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 Y / N EC: 2,760µS/cm Y / N	30.4	pH 4.00: 4.00 pH 7.00: 7.01 ~~Temp:~~ EC: 2803	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N ~~Temp: (± 2°C)~~ Y / N EC: (± 150µS/cm) (Y) / N Y / N		[redacted]	
23/11/21	HEH-B	YSI #21G105 522	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 Y / N EC: 2,760µS/cm Y / N	29.8	pH 4.00: 4.02 pH 7.00: 7.03 ~~Temp:~~ EC: 2765	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N ~~Temp: (± 2°C)~~ Y / N EC: (± 150µS/cm) (Y) / N Y / N		[redacted]	
24/11/21	HEH-B	YSI #14E102 596	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: 2,760µS/cm (Y) / N	31.0	pH 4.00: 4.01 pH 7.00: 7.02 ~~Temp:~~ EC: 2798	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N ~~Temp: (± 2°C)~~ Y / N EC: (± 150µS/cm) (Y) / N Y / N		[redacted]	
24/11/21	HEH-B	YSI #19K102 536	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: 2,760µS/cm (Y) / N	30.8	pH 4.00: 4.05 pH 7.00: 7.06 ~~Temp:~~ EC: 2845	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N ~~Temp: (± 2°C)~~ Y / N EC: (± 150µS/cm) (Y) / N Y / N		[redacted]	

Date of Bump Test	Project 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)
24/11/21	HEH-B	YSI #21C105 322	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: 2,760µS/cm (Y) / N	30.6	pH 4.00: 4.04 pH 7.00: 7.05 ~~Temp:~~ EC: 2785	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N ~~Temp: (± 2°C)~~ Y / N EC: (± 150µS/cm) (Y) / N		[redacted]	
25/11/21	Learmonth	YSI #14E1025 06	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: 2,760µS/cm (Y) / N	29.8	pH 4.00: 4.05 pH 7.00: 7.06 ~~Temp:~~ EC: 2890	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N ~~Temp: (± 2°C)~~ Y / N EC: (± 150µS/cm) (Y) / N Y / N		[redacted]	
25/11/21	Learmonth	YSI #19C14025 36	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: 2,760µS/cm (Y) / N	30.1	pH 4.00: 4.04 pH 7.00: 7.07 ~~Temp:~~ EC: 2856	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N ~~Temp: (± 2°C)~~ Y / N EC: (± 150µS/cm) (Y) / N Y / N		[redacted]	
25/11/21	Learmonth	YSI #21G1053 27	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: 2,760µS/cm (Y) / N	28.7	pH 4.00: 4.07 pH 7.00: 7.12 ~~Temp:~~ EC: 2809	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N ~~Temp: (± 2°C)~~ Y / N EC: (± 150µS/cm) (Y) / N Y / N		[redacted]	
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,760µS/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 Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N Y / N			
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,760µS/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 Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N Y / N			
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,760µS/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 Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N Y / N			
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 2,760µS/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 Temp: (± 2°C) Y / N EC: (± 150µS/cm) Y / N Y / N			

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Cardno
Contact: [redacted]

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 21G105322
Cable length: 1m

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		✓	171.80 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 57.7
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 9 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:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature	Check Temp NATA	Room Temp	21.1	0	°C	NA	21.1	°C
pH	pH 7.00	361531	7.01	-14.60	mV	7.05	7.01	pH
pH	pH 4.00	362911	4.00	157.20	mV	4.05	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	5.07	2734	2764	µs/cm
ORP (Reference check only)	Zobell A & B	21/0502	238	238	mV	223.4	228.7	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	-0.1	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	5.4	uA	99.4	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 13-Nov-21
Next Due: 12-May-22

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Cardno
Contact: [redacted]

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 14E102596
Cable length: 1m

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		✓	173.80 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.15
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 -1 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:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature	Check Temp NATA	Room Temp	23.2	0	°C	NA	23.2	°C
pH	pH 7.00	361531	7.01	-20.30	mV	7.01	7.01	pH
pH	pH 4.00	362911	4.00	153.50	mV	4.04	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	5.05	2739	2764	µs/cm
ORP (Reference check only)	Zobell A & B	21/0502	233	233	mV	207.6	234.3	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	-0.3	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	5.78	uA	80	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 17-Nov-21
Next Due: 16-May-22

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Cardno
Contact: [redacted]

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 19K102536
Cable length: 1m

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		✓	173.90 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.15
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:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature	Check Temp NATA	Room Temp	23.7	0	°C	NA	23.7	°C
pH	pH 7.00	361531	7.01	-39.50	mV	7.1	7.01	pH
pH	pH 4.00	362911	4.00	134.40	mV	4.09	4.00	pH
Conductivity	2764 µs/cm at 25°C	20/1007	2764	GLP	4.92	2779	2764	µs/cm
ORP (Reference check only)	Zobell A & B	21/0502	232	232	mV	231.3	233.7	mV
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0	NA	NA	0.2	0.0	%
100% Dissolved Oxygen	100% Air Saturation	Air	100.0	6.12	uA	98.6	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 17-Nov-21
Next Due: 16-May-22

APPENDIX

E

DATA QUALITY REVIEW

Data Quality Review
PFAS OMP biannual 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 field 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.

<table>
<tr><th>QA/QC Aspects</th><th>Evidence & Evaluation</th></tr>
<tr><td colspan="2">QA Documentation</td></tr>
<tr><td>Project Quality Plan/Work Plan and Data Quality Objectives</td><td>The field investigation was carried out between the 23 November 2021 and 24 November 2021 and is generally in accordance with the proposed scope of work, as documented in the SAQP (ref DEF19009_Harold E Holt Area A_SAQP_Rev4) issued to the client and in general compliance with the Australian standards AS 4482.1- 2005 “Guide to Sampling and Investigation of Potentially Contaminated Soil, Part 1: Non-volatile and Semi-volatile Compounds”, Standards Australia 1998. AS/NZ 5667:1998 Water quality – sampling and NEPM “National Environment Protection (Assessment of Site Contamination) Measure”.
A quality control program was implemented during the Investigation and the quality assurance procedures used have been reiterated in the report (DEF19009_November 2021 OMP Factual Report_HEH-A). In addition, a Health, Safety and Environment Work Method Statement (HSEWMS) was also prepared.
The Data Quality Objectives were expressed in terms of the purpose of the assessment and the relevant assessment criteria.</td></tr>
<tr><td colspan="2">Data Representativeness</td></tr>
<tr><td>Use of Composites</td><td>No Composites were used during the investigation</td></tr>
<tr><td>Holding Times</td><td>Chain of custody and laboratory reports provide evidence of holding times. Holding times were compliant with required timeframes.</td></tr>
<tr><td>Background samples</td><td>No background samples were collected as part of this investigation.</td></tr>
<tr><td>Verification of field procedures</td><td>The methodology conducted during this investigation is documented in the body of the report, and was in general conformance with the SAQP.
Non-disposable equipment was decontaminated between sample locations.</td></tr>
<tr><td colspan="2">Data Precision & Accuracy</td></tr>
<tr><td>QC sample Frequency</td><td colspan="2"><table>
<tr><th>QC sample type</th><th>SAQP required frequency</th><th>Sample Collected</th></tr>
<tr><td>Blind duplicate</td><td>1 in 10 primary water samples (10%)
1 in 10 primary sediment samples (10%)</td><td>4 for 45 primary water samples (8.8%)
1 for 5 primary sediment samples (20%)</td></tr>
<tr><td>Split duplicate</td><td>1 in 10 primary water samples (10%)
1 in 10 primary sediment samples (10%)</td><td>6 for 45 primary water samples (13.3%)
1 for 5 primary sediment samples (20%)</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>QA/QC Aspects</th><th>Evidence & Evaluation</th></tr>
<tr><td></td><td>
<table>
<tr><td>Rinsate</td><td>1 per day / equipment used</td><td>5 (3x equipment for 1 day, 2 x equipment for 1 day) (100%)</td></tr>
<tr><td>Field Blank</td><td>1 per day / field team (esky)</td><td>5 (3x field teams for 1 day, 2 field team for 1 day) (100%)</td></tr>
</table>
QC sample frequency was generally compliant with the SAQP for water and sediment duplicates, rinsates and field blanks with exception of the blind duplicate for water. Two blind duplicate samples were not received by the primary laboratory. This is not considered to have compromised the validity of the dataset due to >8% of blind duplicate frequency achieved and only minor RPD exceedances observed as detailed below.
</td></tr>
<tr><td>QC Testing – Blind Replicates (Primary Lab)</td><td>
▪ Relative Percentage Difference (RPD) Acceptance Criteria:
<table>
<tr><th>Magnitude of Results</th><th>Acceptable RPD range</th></tr>
<tr><td>< 10 x LOR</td><td>No limits</td></tr>
<tr><td>10 – 20 LOR</td><td>0% - 50%</td></tr>
<tr><td>> 20 x LOR</td><td>0% - 20%</td></tr>
</table>
Groundwater, Seepage water & Surface water
▪ Number of primary samples analysed: 45
▪ Duplicate samples analysed: 4
All RPDs for were below acceptable range, except one (1) RPD exceedance. This was minor and is not consider to compromise the validity of the dataset, probably related to the low concentration of analyte pairs.
Sediment
▪ Number of primary samples analysed: 5
▪ Duplicate samples analysed: 1
All RPDs were below acceptable range with the exception of EC (23%) marginally above the acceptable range.
</td></tr>
<tr><td>QC Testing – Field Splits (Secondary Lab)</td><td>
▪ Relative Percentage Difference (RPD) Acceptance Criteria:
<table>
<tr><th>Magnitude of Results</th><th>Acceptable RPD range</th></tr>
<tr><td>< 10 x LOR</td><td>No limits</td></tr>
<tr><td>10 – 20 LOR</td><td>0% - 50%</td></tr>
<tr><td>> 20 x LOR</td><td>0% - 20%</td></tr>
</table>
Groundwater, Seepage water & Surface water
▪ Number of primary samples Analysed: 45
▪ Field Split Samples Analysed: 6
All RPDs were below acceptable range, except two (2) RPD exceedance. This was minor and is not consider to compromise the validity of the dataset, as it is probably related to the low concentrations of analyte pairs.
Sediment
▪ Number of primary samples analysed: 5
▪ Field Split Samples Analysed: 1
All RPDs were below acceptable range, except one (1) RPD exceedance. This was minor and is not consider to compromise the validity of the dataset, probably related to the low concentration of analyte pairs
</td></tr>
<tr><td>Field Blanks</td><td>Field Blanks were collected at a rate of one per field team (esky) per fieldwork day. All field blank samples tested reported analytes below the laboratory limit of reporting.</td></tr>
<tr><td>Laboratory Internal QC</td><td>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, laboratory control samples and laboratory duplicates.</td></tr>
</table>

QA/QC Aspects	Evidence & Evaluation
	All Matrix Spikes generally reported recoveries within the acceptance range of 70% to 130% with the exception of the following: ▪ EP2114295 - Sample ID MW122: Sulfate matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. ▪ EP2114294, EP2114300 - Sample ID Anonymous: Sulfate, chloride, PFBS, PFPeS, PFHxS, PFPeA & PFHxA matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. ▪ EP2114300 - Sample ID MW117: Sulfate and Chloride matrix spike recovery not determined due to background concentrations exceeding 4x spike level. ▪ EP2114299 - Sample ID SD113: 6:2 FTS and 8:2 FTS matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. - Sample ID Anonymous: 6:2 FTS and 8:2 FTS matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. ▪ EP2114300 - Sample ID Anonymous: PFBS, PFPeS, PFHxS, PFPeA & PFHxA matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. - Sample ID Anonymous: Sulfate and Chloride matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. ▪ EP2114392 - Sample ID Anonymous: Chloride matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. All Method Blank results were within acceptable range. All Quality Control sample frequencies were of an acceptable rate with exception of the following: ▪ EP2114295, EP2114519 - Matrix Spikes and Lab duplicates for PFAS were undertaken less than the target rate.
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 Accreditation No. 1261
Calibration of Field Equipment	All equipment used during the investigation was calibrated by the supplier prior to use. The equipment calibration certificates are provided in Appendix D. Cardno undertook in-field calibration checks (bump tests) for each YSI water quality meters per day of sampling. The bump tests found all parameters to be within the acceptable range. As such, Cardno is satisfied that the equipment calibrations were acceptable for this assessment.
Decontamination and Equipment Blanks	Rinsate blanks were collected at a rate of one per day when reusable equipment is used (i.e. YSI, dipper, trowels/shovels...). All rinsate samples tested reported analytes concentrations below the laboratory LORs.

QA/QC Aspects	Evidence & Evaluation
	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 for groundwater and therefore, the data set used as the basis for the investigation is considered valid and complete.

APPENDIX

F

INFORMATION ABOUT ENVIRONMENTAL REPORTS

About Site Environmental Assessment Reports

1. Introduction

This document explains the Environmental Site Assessment (ESA) process and the context that applies to the use of Environmental Reports issued by Cardno.

2. What is an ESA?

Environmental Site Assessments (ESA) are undertaken for a range of purposes, specific to the brief issued by the client in each case. The scope may include one or a combination of any of the following:

- A factual report of the condition of a portion of the site or one aspect of an entire site.
- Assessment of the contamination levels in soil to be removed from a site – a waste classification assessment.
- Validation of the success of remediation of a site or a portion of a site.
- Provision of a professional opinion about the suitability of a site for one or more uses, in terms of its contamination status.

The scope of any ESA needs to be defined at the outset.

An ESA is not an Environmental Audit. Such audits are undertaken in accordance with the provisions of regulations enacted in various states of Australia, and are referred to as Site Audits in some jurisdictions. Statutory audits provide certification by EPA accredited auditors that a site is suitable for one or more uses. An ESA may provide similar advice but cannot be used in place of an audit if the latter is required by regulation in any instance. However in some circumstances and jurisdictions an ESA is sufficient to provide "environmental sign-off" of a site.

An ESA may be undertaken for due diligence purposes, to establish whether the site has been impacted to the extent that some beneficial uses of the site may be precluded. Due diligence audits in many cases may be completed as non-statutory Audits, although in some jurisdictions they can also be statutory audits, if defined as such at the outset.

3. The ESA Process

The Client generally initiates the ESA process by specifying a brief which identifies the specific objectives of the assessment. If not, it is the consultants' duty to so specify the ESA

In the case of an ESA to provide an opinion about the suitability of the site for use, it would be conducted in accordance with NEPM (Site Assessment). Such ESA would not commence until a thorough site history assessment (Phase 1 Assessment: to identify the potential for significant contamination at a site) is conducted. However, where the history is unclear, a broad screening of chemical parameters can be used to test environmental media. This normally includes a broad range of organic and inorganic compounds and elements, often referred to as an Environmental Screen.

(In the case of an ESA for a purpose other than to provide an opinion about the suitability of the site for use, it is not always necessary to undertake a Phase 1 assessment.)

The ESA requires sampling of soil at representative locations across the site. A NATA accredited laboratory performs the analysis of soil. It is impractical for all of the soil to be assessed. The ESA is often based on a statistical method of grid or random sampling, augmented by targeted sampling at locations known or suspected to be contaminated. Guidance on sampling strategy and density is provided in Australian Standard AS4482.1–2005. However, some considerable degree of judgement is still required in the application of any sampling and testing strategy. For example the blanket application of the "hot spot" method presented in this standard is often inappropriate given its limitations.

The field program also investigates the likelihood of contamination below the site surface. Field investigations must sample and test fill as well as the natural soils. If contamination is found then it is common for further work to be undertaken to characterise, to the extent practical, its vertical and horizontal extent. However, where fill is encountered and testing shows it to be uncontaminated, it must be realised that the heterogeneous nature of the material might mean that not all pockets of contaminated material can be detected using normal sampling regimes.

EPA guidelines for auditors, that may be relevant for an ESA, indicate the need in all cases to consider the potential for groundwater contamination in any site. This does not mean all sites need to be drilled to sample groundwater, but it is most often the case. Most hydrogeological settings and groundwater conditions are complex and vary in space and time. The condition of groundwater is investigated to identify if any beneficial use or environmental value of groundwater is precluded due to contamination.

As previously stated for soil, all groundwater at the site cannot be tested. The environmental investigations are conducted in accordance with industry standards and guidelines (e.g. EPA Vic Pub 668). This provides a level of confidence that a sufficiently comprehensive assessment of the groundwater at the site is achieved.

Where an investigation shows that groundwater is polluted, consideration should be given to assessing the risks and the need for and practicality of any clean up.

4. Environmental Assessment Report

The ESA Report details the findings of the ESA. It provides summary information on the site definition, the reasons for the assessment and other relevant facts. It reviews the scope and quality of the site investigations, laboratory testing and data analyses undertaken. These reports also present a review of the contamination status of the site, the need for any further clean up, and an opinion on the suitability of the site for a range of beneficial uses and land uses such as “residential – low density”, “commercial” etc, as appropriate.

However, as noted above, some ESA have a narrow scope such as for classification of waste soil for removal from site, and do not make conclusions on suitability of site for use.

The ESA Report generally includes copies of other documents and reports, necessary to support the assessment findings, presented as appendices. These can contain more detailed information than the body of the ESA Report. Care should be taken to also read the appended documents and the ESA report in full.

Cardno generally issues reports in electronic form (e-Report) on CD ROM. ESA Reports are issued in this format as Adobe Acrobat™ PDF files. However, a paper copy of the executive summary of the ESA Report is generally issued to the client, and others as required by the brief or by regulation.

5. Limitations of Environmental Assessment Report

The ESA Report is prepared in a manner that can be easily read by a lay person with a legitimate interest in the contamination status of the site, such as the site owner or occupier, EPA and Local Planning Authority. The ESA report is not intended for use by other parties or for other purposes. Anyone who uses the assessment report for purposes other than specified in the report, does so at their own risk.

The site should only be used for one or more of the beneficial uses and land uses identified in the ESA as suitable.

The conditions and qualifications may apply to the suitability of the site for use, and it is the responsibility of the Client to be cognizant of and accept these in accepting the report. Cardno are only responsible for the issuing of the ESA report but accepts no liability for the costs incurred in the implementation of ESA findings.

The ESA provides a “snapshot” of the site conditions at the time of the site investigation. Consequently, the report may not be valid at a later time if there has been any change to the contamination status of the site in that time. Verification of the status of the site may be required in cases where a significant time has elapsed, or site conditions have changed since the assessment and audit.

The ESA is necessarily limited by constraints such as time, cost and available information; although normal professional practice at the time has been applied with all due care to prepare the report. A necessary requirement of this process is the horizontal and vertical interpolation of data from discrete locations. However, site conditions are generally not homogenous and some discrepancies will occur between the actual and predicted results at locations not directly sampled. There is a risk that contamination may occur at the site and not be identified by a competent investigation and assessment. The approach adopted in sampling (a combination of statistically based grid and judgmental sampling) seeks to reduce, but cannot eliminate, this risk.

Where unexpected occurrences of contamination arise, subsequent to the issue of the ESA Report, Cardno should be permitted to make an interpretation of these facts in relation to the ESA Report findings. Consequently, the Client should inform Cardno and seek their opinion. Cardno accepts no liability for costs incurred due to such

unexpected occurrences, given the inherent uncertainties in the assessment process.

Cardno uses information provided by other parties as the basis for the ESA, and reliance on this information is at the discretion of Cardno. However, however Cardno cannot guarantee any of the facts, findings or conclusions presented by other parties. Cardno will not be liable for the use of information, provided by others that is subsequently found to be intentionally misleading.

The ESA Report is not and does not purport to be anything other than a contaminated land ESA. It is not a geotechnical report and bore logs reproduced are for interpretation of the likely distribution of contamination. They are not intended for geotechnical interpretations and may not be adequate for this purpose.

The ESA Report is not intended to be a comprehensive analysis of the presence and associated risk of asbestos in buildings and services. Where asbestos in buildings and services is known or likely, the report may only caution that an appropriately qualified person be engaged to undertake demolition to avoid contamination of the site.

Cardno

13 August 2015

PFAS OMP First Flush Sampling Event Factual Report

May 2022

Naval Communication Station Harold E Holt Area A

304700525

Prepared for
Department of Defence

30 September 2022

Cardno

now

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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-fluoro-hexane Sulphonate
PFOA	Per-fluoro-octanoic Acid
PFOS	Per-fluoro-octane Sulfonate
TDS	Total Dissolved Solids (salinity of water)
TSS	Total Suspended Solids

Technical Terms

AFFF	Aqueous Film-Forming Foam
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
AST	Above-ground Storage Tank
BGL	Below Ground Level
COC	Chain of Custody
DQI	Data Quality Indicator
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA	Environment Protection Authority
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
SEPP	State Environment Protection Policy

Units

ha	Hectares
mBGL	Metres Below Ground Level
mbTOC	Metres below Top of Casing
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

OMP	Ongoing Monitoring Plan
FTG	Fire Training Ground

1 Introduction

1.1 Background

Cardno, now Stantec was engaged by the Australian Department of Defence ("the Client") to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP) First Flush sampling event at Naval Communication Station Harold E Holt – Area A ("HEH-A" or "the site"). The site is located at the end of the North West Cape of WA, at the northern edge of Exmouth and is displayed in Figure 1 of 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, 14 June 2021, Reference: DEF19009, 'PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) Naval Communication Station Harold Holt A'.

The SAQP was reviewed prior to the monitoring event and required no updates.

For the purposes of this report:

> "the site" was defined as Harold E Holt – Area A.

> "the Management Area" was defined as comprising the Site, plus the land extending to the Exmouth Gulf (to the east, north and northwest) The Monitoring Area is presented on 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 First Flush 2022 sampling 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 Environment and Regulation (DER), 2014, Assessment and Management of Contaminated Sites.

> 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

As per the SAQP requirements, the OMP First Flush monitoring event should be undertaken as close as possible following the first heavy rainfall of the wet season.

A heavy rainfall event, as defined in the Department of Environment and Energy (DoEE,2017) guidelines, occurred at the site on the 13 May 2022. The Bureau of Meteorology recorded 56.4 mm of rain at the Exmouth Town weather station (Station No. 5051) that day, which exceeds the heavy rainfall benchmark for May 2022 at this station (41.2 mm). Base personnel observed flooding in the area which triggered the first flush sampling event.

Cardno carried out the tasks detailed in the following sections, on the 16 May 2022, in order to satisfy the purpose and objectives of this assessment.

2.1 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 2-1 and are shown on Figure 2, Appendix A.

Table 2-1 Surface water Monitoring Locations

Monitoring Area	Location ID
Broader area	SW112, SW126, SW120, SW127, SW128
Powerhouse	SW113

2.2 Sediment Monitoring

Sampling of selected sediment 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 2-2 and are shown on Figure 3, Appendix A.

Table 2-2 Sediment Monitoring Locations

Monitoring Area	Location ID
Broader area	SD126, SD128, SD120, SD112, SD127
Powerhouse	SD113

2.3 Seepage Water Monitoring

Sampling of one (1) seepage water monitoring location (OTH113) was conducted applying methods set out in Section 3 of this report.

2.4 Data Management

All the data included in this report has been collected, uploaded to the ESdat database 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;

> Laboratory data was uploaded and approved; and

> QA/QC data was reconciled.

2.5 Deviation from the OMP SAQP

Deviations from the SAQP for the First Flush 2022 monitoring event are presented in Table 2-3.

Table 2-3 Summary of deviations from the OMP SAQP

Location	Deviation	Comments
SW126	Not sampled	This location was found dry. No impact – This location has never been sampled for surface water since the start of the OMP as it has always been dry (sediment sample collected)
SW112/SD112	Sampling location moved 500m south	Access to low lying area around antenna field denied due to friable asbestos hazard. Limited impact – Salt pan was flooded, water and sediment samples collected are representative of first flush conditions.
SW120/SD120	Sampling location moved 500m northeast	
SW113, SW127, SW128	Incorrect field pH readings	pH probe faulty – No impact, parameter not influencing any key OMP decision.
OTH113	Sampled	This sample was lost during transport to the lab during the Nov-21 event. No impact – results required to confirm June 2021 results.

3 Methodology

3.1 Surface water Sampling Methodology

Surface water monitoring procedure is detailed in Table 3-1.

Table 3-1 Surface water Sampling Methodology

Activity	Details
Field parameters	The following field parameters were recorded using a water quality meter: ▪ pH. ▪ electrical conductivity (EC). ▪ oxidation reduction potential (ORP). ▪ Dissolved oxygen (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 water body depth was sufficient, 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).

Activity	Details
Laboratory Testing - Quality Control	Surface water QC samples were collected at the following frequencies as detailed in the SAQP (Cardno, 2021): ▪ 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 Sediment Sampling Methodology

Sediment sampling methodology is detailed in Table 3-2.

Table 3-2 Sediment Sampling Method

Activity	Details
Sample Collection	Sediment samples were collected at the sediment/water interface using hand tools (e.g. trowel, shovel, 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: ▪ Sampling time, date and name of sampler ▪ Weather conditions ▪ Sample collection method ▪ Sampling equipment contamination procedure 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, 2021): ▪ 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 Seepage Water Sampling Methodology

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

Table 3-3 Seepage water Sampling method

Activity	Details
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.

Activity	Details
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	The seepage water sample was submitted for the following analysis: ▪ Full PFAS analytical suite (refer to the SAQP for full list of analytes).

3.4 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.
> 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.

3.5 Assessment Criteria

3.5.1 Surface water

The adopted assessment criteria for surface water are detailed in Table 3-4.

Table 3-4 Criteria for Surface water

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS / PFOS	PFOA	
	µg/L		
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).

3.5.2 Sediment

The adopted assessment criteria for sediment are detailed in Table 3-5. There are currently no Australian regulatory endorsed assessment levels for risk posed to ecology or human health by PFAS in sediment, guidelines values for soil have been adopted in the interim.

Table 3-5 Criteria for Sediment

Exposure Scenario	Adopted Assessment Criteria		Guidance
	PFHxS /PFOS	PFOA	
	µg/L		
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

1. Sum of PFOS and PFHxS.
2. PFOS only

4 Field Observations and Results

4.1 Surface water

Surface water was observed pooling in the drains (natural drainage channels and roadsides) and within the salt pan around site following the recent heavy rainfall event.

4.1.1 Summary of Field Observations

Stabilised physiochemical parameters, water colour and turbidity observations recorded during the surface water sampling program are presented in field sampling record sheets, included in Appendix D. Parameters were generally consistent with the previous monitoring event. The pH probe of the water quality meter used was found to be faulty with some pH readings stable and near neutral and others unstable and providing highly acidic readings around 0-1. All water samples were mostly clear and hyper-saline with DO readings indicating aerobic surface water conditions. No visual or olfactory evidence of contamination were recorded.

4.1.2 Surface water Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. Analytical data is presented in Table B1, 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, Figure 2 in Appendix A presents the surface water monitoring locations where a first time detection of Sum of Per-fluoro-octane Sulfonate (PFOS) and Per-fluoro-hexane Sulphonate (PFHxS) or Per-fluoro-octanoic Acid (PFOA), or a new exceedance of guideline values were reported. The laboratory reports are provided in Appendix C.

Table 4-1 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]	0.06	5	0
PFOS	SW113	0.00023[3]	0.22	5	1
Sum of PFHxS and PFOS	-	2[2]	0.30	5	0

Notes:

1. Non-inclusive of quality control samples
2. Human Health - Recreational Use Guideline (HEPA, 2020)
3. Ecological - 99% species protection level (HEPA, 2020) - LOR (0.01 µg/L) adopted as a practical screening value.

Findings are summarised as follows:

- There were no first-time detects above the laboratory LOR or new exceedances of the relevant assessment criteria at any of the surface water monitoring locations.
- Of the five surface water samples taken, one (SW113, within the Powerhouse source area) reported an exceedance of the Ecological 99% species protection criteria for PFOS.
- Four out of the five surface water samples taken did not report a concentration of PFAS above the laboratory limit of reporting (LOR).

4.2 Sediment

4.2.1 Summary of Field Observations

Field observations recorded at the time of the sediment sampling are provided in Table D2, Appendix D.

4.2.2 Laboratory Results

The results of laboratory analysis have been compared against adopted criteria. Sediment analytical results are presented in Table B2, Appendix B. A summary of results and the adopted criteria is presented in Table 4-2. Laboratory results have also been compared to available historical data, Figure 3 in Appendix A presents the sediment monitoring locations. The laboratory reports are provided in Appendix C.

Table 4-2 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]	Below LOR	6	0
PFOS	-	0.01[3]	0.0012	6	0
Sum of PFHxS and PFOS	-	20[4]	0.0014	6	0

Notes:

1. Non-inclusive of quality control samples
2. Ecological – Direct Exposure (HEPA, 2020)
3. Ecological – Indirect Exposure (HEPA, 2020)
4. Human Health – Commercial/Industrial (HEPA, 2020)

Findings are summarised as follows:

- No first time detects or new exceedances of the relevant assessment criteria were recorded for all sediment monitoring locations.
- None of the sediment samples reported as exceedances of the adopted assessment criteria.
- Five of the six sediment samples reported all PFAS concentrations below the laboratory LOR.

4.3 Seepage Water

The results of laboratory analysis have been compared against adopted criteria. The seepage water analytical results are presented in Table B1, Appendix B.

Sample OTH113 reported all PFAS concentrations below LOR.

4.4 Changes to the Monitoring Network Condition

Access to monitoring locations SW/SD112 and SW/SD120 has been lost due to a permanent Asbestos hazard in the area. These sampling locations where moved approximately 500m to the south and northeast respectively (refer to figures 2 and 3).

No other changes to the monitoring network condition were noted during this sampling event.

5 Summary and Conclusion

Cardno undertook the First Flush 2022 surface water and sediment monitoring event at HEH-A as part of the PFAS OMP following the first heavy rainfall of the wet season. Surface water sampling and testing was undertaken at five (5) monitoring locations and sediment sampling and testing at six (6) locations. One surface water monitoring location was found dry and could not be sampled. One seepage water sample was collected from OTH113 monitoring location in addition to the first flush samples to replace a sample lost in November 2021.

The surface water laboratory results reported the following:

- Of the five samples tested, PFOS (1 sample) was detected above the adopted ecological 99% species protection criteria (LOR adopted).
- Four out of five surface water samples reported all PFAS concentrations below the laboratory LOR.
- There were no first-time detects above the LOR or new exceedances of the relevant assessment criteria at any of the surface water monitoring locations.

The sediment laboratory results reported the following:

- Of the six samples that were tested, there were no exceedances of the relevant assessment criteria for any of the sediment samples.
- Four out of six sediment samples reported all PFAS concentrations below the laboratory LOR.
- There were no first-time detects above the LOR or new exceedances of the relevant assessment criteria at any of the sediment monitoring locations.

The seepage water sample collected (OTH113) reported all PFAS concentrations below LOR.

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

The next OMP sampling event for HEH-A will be the biannual monitoring event (June 2022). An Annual Interpretive Report will be prepared following this event.

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. Australian and New Zealand Guidelines (ANZG) for fresh and marine water quality, 2018.
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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 2018) National Water Quality Management Strategy Australian Drinking Water Guidelines 6, August 2018
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)'.
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22. Cardno, February 2021, PFAS OMP Biannual Monitoring Factual Report, 2020 Post-winter, HEH-A
23. Department of Defence, March 2019, Naval Communication Station Harold E Holt – Area A 'PFAS Management Area Plan'.
24. Department of Defence, May 2019, Naval Communication Station Harold E Holt – Area A 'PFAS Ongoing Monitoring Plan'
25. GHD Pty Ltd, December 2018, Reference: 3135526,'Naval Communication Station Harold E Holt – Area A PFAS Investigations Detailed Site Investigation Report'.
26. GHD Pty Ltd, April 2019, Reference: 3135526, 'Harold E Holt A Ecological Risk Assessment'.

APPENDIX

A

FIGURES

Cardno

now

Stantec

Harold E Holt Area A

North West Cape

Exmouth

Legend

Management Area / Commonwealth boundary

FIGURE 1

1:100,000 Scale at A3

Meters

0 1,500 3,000

Site Location

MAY 2022 FIRST FLUSH SAMPLING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

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Map Produced by Cardno WA
Date: 2022-08-02 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-001_RegionalLocation 03.mxd
Aerial Imagery Supplied by Google Earth

FIGURE 3

1:25,000 Scale at A3

Meters

0 500 1,000

Sediment Monitoring Locations & Results

MAY 2022 FIRST FLUSH SAMPLING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2022-08-03 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-002_May22_SD_Results 01.mxd

FIGURE 2

1:25,000 Scale at A3

Meters

0 500 1,000

Surface Water Monitoring Locations & Results

MAY 2022 FIRST FLUSH SAMPLING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2022-08-03 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-002_May22_SW_Results 01.mxd

APPENDIX

B

DATA ASSESSMENT TABLES

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						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
						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	0.05	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
PFAS NEMP 2020 Interim Marine 99%																				
PFAS NEMP 2020 Recreational Water																			**2**	
Site ID	**Location Code**	**Field ID**	**Date**	**Sample Type**	**Lab Report No.**															
0083		**0083_QC302_220516**	**16/05/2022**	**Rinsate**	**EP2205864**	<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
0083		**0083_QC402_220516**	**16/05/2022**	**Field Blank**	**EP2205864**	<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
0083	**OTH113**	**0083_OTH113_220516**	**16/05/2022**	**Normal**	**EP2205863**	<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
0083	**SW112**	**0083_SW112_220516**	**16/05/2022**	**Normal**	**EP2205864**	<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
0083	**SW113**	**0083_QC103_220516**	**16/05/2022**	**Field Duplicate**	**EP2205864**	<0.02	<0.05	<0.05	0.70	0.26	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.30	2.27
0083	**SW113**	**0083_QC203_220516**	**16/05/2022**	**Interlab Duplicate**	**890774**	<0.05	<0.05	<0.2	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.1	1.0
0083	**SW113**	**0083_SW113_220516**	**16/05/2022**	**Normal**	**EP2205864**	<0.02	<0.05	<0.05	0.72	0.31	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	0.30	2.35
0083	**SW120**	**0083_SW120_220516**	**16/05/2022**	**Normal**	**EP2205864**	<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
0083	**SW127**	**0083_SW127_220516**	**16/05/2022**	**Normal**	**EP2205864**	<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
0083	**SW128**	**0083_SW128_220516**	**16/05/2022**	**Normal**	**EP2205864**	<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

Environmental Standards

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

Notes:

First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value

						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																		
Site ID	**Location Code**	**Field ID**	**Date**	**Sample Type**	**Lab Report No.**													
0083		**0083_QC302_220516**	**16/05/2022**	**Rinsate**	**EP2205864**													
0083		**0083_QC402_220516**	**16/05/2022**	**Field Blank**	**EP2205864**													
0083	**OTH113**	**0083_OTH113_220516**	**16/05/2022**	**Normal**	**EP2205863**													
0083	**SW112**	**0083_SW112_220516**	**16/05/2022**	**Normal**	**EP2205864**	<1	90	<1	90	179	179	4,780	0.04	2,030	687	318	147	2,640
0083	**SW113**	**0083_QC103_220516**	**16/05/2022**	**Field Duplicate**	**EP2205864**	<1	54	<1	54	2.92	2.82	43	1.60	30	27	2	2	29
0083	**SW113**	**0083_QC203_220516**	**16/05/2022**	**Interlab Duplicate**	**890774**													
0083	**SW113**	**0083_SW113_220516**	**16/05/2022**	**Normal**	**EP2205864**	<1	51	<1	51	2.83	3.04	42	3.67	30	28	3	2	31
0083	**SW120**	**0083_SW120_220516**	**16/05/2022**	**Normal**	**EP2205864**	<1	78	<1	78	186	195	5,440	2.49	1,470	490	374	162	3,120
0083	**SW127**	**0083_SW127_220516**	**16/05/2022**	**Normal**	**EP2205864**	<1	71	<1	71	83.1	83.2	1,950	0.10	1,280	474	152	72	1,040
0083	**SW128**	**0083_SW128_220516**	**16/05/2022**	**Normal**	**EP2205864**	<1	59	<1	59	133	135	3,810	0.66	1,170	409	279	105	2,040

Environmental Standards

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

Notes:

First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value

	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)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	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	0.0002	0.0002	0.0002	0.0002	0.0002	0.0008	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure					*1*						*10*				
PFAS NEMP 2020 Ecological indirect exposure					0.01										
PFAS NEMP 2020 Industrial/ commercial (HIL D)											**50**				

Site ID	Location Code	Field ID	Date	Sample Type	Lab Report No.														
0083	**SD112**	**0083_SD112_220516**	**16/05/2022**	**Normal**	**EP2206114**	<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
0083	**SD113**	**0083_SD113_220516**	**16/05/2022**	**Normal**	**EP2206114**	<0.0002	<0.0002	0.0002	<0.0002	0.0012	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
0083	**SD120**	**0083_SD120_220516**	**16/05/2022**	**Normal**	**EP2206114**	<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
0083	**SD126**	**0083_SD126_220516**	**16/05/2022**	**Normal**	**EP2206114**	<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
0083	**SD127**	**0083_QC104_220516**	**16/05/2022**	**Field Duplicate**	**EP2206114**	<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
0083	**SD127**	**0083_QC204_220516**	**16/05/2022**	**Interlab Duplicate**	**890774**	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0008	<0.0002	<0.0004	<0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
0083	**SD127**	**0083_SD127_220516**	**16/05/2022**	**Normal**	**EP2206114**	<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
0083	**SD128**	**0083_SD128_220516**	**16/05/2022**	**Normal**	**EP2206114**	<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

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Ecological direct exposure
HEPA, January 2020, PFAS NEMP 2020 Ecological indirect exposure
HEPA, January 2020, PFAS NEMP 2020 Industrial/ commercial (HIL D)

Notes:

First Time detect of PFOA or PFHxS+PFOS
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
					mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	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	0.0002	0.0005	0.0005	0.0005	0.0005	0.0002	0.0004	0.0002	0.0005	0.0004	0.0002	0.0005	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure																			
PFAS NEMP 2020 Ecological indirect exposure																			
PFAS NEMP 2020 Industrial/ commercial (HIL D)																		**20**	
Site ID	**Location Code**	**Field ID**	**Date**	**Sample Type**	**Lab Report No.**														
0083	**SD112**	**0083_SD112_220516**	**16/05/2022**	**Normal**	**EP2206114**	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
0083	**SD113**	**0083_SD113_220516**	**16/05/2022**	**Normal**	**EP2206114**	<0.0002	<0.0005	<0.0005	0.0009	0.0011	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0014	0.0034
0083	**SD120**	**0083_SD120_220516**	**16/05/2022**	**Normal**	**EP2206114**	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
0083	**SD126**	**0083_SD126_220516**	**16/05/2022**	**Normal**	**EP2206114**	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
0083	**SD127**	**0083_QC104_220516**	**16/05/2022**	**Field Duplicate**	**EP2206114**	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
0083	**SD127**	**0083_QC204_220516**	**16/05/2022**	**Interlab Duplicate**	**890774**	<0.0002	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0004	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0008	<0.0004	<0.0002
0083	**SD127**	**0083_SD127_220516**	**16/05/2022**	**Normal**	**EP2206114**	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
0083	**SD128**	**0083_SD128_220516**	**16/05/2022**	**Normal**	**EP2206114**	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Ecological direct exposure
HEPA, January 2020, PFAS NEMP 2020 Ecological indirect exposure
HEPA, January 2020, PFAS NEMP 2020 Industrial/ commercial (HIL D)

Notes:

First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value

			Field ID	0083_SW113_220516	0083_QC103_220516	RPD	0083_SW113_220516	0083_QC203_220516	RPD
			Matrix Type	Water	Water		Water	Water	
			Lab Report Number	EP2205864	EP2205864		EP2205864	890774	
			Date	16/05/2022	16/05/2022		16/05/2022	16/05/2022	
	Unit	LOR							
PFAS - Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.1	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.1	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.01	0.08	0.08	0	0.08	<0.1	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.2	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.01	0.22	0.22	0	0.22	<0.2	10
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.2	0
PFAS - Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	µg/L	0.1	0.1	0.1	0	0.1	<0.1	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.02	0.41	0.39	5	0.41	0.30	**31**
Perfluorohexanoic acid (PFHxA)	µg/L	0.02	0.24	0.25	4	0.24	0.17	34
Perfluoroheptanoic acid (PFHpA)	µg/L	0.02	0.17	0.17	0	0.17	<0.1	52
Perfluorooctanoic acid (PFOA)	µg/L	0.01	0.06	0.06	0	0.06	0.07	15
Perfluorononanoic acid (PFNA)	µg/L	0.02	0.04	0.04	0	0.04	<0.05	0
Perfluorodecanoic acid (PFDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.05	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.05	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.2	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.05	0.72	0.70	3	0.72	0.5	36
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.05	0.31	0.26	18	0.31	<0.2	43
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.2	0
PFAS - Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.2	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.2	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.2	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.2	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.2	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.02	<0.02	<0.02	0	<0.02	<0.2	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.05	<0.05	<0.05	0	<0.05	<0.2	0
Perfluorooctane sulfonamidoacetic acid (FOSAA)	µg/L	0.2					<0.2	
PFAS									
Sum of PFHxS and PFOS	µg/L	0.01	0.30	0.30	0	0.30	<0.1	**100**
Sum of PFAS	µg/L	0.01	2.35	2.27	3	2.35	1.0	**81**
Metals									
Calcium (filtered)	mg/L	1	28	27	4	28		
Magnesium (filtered)	mg/L	1	3	2	40	3		
Potassium (filtered)	mg/L	1	2	2	0	2		
Sodium (filtered)	mg/L	1	31	29	7	31		

*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

			Field ID	0083_SD127_220516	0083_QC104_220516		0083_SD127_220516	0083_QC204_220516	
			Matrix Type	Sediment	Sediment		Sediment	Sediment	
			Lab Report Number	EP2206114	EP2206114		EP2206114	890774	
			Date	16/05/2022	16/05/2022	RPD	16/05/2022	16/05/2022	RPD
	Unit	LOR							
PFAS - Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
PFAS - Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	mg/kg	0.0008	<0.001	<0.001	0	<0.001	<0.0008	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0008	0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0002	<0.0005	<0.0005	0	<0.0005	<0.0002	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	<0.0005	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	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	<0.0005	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0
PFAS - Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0004	<0.0005	<0.0005	0	<0.0005	<0.0004	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0008	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0004	<0.0005	<0.0005	0	<0.0005	<0.0004	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0008	0
Perfluorooctane sulfonamidoacetic acid (FOSAA)	mg/kg	0.0004					<0.0004	
PFAS									
Sum of PFHxS and PFOS	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
Sum of PFAS	mg/kg	0.0002	<0.0002	<0.0002	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

APPENDIX

C

LABORATORY CERTIFICATES

Cardno

now

Stantec

CHAIN OF CUSTODY

ALS COC#: 37633 ALS Laboratory: EP Perth

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

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: DEF19009/HEHA GW - OTH113

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_OTH113		16/05/2022 12:24 PM	Water	ALS: 2 Non ALS: 0	No	X		

CHAIN OF CUSTODY

ALS COC#: 37633 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: DEF19009/HEHA GW - OTH113

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_OTH113	HDPE (no PTFE)	20 mL	0035210105806 2	Grey	No	
001	0083_OTH113	HDPE (no PTFE)	20 mL	0035210105815 3	Grey	No	

Total Bottle Count: ALS: 2, Non ALS: 0

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2205863**

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
E-mail	: [redacted]cardno.com.au	E-mail	: ALSEnviro.Perth@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/0083	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 37633	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/HEHA GW - OTH113		
Sampler	: [redacted]		

Dates

Date Samples Received	: 20-May-2022 11:30	Issue Date	: 24-May-2022
Client Requested Due Date	: 31-May-2022	Scheduled Reporting Date	: **31-May-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 20.7 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 1 / 1

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 discrepencies: 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)
EP2205863-001	16-May-2022 12:24	0083_OTH113_220516	✓

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

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]esdat.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]esdat.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]esdat.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]esdat.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]esdat.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]cardno.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]cardno.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]cardno.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]cardno.com.au

PERTH
- A4 - AU Tax Invoice (INV) — Email — perth@cardno.com.au

RICCARDO DIVITA
- A4 - AU Tax Invoice (INV) — Email — Riccardo.divita@cardno.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2205863**	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 Western Australia Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 20-May-2022 11:30
Order number	: DEF19009/0083	Date Analysis Commenced	: 26-May-2022
C-O-C number	: 37633	Issue Date	: 30-May-2022 09:22
Sampler	: [redacted]		
Site	: DEF19009/HEHA GW - OTH113		
Quote number	: SY/139/19 B		
No. of samples received	: 1		
No. of samples analysed	: 1		

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*
Franco Lentini	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.
- 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: WATER (Matrix: WATER)				Sample ID	0083_OTH113_220516	----	----	----	----
				Sampling date / time	16-May-2022 12:24	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2205863-001	--------	--------	--------	--------
					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: WATER (Matrix: WATER)				Sample ID	0083_OTH113_220516	----	----	----	----
				Sampling date / time	16-May-2022 12:24	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2205863-001	--------	--------	--------	--------
					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	%		**92.3**	----	----	----	----
13C8-PFOA	----	0.02	%		**98.8**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2205863**	Page	: 1 of 4
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 Western Australia Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 20-May-2022
Order number	: DEF19009/0083	Date Analysis Commenced	: 26-May-2022
C-O-C number	: 37633	Issue Date	: 30-May-2022
Sampler	: [redacted]		
Site	: DEF19009/HEHA GW - OTH113		
Quote number	: SY/139/19 B		
No. of samples received	: 1		
No. of samples analysed	: 1		

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 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*
Franco Lentini	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%.

- **No Laboratory Duplicate (DUP) Results are required to be reported.**

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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4361727)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	112	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	112	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	111	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	113	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	111	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	108	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4361727)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	104	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	121	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	111	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	108	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	103	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: 4361727)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	121	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	85.7	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	110	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	107	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	115	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	118	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4361727)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	118	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	115	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	123	67.0	138

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4361727) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	0.25 µg/L	117	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.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2205863**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 20-May-2022
Site	: DEF19009/HEHA GW - OTH113	Issue Date	: 30-May-2022
Sampler	: [redacted]	No. of samples received	: 1
Order number	: DEF19009/0083	No. of samples analysed	: 1

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

- **Quality Control Sample Frequency Outliers exist - please see following pages for full details.**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	7	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	7	0.00	5.00	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 / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0083_OTH113_220516	**16-May-2022**	**27-May-2022**	12-Nov-2022	✓	**27-May-2022**	12-Nov-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) 0083_OTH113_220516	**16-May-2022**	**27-May-2022**	12-Nov-2022	✓	**27-May-2022**	12-Nov-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) 0083_OTH113_220516	**16-May-2022**	**27-May-2022**	12-Nov-2022	✓	**27-May-2022**	12-Nov-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0083_OTH113_220516	**16-May-2022**	**27-May-2022**	12-Nov-2022	✓	**27-May-2022**	12-Nov-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X) 0083_OTH113_220516	**16-May-2022**	**27-May-2022**	12-Nov-2022	✓	**27-May-2022**	12-Nov-2022	✓

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)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	7	**0.00**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	7	**14.29**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	7	**0.00**	**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
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.

CHAIN OF CUSTODY

(ALS) COC#: 37624 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: DEF19009/HEHA SW - MBMG

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE DETAILS							ANALYSIS REQUIRED			
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Rinsate WATER	Surface Waters Primary WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SW113		16/05/2022 10:52 AM	Water	ALS: 5 Non ALS: 0	No		Partial 4/8		extra PFAS bottles for lab QC
002	0083_QC103		16/05/2022 10:53 AM	Water	ALS: 3 Non ALS: 0	No		Partial 4/8		
003	0083_SW112		16/05/2022 11:25 AM	Water	ALS: 3 Non ALS: 0	No		Partial 4/8		
004	0083_SW127		16/05/2022 11:31 AM	Water	ALS: 3 Non ALS: 0	No		Partial 4/8		
005	0083_SW120		16/05/2022 12:10 PM	Water	ALS: 3 Non ALS: 0	No		Partial 4/8		
006	0083_SW128		16/05/2022 01:14 PM	Water	ALS: 3 Non ALS: 0	No		Partial 4/8		
007	0083_QC302		16/05/2022 01:37 PM	Water	ALS: 2 Non ALS: 0	No	X			
008	0083_QC402		16/05/2022 01:37 PM	Water	ALS: 2 Non ALS: 0	No	X			

CHAIN OF CUSTODY

(ALS) COC#: 37624 *ALS Laboratory:* EP Perth

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

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: DEF19009/HEHA SW - MBMG

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_SW113	Surface Waters Primary 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	0083_QC103	Surface Waters Primary 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	0083_SW112	Surface Waters Primary 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	0083_SW127	Surface Waters Primary 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	0083_SW120	Surface Waters Primary 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	0083_SW128	Surface Waters Primary 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#: 37624 *ALS Laboratory:* EP Perth

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

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: DEF19009/HEHA SW - MBMG

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]
PRIMARY SAMPLER:

CONTACT PH:
QUOTE NO: SY/139/19

SAMPLER MOBILE:
/ ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_SW113	Clear Plastic Bottle - Natural	250 mL	00070621172059	Green	No	
001	0083_SW113	HDPE (no PTFE)	20 mL	00352101058142	Grey	No	
001	0083_SW113	HDPE (no PTFE)	20 mL	00352101058191	Grey	No	
001	0083_SW113	HDPE (no PTFE)	20 mL	00352101057821	Grey	No	
001	0083_SW113	HDPE (no PTFE)	20 mL	00350621041460	Grey	No	
002	0083_QC103	Clear Plastic Bottle - Natural	250 mL	00070621172080	Green	No	
002	0083_QC103	HDPE (no PTFE)	20 mL	00352101057875	Grey	No	
002	0083_QC103	HDPE (no PTFE)	20 mL	00352101057862	Grey	No	
003	0083_SW112	Clear Plastic Bottle - Natural	250 mL	00070621172047	Green	No	
003	0083_SW112	HDPE (no PTFE)	20 mL	00352101057897	Grey	No	
003	0083_SW112	HDPE (no PTFE)	20 mL	00352101057814	Grey	No	
004	0083_SW127	Clear Plastic Bottle - Natural	250 mL	00070621172037	Green	No	
004	0083_SW127	HDPE (no PTFE)	20 mL	00352101058008	Grey	No	
004	0083_SW127	HDPE (no PTFE)	20 mL	00352101057768	Grey	No	
005	0083_SW120	Clear Plastic Bottle - Natural	250 mL	00070621172072	Green	No	
005	0083_SW120	HDPE (no PTFE)	20 mL	00350621041355	Grey	No	
005	0083_SW120	HDPE (no PTFE)	20 mL	00352101057976	Grey	No	
006	0083_SW128	HDPE (no PTFE)	20 mL	00350621046720	Grey	No	
006	0083_SW128	HDPE (no PTFE)	20 mL	00350621041444	Grey	No	
006	0083_SW128	Clear Plastic Bottle - Natural	250 mL	00070621172036	Green	No	
007	0083_QC302	HDPE (no PTFE)	20 mL	00352101057852	Grey	No	
007	0083_QC302	HDPE (no PTFE)	20 mL	00352101058025	Grey	No	
008	0083_QC402	HDPE (no PTFE)	20 mL	00352101057860	Grey	No	
008	0083_QC402	HDPE (no PTFE)	20 mL	00350621041437	Grey	No	

Total Bottle Count: ALS: 24, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2205864**

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
E-mail	: [redacted]cardno.com.au	E-mail	: ALSEnviro.Perth@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/0083	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 37624	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/HEHA SW - MBMG		
Sampler	: [redacted]		

Dates

Date Samples Received	: 20-May-2022 11:30	Issue Date	: 24-May-2022
Client Requested Due Date	: 31-May-2022	Scheduled Reporting Date	: **31-May-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 20.7 - Ice present
Receipt Detail	:	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 discrepencies: 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)
EP2205864-001	16-May-2022 10:52	0083_SW113_220516	✓	✓	✓	✓
EP2205864-002	16-May-2022 10:53	0083_QC103_220516	✓	✓	✓	✓
EP2205864-003	16-May-2022 11:25	0083_SW112_220516	✓	✓	✓	✓
EP2205864-004	16-May-2022 11:31	0083_SW127_220516	✓	✓	✓	✓
EP2205864-005	16-May-2022 12:10	0083_SW120_220516	✓	✓	✓	✓
EP2205864-006	16-May-2022 13:14	0083_SW128_220516	✓	✓	✓	✓
EP2205864-007	16-May-2022 13:37	0083_QC302_220516		✓		
EP2205864-008	16-May-2022 13:37	0083_QC402_220516		✓		

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

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]esdat.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]esdat.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]esdat.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]esdat.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]esdat.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]cardno.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]cardno.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]cardno.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]cardno.com.au

PERTH
- A4 - AU Tax Invoice (INV) — Email — perth@cardno.com.au

RICCARDO DIVITA
- A4 - AU Tax Invoice (INV) — Email — Riccardo.divita@cardno.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2205864**	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 Western Australia Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 20-May-2022 11:30
Order number	: DEF19009/0083	Date Analysis Commenced	: 24-May-2022
C-O-C number	: 37624	Issue Date	: 30-May-2022 09:47
Sampler	: [redacted]		
Site	: DEF19009/HEHA SW - MBMG		
Quote number	: SY/139/19 B		
No. of samples received	: 8		
No. of samples analysed	: 8		

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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Franco Lentini	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.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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: **RINSATE** (Matrix: **WATER**)				Sample ID	0083_QC302_220516	0083_QC402_220516	----	----	----
				Sampling date / time	16-May-2022 13:37	16-May-2022 13:37	----	----	----
Compound	CAS Number	LOR	Unit		EP2205864-007	EP2205864-008	--------	--------	--------
					Result	Result	----	----	----
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	----	----	----
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	----	----	----

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0083_QC302_220516	0083_QC402_220516	----	----	----
				Sampling date / time	16-May-2022 13:37	16-May-2022 13:37	----	----	----
Compound	CAS Number	LOR	Unit		EP2205864-007	EP2205864-008	--------	--------	--------
					Result	Result	----	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
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	----	----	----
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	%		**96.0**	**105**	----	----	----
13C8-PFOA	----	0.02	%		**95.3**	**104**	----	----	----

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_SW113_220516	0083_QC103_220516	0083_SW112_220516	0083_SW127_220516	0083_SW120_220516
				Sampling date / time	16-May-2022 10:52	16-May-2022 10:53	16-May-2022 11:25	16-May-2022 11:31	16-May-2022 12:10
					EP2205864-001	EP2205864-002	EP2205864-003	EP2205864-004	EP2205864-005
					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		**51**	**54**	**90**	**71**	**78**
Total Alkalinity as CaCO3	----	1	mg/L		**51**	**54**	**90**	**71**	**78**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**30**	**30**	**2030**	**1280**	**1470**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**42**	**43**	**4780**	**1950**	**5440**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**28**	**27**	**687**	**474**	**490**
Magnesium	7439-95-4	1	mg/L		**3**	**2**	**318**	**152**	**374**
Sodium	7440-23-5	1	mg/L		**31**	**29**	**2640**	**1040**	**3120**
Potassium	7440-09-7	1	mg/L		**2**	**2**	**147**	**72**	**162**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**2.83**	**2.92**	**179**	**83.1**	**186**
ø Total Cations	----	0.01	meq/L		**3.04**	**2.82**	**179**	**83.2**	**195**
ø Ionic Balance	----	0.01	%		**3.67**	**1.60**	**0.04**	**0.10**	**2.49**
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		**0.08**	**0.08**	<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		**0.22**	**0.22**	<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		**0.41**	**0.39**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.24**	**0.25**	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.17**	**0.17**	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW113_220516	0083_QC103_220516	0083_SW112_220516	0083_SW127_220516	0083_SW120_220516
				Sampling date / time	16-May-2022 10:52	16-May-2022 10:53	16-May-2022 11:25	16-May-2022 11:31	16-May-2022 12:10
Compound	CAS Number	LOR	Unit		EP2205864-001	EP2205864-002	EP2205864-003	EP2205864-004	EP2205864-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.06**	**0.06**	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**0.04**	**0.04**	<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		**0.72**	**0.70**	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		**0.31**	**0.26**	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: **SURFACE WATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_SW113_220516	0083_QC103_220516	0083_SW112_220516	0083_SW127_220516	0083_SW120_220516
				Sampling date / time	16-May-2022 10:52	16-May-2022 10:53	16-May-2022 11:25	16-May-2022 11:31	16-May-2022 12:10
					EP2205864-001	EP2205864-002	EP2205864-003	EP2205864-004	EP2205864-005
					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		**2.35**	**2.27**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.30**	**0.30**	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		**2.31**	**2.23**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**100**	**107**	**105**	**98.3**
13C8-PFOA	----	0.02	%		**98.3**	**99.2**	**93.5**	**98.2**	**99.4**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW128_220516	----	----	----	----
				Sampling date / time	16-May-2022 13:14	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2205864-006	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**59**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**59**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**1170**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**3810**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**409**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**279**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**2040**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**105**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**133**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**135**	----	----	----	----
ø Ionic Balance	----	0.01	%		**0.66**	----	----	----	----
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	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW128_220516	----	----	----	----
				Sampling date / time	16-May-2022 13:14	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2205864-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
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	----	----	----	----
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: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW128_220516	----	----	----	----
				Sampling date / time	16-May-2022 13:14	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2205864-006	--------	--------	--------	--------
					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	%		**109**	----	----	----	----
13C8-PFOA	----	0.02	%		**101**	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **RINSATE**		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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2205864**	Page	: 1 of 8
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 Western Australia Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 20-May-2022
Order number	: DEF19009/0083	Date Analysis Commenced	: 24-May-2022
C-O-C number	: 37624	Issue Date	: 30-May-2022
Sampler	: [redacted]		
Site	: DEF19009/HEHA SW - MBMG		
Quote number	: SY/139/19 B		
No. of samples received	: 8		
No. of samples analysed	: 8		

ilac-MRA NATA
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 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Franco Lentini	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**

				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: 4362316)									
EP2205862-002	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	54	56	3.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	54	56	3.7	0% - 20%
EP2205864-006	0083_SW128_220516	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	59	60	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	59	60	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4357646)									
EP2205862-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
EP2205864-005	0083_SW120_220516	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1470	1460	0.4	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4357645)									
EP2205862-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	8	7	0.0	No Limit
EP2205864-005	0083_SW120_220516	ED045G: Chloride	16887-00-6	1	mg/L	5440	5340	1.9	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4357450)									
EP2205862-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	16	16	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	5	5	0.0	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.0	No Limit
EP2205864-005	0083_SW120_220516	ED093F: Calcium	7440-70-2	1	mg/L	490	484	1.1	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	374	370	1.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	3120	3070	1.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	162	159	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: 4361412)									
EP2205862-003	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
EP2205925-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.02	0.02	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	1.11	0.93	17.8	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	0.04	0.03	0.0	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4361412)									
EP2205862-003	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
EP2205925-001	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4361412)									
EP2205862-003	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: 4361412) - continued									
EP2205862-003	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
EP2205925-001	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: 4361412)									
EP2205862-003	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
EP2205925-001	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: 4361412)									

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: 4361412) - continued									
EP2205862-003	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP2205925-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	1.17	0.98	17.7	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4362316)								
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	107	81.2	126
				<1	200 mg/L	96.9	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4357646)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	99.0	87.7	113
				<1	500 mg/L	98.3	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 4357645)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	108	87.9	114
				<1	1000 mg/L	107	87.9	114
ED093F: Dissolved Major Cations (QCLot: 4357450)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	95.4	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	98.5	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.7	89.7	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4361412)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	105	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	114	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	113	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	118	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	108	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	108	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4361412)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	98.5	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	114	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	118	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	116	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	111	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	118	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	115	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4361412) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	121	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	103	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4361412)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	117	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	104	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	86.1	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	114	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	95.0	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	106	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	99.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4361412)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	108	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	108	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	116	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	106	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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4357646)							
EP2205862-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	119	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4357645)							
EP2205862-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	106	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4361412)							
EP2205864-001	0083_SW113_220516	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	95.6	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	109	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	112	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	105	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	91.8	53.0	142

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: 4361412)							
EP2205864-001	0083_SW113_220516	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	93.1	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	93.8	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	104	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	101	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	104	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	107	71.0	129
		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	111	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	123	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	108	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4361412)							
EP2205864-001	0083_SW113_220516	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	115	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	108	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	89.8	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	107	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	97.4	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	109	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	119	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4361412)							
EP2205864-001	0083_SW113_220516	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	122	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	82.4	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	113	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	84.2	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2205864**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 20-May-2022
Site	: DEF19009/HEHA SW - MBMG	Issue Date	: 30-May-2022
Sampler	: [redacted]	No. of samples received	: 8
Order number	: DEF19009/0083	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.**
- **NO Matrix Spike outliers occur.**
- **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 : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
0083_SW113_220516,	0083_QC103_220516,	----	----	----	24-May-2022	23-May-2022	**1**
0083_SW112_220516,	0083_SW127_220516,						
0083_SW120_220516,	0083_SW128_220516						

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 / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0083_SW113_220516,	0083_QC103_220516,	**16-May-2022**	**----**	----	----	**26-May-2022**	30-May-2022	✓
0083_SW112_220516,	0083_SW127_220516,							
0083_SW120_220516,	0083_SW128_220516							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0083_SW113_220516,	0083_QC103_220516,	**16-May-2022**	**----**	----	----	**25-May-2022**	13-Jun-2022	✓
0083_SW112_220516,	0083_SW127_220516,							
0083_SW120_220516,	0083_SW128_220516							
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
0083_SW113_220516,	0083_QC103_220516,	**16-May-2022**	**----**	----	----	**25-May-2022**	13-Jun-2022	✓
0083_SW112_220516,	0083_SW127_220516,							
0083_SW120_220516,	0083_SW128_220516							
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F)								
0083_SW113_220516,	0083_QC103_220516,	**16-May-2022**	**----**	----	----	**24-May-2022**	23-May-2022	✘
0083_SW112_220516,	0083_SW127_220516,							
0083_SW120_220516,	0083_SW128_220516							

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)								
0083_SW113_220516,	0083_QC103_220516,	**16-May-2022**	**27-May-2022**	12-Nov-2022	✓	**27-May-2022**	12-Nov-2022	✓
0083_SW112_220516,	0083_SW127_220516,							
0083_SW120_220516,	0083_SW128_220516,							
0083_QC302_220516,	0083_QC402_220516							
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X)								
0083_SW113_220516,	0083_QC103_220516,	**16-May-2022**	**27-May-2022**	12-Nov-2022	✓	**27-May-2022**	12-Nov-2022	✓
0083_SW112_220516,	0083_SW127_220516,							
0083_SW120_220516,	0083_SW128_220516,							
0083_QC302_220516,	0083_QC402_220516							
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X)								
0083_SW113_220516,	0083_QC103_220516,	**16-May-2022**	**27-May-2022**	12-Nov-2022	✓	**27-May-2022**	12-Nov-2022	✓
0083_SW112_220516,	0083_SW127_220516,							
0083_SW120_220516,	0083_SW128_220516,							
0083_QC302_220516,	0083_QC402_220516							
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X)								
0083_SW113_220516,	0083_QC103_220516,	**16-May-2022**	**27-May-2022**	12-Nov-2022	✓	**27-May-2022**	12-Nov-2022	✓
0083_SW112_220516,	0083_SW127_220516,							
0083_SW120_220516,	0083_SW128_220516,							
0083_QC302_220516,	0083_QC402_220516							
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X)								
0083_SW113_220516,	0083_QC103_220516,	**16-May-2022**	**27-May-2022**	12-Nov-2022	✓	**27-May-2022**	12-Nov-2022	✓
0083_SW112_220516,	0083_SW127_220516,							
0083_SW120_220516,	0083_SW128_220516,							
0083_QC302_220516,	0083_QC402_220516							

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	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	16	**12.50**	**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	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	16	**12.50**	**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	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	16	**6.25**	**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	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	16	**6.25**	**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 SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. 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 BaSO4 suspension is measured by a photometer and the SO4-2 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 thiocynate forms highly-coloured ferric thiocynate 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 SO4 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.

CHAIN OF CUSTODY

(ALS) COC#: 37623 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: DEF19009/HEHA SED - MBMG

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SD113		16/05/2022 10:47 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
002	0083_SD127		16/05/2022 11:27 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
003	0083_QC104		16/05/2022 11:27 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
004	0083_SD112		16/05/2022 11:29 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
005	0083_SD126		16/05/2022 11:52 AM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
006	0083_SD120		16/05/2022 12:08 PM	Soil	ALS: 1 Non ALS: 0	No	Partial 1/4		
007	0083_SD128		16/05/2022 01:13 PM	Soil	ALS: 0 Non ALS: 0	No	Partial 1/4		

CHAIN-OF-CUSTODY

(ALS) COC#: 37623 *ALS Laboratory:* EP Perth

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

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: DEF19009/HEHA SED - MBMG

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_SD113	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
002	0083_SD127	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
003	0083_QC104	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
004	0083_SD112	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
005	0083_SD126	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
006	0083_SD120	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)
007	0083_SD128	Sediments SEDIMENT	Soil	- EP231X (solids) PFAS - Full Suite (28 analytes)

CHAIN OF CUSTODY

ALS COC#: 37623 *ALS Laboratory:* EP Perth

CLIENT: CARBSD - CARDNO (WA) PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: DEF19009/HEHA SED - MBMG

ORDER NO: DEF19009/0083

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

CONTACT PH:

QUOTE NO: SY/139/19

SAMPLER MOBILE: / ES2019CARBSD0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_SD113	HDPE Soil Jar	200 mL	00621019074644	Grey	No	
002	0083_SD127	HDPE Soil Jar	200 mL	00621019054071	Grey	No	
003	0083_QC104	HDPE Soil Jar	200 mL	00621019074580	Grey	No	
004	0083_SD112	HDPE Soil Jar	200 mL	00621019099144	Grey	No	
005	0083_SD126	HDPE Soil Jar	200 mL	00620719085807	Grey	No	
006	0083_SD120	HDPE Soil Jar	200 mL	00620719085912	Grey	No	

Total Bottle Count: ALS: 6, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2206114**

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
E-mail	: [redacted]cardno.com.au	E-mail	: ALSEnviro.Perth@alsglobal.com
Telephone	: ----	Telephone	: +61-8-9406 1301
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: DEF19009/0083	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 37623	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: DEF19009/HEHA SED - MBMG		
Sampler	: [redacted]		

Dates

Date Samples Received	: 20-May-2022 11:30	Issue Date	: 24-May-2022
Client Requested Due Date	: 31-May-2022	Scheduled Reporting Date	: **31-May-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 20.7 - 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 discrepencies: 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)
EP2206114-001	16-May-2022 10:47	0083_SD113_220516	✓	✓
EP2206114-002	16-May-2022 11:27	0083_SD127_220516	✓	✓
EP2206114-003	16-May-2022 11:27	0083_QC104_220516	✓	✓
EP2206114-004	16-May-2022 11:29	0083_SD112_220516	✓	✓
EP2206114-005	16-May-2022 11:52	0083_SD126_220516	✓	✓
EP2206114-006	16-May-2022 12:08	0083_SD120_220516	✓	✓
EP2206114-007	16-May-2022 13:13	0083_SD128_220516	✓	✓

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

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]esdat.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]esdat.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]esdat.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]esdat.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]esdat.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]cardno.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]cardno.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]cardno.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]cardno.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]cardno.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]cardno.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]cardno.com.au

PERTH
- A4 - AU Tax Invoice (INV) — Email — perth@cardno.com.au

RICCARDO DIVITA
- A4 - AU Tax Invoice (INV) — Email — Riccardo.divita@cardno.com.au

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2206114**	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 Western Australia Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 20-May-2022 11:30
Order number	: DEF19009/0083	Date Analysis Commenced	: 29-May-2022
C-O-C number	: 37623	Issue Date	: 31-May-2022 13:35
Sampler	: [redacted]		
Site	: DEF19009/HEHA SED - MBMG		
Quote number	: SY/139/19 B		
No. of samples received	: 7		
No. of samples analysed	: 7		

ilac-MRA NATA
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*
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	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**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_SD113_220516	0083_SD127_220516	0083_QC104_220516	0083_SD112_220516	0083_SD120_220516
				Sampling date / time	16-May-2022 10:47	16-May-2022 11:27	16-May-2022 11:27	16-May-2022 11:29	16-May-2022 12:08
					EP2206114-001	EP2206114-002	EP2206114-003	EP2206114-004	EP2206114-006
					Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**1.2**	**13.6**	**13.8**	**21.8**	**25.0**
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**	<0.0002	<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		**0.0012**	<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	0083_SD113_220516	0083_SD127_220516	0083_QC104_220516	0083_SD112_220516	0083_SD120_220516
				Sampling date / time	16-May-2022 10:47	16-May-2022 11:27	16-May-2022 11:27	16-May-2022 11:29	16-May-2022 12:08
Compound	CAS Number	LOR	Unit		EP2206114-001	EP2206114-002	EP2206114-003	EP2206114-004	EP2206114-006
					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		**0.0011**	<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		**0.0034**	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0014**	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0034**	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**94.0**	**95.0**	**100**	**114**	**100**
13C8-PFOA	----	0.0002	%		**85.5**	**86.0**	**76.0**	**86.0**	**79.5**

Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	0083_SD128_220516	----	----	----	----
				Sampling date / time	16-May-2022 13:13	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2206114-007	--------	--------	--------	--------
					Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**22.4**	----	----	----	----
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	0083_SD128_220516	----	----	----	----
				Sampling date / time	16-May-2022 13:13	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2206114-007	--------	--------	--------	--------
					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	%		**102**	----	----	----	----
13C8-PFOA	----	0.0002	%		**70.0**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	0083_SD126_220516	----	----	----	----
				Sampling date / time	16-May-2022 11:52	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2206114-005	--------	--------	--------	--------
					Result	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		**21.5**	----	----	----	----
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: SOIL (Matrix: SOIL)			Sample ID	0083_SD126_220516	----	----	----	----
			Sampling date / time	16-May-2022 11:52	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2206114-005	--------	--------	--------	--------
				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	%	**106**	----	----	----	----
13C8-PFOA	----	0.0002	%	**84.0**	----	----	----	----

Surrogate Control Limits

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

Sub-Matrix: **SOIL**		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)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2206114**	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 Western Australia Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 20-May-2022
Order number	: DEF19009/0083	Date Analysis Commenced	: 29-May-2022
C-O-C number	: 37623	Issue Date	: 31-May-2022
Sampler	: [redacted]		
Site	: DEF19009/HEHA SED - MBMG		
Quote number	: SY/139/19 B		
No. of samples received	: 7		
No. of samples analysed	: 7		

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 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*
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	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: 4366989)									
EB2214079-052	Anonymous	EA055: Moisture Content	----	0.1	%	19.0	19.1	0.0	0% - 20%
EP2205861-010	Anonymous	EA055: Moisture Content	----	0.1	%	3.5	3.8	8.4	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4366990)									
EP2206114-005	0083_SD126_220516	EA055: Moisture Content	----	0.1	%	21.5	22.3	3.7	0% - 20%
ES2217223-035	Anonymous	EA055: Moisture Content	----	0.1	%	15.6	15.6	0.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4365272)									
EP2205861-013	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
EP2206256-003	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	0.0004	0.0003	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: 4365272)									
EP2205861-013	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

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: 4365272) - continued									
EP2205861-013	Anonymous	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
EP2206256-003	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 (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: 4365272)									
EP2205861-013	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
EP2206256-003	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

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: 4365272) - continued									
EP2206256-003	Anonymous	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: 4365272)									
EP2205861-013	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
EP2206256-003	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4365272)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	95.2	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.4	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.2	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4365272)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	88.9	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	69.0	132
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	107	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	108	69.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	72.0	129
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.8	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	64.0	136
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	69.0	135
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.4	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	89.6	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4365272)								
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	100	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.8	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	94.2	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.0	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4365272)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	93.6	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	100	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	113	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4365272) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	123	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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4365272)							
EP2205861-013	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	108	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	97.6	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	102	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	96.0	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	99.2	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4365272)							
EP2205861-013	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	96.6	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	113	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	110	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	113	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	112	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	114	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	118	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	93.3	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4365272)							
EP2205861-013	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	112	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	108	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	98.9	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	102	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	79.8	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	109	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: 4365272) - continued							
EP2205861-013	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	101	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4365272)							
EP2205861-013	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	102	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	108	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	106	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	124	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2206114**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +61-8-9406 1301
Project	: WA_0082_PFASOMP	Date Samples Received	: 20-May-2022
Site	: DEF19009/HEHA SED - MBMG	Issue Date	: 31-May-2022
Sampler	: [redacted]	No. of samples received	: 7
Order number	: DEF19009/0083	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: **SOIL**

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
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055)							
0083_SD113_220516, 0083_SD127_220516, 0083_QC104_220516, 0083_SD112_220516, 0083_SD126_220516, 0083_SD120_220516, 0083_SD128_220516	**16-May-2022**	**----**	----	----	**29-May-2022**	30-May-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0083_SD113_220516, 0083_SD127_220516, 0083_QC104_220516, 0083_SD112_220516, 0083_SD126_220516, 0083_SD120_220516, 0083_SD128_220516	**16-May-2022**	**30-May-2022**	12-Nov-2022	✓	**30-May-2022**	09-Jul-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0083_SD113_220516, 0083_SD127_220516, 0083_QC104_220516, 0083_SD112_220516, 0083_SD126_220516, 0083_SD120_220516, 0083_SD128_220516	**16-May-2022**	**30-May-2022**	12-Nov-2022	✓	**30-May-2022**	09-Jul-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0083_SD113_220516, 0083_SD127_220516, 0083_QC104_220516, 0083_SD112_220516, 0083_SD126_220516, 0083_SD120_220516, 0083_SD128_220516	**16-May-2022**	**30-May-2022**	12-Nov-2022	✓	**30-May-2022**	09-Jul-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0083_SD113_220516, 0083_SD127_220516, 0083_QC104_220516, 0083_SD112_220516, 0083_SD126_220516, 0083_SD120_220516, 0083_SD128_220516	**16-May-2022**	**30-May-2022**	12-Nov-2022	✓	**30-May-2022**	09-Jul-2022	✓

Matrix: **SOIL**

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
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0083_SD113_220516, 0083_SD127_220516, 0083_QC104_220516, 0083_SD112_220516, 0083_SD126_220516, 0083_SD120_220516, 0083_SD128_220516	**16-May-2022**	**30-May-2022**	12-Nov-2022	✓	**30-May-2022**	09-Jul-2022	✓

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	40	**10.00**	**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
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	18	**5.56**	**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.

eurofins | mgt

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CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Company Name : Cardno (WA) Pty Ltd

[redacted]

Office Address : 11 Harvest Terrace, West perth, WA, 6005

Purchase Order : PFAS-OMP

PROJECT Number : WA_0082_PFASOMP

PROJECT Name : WA_0082_PFASOMP

COC Number : PFAS-OMP -01

Eurofins | mgt quote ID : NA

Data output format: PDF; ESDAT

[redacted]

Eurofins | mgt DI water batch number:

	Sample ID	Date	Matrix	Analytes: PFAS (28 analytes)
1	0083_QC203_220516	16/05/2022	water	X
2	0083_QC204_220516	16/05/2022	soil	X
3				
4				
5				
6				
7				
8				
9				
10				

Some common holding times (with correct preservation).
For further information contact the lab

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 days
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14 days
Heavy Metals	6 months	Heavy Metals	6 months
Mercury, CrVI	28 days	Mercury, CrVI	28 days
Microbiological testing	24 hours	Microbiological testing	72 hours
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28 days
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24 hours
Ferrous iron	7 days	ASLP, TCLP	7 days

Containers:

1LP	250P	125P	1LA	40mL vial	125mL A	Jar		Sample comments:

Laboratory Staff

Relinquished By: Cardno

Date & Time : 18/05/2022

Signature:

Received By: MS

Date & Time : 20/5/22 1000

Signature:

Turn around time

1 DAY ☐ 2 DAY ☐ 3 DAY ☐

STANDARD ☑ Other:

Method Of Shipment

☑ Courier
☐ Hand Delivered
☐ Postal

Courier Consignment # : 00903WFOPB

Temperature on arrival: 17.9

Report number:

890774

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Christchurch
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Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name:	Cardno (WA)
Contact name:	[redacted]
Project name:	Not provided
Project ID:	WA_0082_PFASOMP
Turnaround time:	5 Day
Date/Time received	May 20, 2022 10:00 AM
Eurofins reference	890774

Sample Information

✓	A detailed list of analytes logged into our LIMS, is included in the attached summary table.
✓	Sample Temperature of chilled sample on the batch as recorded by Eurofins Sample Receipt : 19.9 degrees Celsius.
✓	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.
✓	Sample containers for volatile analysis received with zero headspace.
X	Split sample sent to requested external lab.
X	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:

Robert Johnston on phone : or by email: RobertJohnston@eurofins.com

Results will be delivered electronically via email to [redacted] - [redacted]cardno.com.au.

Note: A copy of these results will also be delivered to the general Cardno (WA) email address.

Global Leader - Results you can trust

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Phone : 0800 856 450
IANZ # 1290

Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name:
Project ID: WA_0082_PFASOMP

Order No.:
Report #: 890774
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: May 20, 2022 10:00 AM
Due: May 27, 2022
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Moisture Set	PFAS (Full Suite) Water Std	PFAS (Full Suite) Soil
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X
Melbourne Laboratory - NATA # 1261 Site # 1254								
Sydney Laboratory - NATA # 1261 Site # 18217								
Brisbane Laboratory - NATA # 1261 Site # 20794								
Mayfield Laboratory - NATA # 1261 Site # 25079								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	0083_QC203_220516	May 16, 2022		Water	L22-My0053998		X	
2	0083_QC204_220516	May 16, 2022		Soil	L22-My0053999	X		X
Test Counts						1	1	1

Cardno Consulting WA
11 Harvest Terrace
West Perth
WA 6005

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: [redacted]

Report **890774-S**
Project name
Project ID WA_0082_PFASOMP
Received Date May 20, 2022

Client Sample ID			**0083_QC204_220516**
Sample Matrix			**Soil**
Eurofins Sample No.			**L22-My0053999**
Date Sampled			**May 16, 2022**
Test/Reference	LOR	Unit	
% Moisture	1	%	13
PFAS (Full Suite) Soil			
Perfluorobutanoic acid (PFBA)	0.0008	mg/kg	< 0.0008
Perfluoropentanoic acid (PFPeA)	0.0002	mg/kg	< 0.0002
Perfluorohexanoic acid (PFHxA)	0.0004	mg/kg	< 0.0004
Perfluoroheptanoic acid (PFHpA)	0.0008	mg/kg	< 0.0008
Perfluorooctanoic acid (PFOA)	0.0002	mg/kg	< 0.0002
Perfluorononanoic acid (PFNA)	0.0002	mg/kg	< 0.0002
Perfluorodecanoic acid (PFDA)	0.0002	mg/kg	< 0.0002
Perfluoroundecanoic acid (PFUnDA)	0.0002	mg/kg	< 0.0002
Perfluorododecanoic acid (PFDoDA)	0.0002	mg/kg	< 0.0002
Perfluorotridecanoic acid (PFTrDA)	0.0002	mg/kg	< 0.0002
Perfluorotetradecanoic acid (PFTeDA)	0.0002	mg/kg	< 0.0002
Perfluorobutane sulfonic acid (PFBS)	0.0004	mg/kg	< 0.0004
Perfluoropentane sulfonic acid (PFPeS)	0.0004	mg/kg	< 0.0004
Perfluorohexane sulfonic acid (PFHxS)	0.0004	mg/kg	< 0.0004
Perfluoroheptane sulfonic acid (PFHpS)	0.0004	mg/kg	< 0.0004
Perfluorooctane sulfonic acid (PFOS)	0.0004	mg/kg	< 0.0004
Perfluorodecane sulfonic acid (PFDS)	0.0004	mg/kg	< 0.0004
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.0005	mg/kg	< 0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.0005	mg/kg	< 0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.0005	mg/kg	< 0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.0005	mg/kg	< 0.0005
Perfluorooctane sulfonamide (FOSA)	0.0004	mg/kg	< 0.0004
N-Methyl perfluorooctane sulfonamide (Me-FOSA)	0.0004	mg/kg	< 0.0004
N-Ethyl perfluorooctane sulfonamide (Et-FOSA)	0.0004	mg/kg	< 0.0004
Perfluorooctane sulfonamidoacetic acid (FOSAA)	0.0004	mg/kg	< 0.0004
N-Methyl perfluorooctane sulfonamidoacetic acid (Me-FOSAA)	0.0004	mg/kg	< 0.0004
N-Ethyl perfluorooctane sulfonamidoacetic acid (Et-FOSAA)	0.0004	mg/kg	< 0.0004
N-Methyl perfluorooctane sulfonamidoethanol (N-Me-FOSE)	0.0008	mg/kg	< 0.0008
N-Ethyl perfluorooctane sulfonamidoethanol (N-Et-FOSE)	0.0008	mg/kg	< 0.0008
Sum of PFAS	0.0002	mg/kg	< 0.0002

Client Sample ID			0083_QC204_220516
Sample Matrix			**Soil**
Eurofins Sample No.			**L22-My0053999**
Date Sampled			**May 16, 2022**
Test/Reference	LOR	Unit	
PFAS (Full Suite) Soil			
Sum of PFHxS and PFOS	0.0004	mg/kg	< 0.0004
Sum of PFAS (WA DER List)	0.0002	mg/kg	< 0.0002

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	Welshpool	May 23, 2022	14 Days
- Method: ARL135 Moisture in Solids			
PFAS (Full Suite) Soil	Welshpool	May 23, 2022	28 Days
- Method: ARL511 - Per and Polyfluoroalkyl Substances in Soil/Sediment by LCMS			

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Rolleston, Christchurch 7675
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IANZ # 1290

Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name:
Project ID: WA_0082_PFASOMP

Order No.:
Report #: 890774
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: May 20, 2022 10:00 AM
Due: May 27, 2022
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Moisture Set	PFAS (Full Suite) Water Std	PFAS (Full Suite) Soil
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X
Melbourne Laboratory - NATA # 1261 Site # 1254								
Sydney Laboratory - NATA # 1261 Site # 18217								
Brisbane Laboratory - NATA # 1261 Site # 20794								
Mayfield Laboratory - NATA # 1261 Site # 25079								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	0083_QC203_220516	May 16, 2022		Water	L22-My0053998		X	
2	0083_QC204_220516	May 16, 2022		Soil	L22-My0053999	X		X
Test Counts						1	1	1

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

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 (*bis*-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.

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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							
PFAS (Full Suite) Soil							
Perfluorobutanoic acid (PFBA)	mg/kg	< 0.0008			0.0008	Pass	
Perfluoropentanoic acid (PFPeA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluorohexanoic acid (PFHxA)	mg/kg	< 0.0004			0.0004	Pass	
Perfluoroheptanoic acid (PFHpA)	mg/kg	< 0.0008			0.0008	Pass	
Perfluorooctanoic acid (PFOA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluorononanoic acid (PFNA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluorodecanoic acid (PFDA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluoroundecanoic acid (PFUnDA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluorododecanoic acid (PFDoDA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluorotridecanoic acid (PFTrDA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluorobutane sulfonic acid (PFBS)	mg/kg	< 0.0004			0.0004	Pass	
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	< 0.0004			0.0004	Pass	
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	< 0.0004			0.0004	Pass	
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	< 0.0004			0.0004	Pass	
Perfluorooctane sulfonic acid (PFOS)	mg/kg	< 0.0004			0.0004	Pass	
Perfluorodecane sulfonic acid (PFDS)	mg/kg	< 0.0004			0.0004	Pass	
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	< 0.0005			0.0005	Pass	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	< 0.0005			0.0005	Pass	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	< 0.0005			0.0005	Pass	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	< 0.0005			0.0005	Pass	
Perfluorooctane sulfonamide (FOSA)	mg/kg	< 0.0004			0.0004	Pass	
N-Methyl perfluorooctane sulfonamide (Me-FOSA)	mg/kg	< 0.0004			0.0004	Pass	
N-Ethyl perfluorooctane sulfonamide (Et-FOSA)	mg/kg	< 0.0004			0.0004	Pass	
Perfluorooctane sulfonamidoacetic acid (FOSAA)	mg/kg	< 0.0004			0.0004	Pass	
N-Methyl perfluorooctane sulfonamidoacetic acid (Me-FOSAA)	mg/kg	< 0.0004			0.0004	Pass	
N-Ethyl perfluorooctane sulfonamidoacetic acid (Et-FOSAA)	mg/kg	< 0.0004			0.0004	Pass	
N-Methyl perfluorooctane sulfonamidoethanol (N-Me-FOSE)	mg/kg	< 0.0008			0.0008	Pass	
N-Ethyl perfluorooctane sulfonamidoethanol (N-Et-FOSE)	mg/kg	< 0.0008			0.0008	Pass	
Sum of PFAS	mg/kg	< 0.0002			0.0002	Pass	
Sum of PFHxS and PFOS	mg/kg	< 0.0004			0.0004	Pass	
Sum of PFAS (WA DER List)	mg/kg	< 0.0002			0.0002	Pass	
LCS - % Recovery							
PFAS (Full Suite) Soil							
Perfluorobutanoic acid (PFBA)	%	115			50-130	Pass	
Perfluoropentanoic acid (PFPeA)	%	116			50-130	Pass	
Perfluorohexanoic acid (PFHxA)	%	112			50-130	Pass	
Perfluorooctanoic acid (PFOA)	%	109			50-130	Pass	
Perfluorononanoic acid (PFNA)	%	107			50-130	Pass	
Perfluorodecanoic acid (PFDA)	%	109			50-130	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	117			50-130	Pass	
Perfluorododecanoic acid (PFDoDA)	%	104			50-130	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	106			50-130	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	104			50-130	Pass	
Perfluorobutane sulfonic acid (PFBS)	%	117			50-130	Pass	
Perfluoropentane sulfonic acid (PFPeS)	%	109			50-130	Pass	
Perfluorohexane sulfonic acid (PFHxS)	%	96			50-130	Pass	
Perfluoroheptane sulfonic acid (PFHpS)	%	108			50-130	Pass	
Perfluorooctane sulfonic acid (PFOS)	%	116			50-130	Pass	
Perfluorodecane sulfonic acid (PFDS)	%	108			50-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
4:2 Fluorotelomer sulfonic acid (4:2 FTS)			%	109			50-130	Pass	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)			%	111			50-130	Pass	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)			%	107			50-130	Pass	
Perfluorooctane sulfonamide (FOSA)			%	115			50-130	Pass	
N-Methyl perfluorooctane sulfonamidoacetic acid (Me-FOSAA)			%	107			50-130	Pass	
N-Ethyl perfluorooctane sulfonamidoacetic acid (Et-FOSAA)			%	115			50-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	L22-My0053989	NCP	%	5.2	5.2	1.0	30%	Pass	
Duplicate									
PFAS (Full Suite) Soil				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	L22-My0067800	NCP	mg/kg	< 0.0008	< 0.0008	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	L22-My0067800	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	L22-My0067800	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	L22-My0067800	NCP	mg/kg	< 0.0008	< 0.0008	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	L22-My0067800	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	L22-My0067800	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	L22-My0067800	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	L22-My0067800	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	L22-My0067800	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	L22-My0067800	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L22-My0067800	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluorobutane sulfonic acid (PFBS)	L22-My0067800	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Perfluoropentane sulfonic acid (PFPeS)	L22-My0067800	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Perfluorohexane sulfonic acid (PFHxS)	L22-My0067800	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Perfluoroheptane sulfonic acid (PFHpS)	L22-My0067800	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Perfluorooctane sulfonic acid (PFOS)	L22-My0067800	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Perfluorodecane sulfonic acid (PFDS)	L22-My0067800	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	L22-My0067800	NCP	mg/kg	< 0.0005	< 0.0005	<1	30%	Pass	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	L22-My0067800	NCP	mg/kg	< 0.0005	< 0.0005	<1	30%	Pass	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	L22-My0067800	NCP	mg/kg	< 0.0005	< 0.0005	<1	30%	Pass	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	L22-My0067800	NCP	mg/kg	< 0.0005	< 0.0005	<1	30%	Pass	
Perfluorooctane sulfonamide (FOSA)	L22-My0067800	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
N-Methyl perfluorooctane sulfonamide (Me-FOSA)	L22-My0067800	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
N-Ethyl perfluorooctane sulfonamide (Et-FOSA)	L22-My0067800	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Perfluorooctane sulfonamidoacetic acid (FOSAA)	L22-My0067800	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
N-Methyl perfluorooctane sulfonamidoacetic acid (Me-FOSAA)	L22-My0067800	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
N-Ethyl perfluorooctane sulfonamidoacetic acid (Et-FOSAA)	L22-My0067800	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	

Duplicate									
PFAS (Full Suite) Soil				Result 1	Result 2	RPD			
N-Methyl perfluorooctane sulfonamidoethanol (N-Me-FOSE)	L22-My0067800	NCP	mg/kg	< 0.0008	< 0.0008	<1	30%	Pass	
N-Ethyl perfluorooctane sulfonamidoethanol (N-Et-FOSE)	L22-My0067800	NCP	mg/kg	< 0.0008	< 0.0008	<1	30%	Pass	
Sum of PFAS	L22-My0067800	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Sum of PFHxS and PFOS	L22-My0067800	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Sum of PFAS (WA DER List)	L22-My0067800	NCP	mg/kg	< 0.0002	< 0.0002	<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	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised by:

Robert Johnston	Analytical Services Manager
Paul Nottle	Senior Analyst-PFAS
Sean Sangster	Senior Analyst-Sample Properties

Kim Rodgers
Business Unit Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

Cardno Consulting WA
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West Perth
WA 6005

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: [redacted]

Report **890774-W**
Project name
Project ID WA_0082_PFASOMP
Received Date May 20, 2022

Client Sample ID			**0083_QC203_220516**
Sample Matrix			**Water**
Eurofins Sample No.			**L22-My0053998**
Date Sampled			**May 16, 2022**
Test/Reference	LOR	Unit	
PFAS (Full Suite) Water Std			
Perfluorobutanoic acid (PFBA)	0.1	ug/L	< 0.1
Perfluoropentanoic acid (PFPeA)	0.05	ug/L	0.30
Perfluorohexanoic acid (PFHxA)	0.05	ug/L	0.17
Perfluoroheptanoic acid (PFHpA)	0.1	ug/L	< 0.1
Perfluorooctanoic acid (PFOA)	0.05	ug/L	0.07
Perfluorononanoic acid (PFNA)	0.05	ug/L	< 0.05
Perfluorodecanoic acid (PFDA)	0.05	ug/L	< 0.05
Perfluoroundecanoic acid (PFUnDA)	0.05	ug/L	< 0.05
Perfluorododecanoic acid (PFDoDA)	0.05	ug/L	< 0.05
Perfluorotridecanoic acid (PFTrDA)	0.05	ug/L	< 0.05
Perfluorotetradecanoic acid (PFTeDA)	0.05	ug/L	< 0.05
Perfluorobutane sulfonic acid (PFBS)	0.1	ug/L	< 0.1
Perfluoropentane sulfonic acid (PFPeS)	0.1	ug/L	< 0.1
Perfluorohexane sulfonic acid (PFHxS)	0.1	ug/L	< 0.1
Perfluoroheptane sulfonic acid (PFHpS)	0.2	ug/L	< 0.2
Perfluorooctane sulfonic acid (PFOS)	0.2	ug/L	< 0.2
Perfluorodecane sulfonic acid (PFDS)	0.2	ug/L	< 0.2
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.2	ug/L	< 0.2
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.2	ug/L	0.5
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.2	ug/L	< 0.2
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.2	ug/L	< 0.2
Perfluorooctane sulfonamide (FOSA)	0.2	ug/L	< 0.2
N-Methyl perfluorooctane sulfonamide (Me-FOSA)	0.2	ug/L	< 0.2
N-Ethyl perfluorooctane sulfonamide (Et-FOSA)	0.2	ug/L	< 0.2
Perfluorooctane sulfonamidoacetic acid (FOSAA)	0.2	ug/L	< 0.2
N-Methyl perfluorooctane sulfonamidoacetic acid (Me-FOSAA)	0.2	ug/L	< 0.2
N-Ethyl perfluorooctane sulfonamidoacetic acid (Et-FOSAA)	0.2	ug/L	< 0.2
N-Methyl perfluorooctane sulfonamidoethanol (N-Me-FOSE)	0.2	ug/L	< 0.2
N-Ethyl perfluorooctane sulfonamidoethanol (N-Et-FOSE)	0.2	ug/L	< 0.2
Sum of PFAS	0.05	ug/L	1.0
Sum of PFHxS and PFOS	0.1	ug/L	< 0.1
Sum of PFAS (WA DER List)	0.05	ug/L	1.0

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
PFAS (Full Suite) Water Std	Welshpool	May 23, 2022	28 Days

- Method: ARL510 - Per and Polyfluoroalkyl Substances in Water by LCMS

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Company Name: Cardno (WA)
Address: 11 Harvest Terrace
West Perth
WA 6005

Project Name:
Project ID: WA_0082_PFASOMP

Order No.:
Report #: 890774
Phone: 08 9273 3888
Fax: 08 9388 3831

Received: May 20, 2022 10:00 AM
Due: May 27, 2022
Priority: 5 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail						Moisture Set	PFAS (Full Suite) Water Std	PFAS (Full Suite) Soil
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X
Melbourne Laboratory - NATA # 1261 Site # 1254								
Sydney Laboratory - NATA # 1261 Site # 18217								
Brisbane Laboratory - NATA # 1261 Site # 20794								
Mayfield Laboratory - NATA # 1261 Site # 25079								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	0083_QC203_220516	May 16, 2022		Water	L22-My0053998		X	
2	0083_QC204_220516	May 16, 2022		Soil	L22-My0053999	X		X
Test Counts						1	1	1

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

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 (*bis*-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.

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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.

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	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised by:

Robert Johnston	Analytical Services Manager
Paul Nottle	Senior Analyst-PFAS

Kim Rodgers
Business Unit Manager

Final Report – this report replaces any previously issued Report

- 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

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Site	Location ID	Date	Sample ID	Sampling Method	Sample Depth (m)	WaterBody Depth (m)	Flow Rate	Comments/QC	Temperature C	DO (mg/L)	EC (us/Cm)	pH	Eh (mV)	Water Colour	Turbidity
Harold E Holt Area A	SW112	16/05/2022	0083_SW112_220516	Direct into Bottle	0.1	0.3	Slow	Taken 500m south of point due to asbestos hazard	21.7	4.76	16889	7.9	62	Clear	Low
Harold E Holt Area A	SW113	16/05/2022	0083_SW113_220516	Direct into Bottle	0.1	0.3	Slow	Basin, QC103/QC203	22.4	6.06	1137	0.01*	200.9	brown	Medium
Harold E Holt Area A	SW120	16/05/2022	0083_SW120_220516	Direct into Bottle	0.1	0.15	Slow	Taken 500m northwest of point due to access	23.6	4.83	18636	7.69	64.3	Clear	Low
Harold E Holt Area A	SW126	16/05/2022						Dry							
Harold E Holt Area A	SW127	16/05/2022	0083_SW127_220516	Direct into Bottle	0.1	0.5	Slow		22.5	5.64	8541	0*	243.5	Clear	Low
Harold E Holt Area A	SW128	16/05/2022	0083_SW128_220516	Direct into Bottle	0.1	0.15	Slow		26.3	5.16	13511	3.57*	69.7	Clear	Low

Note: *pH values erroneous

Site	Location ID	Date	Sample ID	Depth of Sediment Sampling (m)	Sampling Method	Sample Condition	Sample Description	Comment/QC
Harold E Holt Area A	SD112	16/05/2022	0083_SD112_220516	0.1	Shovel Trowel	Wet	Beige coarse sand	Taken 500m south due to asbeatos hazard
Harold E Holt Area A	SD113	16/05/2022	0083_SD113_220516	0.1	Direct into Bottle	Dry	Light brown, sandy clay	
Harold E Holt Area A	SD120	16/05/2022	0083_SD120_220516	0.1	Direct into Bottle	Dry	Grey light brown, sandy clay	Taken 500 m north west of point
Harold E Holt Area A	SD126	16/05/2022	0083_SD126_220516	0.1	Direct into Bottle	Dry	Sandy clay, light brown	
Harold E Holt Area A	SD127	16/05/2022	0083_SD127_220516	0.1	Direct into Bottle	Wet	Reddy brown, sandy clay	QC104, QC204
Harold E Holt Area A	SD128	16/05/2022	0083_SD128_220516	0.1	Direct into Bottle	Dry	Sand, light brown	

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer:
Contact:

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 20J100956
Cable length: 1m 20J100101

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		✓	173.40 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.72
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 4 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:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature	Check Temp NATA	Room Temp	18.2	-0.9	°C	NA	17.3	°C
pH (21K)	pH 7.00	375757	7.01	-6.00	mV	7.04	7.01	pH
pH (21K)	pH 4.00	378281	4.00	167.40	mV	4.02	4.00	pH
Conductivity (20H100492)	2764 µs/cm at 25°C	21/1012	2764	GLP	4.94	2766	2764	µs/cm
ORP (201013SIA605102)	Zobell A & B	21/1611	246	246	mV	244.8	242	mV
Zero DO (20H100658)	NaSO3 in distilled water	10175	0.0	NA	NA	0.1	0.0	%
100% DO (20H100658)	100% Air Saturation	Air	100.0	4.7	uA	102.3	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 07-May-22
Next Due: 03-Nov-22

GK Environmental EQUIPMENT

Calibration Report

Multi-Parameter Water Quality Instrument

Customer:
Contact:

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 20D101039
Cable length: 1m 20A100403

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		✓	171.70 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.14
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 4 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:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature (11H100544)	Check Temp NATA	Room Temp	18.2	-1	°C	NA	17.2	°C
pH (21K)	pH 7.00	375757	7.01	-4.10	mV	7.07	7.01	pH
pH (21K)	pH 4.00	378281	4.00	167.60	mV	4.07	4.00	pH
Conductivity (11H100544)	2764 µs/cm at 25°C	21/1012	2764	GLP	4.88	2718	2764	µs/cm
ORP (200408SA605101)	Zobell A & B	21/1611	246	246	mV	243.2	242.1	mV
Zero DO (208140053)	NaSO3 in distilled water	10175	0.0	NA	NA	0.4	0.0	%
100% DO (208140053)	100% Air Saturation	Air	100.0	4.6	uA	94.2	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 07-May-22
Next Due: 03-Nov-22

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)
16/5/22	0082 0083	YSI # 20D1019039	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: ~~1,413µS/cm~~ Y / N 35,000		pH 4.00: 4.09 pH 7.00: 7.08 EC: 34640	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N EC: (± 150µS/cm) (Y) N		[redacted]	
17/05/22	0960	YSI # 20D10 1039	100% Saturation? (Y) N	(0%) Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: 1,413µS/cm (Y) / N 35,000		pH 4.00: -2.12 pH 7.00: 7.15 EC: 34663	pH 4.00: (± pH 0.2) Y / N pH 7.00: (± pH 0.2) Y / N EC: (± 150µS/cm) Y / N		[redacted]	
18/05/22	0960	YSI #20D100 956	100% Saturation? (Y) N	0% Calibration? Y (N) NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: ~~1,413µS/cm~~ (Y) / N 35,000		pH 4.00: 4.11 pH 7.00: 7.06 EC: 34753	pH 4.00: (± pH 0.2) (Y) N pH 7.00: (± pH 0.2) (Y) N EC: (± 150µS/cm) (Y) N		[redacted]	
		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 1,413µS/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: 1,413µS/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: 1,413µS/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: 1,413µS/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: 1,413µS/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

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Data Quality Review
PFAS OMP First Flush 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 field 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 16 May 2022 and is generally in accordance with the proposed scope of work, as documented in the SAQP (ref DEF19009_Harold E Holt Area A_SAQP_Rev5) issued to the client and in general compliance with the Australian standards AS 4482.1- 2005 "*Guide to Sampling and Investigation of Potentially Contaminated Soil, Part 1: Non-volatile and Semi-volatile Compounds",* Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling* and NEPM "*National Environment Protection (Assessment of Site Contamination) Measure".* A quality control program was implemented during the Investigation and the quality assurance procedures used have been reiterated in the report (DEF19009_First Flush 2022 OMP Factual Report_HEH-A). In addition, a Health, Safety and Environment Work Method Statement (HSEWMS) 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 compliant with required timeframes with the following exception: ▪ EP2205864 holding time for Major Cations was exceeded by 1 day for the surface water samples. This minor holding time exceedance due to the site's remoteness is not considered to have affected the validity of the dataset.
Background samples	No background samples were collected as part of this investigation.
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. Non-disposable equipment was decontaminated between sample locations.
	Data Precision & Accuracy

QC sample Frequency	QC sample type	SAQP required frequency	Sample Collected
	Blind duplicate	1 in 10 primary water samples (10%) 1 in 10 primary sediment samples (10%)	1 for 6 primary water samples (16.7%) 1 for 6 primary sediment samples (16.7%)

QA/QC Aspects	Evidence & Evaluation		
	Interlab duplicate	1 in 10 primary water samples (10%) 1 in 10 primary sediment samples (10%)	1 for 6 primary water samples (16.7%) 1 for 6 primary sediment samples (16.7%)
	Rinsate	1 per day / equipment used	1 for 1 day (100%)
	Field Blank	1 per day / field team (esky)	1 for 1 day (100%)
	QC sample frequency was generally compliant with the SAQP for water and sediment duplicates, rinsates and field blanks with exception of the blind duplicate for water. Two blind duplicate samples were not received by the primary laboratory. This is not considered to have compromised the validity of the dataset due to >8% of blind duplicate frequency achieved and only minor RPD exceedances observed as detailed below.		
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)	**Seepage water & Surface water** ▪ Number of primary samples analysed: 6 ▪ Duplicate samples analysed: 1 All RPDs were within acceptable range. **Sediment** ▪ Number of primary samples analysed: 6 ▪ Duplicate samples analysed: 1 All RPDs were within acceptable range.		
QC Testing – Interlab Duplicates (Secondary Lab)	**Seepage water & Surface water** ▪ Number of primary samples Analysed: 6 ▪ Interlab Duplicates Samples Analysed: 1 All RPDs were below acceptable range, except one (1) RPD exceedance for PFPeA. This was minor and is not consider to compromise the validity of the dataset, as it is probably related to the low concentrations of analyte pairs and difference of methodology between the primary and secondary laboratories. **Sediment** ▪ Number of primary samples analysed: 6 ▪ Interlab Duplicates Samples Analysed: 1 All RPDs were within acceptable range.		
Field Blanks	Field Blanks were collected at a rate of one per field team (esky) 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, laboratory control samples and laboratory duplicates. All Matrix Spikes reported recoveries within the acceptable range. All Method Blank results were within acceptable range. All Quality Control sample frequencies were of an acceptable rate with exception of the following: ▪ EP2205863 - Matrix Spikes and Lab duplicates for PFAS were undertaken less than the target rate.		

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 Accreditation No. 1261
Calibration of Field Equipment	All equipment used during the investigation was calibrated by the supplier prior to use. The equipment calibration certificates are provided in Appendix D. Cardno undertook in-field calibration checks (bump tests) for each YSI water quality meters per day of sampling. The bump tests found all parameters to be within the acceptable range. As such, Cardno is satisfied that the equipment calibrations were acceptable for this assessment.
Decontamination and Equipment Blanks	Rinsate blanks were collected at a rate of one per day when reusable equipment is used (i.e. YSI, dipper, trowels/shovels...). 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 for groundwater and therefore, the data set used as the basis for the investigation is considered valid and complete.

PFAS OMP Biannual Monitoring Event Factual Report

June 2022

Naval Communication Station Harold E Holt Area A

Prepared for

Department of Defence

7 October 2022

Cardno

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Stantec

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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
ANZECC	Australian and New Zealand Environment and Conservation Council
AS	Australian Standard
BGL	Below Ground Level
COC	Chain of Custody
DQI	Data Quality Indicator
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA	Environment Protection Authority
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

Units

ha	Hectares
mBGL	Metres Below Ground Level
mbTOC	Metres below Top of Casing
mg/kg	Milligram per Kilogram (approximately equivalent to ppm)
mg/L	Milligram per Litre
µS/cm	Micro Siemens per Centimetre (Electrical Conductivity - Water)

Site Specific

HEH-A	Naval Communication Station Harold E Holt Area A
OMP	Ongoing Monitoring Plan
FTG	Fire Training Ground

1 Introduction

1.1 Background

Cardno, now Stantec ("Cardno") was engaged by the Australian Department of Defence ("the Client") to carry out the Per- and Poly-Fluoroalkyl Substances (PFAS) Ongoing Monitoring Plan (OMP) biannual monitoring event at the Naval Communication Station Harold E Holt - Area A ("HEH-A" or "the site"). The site is situated at the end of the northwest Cape of Western Australia (WA), at the northern edge of Exmouth (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, 14 June 2021, Reference: DEF19009, *PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) Naval Communication Station Harold Holt A*. Rev 4

The SAQP was reviewed prior to the monitoring event and required no updates.

For the purposes of this report:

> "the site" was defined as Harold E Holt – Area A.

> "the Management Area" was defined as comprising the site, plus the land extending to the Exmouth Gulf (to the east, north and north-west). The Monitoring Area is presented on 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 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 and 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 bores was performed in accordance with the SAQP, applying methods set out in Section 3 of this report. The groundwater bores 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
Powerhouse	MW017; MW019; MW027; MW101; MW102; MW103; MW104; MW123, MW213; MW214
Fuel Farm	MW003; MW008; MW105; MW119; MW210; MW212
Powerhouse pathway	MW113; MW114; MW115; MW116; MW117; MW217; MW218
Fuel farm pathway	MW107; MW109; MW110; MW111; MW112; MW202
Broader area	MW129; MW130; MW134

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
Powerhouse pathway	OTH105; OTH106; OTH107; OTH108
Fuel farm pathway	OTH101; OTH103; OTH104
Broader area	OTH102; OTH109; OTH110; OTH113
Murat Pier salt water discharge water	OTH002

[1] It is noted that the 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 offsite private properties and waterways.

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 4, Appendix A.

Table 2-3 Surface water Monitoring Locations

Monitoring Area	Location ID
Broader area	SW112; SW120; SW126; SW127; SW128
Powerhouse	SW113

2.4 Sediment Monitoring

Sampling of selected sediment 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 5, Appendix A.

Table 2-4 Sediment Monitoring Locations

Monitoring Area	Location ID
Broader area	SD112, SD120, SD126, SD127; SD128
Powerhouse	SD113

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, 2021) for the June 2022 monitoring event are presented in Table 2-5.

Table 2-5 Summary of deviations from the OMP SAQP

Location	Deviation	Comments
SW112/SD112	Samples taken 500m south of monitoring point.	Access permanently denied due to asbestos hazard. Sampling location consistent with previous monitoring event. No impact on the OMP.
SW120/SD120	Samples taken 500m northeast of monitoring point	Access permanently denied due to asbestos hazard. Sampling location consistent with previous monitoring event. No impact on the OMP.
MW003	Not Sampled	Monitoring well was found blocked (damaged) 1 mBGL. MW004 was sampled as a contingency location consistently with previous monitoring event. No impact on the OMP.
MW123	Not Sampled	Access permanently denied due to asbestos hazard. Area flooded. Limited impact on the OMP, no data collected for June 2022.
OTH002	Not Sampled	Murat Pier saltwater discharge point not flowing. No impact on the OMP.
All groundwater monitoring locations	Water quality meter not placed down-hole	In order to prevent risks of cross contamination of the monitoring wells, the water quality parameters were taken from water collected from the hydraSleeves rather than placing the water quality meter inside the wells. No impact on the OMP.

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: ▪ 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 bump tested daily to optimise the accuracy of the measurements taken. Calibration certificates are provided in Appendix D.
Deployment and Retrieval of HydraSleeves (single level well sample collection)	HydraSleeve were deployed with top weight sample collection to begin at the lowest point. HydraSleeve sampling devices were left in wells for a minimum of 12 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 value 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 events (same depth of sampling i.e. within screen).
Peristaltic pump (multi-level well sample collection)	The shallowest (non-dry) wells 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 L/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 (removal of 3x well volume) was undertaken prior to sampling to ensure that a sample representative of the aquifer is taken.
Decontamination procedure	Dedicated HydraSleeves/tubing were used at each groundwater bore 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 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).
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 Chain of Custody 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, 2021): ▪ 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).

Activity	Details
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, 2021): ▪ 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 water body depth was sufficient, 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, 2021): ▪ 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, shovel, 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: ▪ 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, 2021): ▪ Field duplicate (intra-laboratory) samples at 1 per 10 sediment samples or 1 per batch if the batch is less than 10 samples. ▪ Field triplicate (inter-laboratory) samples at 1 per 10 sediment 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.

3.5 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	PFOA	
	µg/L		
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

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	PFOA	
	mg/kg		
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

1. Sum of PFOS and PFHxS.
2. PFOS only

4 Field Observations and Results

4.1 General Observations

The site experienced above average rainfall for the months leading to the June 2022 monitoring event.

Flooding was observed in the salt pan around the antenna field. All surface water locations monitored had surface water present. None of the groundwater monitoring wells was found dry during the June 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 turbidity observations recorded during the groundwater sampling program are presented in field sampling records, included in Appendix D. Groundwater was fresh to saline (TDS ranging from 447.4 mg/L to 53540.0 mg/L), near neutral to slightly alkaline (pH 7.26 to 8.55). Groundwater temperature was on average 26^{o}C, DO readings indicate aerobic groundwater condition. Field parameters were generally consistent with the previous monitoring events.

4.2.1.2 Groundwater Elevation and Migration

Groundwater elevation ranged from 0.404 mAHD (MW104) to 1.088 mAHD (MW116). Depth to groundwater was observed to range approximately between 1.3 metres below ground level (mbgl) and 9.4 mbgl.

Groundwater flow direction was interpreted to follow the site topography and be radial from the sand dunes east of site, where mounding is occurring, which is consistent with the previous monitoring events.

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

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results including non-PFAS analytes 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 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 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]	0.90 (MW017)	31	0
PFOS	MW004, MW008, MW017, MW019, MW027, MW101, MW102, MW103, MW105, MW111, MW119, MW213, MW214.	0.01[3]	9.45 (MW017)	31	13
Sum of PFHxS and PFOS	MW017, MW119	2[2]	12.0 (MW017)	31	2

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:

> MW004 (fuel farm) recorded a first-time detection of PFOA (0.02 µg/L).

> There was no new exceedance of guideline values for the groundwater monitoring locations during the June 2022 monitoring event.

4.3 Seepage Water

4.3.1 Summary of Field Observations

Stabilised physicochemical parameters, water colour and turbidity observations recorded during the seepage water sampling program are presented in field sampling records, included in Appendix D. Water temperature was on average 23.3ºC, water condition was slightly alkaline (pH 7.78 to 8.22), saline (TDS ranging from 34,333 to 35,750 mg/L) and DO readings ranging from 4.40 to 5.49 mg/L indicate aerobic conditions. Field parameters were generally consistent with the previous monitoring event.

4.3.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results including non-PFAS analytes are provided within Appendix B. A summary of results exceeding the adopted criteria is presented in Table 4-2. Laboratory results have also been compared to available historical data in order to identify monitoring locations 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	11	0
PFOS	-	0.01[3]	<0.01	11	0
Sum of PFHxS and PFOS	-	2[2]	<0.01	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 (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 seepage water monitoring locations during the June 2022 monitoring event.

> All samples analysed reported PFAS concentrations below the laboratory LOR.

4.4 Surface water

4.4.1 Summary of Field Observations

Stabilised physicochemical parameters, water colour and turbidity observations recorded during the surface water sampling program are presented in field sampling records, included in Appendix D. Surface water temperature was on average 23.8 ºC. Surface water was slightly alkaline (pH 7.77 to 8.45), fresh to saline (TDS ranging from 429 to 14,274 mg/L) and DO readings indicate aerobic conditions. Field parameters were generally consistent with the previous monitoring event.

4.4.2 Laboratory Results

The results of laboratory analysis have been compared against adopted assessment criteria. Tabulated analytical results including non-PFAS analytes 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 locations 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 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]	0.04 (SW113)	6	0
PFOS	SW113	0.01[3]	0.12 (SW113)	6	1
Sum of PFHxS and PFOS	-	2[2]	0.17 (SW113)	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:

- There was no first time detection of PFOA or Sum of PFOS and PFHxS, or new exceedance of guideline value at the surface water monitoring locations during the June 2022 monitoring event.
- Five out of six surface water samples reported PFAS concentrations below the laboratory LOR.

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, June 2021), DSI (GHD, 2018) and 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 in order to identify monitoring locations 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 sediment monitoring locations. The laboratory reports are provided in Appendix C.

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]	<0.0002	6	0
PFOS	-	0.01[3]	0.0011 (SD113)	6	0
Sum of PFHxS and PFOS	-	20[4]	0.0011 (SD113)	6	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:

- There was no first-time detection of PFOA or Sum of PFOS and PFHxS or new exceedance of guideline values at the sediment monitoring locations during the June 2022 monitoring event.

> Five out of six sediment samples reported PFAS concentrations below the laboratory LOR.

4.6 Changes to the Monitoring Network Condition

During the June 2022 monitoring event, access was still denied to MW123, SD112/SW112 and SD120/SW120 monitoring locations due to asbestos hazard within the low laying areas around the antenna field. It is understood the area will be permanently inaccessible.

Groundwater monitoring well MW003 at the POL storage area was found damaged at approximately 1 mBGL and was unable to be sampled. This well should be repaired.

The gatic lid of groundwater monitoring well MW008 at the POL storage area was found to be destroyed and should be replaced to protect the monitoring well's PVC casing. A witch's hat cone was placed on top of the well as an interim protection.

5 Summary and Conclusions

Cardno undertook the June 2022 groundwater, seepage water, surface water and sediment biannual monitoring event at HEH-A as part of the PFAS OMP. Sampling and testing was undertaken at 31 groundwater monitoring bores, six surface water locations, 11 seepage water sampling locations and six sediment monitoring locations. One groundwater monitoring bore (MW123) couldn't be accessed due to an Asbestos hazard. Two sampling locations (SD/SW112 and SD/SW120) were moved due to the Asbestos hazard. MW004 was sampled at the fuel farm in replacement of MW003 (damaged).

Groundwater levels were gauged in all wells before sampling. Groundwater flow direction was interpreted to be radial from the site, following the site's topography with mounding occurring beneath the sand dunes, which is consistent with the previous monitoring events.

The groundwater laboratory results reported the following:

- Of the 31 samples that were tested, PFOS (13 samples) and Sum of PFHxS and PFOS (2 samples) reported concentrations that exceeded the HEPA (2020) ecological guideline value for 99% protection species and HEPA (2020) guideline value for recreational use respectively.
- MW004 (fuel farm) recorded a first-time detection of PFOA (0.02 µg/L).
- There was no new exceedance of guideline values for the groundwater monitoring locations during the June 2022 monitoring event.

The seepage water laboratory results reported the following:

- All 11 seepage water samples analysed reported PFAS concentrations below the laboratory LOR.
- There was no first-time detection of PFOA or Sum of PFOS and PFHxS, or new exceedance of guideline value at the seepage water monitoring locations during the June 2022 monitoring event.

The surface water laboratory results reported the following:

- Five out of six surface water samples reported PFAS concentrations below the laboratory LOR.
- There was no first time detection of PFOA or Sum of PFOS and PFHxS, or new exceedance of guideline value at the surface water monitoring locations during the June 2022 monitoring event.

The sediment laboratory results reported the following:

- Five out of six sediment samples reported PFAS concentrations below the laboratory LOR.
- There was no first time detection of PFOA or Sum of PFOS and PFHxS at the sediment monitoring locations during the June 2022 monitoring event.

The next OMP sampling event for HEH-A will be the November 2022 biannual 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.
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4. *Contaminated Sites Act 2003*, Western Australia.
5. Department of Defence, May 2021, PFAS OMP Factual Report Guidance Version 0.2.
6. Department of Defence, July 2018 amended June 2021, *Contamination Management Manual*, Annex L *Guidance on Data Management*.
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 Environment Regulation (DER), 2014, *Assessment and Management of Contaminated Sites*.
9. Department of Water and Environment Regulation (DWER), 2018, Perth Groundwater Atlas, (https://maps.water.wa.gov.au/#/webmap/gwm).
10. Environmental Protection Agency (United States EPA), November 2002, Reference: EPA/240/R-02/004, '*Guidance on Environmental Data Verification and Data Validation'.*
11. The Heads of EPAs Australia and New Zealand (HEPA; 2020) PFAS National Environmental Management Plan (NEMP) 2.0, January 2020.
12. National Environment Protection Council (NEPC), 1999, National Environmental Protection (Assessment of Site Contamination) Measure (as amended), registered May 2013.
13. National Health and Medical Research Council (NHMRC) (2011, as updated 2018) National Water Quality Management Strategy Australian Drinking Water Guidelines 6, August 2018
14. NHMRC, August 2019, Guidance on Per and Polyfluoroalkyl Substances (PFAS) in Recreational Water.
15. 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'*.
16. U.S. Environmental Protection Agency (EPA), 2000, 'Guidance for the Data Quality Objectives Process (EPA QA/G-4)'.
17. USEPA, 2002, 'Guidance on Environmental Data Verification and Data Validation (EPA QA/G-8)'.

Site Specific References

18. Cardno, June 2021, Reference: DEF19009, '*PFAS Ongoing Monitoring Plan Sampling and Analysis Quality Plan (SAQP) Naval Communication Station Harold Holt A'*.
19. Cardno, April 2020, PFAS OMP Biannual Monitoring Factual Report, 2019 Post-Winter, HEH-A
20. Cardno, July 2020, PFAS OMP First Flush Sampling Event Factual Report, HEH-A
21. Cardno, February 2021, PFAS OMP Biannual Monitoring Factual Report, 2020 Post Summer, HEH-A
22. Cardno, February 2021, PFAS OMP Biannual Monitoring Factual Report, 2020 Post Winter, HEH-A
23. Cardno, May 2021, PFAS OMP First Flush Sampling Event Factual Report, March 2021, HEH-A
24. Cardno, June 2021, PFAS OMP 2020 Annual Interpretive Report, HEH-A
25. Cardno, August 2021, PFAS OMP Biannual Monitoring Factual Report, June 2021, HEH-A
26. Department of Defence, March 2019, Naval Communication Station Harold E Holt – Area A 'PFAS Management Area Plan'.
27. Department of Defence, May 2019, Naval Communication Station Harold E Holt – Area A 'PFAS Ongoing Monitoring Plan'

28. GHD Pty Ltd, December 2018, Reference: 3135526,'Naval Communication Station Harold E Holt – Area A PFAS Investigations Detailed Site Investigation Report'.

29. GHD Pty Ltd, April 2019, Reference: 3135526, 'Harold E Holt A Ecological Risk Assessment'.

APPENDIX

A

FIGURES

Cardno

now

Stantec

Harold E Holt Area A

North West Cape

Exmouth

Legend

Monitoring Area / Commonwealth boundary

FIGURE 1

1:100,000 Scale at A3

Meters

0 1,500 3,000

Site Location

JUNE 2022 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

Cardno

Map Produced by Cardno WA
Date: 2022-10-04 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-001_RegionalLocation 03.mxd
Aerial Imagery Supplied by Google Earth

FIGURE 2

1:25,000 Scale at A3

Meters

0 500 1,000

Management Area

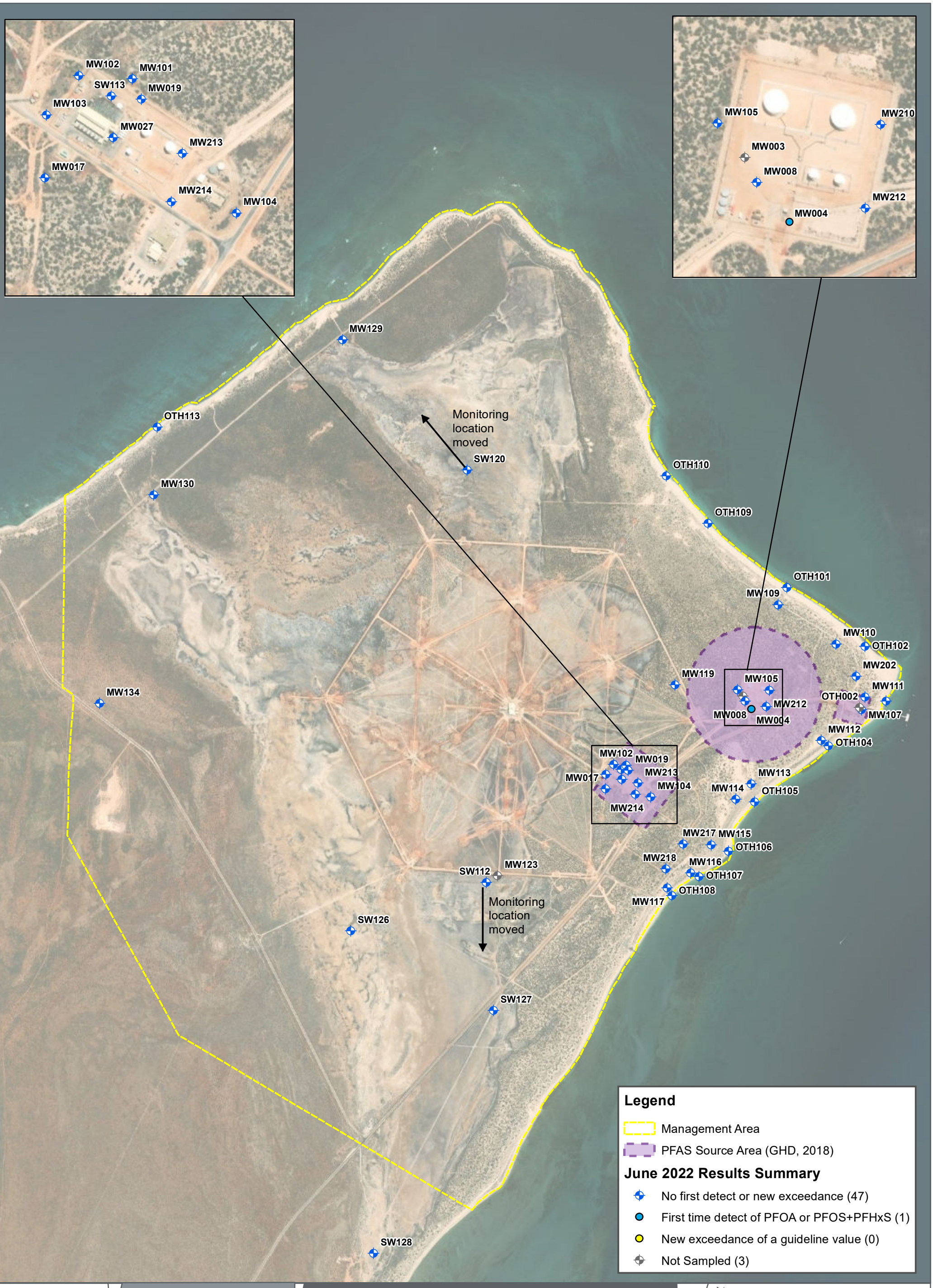
JUNE 2022 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2022-10-04 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-002_ManagementAreas 02.mxd

MW129 (0.476)
0.5
MW130 (0.516)
MW134 (0.659)
MW109 (0.873)
MW110 (0.867)
MW202 (0.869)
MW119 (0.707)
MW210 (0.963)
MW111 (0.688)
0.9
MW004 (0.959)
MW008 (0.906)
0.8
0.7
MW112 (0.689)
0.7
MW103 (0.59)
0.6
0.6
MW214 (0.61)
MW213 (0.65)
MW017 (0.571)
MW104 (0.404)
MW113 (0.75)
MW114 (0.706)
0.5
MW217 (0.598)
MW115 (0.5981)
MW218 (0.557)
0.8
MW116 (1.0875)
Legend
Monitoring Wells (Jun-22 RWL, mAHD)
Inferred groundwater contours (mAHD)
Inferred groundwater flow direction
FIGURE 3
1:24,000 Scale at A3
Meters
0
500
1,000
Inferred Groundwater Contours
JUNE 2022 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2022-10-04 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-003_Jun-22_GWContours 01.mxd


MW102
MW101
SW113
MW019
MW103
MW027
MW213
MW017
MW214
MW104
MW105
MW210
MW003
MW008
MW212
MW004
MW129
OTH113
Monitoring location moved
SW120
OTH110
MW130
OTH109
OTH101
MW109
MW110
OTH102
MW202
MW119
MW111
OTH002
MW107
MW112
OTH104
MW134
MW113
MW114
OTH105
MW217
MW115
OTH106
MW218
MW116
OTH107
OTH108
MW117
SW112
MW123
Monitoring location moved
SW126
SW127
SW128
Legend
Management Area
PFAS Source Area (GHD, 2018)
June 2022 Results Summary
No first detect or new exceedance (47)
First time detect of PFOA or PFOS+PFHxS (1)
New exceedance of a guideline value (0)
Not Sampled (3)
FIGURE 4
1:25,000 Scale at A3
Meters
0
500
1,000
Water Monitoring Locations & Results
JUNE 2022 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE
N
Cardno
Map Produced by Cardno WA
Date: 2022-10-04 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-004_Jun22_W_Results 01.mxd

Monitoring location moved

SD120

SD113

SD112

Monitoring location moved

SD126

SD127

SD128

Legend

- Management Area
- PFAS Source Area (GHD, 2018)

Sediment Results Summary

- No first detect or new exceedance
- First Time detect of PFOA or PFOS+PFHxS
- New exceedance of a guideline value
- Not Sampled

FIGURE 5

1:25,000 Scale at A3

Meters

0 500 1,000

Sediment Monitoring Locations & Results

JUNE 2022 BIANNUAL MONITORING EVENT
HAROLD E HOLT AREA A
DEPARTMENT OF DEFENCE

N

Cardno

Map Produced by Cardno WA
Date: 2022-10-04 | Project: DEF19009
Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere
Map: DEF19009_WA_0083-GS-005_Jun22_S_Results 01.mxd

APPENDIX

B

DATA ASSESSMENT TABLES

Cardno

now

Stantec

	PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids											PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfluoroalkyl Sulfonamides					
	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)	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)
	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	0.002	0.002	0.002	0.002	0.004	0.004	0.008	0.002	0.001	0.004	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.008	0.008	0.002	0.004	0.004	0.004	0.004	0.008	0.004	0.004
PFAS NEMP 2020 Interim Marine 99%					0.00023*						19																
PFAS NEMP 2020 Recreational Water											**10**																
MW134	0.003	0.004	0.041	<0.002	<0.004	<0.004	0.024	<0.002	0.001	0.006	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.008	<0.008	<0.002	<0.004	<0.004	<0.004	<0.004	<0.008	<0.004	<0.004
MW213	<0.02	<0.02	0.01	<0.02	0.01	<0.02	<0.1	0.02	0.03	<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
MW214	<0.02	<0.02	0.03	<0.02	0.21	<0.02	<0.1	<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
MW214	<0.02	<0.02	0.03	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW214	0.003	<0.002	0.035	0.006	0.16	<0.004	0.039	0.006	0.007	0.005	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.008	<0.008	<0.002	<0.004	<0.004	<0.004	<0.004	<0.008	<0.004	<0.004
MW217	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
MW218	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH101	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH102	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH103	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH104	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH105	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH106	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH107	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH108	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH109	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH110	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
OTH113	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW112	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW113	<0.02	<0.02	0.04	<0.02	0.10	<0.02	<0.1	0.35	0.20	0.13	0.04	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	0.53	0.09	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.02
SW113	<0.002	<0.002	0.058	<0.002	0.043	<0.004	0.12	0.006	0.12	0.057	0.072	0.024	<0.001	<0.001	<0.001	<0.001	<0.001	<0.008	0.39	0.043	<0.004	<0.004	<0.004	<0.004	<0.008	<0.004	<0.004
SW113	<0.02	<0.02	0.05	<0.02	0.12	<0.02	<0.1	0.37	0.19	0.13	0.04	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	0.54	0.09	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.05	<0.02
SW120	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW126	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW127	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02
SW128	<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	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02

Location Code	Field ID	Date	Sample Type	Lab Report Number
	0083_QC301_220621	**21/06/2022**	**Rinsate**	**EP2207624**
	0083_QC302_220621	**21/06/2022**	**Rinsate**	**EP2207624**
	0083_QC303_220621	**21/06/2022**	**Rinsate**	**EP2207624**
	0083_QC401_220621	**21/06/2022**	**Field_B**	**EP2207624**
	0083_QC402_220621	**21/06/2022**	**Field_B**	**EP2207624**
	0083_QC403_220621	**21/06/2022**	**Field_B**	**EP2207624**
MW004	**0083_MW004_220621**	**21/06/2022**	**Normal**	**EP2207624**
MW008	**0083_MW008_220621**	**21/06/2022**	**Normal**	**EP2207624**
MW008	**0083_QC108_220621**	**21/06/2022**	**Field Duplicate**	**EP2207624**
MW008	**0083_QC208_220621**	**21/06/2022**	**Interlab Duplicate**	**901207**
MW017	**0083_MW017_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW017	**0083_QC113_220621**	**21/06/2022**	**Field Duplicate**	**EP2207630**
MW017	**0083_QC213_220621**	**21/06/2022**	**Interlab Duplicate**	**901207**
MW019	**0083_MW019_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW027	**0083_MW027_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW101	**0083_MW101_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW102	**0083_MW102_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW103	**0083_MW103_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW104	**0083_MW104_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW105	**0083_MW105_4-4.5_2206**	**21/06/2022**	**Normal**	**EP2207624**
MW107	**0083_MW107_5.5-6_2206**	**21/06/2022**	**Normal**	**EP2207624**
MW109	**0083_MW109_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW110	**0083_MW110_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW111	**0083_MW111_10.5-11_22**	**21/06/2022**	**Normal**	**EP2207624**
MW111	**0083_QC114_220621**	**21/06/2022**	**Field Duplicate**	**EP2207624**
MW111	**0083_QC214_220621**	**21/06/2022**	**Interlab Duplicate**	**901207**
MW112	**0083_MW112_4.5-5_2206**	**21/06/2022**	**Normal**	**EP2207624**
MW113	**0083_MW113_2.5-3.5_220**	**21/06/2022**	**Normal**	**EP2207626**
MW114	**0083_MW114_2-3_220621**	**21/06/2022**	**Normal**	**EP2207626**
MW115	**0083_MW115_2-3_220621**	**21/06/2022**	**Normal**	**EP2207626**
MW116	**0083_MW116_220621**	**21/06/2022**	**Normal**	**EP2207626**
MW117	**0083_MW117_2-2.5_2206**	**21/06/2022**	**Normal**	**EP2207626**
MW119	**0083_MW119_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW129	**0083_MW129_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW130	**0083_MW130_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW134	**0083_MW134_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW202	**0083_MW202_220621**	**21/06/2022**	**Normal**	**EP2207626**
MW210	**0083_MW210_220621**	**21/06/2022**	**Normal**	**EP2207624**
MW212	**0083_MW212_220621**	**21/06/2022**	**Normal**	**EP2207624**
MW212	**0083_QC111_220621**	**21/06/2022**	**Field Duplicate**	**EP2207624**
MW212	**0083_QC211_220621**	**21/06/2022**	**Interlab Duplicate**	**901207**
MW213	**0083_MW213_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW214	**0083_MW214_220621**	**21/06/2022**	**Normal**	**EP2207630**
MW214	**0083_QC112_220621**	**21/06/2022**	**Field Duplicate**	**EP2207630**
MW214	**0083_QC212_220621**	**21/06/2022**	**Interlab Duplicate**	**901207**
MW217	**0083_MW217_220621**	**21/06/2022**	**Normal**	**EP2207626**
MW218	**0083_MW218_220621**	**21/06/2022**	**Normal**	**EP2207626**
OTH101	**0083_OTH101_220621**	**21/06/2022**	**Normal**	**EP2207627**
OTH102	**0083_OTH102_220621**	**21/06/2022**	**Normal**	**EP2207627**
OTH103	**0083_OTH103_220621**	**21/06/2022**	**Normal**	**EP2207634**
OTH104	**0083_OTH104_220621**	**21/06/2022**	**Normal**	**EP2207634**
OTH105	**0083_OTH105_220621**	**21/06/2022**	**Normal**	**EP2207627**
OTH106	**0083_OTH106_220621**	**21/06/2022**	**Normal**	**EP2207627**
OTH107	**0083_OTH107_220621**	**21/06/2022**	**Normal**	**EP2207627**
OTH108	**0083_OTH108_220621**	**21/06/2022**	**Normal**	**EP2207627**
OTH109	**0083_OTH109_220621**	**21/06/2022**	**Normal**	**EP2207627**
OTH110	**0083_OTH110_220621**	**21/06/2022**	**Normal**	**EP2207627**
OTH113	**0083_OTH113_220621**	**21/06/2022**	**Normal**	**EP2207632**
SW112	**0083_SW112_220621**	**21/06/2022**	**Normal**	**EP2207634**
SW113	**0083_QC109_220621**	**21/06/2022**	**Field Duplicate**	**EP2207632**
SW113	**0083_QC209_220621**	**21/06/2022**	**Interlab Duplicate**	**901207**
SW113	**0083_SW113_220621**	**21/06/2022**	**Normal**	**EP2207632**
SW120	**0083_SW120_220621**	**21/06/2022**	**Normal**	**EP2207632**
SW126	**0083_SW126_220621**	**21/06/2022**	**Normal**	**EP2207634**
SW127	**0083_SW127_220621**	**21/06/2022**	**Normal**	**EP2207634**
SW128	**0083_SW128_220621**	**21/06/2022**	**Normal**	**EP2207634**

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

Note:
First Time detect 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)

					PFAS			Inorganics									Metals			
					N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	Sum of PFHxS and PFOS	Sum of PFAS	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)
					µg/L	µg/L	µg/L	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					0.008	0.002	0.001	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						**2**														
Location Code	**Field ID**	**Date**	**Sample Type**	**Lab Report Number**																
	0083_QC301_220621	**21/06/2022**	**Rinsate**	**EP2207624**	<0.05	<0.01	<0.01													
	0083_QC302_220621	**21/06/2022**	**Rinsate**	**EP2207624**	<0.05	<0.01	<0.01													
	0083_QC303_220621	**21/06/2022**	**Rinsate**	**EP2207624**	<0.05	<0.01	<0.01													
	0083_QC401_220621	**21/06/2022**	**Field_B**	**EP2207624**	<0.05	<0.01	<0.01													
	0083_QC402_220621	**21/06/2022**	**Field_B**	**EP2207624**	<0.05	<0.01	<0.01													
	0083_QC403_220621	**21/06/2022**	**Field_B**	**EP2207624**	<0.05	<0.01	<0.01													
MW004	**0083_MW004_220621**	**21/06/2022**	**Normal**	**EP2207624**	<0.05	0.37	0.45	<1	104	<1	104	2.56	2.24	4	6.87	18	27	7	2	6
MW008	**0083_MW008_220621**	**21/06/2022**	**Normal**	**EP2207624**	<0.05	0.62	0.62	<1	221	<1	221	288	324	8,980	6.01	1,430	305	802	303	5,410
MW008	**0083_QC108_220621**	**21/06/2022**	**Field Duplicate**	**EP2207624**	<0.05	0.63	0.63	<1	209	<1	209	305	349	9,530	6.81	1,520	320	856	324	5,850
MW008	**0083_QC208_220621**	**21/06/2022**	**Interlab Duplicate**	**901207**	<0.008	0.45	0.49													
MW017	**0083_MW017_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	**12.0**	42.5	<1	322	<1	322	166	168	5,000	0.74	883	214	412	178	2,740
MW017	**0083_QC113_220621**	**21/06/2022**	**Field Duplicate**	**EP2207630**	<0.05	**9.75**	45.0	<1	303	<1	303	229	265	6,940	7.35	1,290	292	628	286	4,400
MW017	**0083_QC213_220621**	**21/06/2022**	**Interlab Duplicate**	**901207**	<0.008	0.81	4.8													
MW019	**0083_MW019_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	0.11	0.11	<1	220	<1	220	73.7	78.7	2,100	3.29	484	142	194	85	1,230
MW027	**0083_MW027_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	1.60	2.16	<1	305	<1	305	151	146	4,580	1.69	767	234	327	127	2,400
MW101	**0083_MW101_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	0.31	0.82	<1	411	<1	411	53.0	60.3	1,480	6.45	145	63	140	66	1,010
MW102	**0083_MW102_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	0.99	2.38	<1	205	<1	205	34.4	32.1	953	3.50	166	74	77	28	491
MW103	**0083_MW103_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	0.41	2.05	<1	244	<1	244	190	200	5,800	2.58	1,020	243	470	212	3,300
MW104	**0083_MW104_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	<0.01	<0.01	<1	208	<1	208	45.6	54.0	1,220	8.46	336	166	158	44	726
MW105	**0083_MW105_4-4.5_2206**	**21/06/2022**	**Normal**	**EP2207624**	<0.05	0.17	0.53	<1	228	<1	228	298	342	9,270	6.90	1,540	325	845	321	5,710
MW107	**0083_MW107_5.5-6_2206**	**21/06/2022**	**Normal**	**EP2207624**	<0.05	<0.01	<0.01	<1	135	<1	135	581	542	18,700	3.47	2,430	411	1,260	511	9,300
MW109	**0083_MW109_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	<0.01	<0.01	<1	167	<1	167	536	554	17,200	1.66	2,280	444	1,300	560	9,440
MW110	**0083_MW110_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	<0.01	<0.01	<1	180	<1	180	505	456	16,400	5.09	1,870	377	1,080	464	7,740
MW111	**0083_MW111_10.5-11_22**	**21/06/2022**	**Normal**	**EP2207624**	<0.05	0.02	0.02	<1	90	<1	90	579	694	18,600	9.03	2,510	535	1,600	692	11,900
MW111	**0083_QC114_220621**	**21/06/2022**	**Field Duplicate**	**EP2207624**	<0.05	0.02	0.02													
MW111	**0083_QC214_220621**	**21/06/2022**	**Interlab Duplicate**	**901207**	<0.008	1.9	1.9													
MW112	**0083_MW112_4.5-5_2206**	**21/06/2022**	**Normal**	**EP2207624**	<0.05	<0.01	<0.01	<1	110	<1	110	564	670	18,100	8.58	2,470	493	1,560	663	11,500
MW113	**0083_MW113_2.5-3.5_220**	**21/06/2022**	**Normal**	**EP2207626**	<0.05	<0.01	<0.01	<1	155	<1	155	307	301	9,740	0.95	1,400	252	706	307	5,120
MW114	**0083_MW114_2-3_220621**	**21/06/2022**	**Normal**	**EP2207626**	<0.05	<0.01	<0.01	<1	120	<1	120	584	676	18,600	7.31	2,730	503	1,570	669	11,600
MW115	**0083_MW115_2-3_220621**	**21/06/2022**	**Normal**	**EP2207626**	<0.05	<0.01	<0.01	<1	200	<1	200	438	486	13,800	5.18	2,140	375	1,080	479	8,410
MW116	**0083_MW116_220621**	**21/06/2022**	**Normal**	**EP2207626**	<0.05	<0.01	<0.01	<1	112	<1	112	538	641	17,100	8.78	2,550	473	1,490	646	11,000
MW117	**0083_MW117_2-2.5_2206**	**21/06/2022**	**Normal**	**EP2207626**	<0.05	<0.01	<0.01	<1	251	<1	251	88.8	81.0	2,580	4.58	527	61	154	103	1,440
MW119	**0083_MW119_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	**8.56**	15.9	<1	279	<1	279	189	205	5,950	4.14	733	192	485	228	3,440
MW129	**0083_MW129_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	<0.01	<0.01	<1	281	<1	281	582	647	18,500	5.26	2,620	547	1,520	618	11,000
MW130	**0083_MW130_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	<0.01	<0.01	<1	77	<1	77	536	614	17,100	6.74	2,510	490	1,470	620	10,400
MW134	**0083_MW134_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	<0.01	<0.01	<1	188	<1	188	525	473	16,800	5.18	2,270	459	1,040	486	8,100
MW202	**0083_MW202_220621**	**21/06/2022**	**Normal**	**EP2207626**	<0.05	<0.01	<0.01	<1	150	<1	150	513	600	16,400	7.85	2,280	454	1,390	604	10,300
MW210	**0083_MW210_220621**	**21/06/2022**	**Normal**	**EP2207624**	<0.05	0.03	0.19	<1	91	<1	91	22.8	21.2	671	3.80	101	51	50	20	322
MW212	**0083_MW212_220621**	**21/06/2022**	**Normal**	**EP2207624**	<0.05	0.02	0.02	<1	221	<1	221	379	452	12,100	8.87	1,580	385	1,080	431	7,660
MW212	**0083_QC111_220621**	**21/06/2022**	**Field Duplicate**	**EP2207624**	<0.05	0.02	0.02	<1	208	<1	208	275	329	8,640	8.88	1,320	306	803	312	5,510
MW212	**0083_QC211_220621**	**21/06/2022**	**Interlab Duplicate**	**901207**	<0.008	0.041	0.079													
MW213	**0083_MW213_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	0.02	0.07	<1	366	<1	366	32.2	33.6	765	2.21	159	151	95	32	402
MW214	**0083_MW214_220621**	**21/06/2022**	**Normal**	**EP2207630**	<0.05	0.24	0.24	<1	144	<1	144	6.04	6.93	76	6.85	49	46	20	8	64
MW214	**0083_QC112_220621**	**21/06/2022**	**Field Duplicate**	**EP2207630**	<0.05	0.25	0.25	<1	152	<1	152	6.36	7.15	81	5.82	50	47	21	8	66
MW214	**0083_QC212_220621**	**21/06/2022**	**Interlab Duplicate**	**901207**	<0.008	0.19	0.26													
MW217	**0083_MW217_220621**	**21/06/2022**	**Normal**	**EP2207626**	<0.05	<0.01	<0.01	<1	244	<1	244	109	104	3,320	2.50	525	98	210	109	1,820
MW218	**0083_MW218_220621**	**21/06/2022**	**Normal**	**EP2207626**	<0.05	<0.01	<0.01	<1	192	<1	192	135	130	4,260	1.97	538	141	272	122	2,240
OTH101	**0083_OTH101_220621**	**21/06/2022**	**Normal**	**EP2207627**	<0.05	<0.01	<0.01	<1	116	<1	116	596	675	19,000	6.20	2,770	497	1,560	663	11,600
OTH102	**0083_OTH102_220621**	**21/06/2022**	**Normal**	**EP2207627**	<0.05	<0.01	<0.01	<1	114	<1	114	582	698	18,500	9.02	2,790	514	1,610	687	12,000
OTH103	**0083_OTH103_220621**	**21/06/2022**	**Normal**	**EP2207634**	<0.05	<0.01	<0.01	<1	116	<1	116	609	574	19,600	2.98	2,570	418	1,330	542	9,870
OTH104	**0083_OTH104_220621**	**21/06/2022**	**Normal**	**EP2207634**	<0.05	<0.01	<0.01	<1	116	<1	116	624	564	20,100	5.09	2,640	409	1,320	536	9,680
OTH105	**0083_OTH105_220621**	**21/06/2022**	**Normal**	**EP2207627**	<0.05	<0.01	<0.01	<1	119	<1	119	595	698	19,000	7.94	2,720	511	1,610	688	12,000
OTH106	**0083_OTH106_220621**	**21/06/2022**	**Normal**	**EP2207627**	<0.05	<0.01	<0.01	<1	108	<1	108	603	710	19,300	8.08	2,730	519	1,640	704	12,200
OTH107	**0083_OTH107_220621**	**21/06/2022**	**Normal**	**EP2207627**	<0.05	<0.01	<0.01	<1	118	<1	118	617	604	19,900	1.06	2,570	438	1,400	577	10,400
OTH108	**0083_OTH108_220621**	**21/06/2022**	**Normal**	**EP2207627**	<0.05	<0.01	<0.01	<1	118	<1	118	589	715	19,400	9.68	1,890	527	1,650	710	12,300
OTH109	**0083_OTH109_220621**	**21/06/2022**	**Normal**	**EP2207627**	<0.05	<0.01	<0.01	<1	126	<1	126	592	710	18,900	9.01	2,720	520	1,640	704	12,200
OTH110	**0083_OTH110_220621**	**21/06/2022**	**Normal**	**EP2207627**	<0.05	<0.01	<0.01	<1	106	<1	106	597	687	19,100	6.96	2,710	504	1,590	680	11,800
OTH113	**0083_OTH113_220621**	**21/06/2022**	**Normal**	**EP2207632**	<0.05	<0.01	<0.01	<1	116	<1	116	564	641	17,900	6.43	2,720	455	1,520	593	11,000
SW112	**0083_SW112_220621**	**21/06/2022**	**Normal**	**EP2207634**	<0.05	<0.01	<0.01	<1	71	<1	71	94.9	104	2,080	4.86	1,670	621	180	86	1,300
SW113	**0083_QC109_220621**	**21/06/2022**	**Field Duplicate**	**EP2207632**	<0.05	0.14	1.50	<1	40	<1	40	2.60	2.89	43	5.44	28	25	3	2	31
SW113	**0083_QC209_220621**	**21/06/2022**	**Interlab Duplicate**	**901207**	<0.008	0.10	0.93													
SW113	**0083_SW113_220621**	**21/06/2022**	**Normal**	**EP2207632**	<0.05	0.17	1.56	<1	40	<1	40	2.64	2.89	44	4.51	29	25	3	2	31
SW120	**0083_SW120_220621**	**21/06/2022**	**Normal**	**EP2207632**	<0.05	<0.01	<0.01	<1	99	<1	99	263	270	7,680	1.45	2,120	764	599	220	4,080
SW126	**0083_SW126_220621**	**21/06/2022**	**Normal**	**EP2207634**	<0.05	<0.01	<0.01	<1	75	<1	75	74.4	80.2	1,640	3.74	1,280	475	146	64	985
SW127	**0083_SW127_220621**	**21/06/2022**	**Normal**	**EP2207634**	<0.05	<0.01	<0.01	<1	107	<1	107	201	205	5,500	1.02	2,110	706	406	158	3,050
SW128	**0083_SW128_220621**	**21/06/2022**	**Normal**	**EP2207634**	<0.05	<0.01	<0.01	<1	<1	<1	<1	230	245	6,770	3.22	1,870	590	566	220	3,760

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

Note:
First Time detect 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)

	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)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	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	0.0002	0.0002	0.0002	0.0002	0.0002	0.0008	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure					1						10				
PFAS NEMP 2020 Ecological indirect exposure					*0.01*										
PFAS NEMP 2020 Industrial/ commercial (HIL D)											**50**				
Location Code	**Field ID**	**Date**	**Sample Type**	**Lab Report Number**												
SD112	**0083_SD112_220621**	**21/06/2022**	**Normal**	**EP2207635**	<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
SD113	**0083_QC110_220621**	**21/06/2022**	**Field Duplicate**	**EP2207633**	<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
SD113	**0083_QC210_220621**	**21/06/2022**	**Interlab Duplicate**	**901207**	<0.0004	<0.0004	<0.0004	<0.0004	0.0010	<0.0004	<0.0008	<0.0002	<0.0004	<0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD113	**0083_SD113_220621**	**21/06/2022**	**Normal**	**EP2207633**	<0.0002	<0.0002	<0.0002	<0.0002	0.0011	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
SD120	**0083_SD120_220621**	**21/06/2022**	**Normal**	**EP2207633**	<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
SD126	**0083_SD126_220621**	**21/06/2022**	**Normal**	**EP2207635**	<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
SD127	**0083_SD127_220621**	**21/06/2022**	**Normal**	**EP2207635**	<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
SD128	**0083_SD128_220621**	**21/06/2022**	**Normal**	**EP2207635**	<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

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Ecological direct exposure
HEPA, January 2020, PFAS NEMP 2020 Ecological indirect exposure
HEPA, January 2020, PFAS NEMP 2020 Industrial/ commercial (HIL D)

Note:

First Time detect of PFOA or PFHxS+PFOS
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
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	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	0.0002	0.0005	0.0005	0.0005	0.0005	0.0002	0.0004	0.0002	0.0005	0.0004	0.0002	0.0005	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	Field ID	Date	Sample Type	Lab Report Number														
SD112	**0083_SD112_220621**	**21/06/2022**	**Normal**	**EP2207635**	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
SD113	**0083_QC110_220621**	**21/06/2022**	**Field Duplicate**	**EP2207633**	<0.0002	<0.0005	<0.0005	0.0006	0.0006	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0005	0.0017
SD113	**0083_QC210_220621**	**21/06/2022**	**Interlab Duplicate**	**901207**	<0.0002	<0.0002	<0.0005	0.0015	0.0019	<0.0005	<0.0004	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0008	0.0010	0.0044
SD113	**0083_SD113_220621**	**21/06/2022**	**Normal**	**EP2207633**	<0.0002	<0.0005	<0.0005	0.0014	0.0015	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0011	0.0040
SD120	**0083_SD120_220621**	**21/06/2022**	**Normal**	**EP2207633**	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
SD126	**0083_SD126_220621**	**21/06/2022**	**Normal**	**EP2207635**	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
SD127	**0083_SD127_220621**	**21/06/2022**	**Normal**	**EP2207635**	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002
SD128	**0083_SD128_220621**	**21/06/2022**	**Normal**	**EP2207635**	<0.0002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Ecological direct exposure
HEPA, January 2020, PFAS NEMP 2020 Ecological indirect exposure
HEPA, January 2020, PFAS NEMP 2020 Industrial/ commercial (HIL D)

Note:

First Time detect of PFOA or PFHxS+PFOS
New exceedance of guideline value

			Field ID	0083_MW008_220621	0083_QC108_220621		0083_MW008_220621	0083_QC208_220621		0083_SW113_220621	0083_QC109_220621		0083_SW113_220621	0083_QC209_220621	
			Date	21/06/2022	21/06/2022		21/06/2022	21/06/2022		21/06/2022	21/06/2022		21/06/2022	21/06/2022	
			Matrix Type	Water	Water		Water	Water		Water	Water		Water	Water	
			Lab Report Number	EP2207624	EP2207624	RPD	EP2207624	901207	RPD	EP2207632	EP2207632	RPD	EP2207632	901207	RPD
	Unit	LOR													
PFAS - Perfluoroalkyl Sulfonic Acids															
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.002		<0.02	<0.02	0	<0.02	<0.002	0	<0.02	<0.02	0	<0.02	<0.002	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.002		<0.02	<0.02	0	<0.02	<0.002	0	<0.02	<0.02	0	<0.02	<0.002	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.002		<0.01	0.01	0	<0.01	0.019	62	0.05	0.04	22	0.05	0.058	15
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.002		<0.02	<0.02	0	<0.02	0.003	0	<0.02	<0.02	0	<0.02	<0.002	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.004		0.62	0.62	0	0.62	0.43	**36**	0.12	0.10	18	0.12	0.043	**94**
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.004		<0.02	<0.02	0	<0.02	<0.004	0	<0.02	<0.02	0	<0.02	<0.004	0
PFAS - Perfluoroalkyl Carboxylic Acids															
Perfluorobutanoic acid (PFBA)	µg/L	0.008		<0.1	<0.1	0	<0.1	<0.008	0	<0.1	<0.1	0	<0.1	0.12	18
Perfluoropentanoic acid (PFPeA)	µg/L	0.002		<0.02	<0.02	0	<0.02	0.006	0	0.37	0.35	6	0.37	0.006	**194**
Perfluorohexanoic acid (PFHxA)	µg/L	0.001		<0.02	<0.02	0	<0.02	0.007	0	0.19	0.20	5	0.19	0.12	**45**
Perfluoroheptanoic acid (PFHpA)	µg/L	0.004		<0.02	<0.02	0	<0.02	<0.004	0	0.13	0.13	0	0.13	0.057	**78**
Perfluorooctanoic acid (PFOA)	µg/L	0.001		<0.01	<0.01	0	<0.01	0.004	0	0.04	0.04	0	0.04	0.072	**57**
Perfluorononanoic acid (PFNA)	µg/L	0.002		<0.02	<0.02	0	<0.02	<0.002	0	0.03	0.02	40	0.03	0.024	22
Perfluorodecanoic acid (PFDA)	µg/L	0.001		<0.02	<0.02	0	<0.02	<0.001	0	<0.02	<0.02	0	<0.02	<0.001	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.001		<0.02	<0.02	0	<0.02	<0.001	0	<0.02	<0.02	0	<0.02	<0.001	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.001		<0.02	<0.02	0	<0.02	<0.001	0	<0.02	<0.02	0	<0.02	<0.001	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.001		<0.02	<0.02	0	<0.02	<0.001	0	<0.02	<0.02	0	<0.02	<0.001	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.001		<0.05	<0.05	0	<0.05	<0.001	0	<0.05	<0.05	0	<0.05	<0.001	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids															
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.008		<0.05	<0.05	0	<0.05	<0.008	0	<0.05	<0.05	0	<0.05	<0.008	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.008		<0.05	<0.05	0	<0.05	<0.008	0	0.54	0.53	2	0.54	0.39	**32**
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.002		<0.05	<0.05	0	<0.05	0.017	0	0.09	0.09	0	0.09	0.043	**71**
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.004		<0.05	<0.05	0	<0.05	<0.004	0	<0.05	<0.05	0	<0.05	<0.004	0
PFAS - Perfluoroalkyl Sulfonamides															
Perfluorooctane sulfonamide (FOSA)	µg/L	0.004		<0.02	<0.02	0	<0.02	<0.004	0	<0.02	<0.02	0	<0.02	<0.004	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.004		<0.05	<0.05	0	<0.05	<0.004	0	<0.05	<0.05	0	<0.05	<0.004	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.004		<0.02	<0.02	0	<0.02	<0.004	0	<0.02	<0.02	0	<0.02	<0.004	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.008		<0.05	<0.05	0	<0.05	<0.008	0	<0.05	<0.05	0	<0.05	<0.008	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.004		<0.05	<0.05	0	<0.05	<0.004	0	<0.05	<0.05	0	<0.05	<0.004	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.004		<0.02	<0.02	0	<0.02	<0.004	0	<0.02	<0.02	0	<0.02	<0.004	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.008		<0.05	<0.05	0	<0.05	<0.008	0	<0.05	<0.05	0	<0.05	<0.008	0
Perfluorooctane sulfonamidoacetic acid (FOSAA)	µg/L	0.002						<0.002						<0.002	
PFAS															
Sum of PFHxS and PFOS	µg/L	0.002		0.62	0.63	2	0.62	0.45	**32**	0.17	0.14	19	0.17	0.10	**52**
Sum of PFAS	µg/L	0.001		0.62	0.63	2	0.62	0.49	**23**	1.56	1.50	4	1.56	0.93	**51**

**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

		Field ID	0083_MW212_220621	0083_QC111_220621		0083_MW212_220621	0083_QC211_220621		0083_MW214_220621	0083_QC112_220621		0083_MW214_220621	0083_QC212_220621	
		Date	21/06/2022	21/06/2022		21/06/2022	21/06/2022		21/06/2022	21/06/2022		21/06/2022	21/06/2022	
		Matrix Type	Water	Water		Water	Water		Water	Water		Water	Water	
		Lab Report Number	EP2207624	EP2207624	RPD	EP2207624	901207	RPD	EP2207630	EP2207630	RPD	EP2207630	901207	RPD
	Unit	LOR												
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.002	<0.02	<0.02	0	<0.02	0.003	0	<0.02	<0.02	0	<0.02	0.003	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.002	<0.02	<0.02	0	<0.02	0.004	0	<0.02	<0.02	0	<0.02	<0.002	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.002	0.02	0.02	0	0.02	0.041	69	0.03	0.03	0	0.03	0.035	15
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.002	<0.02	<0.02	0	<0.02	<0.002	0	<0.02	<0.02	0	<0.02	0.006	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.004	<0.01	<0.01	0	<0.01	<0.004	0	0.21	0.22	5	0.21	0.16	27
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.004	<0.02	<0.02	0	<0.02	<0.004	0	<0.02	<0.02	0	<0.02	<0.004	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.008	<0.1	<0.1	0	<0.1	0.024	0	<0.1	<0.1	0	<0.1	0.039	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.002	<0.02	<0.02	0	<0.02	<0.002	0	<0.02	<0.02	0	<0.02	0.006	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.001	<0.02	<0.02	0	<0.02	0.001	0	<0.02	<0.02	0	<0.02	0.007	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.004	<0.02	<0.02	0	<0.02	0.006	0	<0.02	<0.02	0	<0.02	0.005	0
Perfluorooctanoic acid (PFOA)	µg/L	0.001	<0.01	<0.01	0	<0.01	<0.001	0	<0.01	<0.01	0	<0.01	0.002	0
Perfluorononanoic acid (PFNA)	µg/L	0.002	<0.02	<0.02	0	<0.02	<0.002	0	<0.02	<0.02	0	<0.02	<0.002	0
Perfluorodecanoic acid (PFDA)	µg/L	0.001	<0.02	<0.02	0	<0.02	<0.001	0	<0.02	<0.02	0	<0.02	<0.001	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.001	<0.02	<0.02	0	<0.02	<0.001	0	<0.02	<0.02	0	<0.02	<0.001	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.001	<0.02	<0.02	0	<0.02	<0.001	0	<0.02	<0.02	0	<0.02	<0.001	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.001	<0.02	<0.02	0	<0.02	<0.001	0	<0.02	<0.02	0	<0.02	<0.001	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.001	<0.05	<0.05	0	<0.05	<0.001	0	<0.05	<0.05	0	<0.05	<0.001	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.008	<0.05	<0.05	0	<0.05	<0.008	0	<0.05	<0.05	0	<0.05	<0.008	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.008	<0.05	<0.05	0	<0.05	<0.008	0	<0.05	<0.05	0	<0.05	<0.008	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.002	<0.05	<0.05	0	<0.05	<0.002	0	<0.05	<0.05	0	<0.05	<0.002	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.004	<0.05	<0.05	0	<0.05	<0.004	0	<0.05	<0.05	0	<0.05	<0.004	0
PFAS - Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.004	<0.02	<0.02	0	<0.02	<0.004	0	<0.02	<0.02	0	<0.02	<0.004	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.004	<0.05	<0.05	0	<0.05	<0.004	0	<0.05	<0.05	0	<0.05	<0.004	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.004	<0.02	<0.02	0	<0.02	<0.004	0	<0.02	<0.02	0	<0.02	<0.004	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.008	<0.05	<0.05	0	<0.05	<0.008	0	<0.05	<0.05	0	<0.05	<0.008	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.004	<0.05	<0.05	0	<0.05	<0.004	0	<0.05	<0.05	0	<0.05	<0.004	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.004	<0.02	<0.02	0	<0.02	<0.004	0	<0.02	<0.02	0	<0.02	<0.004	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.008	<0.05	<0.05	0	<0.05	<0.008	0	<0.05	<0.05	0	<0.05	<0.008	0
Perfluorooctane sulfonamidoacetic acid (FOSAA)	µg/L	0.002					<0.002						<0.002	
PFAS														
Sum of PFHxS and PFOS	µg/L	0.002	0.02	0.02	0	0.02	0.041	69	0.24	0.25	4	0.24	0.19	23
Sum of PFAS	µg/L	0.001	0.02	0.02	0	0.02	0.079	119	0.24	0.25	4	0.24	0.26	8

		Field ID	0083_MW017_220621	0083_QC113_220621		0083_MW017_220621	0083_QC213_220621		0083_MW111_10.5-11_220621	0083_QC114_220621		0083_MW111_10.5-11_220621	0083_QC214_220621	
		Date	21/06/2022	21/06/2022		21/06/2022	21/06/2022		21/06/2022	21/06/2022		21/06/2022	21/06/2022	
		Matrix Type	Water	Water		Water	Water		Water	Water		Water	Water	
		Lab Report Number	EP2207630	EP2207630	RPD	EP2207630	901207	RPD	EP2207624	EP2207624	RPD	EP2207624	901207	RPD
	Unit	LOR												
PFAS - Perfluoroalkyl Sulfonic Acids														
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.002	0.13	0.15	14	0.13	0.12	8	<0.02	<0.02	0	<0.02	0.003	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.002	0.13	0.16	21	0.13	0.18	**32**	<0.02	<0.02	0	<0.02	<0.002	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.002	2.59	3.25	**23**	2.59	0.32	**156**	<0.01	<0.01	0	<0.01	0.005	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.002	0.15	0.13	14	0.15	0.15	0	<0.02	<0.02	0	<0.02	<0.002	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.004	9.45	6.50	**37**	9.45	0.48	**181**	0.02	0.02	0	0.02	1.9	**196**
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.004	<0.02	<0.02	0	<0.02	<0.004	0	<0.02	<0.02	0	<0.02	<0.004	0
PFAS - Perfluoroalkyl Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.008	2.4	3.0	**22**	2.4	0.017	**197**	<0.1	<0.1	0	<0.1	<0.008	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.002	8.70	10.7	**21**	8.70	1.1	**155**	<0.02	<0.02	0	<0.02	<0.002	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.001	9.62	11.5	18	9.62	1.4	**149**	<0.02	<0.02	0	<0.02	0.003	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.004	4.68	5.27	12	4.68	0.62	**153**	<0.02	<0.02	0	<0.02	0.005	0
Perfluorooctanoic acid (PFOA)	µg/L	0.001	0.90	1.08	18	0.90	0.16	**140**	<0.01	<0.01	0	<0.01	0.002	0
Perfluorononanoic acid (PFNA)	µg/L	0.002	0.07	0.06	15	0.07	0.069	1	<0.02	<0.02	0	<0.02	<0.002	0
Perfluorodecanoic acid (PFDA)	µg/L	0.001	<0.02	<0.02	0	<0.02	0.001	0	<0.02	<0.02	0	<0.02	<0.001	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.001	<0.02	<0.02	0	<0.02	<0.001	0	<0.02	<0.02	0	<0.02	<0.001	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.001	<0.02	<0.02	0	<0.02	<0.001	0	<0.02	<0.02	0	<0.02	<0.001	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.001	<0.02	<0.02	0	<0.02	<0.001	0	<0.02	<0.02	0	<0.02	<0.001	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.001	<0.05	<0.05	0	<0.05	<0.001	0	<0.05	<0.05	0	<0.05	<0.001	0
PFAS - (n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.008	<0.05	<0.05	0	<0.05	<0.008	0	<0.05	<0.05	0	<0.05	<0.008	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.008	3.11	2.84	9	3.11	0.13	**184**	<0.05	<0.05	0	<0.05	<0.008	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.002	0.55	0.36	42	0.55	0.006	**196**	<0.05	<0.05	0	<0.05	<0.002	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.004	<0.05	<0.05	0	<0.05	<0.004	0	<0.05	<0.05	0	<0.05	<0.004	0
PFAS - Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.004	<0.02	<0.02	0	<0.02	<0.004	0	<0.02	<0.02	0	<0.02	<0.004	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.004	<0.05	<0.05	0	<0.05	<0.004	0	<0.05	<0.05	0	<0.05	<0.004	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.004	<0.02	<0.02	0	<0.02	<0.004	0	<0.02	<0.02	0	<0.02	<0.004	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.008	<0.05	<0.05	0	<0.05	<0.008	0	<0.05	<0.05	0	<0.05	<0.008	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.004	<0.05	<0.05	0	<0.05	<0.004	0	<0.05	<0.05	0	<0.05	<0.004	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.004	<0.02	<0.02	0	<0.02	<0.004	0	<0.02	<0.02	0	<0.02	<0.004	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.008	<0.05	<0.05	0	<0.05	<0.008	0	<0.05	<0.05	0	<0.05	<0.008	0
Perfluorooctane sulfonamidoacetic acid (FOSAA)	µg/L	0.002					<0.002						<0.002	
PFAS														
Sum of PFHxS and PFOS	µg/L	0.002	12.0	9.75	**21**	12.0	0.81	**175**	0.02	0.02	0	0.02	1.9	**196**
Sum of PFAS	µg/L	0.001	42.5	45.0	6	42.5	4.8	**159**	0.02	0.02	0	0.02	1.9	**196**

			Field ID	0083_SD113_220621	0083_QC110_220621		0083_SD113_220621	0083_QC210_220621	
			Date	21/06/2022	21/06/2022		21/06/2022	21/06/2022	
			Matrix Type	Soil	Soil		Soil	Soil	
			Lab Report Number	EP2207633	EP2207633	RPD	EP2207633	901207	RPD
	Unit	LOR							
PFAS - Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	0.0011	0.0005	75	0.0011	0.0010	10
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
PFAS - Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	mg/kg	0.0008	<0.001	<0.001	0	<0.001	<0.0008	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0008	0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluorononanoic acid (PFNA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0002	0
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0002	<0.0005	<0.0005	0	<0.0005	<0.0002	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	<0.0005	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	0.0014	0.0006	80	0.0014	0.0015	7
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005	0.0015	0.0006	86	0.0015	0.0019	24
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0005	0
PFAS - Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0004	<0.0005	<0.0005	0	<0.0005	<0.0004	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0008	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0004	<0.0005	<0.0005	0	<0.0005	<0.0004	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002	<0.0002	<0.0002	0	<0.0002	<0.0004	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	<0.0005	<0.0005	0	<0.0005	<0.0008	0
Perfluorooctane sulfonamidoacetic acid (FOSAA)	mg/kg	0.0004					<0.0004	
PFAS									
Sum of PFHxS and PFOS	mg/kg	0.0002	0.0011	0.0005	75	0.0011	0.0010	10
Sum of PFAS	mg/kg	0.0002	0.0040	0.0017	**81**	0.0040	0.0044	10

**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

APPENDIX

C

LABORATORY CERTIFICATES

Cardno

now

Stantec

CHAIN OF CUSTODY

ALS COC#: 39136 *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_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: [redacted] SAMPLER MOBILE: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [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	Ground Waters WATER	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW008		21/06/2022 08:05 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
002	0083_QC108		21/06/2022 08:08 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			green bottle for lab qc
003	0083_MW004		21/06/2022 08:24 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
004	0083_MW212		21/06/2022 08:46 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8			extra PFAS bottles for lab QC
005	0083_QC111		21/06/2022 08:47 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
006	0083_MW210		21/06/2022 08:58 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
007	0083_MW105_4-4.5		21/06/2022 09:17 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
008	0083_MW107_5.5-6		21/06/2022 09:44 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			
009	0083_MW111_10.5-11		21/06/2022 10:22 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8			

CHAIN OF CUSTODY

ALS COC#: 39136 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_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

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

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	Rinsate WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0083_QC114		21/06/2022 10:24 AM	Water	ALS: 2 Non ALS: 0	No		X		
011	0083 MW112_4.5-5		21/06/2022 11:19 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8			extra PFAS bottles for lab QC
012	0083_QC301		21/06/2022 02:54 PM	Water	ALS: 2 Non ALS: 0	No		X		
013	0083_QC302		21/06/2022 02:55 PM	Water	ALS: 2 Non ALS: 0	No		X		
014	0083_QC303		21/06/2022 02:56 PM	Water	ALS: 2 Non ALS: 0	No		X		
015	0083_QC401		21/06/2022 02:55 PM	Water	ALS: 2 Non ALS: 0	No		X		
016	0083_QC402		21/06/2022 02:56 PM	Water	ALS: 2 Non ALS: 0	No		X		
017	0083_QC403		21/06/2022 02:54 PM	Water	ALS: 2 Non ALS: 0	No		X		

CHAIN OF CUSTODY

COC#: 39136 *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_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: [redacted] SAMPLER MOBILE: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [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	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_MW008	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	0083_QC108	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	0083_MW004	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	0083_MW212	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	0083_QC111	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	0083_MW210	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	0083_MW105_4-4.5	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)
008	0083_MW107_5.5-6	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	0083_MW111_10.5-11	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)

CHAIN OF CUSTODY

(ALS) COC#: 39136 *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_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: [redacted] SAMPLER MOBILE: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [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:

011	0083_MW112_4.5-5	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)

CHAIN OF CUSTODY

COC#: 39136 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: [redacted] SAMPLER MOBILE: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

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? 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	0083_MW008	Clear Plastic Bottle - Natural	500 mL	00070621089869	Green	No	
001	0083_MW008	HDPE (no PTFE)	20 mL	00350821023929	Grey	No	
001	0083_MW008	HDPE (no PTFE)	20 mL	00350821023951	Grey	No	
002	0083_QC108	Clear Plastic Bottle - Natural	500 mL	00070621089977	Green	No	
002	0083_QC108	HDPE (no PTFE)	20 mL	00350821023881	Grey	No	
002	0083_QC108	HDPE (no PTFE)	20 mL	00350821023945	Grey	No	
003	0083_MW004	Clear Plastic Bottle - Natural	500 mL	00070621089689	Green	No	
003	0083_MW004	HDPE (no PTFE)	20 mL	00350821023843	Grey	No	
003	0083_MW004	HDPE (no PTFE)	20 mL	00350821023880	Grey	No	
004	0083_MW212	HDPE (no PTFE)	20 mL	00350821023788	Grey	No	
004	0083_MW212	HDPE (no PTFE)	20 mL	00350821023940	Grey	No	
004	0083_MW212	HDPE (no PTFE)	20 mL	00352005019388	Grey	No	
004	0083_MW212	Clear Plastic Bottle - Natural	500 mL	00070621089842	Green	No	
004	0083_MW212	HDPE (no PTFE)	20 mL	00352005019524	Grey	No	
005	0083_QC111	HDPE (no PTFE)	20 mL	00350821023810	Grey	No	
005	0083_QC111	HDPE (no PTFE)	20 mL	00350821023890	Grey	No	
005	0083_QC111	Clear Plastic Bottle - Natural	500 mL	00070621089966	Green	No	
006	0083_MW210	HDPE (no PTFE)	20 mL	00350821023904	Grey	No	
006	0083_MW210	Clear Plastic Bottle - Natural	500 mL	00070621089881	Green	No	
006	0083_MW210	HDPE (no PTFE)	20 mL	00350821023791	Grey	No	
007	0083_MW105_4-4.5	Clear Plastic Bottle - Natural	500 mL	00070621172030	Green	No	
007	0083_MW105_4-4.5	HDPE (no PTFE)	20 mL	00350621046295	Grey	No	
007	0083_MW105_4-4.5	HDPE (no PTFE)	20 mL	00352101058340	Grey	No	
008	0083_MW107_5.5-6	HDPE (no PTFE)	20 mL	00352101058202	Grey	No	
008	0083_MW107_5.5-6	HDPE (no PTFE)	20 mL	00352101058064	Grey	No	
008	0083_MW107_5.5-6	Clear Plastic Bottle - Natural	500 mL	00070621172067	Green	No	

CHAIN OF CUSTODY

ALS COC#: 39136 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_0082_PFASOMP

SITE: HEHA GW - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: [redacted] SAMPLER MOBILE: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [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:

009	0083_MW111_10.5-11	Clear Plastic Bottle - Natural	500 mL	00070621089632	Green	No	
009	0083_MW111_10.5-11	HDPE (no PTFE)	20 mL	00352101071774	Grey	No	
009	0083_MW111_10.5-11	HDPE (no PTFE)	20 mL	00352101071730	Grey	No	
010	0083_QC114	HDPE (no PTFE)	20 mL	00350821043228	Grey	No	
010	0083_QC114	HDPE (no PTFE)	20 mL	00350821023751	Grey	No	
011	0083_MW112_4.5-5	Clear Plastic Bottle - Natural	500 mL	00070621089950	Green	No	
011	0083_MW112_4.5-5	HDPE (no PTFE)	20 mL	00352005019835	Grey	No	
011	0083_MW112_4.5-5	HDPE (no PTFE)	20 mL	00352101071869	Grey	No	
011	0083_MW112_4.5-5	HDPE (no PTFE)	20 mL	00352005019682	Grey	No	
011	0083_MW112_4.5-5	HDPE (no PTFE)	20 mL	00352101071846	Grey	No	
012	0083_QC301	HDPE (no PTFE)	20 mL	00350019042076	Grey	No	
012	0083_QC301	HDPE (no PTFE)	20 mL	00350019177339	Grey	No	
013	0083_QC302	HDPE (no PTFE)	20 mL	00350019034986	Grey	No	
013	0083_QC302	HDPE (no PTFE)	20 mL	00350019042044	Grey	No	
014	0083_QC303	HDPE (no PTFE)	20 mL	00350019177502	Grey	No	
014	0083_QC303	HDPE (no PTFE)	20 mL	00350019177526	Grey	No	
015	0083_QC401	HDPE (no PTFE)	20 mL	00350019177547	Grey	No	
015	0083_QC401	HDPE (no PTFE)	20 mL	00350019034985	Grey	No	
016	0083_QC402	HDPE (no PTFE)	20 mL	00350019177367	Grey	No	
016	0083_QC402	HDPE (no PTFE)	20 mL	00350019177333	Grey	No	
017	0083_QC403	HDPE (no PTFE)	20 mL	00350019177380	Grey	No	
017	0083_QC403	HDPE (no PTFE)	20 mL	00350019177458	Grey	No	

Total Bottle Count: ALS: 48, Non ALS: 0

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2207624**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: graeme.jablonskas@alsglobal.com
Telephone	: ----	Telephone	: +6138549 9609
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 3
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 39136	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA GW - MB		
Sampler	: [redacted]		

Dates

Date Samples Received	: 23-Jun-2022 11:30	Issue Date	: 27-Jun-2022
Client Requested Due Date	: 07-Jul-2022	Scheduled Reporting Date	: **07-Jul-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.1 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 17 / 17

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
- EP231X conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: 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.

EP2207624-007	: 21-Jun-2022 09:17	: 0083_MW105_4-4.5_220621
EP2207624-008	: 21-Jun-2022 09:44	: 0083_MW107_5.5-6_220621
EP2207624-009	: 21-Jun-2022 10:22	: 0083_MW111_10.5-11_220621
EP2207624-011	: 21-Jun-2022 11:19	: 0083_MW112_4.5-5_220621

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)
EP2207624-001	21-Jun-2022 08:05	0083_MW008_220621	✓	✓	✓	✓
EP2207624-002	21-Jun-2022 08:08	0083_QC108_220621	✓	✓	✓	✓
EP2207624-003	21-Jun-2022 08:24	0083_MW004_220621	✓	✓	✓	✓
EP2207624-004	21-Jun-2022 08:46	0083_MW212_220621	✓	✓	✓	✓
EP2207624-005	21-Jun-2022 08:47	0083_QC111_220621	✓	✓	✓	✓
EP2207624-006	21-Jun-2022 08:58	0083_MW210_220621	✓	✓	✓	✓
EP2207624-007	21-Jun-2022 09:17	0083_MW105_4-4.5_220...	✓	✓	✓	✓
EP2207624-008	21-Jun-2022 09:44	0083_MW107_5.5-6_220...	✓	✓	✓	✓
EP2207624-009	21-Jun-2022 10:22	0083_MW111_10.5-11_2...	✓	✓	✓	✓
EP2207624-010	21-Jun-2022 10:24	0083_QC114_220621		✓		
EP2207624-011	21-Jun-2022 11:19	0083_MW112_4.5-5_220...	✓	✓	✓	✓
EP2207624-012	21-Jun-2022 14:54	0083_QC301_220621		✓		
EP2207624-013	21-Jun-2022 14:55	0083_QC302_220621		✓		
EP2207624-014	21-Jun-2022 14:56	0083_QC303_220621		✓		
EP2207624-015	21-Jun-2022 14:55	0083_QC401_220621		✓		
EP2207624-016	21-Jun-2022 14:56	0083_QC402_220621		✓		
EP2207624-017	21-Jun-2022 14:54	0083_QC403_220621		✓		

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

[redacted]

- EDI Format - ESDAT (ESDAT)	Email	[redacted]esdat.com.au

[redacted]

- *AU Certificate of Analysis - NATA (COA)	Email	[redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	[redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	[redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	[redacted]stantec.com
- Chain of Custody (CoC) (COC)	Email	[redacted]stantec.com
- EDI Format - ESDAT (ESDAT)	Email	[redacted]stantec.com
- EDI Format - XTab (XTAB)	Email	[redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2207624**	Page	: 1 of 16
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 27-Jun-2022
C-O-C number	: 39136	Issue Date	: 07-Jul-2022 15:34
Sampler	: [redacted]		
Site	: HEHA GW - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 17		
No. of samples analysed	: 17		

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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Franco Lentini	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.

- EP231X 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.
- ED041G (Sulfate - Turbidimetric): samples EP2207624-003 & -008 were re-filtered and re-analyzed from parent sample to confirm results.
- ED045G (Chloride): samples EP2207624-003 & -008 were re-filtered and re-analyzed from parent sample to confirm results.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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	0083_MW008_220621	0083_QC108_220621	0083_MW004_220621	0083_MW212_220621	0083_QC111_220621
				Sampling date / time	21-Jun-2022 08:05	21-Jun-2022 08:08	21-Jun-2022 08:24	21-Jun-2022 08:46	21-Jun-2022 08:47
Compound	CAS Number	LOR	Unit		EP2207624-001	EP2207624-002	EP2207624-003	EP2207624-004	EP2207624-005
					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		221	209	104	221	208
Total Alkalinity as CaCO3	----	1	mg/L		221	209	104	221	208
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1430	1520	18	1580	1320
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		8980	9530	4	12100	8640
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		305	320	27	385	306
Magnesium	7439-95-4	1	mg/L		802	856	7	1080	803
Sodium	7440-23-5	1	mg/L		5410	5850	6	7660	5510
Potassium	7440-09-7	1	mg/L		303	324	2	431	312
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		288	305	2.56	379	275
ø Total Cations	----	0.01	meq/L		324	349	2.24	452	329
ø Ionic Balance	----	0.01	%		6.01	6.81	6.87	8.87	8.88
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	0.02	0.02	0.02
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		0.62	0.62	0.35	<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	0.04	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW008_220621	0083_QC108_220621	0083_MW004_220621	0083_MW212_220621	0083_QC111_220621
				Sampling date / time	21-Jun-2022 08:05	21-Jun-2022 08:08	21-Jun-2022 08:24	21-Jun-2022 08:46	21-Jun-2022 08:47
Compound	CAS Number	LOR	Unit		EP2207624-001	EP2207624-002	EP2207624-003	EP2207624-004	EP2207624-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	<0.01	**0.02**	<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	0083_MW008_220621	0083_QC108_220621	0083_MW004_220621	0083_MW212_220621	0083_QC111_220621
				Sampling date / time	21-Jun-2022 08:05	21-Jun-2022 08:08	21-Jun-2022 08:24	21-Jun-2022 08:46	21-Jun-2022 08:47
Compound	CAS Number	LOR	Unit		EP2207624-001	EP2207624-002	EP2207624-003	EP2207624-004	EP2207624-005
					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		**0.62**	**0.63**	**0.45**	**0.02**	**0.02**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.62**	**0.63**	**0.37**	**0.02**	**0.02**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.62**	**0.63**	**0.45**	**0.02**	**0.02**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**104**	**101**	**96.1**	**98.0**	**101**
13C8-PFOA	----	0.02	%		**101**	**104**	**99.7**	**105**	**101**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW210_220621	0083_MW105_4-4.5_220621	0083_MW107_5.5-6_220621	0083_MW111_10.5-11_220621	0083_QC114_220621
				Sampling date / time	21-Jun-2022 08:58	21-Jun-2022 09:17	21-Jun-2022 09:44	21-Jun-2022 10:22	21-Jun-2022 10:24
Compound	CAS Number	LOR	Unit		EP2207624-006	EP2207624-007	EP2207624-008	EP2207624-009	EP2207624-010
					Result	Result	Result	Result	Result
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**91**	**228**	**135**	**90**	----
Total Alkalinity as CaCO3	----	1	mg/L		**91**	**228**	**135**	**90**	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**101**	**1540**	**2430**	**2510**	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**671**	**9270**	**18700**	**18600**	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**51**	**325**	**411**	**535**	----
Magnesium	7439-95-4	1	mg/L		**50**	**845**	**1260**	**1600**	----
Sodium	7440-23-5	1	mg/L		**322**	**5710**	**9300**	**11900**	----
Potassium	7440-09-7	1	mg/L		**20**	**321**	**511**	**692**	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**22.8**	**298**	**581**	**579**	----
ø Total Cations	----	0.01	meq/L		**21.2**	**342**	**542**	**694**	----
ø Ionic Balance	----	0.01	%		**3.80**	**6.90**	**3.47**	**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		**0.03**	**0.03**	<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	**0.14**	<0.01	**0.02**	**0.02**
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**	**0.16**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.04**	**0.15**	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW210_220621	0083_MW105_4-4.5_220621	0083_MW107_5.5-6_220621	0083_MW111_10.5-11_220621	0083_QC114_220621
				Sampling date / time	21-Jun-2022 08:58	21-Jun-2022 09:17	21-Jun-2022 09:44	21-Jun-2022 10:22	21-Jun-2022 10:24
Compound	CAS Number	LOR	Unit		EP2207624-006	EP2207624-007	EP2207624-008	EP2207624-009	EP2207624-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.06**	**0.04**	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.04**	**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	0083_MW210_220621	0083_MW105_4-4.5_220621	0083_MW107_5.5-6_220621	0083_MW111_10.5-11_220621	0083_QC114_220621
				Sampling date / time	21-Jun-2022 08:58	21-Jun-2022 09:17	21-Jun-2022 09:44	21-Jun-2022 10:22	21-Jun-2022 10:24
Compound	CAS Number	LOR	Unit		EP2207624-006	EP2207624-007	EP2207624-008	EP2207624-009	EP2207624-010
					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		**0.19**	**0.53**	<0.01	**0.02**	**0.02**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.03**	**0.17**	<0.01	**0.02**	**0.02**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**0.19**	**0.53**	<0.01	**0.02**	**0.02**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**97.7**	**102**	**109**	**102**	**92.4**
13C8-PFOA	----	0.02	%		**98.3**	**103**	**100**	**104**	**104**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW112_4.5-5_220621	----	----	----	----
				Sampling date / time	21-Jun-2022 11:19	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2207624-011	--------	--------	--------	--------	
				Result	----	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**110**	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	**110**	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**2470**	----	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	**18100**	----	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	**493**	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	**1560**	----	----	----	----	
Sodium	7440-23-5	1	mg/L	**11500**	----	----	----	----	
Potassium	7440-09-7	1	mg/L	**663**	----	----	----	----	
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L	**564**	----	----	----	----	
ø Total Cations	----	0.01	meq/L	**670**	----	----	----	----	
ø Ionic Balance	----	0.01	%	**8.58**	----	----	----	----	
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	0083_MW112_4.5-5_220621	----	----	----	----
				Sampling date / time	21-Jun-2022 11:19	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2207624-011	--------	--------	--------	--------
					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 (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	----	----	----	----
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	0083_MW112_4.5-5_220621	----	----	----	----
				Sampling date / time	21-Jun-2022 11:19	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2207624-011	--------	--------	--------	--------
					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	%		**100**	----	----	----	----
13C8-PFOA	----	0.02	%		**104**	----	----	----	----

Analytical Results

Sub-Matrix: RINSATE (Matrix: WATER)				Sample ID	0083_QC301_220621	0083_QC302_220621	0083_QC303_220621	0083_QC401_220621	0083_QC402_220621
				Sampling date / time	21-Jun-2022 14:54	21-Jun-2022 14:55	21-Jun-2022 14:56	21-Jun-2022 14:55	21-Jun-2022 14:56
Compound	CAS Number	LOR	Unit		EP2207624-012	EP2207624-013	EP2207624-014	EP2207624-015	EP2207624-016
					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	0083_QC301_220621	0083_QC302_220621	0083_QC303_220621	0083_QC401_220621	0083_QC402_220621
				Sampling date / time	21-Jun-2022 14:54	21-Jun-2022 14:55	21-Jun-2022 14:56	21-Jun-2022 14:55	21-Jun-2022 14:56
Compound	CAS Number	LOR	Unit		EP2207624-012	EP2207624-013	EP2207624-014	EP2207624-015	EP2207624-016
					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	%		**96.7**	**90.3**	**96.0**	**97.7**	**91.0**
13C8-PFOA	----	0.02	%		**102**	**99.6**	**105**	**105**	**102**

Analytical Results

Sub-Matrix: **RINSATE** (Matrix: **WATER**)				Sample ID	0083_QC403_220621	----	----	----	----
				Sampling date / time	21-Jun-2022 14:54	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2207624-017	--------	--------	--------	--------
					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	0083_QC403_220621	----	----	----	----
				Sampling date / time	21-Jun-2022 14:54	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2207624-017	--------	--------	--------	--------
					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	%		**98.3**	----	----	----	----
13C8-PFOA	----	0.02	%		**101**	----	----	----	----

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2207624**	Page	: 1 of 10
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 27-Jun-2022
C-O-C number	: 39136	Issue Date	: 07-Jul-2022
Sampler	: [redacted]		
Site	: HEHA GW - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 17		
No. of samples analysed	: 17		

ilac-MRA NATA
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 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Franco Lentini	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**

				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: 4442808)									
EP2207565-002	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	163	173	5.8	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	163	173	5.8	0% - 20%
EP2207565-012	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	1250	1260	0.7	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1250	1260	0.7	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4442809)									
EP2207624-004	0083_MW212_220621	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	221	205	7.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	221	205	7.9	0% - 20%
EP2207626-006	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	192	195	1.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	192	195	1.6	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4424454)									
EP2207566-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2550	2460	3.4	0% - 20%
EP2207624-002	0083_QC108_220621	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1520	1520	0.1	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4424453)									
EP2207566-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	18600	18600	0.1	0% - 20%
EP2207624-002	0083_QC108_220621	ED045G: Chloride	16887-00-6	1	mg/L	9530	9580	0.6	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 4424153)									
EP2207564-010	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	488	510	4.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1250	1310	4.6	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9660	10100	4.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	553	581	5.0	0% - 20%
EP2207624-009	0083_MW111_10.5-11_220621	ED093F: Calcium	7440-70-2	1	mg/L	535	573	6.9	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1600	1710	6.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11900	12800	7.2	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	692	749	8.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4436360)									
EP2207566-005	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: 4436371)									
EP2207624-011	0083_MW112_4.5-5_220621	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: 4436360)									
EP2207566-005	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
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4436371)									
EP2207624-011	0083_MW112_4.5-5_220621	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

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: 4436371) - continued									
EP2207624-011	0083_MW112_4.5-5_220621	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: 4436360)									
EP2207566-005	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: 4436371)									
EP2207624-011	0083_MW112_4.5-5_220621	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: 4436360)									

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: 4436360) - continued									
EP2207566-005	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4436371)									
EP2207624-011	0083_MW112_4.5-5_220621	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: 4436360)									
EP2207566-005	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4436371)									
EP2207624-011	0083_MW112_4.5-5_220621	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4442808)								
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	106	87.8	118
				<1	200 mg/L	94.9	87.8	118
ED037P: Alkalinity by PC Titrator (QCLot: 4442809)								
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	108	87.8	118
				<1	200 mg/L	97.0	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4424454)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	95.3	89.9	112
				<1	500 mg/L	98.7	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4424453)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.4	88.6	113
				<1	1000 mg/L	95.0	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4424153)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.8	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.9	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	108	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.4	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4436360)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	117	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	122	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	124	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	125	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	125	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	102	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4436371)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	113	71.0	127

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4436371) - continued								
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	129	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	134	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	119	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	132	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4436360)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	111	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	117	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	124	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	132	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	125	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	122	71.0	129
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	<0.02	0.25 µg/L	130	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	131	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	108	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	116	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4436371)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	110	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	133	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	117	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	118	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	136	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	119	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4436360)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	128	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	95.1	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	101	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	114	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	130	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	127	65.0	136

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4436360) - continued								
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	117	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4436371)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	134	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	128	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	113	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	117	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	121	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	133	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	131	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436360)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	132	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	122	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	122	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	104	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436371)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	126	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	109	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	134	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	138	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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4424454)							
EP2207566-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4424453)							
EP2207566-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4436360)							
EP2207624-004	0083_MW212_220621	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	120	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	124	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	119	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	127	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	128	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	132	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4436371)							
EP2207627-007	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	126	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	124	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	123	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	114	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	127	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	136	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4436360)							
EP2207624-004	0083_MW212_220621	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	109	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	125	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	129	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	124	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	124	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	123	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	116	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	129	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	121	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	135	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	132	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4436371)							
EP2207627-007	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	114	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	126	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	127	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	130	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	130	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	112	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	113	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	129	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	116	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	117	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	124	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4436360)							

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: 4436360) - continued							
EP2207624-004	0083_MW212_220621	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	129	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	122	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	112	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	124	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	131	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	121	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	117	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4436371)							
EP2207627-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	129	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	121	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	126	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	132	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	136	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	125	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436360)							
EP2207624-004	0083_MW212_220621	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	124	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	133	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	132	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	121	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436371)							
EP2207627-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	118	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	118	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	130	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	139	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2207624**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Site	: HEHA GW - MB	Issue Date	: 07-Jul-2022
Sampler	: [redacted]	No. of samples received	: 17
Order number	: pfas-omp HEHA	No. of samples analysed	: 17

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	EP2207566--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	EP2207566--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 / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural							
0083_MW008_220621,	0083_QC108_220621,	----	----	----	06-Jul-2022	05-Jul-2022	**1**
0083_MW004_220621,	0083_MW212_220621,						
0083_QC111_220621,	0083_MW210_220621,						
0083_MW105_4-4.5_220621,	0083_MW107_5.5-6_220621,						
0083_MW111_10.5-11_220621,	0083_MW112_4.5-5_220621						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count QC	Count Regular	Rate (%) Actual	Rate (%) Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	40	5.00	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 / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

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
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0083_MW008_220621, 0083_MW004_220621, 0083_QC111_220621, 0083_MW105_4-4.5_220621, 0083_MW111_10.5-11_220621, 0083_QC108_220621, 0083_MW212_220621, 0083_MW210_220621, 0083_MW107_5.5-6_220621, 0083_MW112_4.5-5_220621	**21-Jun-2022**	**----**	----	----	**06-Jul-2022**	05-Jul-2022	×
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0083_MW008_220621, 0083_MW004_220621, 0083_QC111_220621, 0083_MW105_4-4.5_220621, 0083_MW111_10.5-11_220621, 0083_QC108_220621, 0083_MW212_220621, 0083_MW210_220621, 0083_MW107_5.5-6_220621, 0083_MW112_4.5-5_220621	**21-Jun-2022**	**----**	----	----	**04-Jul-2022**	19-Jul-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_MW008_220621, 0083_MW004_220621, 0083_QC111_220621, 0083_MW105_4-4.5_220621, 0083_MW111_10.5-11_220621, 0083_QC108_220621, 0083_MW212_220621, 0083_MW210_220621, 0083_MW107_5.5-6_220621, 0083_MW112_4.5-5_220621	**21-Jun-2022**	**----**	----	----	**04-Jul-2022**	19-Jul-2022	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_MW008_220621, 0083_MW004_220621, 0083_QC111_220621, 0083_MW105_4-4.5_220621, 0083_MW111_10.5-11_220621, 0083_QC108_220621, 0083_MW212_220621, 0083_MW210_220621, 0083_MW107_5.5-6_220621, 0083_MW112_4.5-5_220621	**21-Jun-2022**	**----**	----	----	**27-Jun-2022**	28-Jun-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW112_4.5-5_220621, 0083_QC302_220621, 0083_QC401_220621, 0083_QC403_220621, 0083_QC301_220621, 0083_QC303_220621, 0083_QC402_220621,	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
HDPE (no PTFE) (EP231X)							
0083_MW008_220621, 0083_MW004_220621, 0083_QC111_220621, 0083_MW105_4-4.5_220621, 0083_MW111_10.5-11_220621, 0083_QC108_220621, 0083_MW212_220621, 0083_MW210_220621, 0083_MW107_5.5-6_220621, 0083_QC114_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	18-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
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X) 0083_MW112_4.5-5_220621, 0083_QC301_220621, 0083_QC302_220621, 0083_QC303_220621, 0083_QC401_220621, 0083_QC402_220621, 0083_QC403_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
HDPE (no PTFE) (EP231X) 0083_MW008_220621, 0083_QC108_220621, 0083_MW004_220621, 0083_MW212_220621, 0083_QC111_220621, 0083_MW210_220621, 0083_MW105_4-4.5_220621, 0083_MW107_5.5-6_220621, 0083_MW111_10.5-11_220621, 0083_QC114_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	18-Dec-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X) 0083_MW112_4.5-5_220621, 0083_QC301_220621, 0083_QC302_220621, 0083_QC303_220621, 0083_QC401_220621, 0083_QC402_220621, 0083_QC403_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
HDPE (no PTFE) (EP231X) 0083_MW008_220621, 0083_QC108_220621, 0083_MW004_220621, 0083_MW212_220621, 0083_QC111_220621, 0083_MW210_220621, 0083_MW105_4-4.5_220621, 0083_MW107_5.5-6_220621, 0083_MW111_10.5-11_220621, 0083_QC114_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	18-Dec-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X) 0083_MW112_4.5-5_220621, 0083_QC301_220621, 0083_QC302_220621, 0083_QC303_220621, 0083_QC401_220621, 0083_QC402_220621, 0083_QC403_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
HDPE (no PTFE) (EP231X) 0083_MW008_220621, 0083_QC108_220621, 0083_MW004_220621, 0083_MW212_220621, 0083_QC111_220621, 0083_MW210_220621, 0083_MW105_4-4.5_220621, 0083_MW107_5.5-6_220621, 0083_MW111_10.5-11_220621, 0083_QC114_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	18-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
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_MW112_4.5-5_220621, 0083_QC301_220621, 0083_QC302_220621, 0083_QC303_220621, 0083_QC401_220621, 0083_QC402_220621, 0083_QC403_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
HDPE (no PTFE) (EP231X)							
0083_MW008_220621, 0083_QC108_220621, 0083_MW004_220621, 0083_MW212_220621, 0083_QC111_220621, 0083_MW210_220621, 0083_MW105_4-4.5_220621, 0083_MW107_5.5-6_220621, 0083_MW111_10.5-11_220621, 0083_QC114_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	18-Dec-2022	✓

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	2	40	**5.00**	**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	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	40	**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	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	40	**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	2	40	**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 SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. 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 BaSO4 suspension is measured by a photometer and the SO4-2 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 thiocynate forms highly-coloured ferric thiocynate 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 SO4 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.

CHAIN OF CUSTODY

ALS COC#: 39138 *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_0082_PFASOMP

SITE: HEHA GW - AG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: [redacted] SAMPLER MOBILE: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [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	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW117_2-2.5		21/06/2022 07:49 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0083_MW116		21/06/2022 08:16 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
003	0083_MW113_2.5-3.5		21/06/2022 09:35 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0083_MW114_2-3		21/06/2022 09:34 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0083_MW115_2-3		21/06/2022 10:20 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0083_MW218		21/06/2022 10:58 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		extra PFAS bottles for lab qaqc
007	0083_MW217		21/06/2022 11:10 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
008	0083_MW202		21/06/2022 11:49 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: 39138 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - AG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: [redacted] SAMPLER MOBILE: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

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? 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	0083_MW117_2-2.5	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)
002	0083_MW116	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	0083_MW113_2.5-3.5	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)
004	0083_MW114_2-3	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	0083_MW115_2-3	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	0083_MW218	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	0083_MW217	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	0083_MW202	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)

CHAIN OF CUSTODY

(ALS) COC#: **39138** *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - AG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

CONTACT PH: [redacted] SAMPLER MOBILE: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

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? 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	0083_MW117_2-2.5	Clear Plastic Bottle - Natural	500 mL	00070621089943	Green	No	
001	0083_MW117_2-2.5	HDPE (no PTFE)	20 mL	00350821023892	Grey	No	
001	0083_MW117_2-2.5	HDPE (no PTFE)	20 mL	00350821023932	Grey	No	
002	0083_MW116	Clear Plastic Bottle - Natural	500 mL	00070621089728	Green	No	
002	0083_MW116	HDPE (no PTFE)	20 mL	0035082103221	Grey	No	
002	0083_MW116	HDPE (no PTFE)	20 mL	00350821023984	Grey	No	
003	0083_MW113_2.5-3.5	HDPE (no PTFE)	20 mL	00350821023983	Grey	No	
003	0083_MW113_2.5-3.5	HDPE (no PTFE)	20 mL	00350821023967	Grey	No	
003	0083_MW113_2.5-3.5	Clear Plastic Bottle - Natural	500 mL	00070621089882	Green	No	
004	0083_MW114_2-3	Clear Plastic Bottle - Natural	500 mL	00070621089633	Green	No	
004	0083_MW114_2-3	HDPE (no PTFE)	20 mL	00350821023966	Grey	No	
004	0083_MW114_2-3	HDPE (no PTFE)	20 mL	00350821023861	Grey	No	
005	0083_MW115_2-3	HDPE (no PTFE)	20 mL	00350821023811	Grey	No	
005	0083_MW115_2-3	HDPE (no PTFE)	20 mL	00350821023862	Grey	No	
005	0083_MW115_2-3	Clear Plastic Bottle - Natural	500 mL	00070621089885	Green	No	
006	0083_MW218	Clear Plastic Bottle - Natural	500 mL	00070621089933	Green	No	
006	0083_MW218	HDPE (no PTFE)	20 mL	00350019008224	Grey	No	
006	0083_MW218	HDPE (no PTFE)	20 mL	00350821023832	Grey	No	
006	0083_MW218	HDPE (no PTFE)	20 mL	00350621041310	Grey	No	
006	0083_MW218	HDPE (no PTFE)	20 mL	00350821023877	Grey	No	
007	0083_MW217	Clear Plastic Bottle - Natural	500 mL	00071020117833	Green	No	
007	0083_MW217	HDPE (no PTFE)	20 mL	00350821023758	Grey	No	
007	0083_MW217	HDPE (no PTFE)	20 mL	00350821023783	Grey	No	
008	0083_MW202	Clear Plastic Bottle - Natural	500 mL	00070621089910	Green	No	
008	0083_MW202	HDPE (no PTFE)	20 mL	00350821043203	Grey	No	
008	0083_MW202	HDPE (no PTFE)	20 mL	00350821043238	Grey	No	

CHAIN OF CUSTODY

COC#: 39138 *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_0082_PFASOMP

SITE: HEHA GW - AG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted] CONTACT PH: [redacted] SAMPLER MOBILE: [redacted]

PRIMARY SAMPLER: [redacted] QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [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:			

Total Bottle Count: ALS: 26, Non ALS: 0

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2207626**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: graeme.jablonskas@alsglobal.com
Telephone	: ----	Telephone	: +6138549 9609
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 39138	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA GW - AG		
Sampler	: [redacted]		

Dates

Date Samples Received	: 23-Jun-2022 11:30	Issue Date	: 27-Jun-2022
Client Requested Due Date	: 07-Jul-2022	Scheduled Reporting Date	: **07-Jul-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.1 - Ice present
Receipt Detail	:	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
- EP231X conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: 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.

EP2207626-001	: 21-Jun-2022 07:49	: 0083_MW117_2-2.5_220621
EP2207626-003	: 21-Jun-2022 09:35	: 0083_MW113_2.5-3.5_220621
EP2207626-004	: 21-Jun-2022 09:34	: 0083_MW114_2-3_220621
EP2207626-005	: 21-Jun-2022 10:20	: 0083_MW115_2-3_220621

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)
EP2207626-001	21-Jun-2022 07:49	0083_MW117_2-2.5_220...	✓	✓	✓	✓
EP2207626-002	21-Jun-2022 08:16	0083_MW116_220621	✓	✓	✓	✓
EP2207626-003	21-Jun-2022 09:35	0083_MW113_2.5-3.5_2...	✓	✓	✓	✓
EP2207626-004	21-Jun-2022 09:34	0083_MW114_2-3_220621	✓	✓	✓	✓
EP2207626-005	21-Jun-2022 10:20	0083_MW115_2-3_220621	✓	✓	✓	✓
EP2207626-006	21-Jun-2022 10:58	0083_MW218_220621	✓	✓	✓	✓
EP2207626-007	21-Jun-2022 11:10	0083_MW217_220621	✓	✓	✓	✓
EP2207626-008	21-Jun-2022 11:49	0083_MW202_220621	✓	✓	✓	✓

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

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2207626**	Page	: 1 of 9
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 27-Jun-2022
C-O-C number	: 39138	Issue Date	: 07-Jul-2022 11:54
Sampler	: [redacted]		
Site	: HEHA GW - AG		
Quote number	: SY/139/19 B		
No. of samples received	: 8		
No. of samples analysed	: 8		

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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Franco Lentini	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.

- EP231X 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.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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	0083_MW117_2-2.5_220621	0083_MW116_220621	0083_MW113_2.5-3.5_220621	0083_MW114_2-3_220621	0083_MW115_2-3_220621
				Sampling date / time	21-Jun-2022 07:49	21-Jun-2022 08:16	21-Jun-2022 09:35	21-Jun-2022 09:34	21-Jun-2022 10:20
Compound	CAS Number	LOR	Unit		EP2207626-001	EP2207626-002	EP2207626-003	EP2207626-004	EP2207626-005
					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		**251**	**112**	**155**	**120**	**200**
Total Alkalinity as CaCO3	----	1	mg/L		**251**	**112**	**155**	**120**	**200**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**527**	**2550**	**1400**	**2730**	**2140**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**2580**	**17100**	**9740**	**18600**	**13800**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**61**	**473**	**252**	**503**	**375**
Magnesium	7439-95-4	1	mg/L		**154**	**1490**	**706**	**1570**	**1080**
Sodium	7440-23-5	1	mg/L		**1440**	**11000**	**5120**	**11600**	**8410**
Potassium	7440-09-7	1	mg/L		**103**	**646**	**307**	**669**	**479**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**88.8**	**538**	**307**	**584**	**438**
ø Total Cations	----	0.01	meq/L		**81.0**	**641**	**301**	**676**	**486**
ø Ionic Balance	----	0.01	%		**4.58**	**8.78**	**0.95**	**7.31**	**5.18**
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	0083_MW117_2-2.5_220621	0083_MW116_220621	0083_MW113_2.5-3.5_220621	0083_MW114_2-3_220621	0083_MW115_2-3_220621
				Sampling date / time	21-Jun-2022 07:49	21-Jun-2022 08:16	21-Jun-2022 09:35	21-Jun-2022 09:34	21-Jun-2022 10:20
Compound	CAS Number	LOR	Unit		EP2207626-001	EP2207626-002	EP2207626-003	EP2207626-004	EP2207626-005
					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	0083_MW117_2-2.5_220621	0083_MW116_220621	0083_MW113_2.5-3.5_220621	0083_MW114_2-3_220621	0083_MW115_2-3_220621
				Sampling date / time	21-Jun-2022 07:49	21-Jun-2022 08:16	21-Jun-2022 09:35	21-Jun-2022 09:34	21-Jun-2022 10:20
Compound	CAS Number	LOR	Unit		EP2207626-001	EP2207626-002	EP2207626-003	EP2207626-004	EP2207626-005
					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	%		**99.6**	**91.8**	**104**	**99.5**	**96.8**
13C8-PFOA	----	0.02	%		**103**	**102**	**103**	**106**	**104**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW218_220621	0083_MW217_220621	0083_MW202_220621	----	----
				Sampling date / time	21-Jun-2022 10:58	21-Jun-2022 11:10	21-Jun-2022 11:49	----	----
Compound	CAS Number	LOR	Unit		EP2207626-006	EP2207626-007	EP2207626-008	--------	--------
					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	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		192	244	150	----	----
Total Alkalinity as CaCO3	----	1	mg/L		192	244	150	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		538	525	2280	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		4260	3320	16400	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		141	98	454	----	----
Magnesium	7439-95-4	1	mg/L		272	210	1390	----	----
Sodium	7440-23-5	1	mg/L		2240	1820	10300	----	----
Potassium	7440-09-7	1	mg/L		122	109	604	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		135	109	513	----	----
ø Total Cations	----	0.01	meq/L		130	104	600	----	----
ø Ionic Balance	----	0.01	%		1.97	2.50	7.85	----	----
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: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW218_220621	0083_MW217_220621	0083_MW202_220621	----	----
				Sampling date / time	21-Jun-2022 10:58	21-Jun-2022 11:10	21-Jun-2022 11:49	----	----
Compound	CAS Number	LOR	Unit		EP2207626-006	EP2207626-007	EP2207626-008	--------	--------
					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: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW218_220621	0083_MW217_220621	0083_MW202_220621	----	----
				Sampling date / time	21-Jun-2022 10:58	21-Jun-2022 11:10	21-Jun-2022 11:49	----	----
Compound	CAS Number	LOR	Unit		EP2207626-006	EP2207626-007	EP2207626-008	--------	--------
					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	%		**97.1**	**93.2**	**93.1**	----	----
13C8-PFOA	----	0.02	%		**104**	**105**	**102**	----	----

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) EP231C: Perfluoroalkyl Sulfonamides

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

(WATER) EP231P: PFAS Sums

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2207626**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 27-Jun-2022
C-O-C number	: 39138	Issue Date	: 07-Jul-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - AG		
Quote number	: SY/139/19 B		
No. of samples received	: 8		
No. of samples analysed	: 8		

ilac-MRA NATA
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 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Franco Lentini	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**

				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: 4442809)									
EP2207624-004	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	221	205	7.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	221	205	7.9	0% - 20%
EP2207626-006	0083_MW218_220621	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	192	195	1.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	192	195	1.6	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4424461)									
EP2207626-001	0083_MW117_2-2.5_220621	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	527	529	0.4	0% - 20%
EP2207627-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2720	2720	0.4	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4424460)									
EP2207626-001	0083_MW117_2-2.5_220621	ED045G: Chloride	16887-00-6	1	mg/L	2580	2560	1.1	0% - 20%
EP2207627-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	19000	19500	2.9	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4424153)									
EP2207564-010	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	488	510	4.5	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1250	1310	4.6	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	9660	10100	4.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	553	581	5.0	0% - 20%
EP2207624-009	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	535	573	6.9	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1600	1710	6.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11900	12800	7.2	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 4424153) - continued									
EP2207624-009	Anonymous	ED093F: Potassium	7440-09-7	1	mg/L	692	749	8.0	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4434104)									
EP2207565-011	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.20	0.21	0.0	0% - 20%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.07	0.08	0.0	No Limit
		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	0.02	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: 4434104)									
EP2207565-011	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	0.03	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: 4434104)									
EP2207565-011	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4434104)									
EP2207565-011	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

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: 4434104) - continued									
EP2207565-011	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: 4434104)									
EP2207565-011	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.36	0.38	5.4	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4442809)								
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	108	87.8	118
				<1	200 mg/L	97.0	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4424461)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	89.9	112
				<1	500 mg/L	94.8	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4424460)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.6	88.6	113
				<1	1000 mg/L	95.9	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4424153)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.8	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.9	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	108	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.4	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4434104)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	124	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	104	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	102	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	95.0	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	115	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	115	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4434104)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	95.3	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	117	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	123	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	100	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	122	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	129	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	127	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4434104) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	98.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	119	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4434104)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	129	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	125	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	116	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	125	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	126	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	129	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	125	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4434104)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	107	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	121	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	120	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	120	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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4424461)							
EP2207626-001	0083_MW117_2-2.5_220621	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4424460)							
EP2207626-001	0083_MW117_2-2.5_220621	ED045G: Chloride	16887-00-6	1000 mg/L	83.4	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4434104)							
EP2207626-006	0083_MW218_220621	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	130	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	111	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	107	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	99.6	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	111	65.0	140

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: 4434104) - continued							
EP2207626-006	0083_MW218_220621	EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	115	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4434104)							
EP2207626-006	0083_MW218_220621	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	89.2	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	118	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	100	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	127	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	128	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	117	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	130	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	129	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	114	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4434104)							
EP2207626-006	0083_MW218_220621	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	124	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	125	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	123	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	122	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	122	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	126	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	127	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4434104)							
EP2207626-006	0083_MW218_220621	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	108	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	119	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	126	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	128	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2207626**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Site	: HEHA GW - AG	Issue Date	: 07-Jul-2022
Sampler	: [redacted]	No. of samples received	: 8
Order number	: pfas-omp HEHA	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 SO4 2- by DA	EP2207626--001	0083_MW117_2-2.5_220621	**Sulfate as SO4 - Turbidimetric**	14808-79-8	Not Determined	----	**MS recovery not determined, background level greater than or equal to 4x spike level.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural							
0083_MW117_2-2.5_220621,	0083_MW116_220621,	----	----	----	06-Jul-2022	05-Jul-2022	**1**
0083_MW113_2.5-3.5_220621,	0083_MW114_2-3_220621,						
0083_MW115_2-3_220621,	0083_MW218_220621,						
0083_MW217_220621,	0083_MW202_220621						

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	1	20	5.00	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 / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0083_MW117_2-2.5_220621,	0083_MW116_220621,	**21-Jun-2022**	**----**	----	----	**06-Jul-2022**	05-Jul-2022	×
0083_MW113_2.5-3.5_220621,	0083_MW114_2-3_220621,							
0083_MW115_2-3_220621,	0083_MW218_220621,							
0083_MW217_220621,	0083_MW202_220621							

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)							
0083_MW117_2-2.5_220621, 0083_MW116_220621, 0083_MW113_2.5-3.5_220621, 0083_MW114_2-3_220621, 0083_MW115_2-3_220621, 0083_MW218_220621, 0083_MW217_220621, 0083_MW202_220621	**21-Jun-2022**	**----**	----	----	**05-Jul-2022**	19-Jul-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_MW117_2-2.5_220621, 0083_MW116_220621, 0083_MW113_2.5-3.5_220621, 0083_MW114_2-3_220621, 0083_MW115_2-3_220621, 0083_MW218_220621, 0083_MW217_220621, 0083_MW202_220621	**21-Jun-2022**	**----**	----	----	**05-Jul-2022**	19-Jul-2022	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_MW117_2-2.5_220621, 0083_MW116_220621, 0083_MW113_2.5-3.5_220621, 0083_MW114_2-3_220621, 0083_MW115_2-3_220621, 0083_MW218_220621, 0083_MW217_220621, 0083_MW202_220621	**21-Jun-2022**	**----**	----	----	**27-Jun-2022**	28-Jun-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW117_2-2.5_220621, 0083_MW116_220621, 0083_MW113_2.5-3.5_220621, 0083_MW114_2-3_220621, 0083_MW115_2-3_220621, 0083_MW218_220621, 0083_MW217_220621, 0083_MW202_220621	**21-Jun-2022**	**01-Jul-2022**	18-Dec-2022	✓	**01-Jul-2022**	18-Dec-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW117_2-2.5_220621, 0083_MW116_220621, 0083_MW113_2.5-3.5_220621, 0083_MW114_2-3_220621, 0083_MW115_2-3_220621, 0083_MW218_220621, 0083_MW217_220621, 0083_MW202_220621	**21-Jun-2022**	**01-Jul-2022**	18-Dec-2022	✓	**01-Jul-2022**	18-Dec-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_MW117_2-2.5_220621, 0083_MW116_220621, 0083_MW113_2.5-3.5_220621, 0083_MW114_2-3_220621, 0083_MW115_2-3_220621, 0083_MW218_220621, 0083_MW217_220621, 0083_MW202_220621	**21-Jun-2022**	**01-Jul-2022**	18-Dec-2022	✓	**01-Jul-2022**	18-Dec-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW117_2-2.5_220621, 0083_MW116_220621, 0083_MW113_2.5-3.5_220621, 0083_MW114_2-3_220621, 0083_MW115_2-3_220621, 0083_MW218_220621, 0083_MW217_220621, 0083_MW202_220621	**21-Jun-2022**	**01-Jul-2022**	18-Dec-2022	✓	**01-Jul-2022**	18-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
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_MW117_2-2.5_220621, 0083_MW116_220621, 0083_MW113_2.5-3.5_220621, 0083_MW114_2-3_220621, 0083_MW115_2-3_220621, 0083_MW218_220621, 0083_MW217_220621, 0083_MW202_220621	**21-Jun-2022**	**01-Jul-2022**	18-Dec-2022	✓	**01-Jul-2022**	18-Dec-2022	✓

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	1	20	**5.00**	**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 SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. 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 BaSO4 suspension is measured by a photometer and the SO4-2 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 thiocynate forms highly-coloured ferric thiocynate 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 SO4 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.

CHAIN OF CUSTODY

(ALS) COC#: 39139 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - AG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

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: [redacted]

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	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_OTH108		21/06/2022 07:56 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0083_OTH107		21/06/2022 08:22 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
003	0083_OTH105		21/06/2022 09:46 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0083_OTH106		21/06/2022 10:00 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0083_OTH110		21/06/2022 11:57 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0083_OTH109		21/06/2022 11:57 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
007	0083_OTH101		21/06/2022 11:58 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		extra PFAS bottles for lab qaqc
008	0083_OTH102		21/06/2022 11:59 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

(ALS) COC#: 39139 *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_0082_PFASOMP

SITE: HEHA SW/OTH - AG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [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	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_OTH108	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	0083_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)
003	0083_OTH105	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	0083_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	0083_OTH110	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	0083_OTH109	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	0083_OTH101	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)
008	0083_OTH102	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#: 39139 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - AG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

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: [redacted]

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	0083_OTH108	Clear Plastic Bottle - Natural	500 mL	00070621089975	Green	No	
001	0083_OTH108	HDPE (no PTFE)	20 mL	00350821023902	Grey	No	
001	0083_OTH108	HDPE (no PTFE)	20 mL	00350821023988	Grey	No	
002	0083_OTH107	Clear Plastic Bottle - Natural	500 mL	00070621089622	Green	No	
002	0083_OTH107	HDPE (no PTFE)	20 mL	00350821043225	Grey	No	
002	0083_OTH107	HDPE (no PTFE)	20 mL	00350821023867	Grey	No	
003	0083_OTH105	Clear Plastic Bottle - Natural	500 mL	00070621089631	Green	No	
003	0083_OTH105	HDPE (no PTFE)	20 mL	00350821023883	Grey	No	
003	0083_OTH105	HDPE (no PTFE)	20 mL	00350821023794	Grey	No	
004	0083_OTH106	Clear Plastic Bottle - Natural	500 mL	00070621089884	Green	No	
004	0083_OTH106	HDPE (no PTFE)	20 mL	00350821023829	Grey	No	
004	0083_OTH106	HDPE (no PTFE)	20 mL	00350821023799	Grey	No	
005	0083_OTH110	HDPE (no PTFE)	20 mL	00350821023786	Grey	No	
005	0083_OTH110	Clear Plastic Bottle - Natural	500 mL	00070621089872	Green	No	
005	0083_OTH110	HDPE (no PTFE)	20 mL	00352101071121	Grey	No	
006	0083_OTH109	HDPE (no PTFE)	20 mL	00350821023922	Grey	No	
006	0083_OTH109	HDPE (no PTFE)	20 mL	00350821043209	Grey	No	
006	0083_OTH109	Clear Plastic Bottle - Natural	500 mL	00070621089729	Green	No	
007	0083_OTH101	HDPE (no PTFE)	20 mL	00350621041346	Grey	No	
007	0083_OTH101	HDPE (no PTFE)	20 mL	00350019008233	Grey	No	
007	0083_OTH101	Clear Plastic Bottle - Natural	500 mL	00070621089973	Green	No	
007	0083_OTH101	HDPE (no PTFE)	20 mL	00350821043239	Grey	No	
007	0083_OTH101	HDPE (no PTFE)	20 mL	00350821023846	Grey	No	
008	0083_OTH102	Clear Plastic Bottle - Natural	500 mL	00070621089906	Green	No	
008	0083_OTH102	HDPE (no PTFE)	20 mL	00350821023792	Grey	No	
008	0083_OTH102	HDPE (no PTFE)	20 mL	00350821023820	Grey	No	

CHAIN OF CUSTODY

(ALS) COC#: 39139 *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_0082_PFASOMP

SITE: HEHA SW/OTH - AG

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [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:			

Total Bottle Count: ALS: 26, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2207627**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: graeme.jablonskas@alsglobal.com
Telephone	: ----	Telephone	: +6138549 9609
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 39139	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SW/OTH - AG		
Sampler	: [redacted]		

Dates

Date Samples Received	: 23-Jun-2022 11:30	Issue Date	: 27-Jun-2022
Client Requested Due Date	: 07-Jul-2022	Scheduled Reporting Date	: **07-Jul-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.1 - Ice present
Receipt Detail	:	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
- EP231X conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: 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)
EP2207627-001	21-Jun-2022 07:56	0083_OTH108_220621	✓	✓	✓	✓
EP2207627-002	21-Jun-2022 08:22	0083_OTH107_220621	✓	✓	✓	✓
EP2207627-003	21-Jun-2022 09:46	0083_OTH105_220621	✓	✓	✓	✓
EP2207627-004	21-Jun-2022 10:00	0083_OTH106_220621	✓	✓	✓	✓
EP2207627-005	21-Jun-2022 11:57	0083_OTH110_220621	✓	✓	✓	✓
EP2207627-006	21-Jun-2022 11:57	0083_OTH109_220621	✓	✓	✓	✓
EP2207627-007	21-Jun-2022 11:58	0083_OTH101_220621	✓	✓	✓	✓
EP2207627-008	21-Jun-2022 11:59	0083_OTH102_220621	✓	✓	✓	✓

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

[redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]stantec.com
- Chain of Custody (CoC) (COC) Email [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) Email [redacted]stantec.com
- EDI Format - XTab (XTAB) Email [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2207627**	Page	: 1 of 9
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 27-Jun-2022
C-O-C number	: 39139	Issue Date	: 07-Jul-2022 15:36
Sampler	: [redacted]		
Site	: HEHA SW/OTH - AG		
Quote number	: SY/139/19 B		
No. of samples received	: 8		
No. of samples analysed	: 8		

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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, Western Australia
Franco Lentini	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.

- EP231X 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.
- ED041G (Sulfate - Turbidimetric): sample EP2207627-002 was re-filtered and re-analyzed from parent sample to confirm results.
- ED045G (Chloride): sample EP2207627-002 was re-filtered and re-analyzed from parent sample to confirm results.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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	0083_OTH108_220621	0083_OTH107_220621	0083_OTH105_220621	0083_OTH106_220621	0083_OTH110_220621
				Sampling date / time	21-Jun-2022 07:56	21-Jun-2022 08:22	21-Jun-2022 09:46	21-Jun-2022 10:00	21-Jun-2022 11:57
Compound	CAS Number	LOR	Unit		EP2207627-001	EP2207627-002	EP2207627-003	EP2207627-004	EP2207627-005
					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		118	118	119	108	106
Total Alkalinity as CaCO3	----	1	mg/L		118	118	119	108	106
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		1890	2570	2720	2730	2710
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		19400	19900	19000	19300	19100
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		527	438	511	519	504
Magnesium	7439-95-4	1	mg/L		1650	1400	1610	1640	1590
Sodium	7440-23-5	1	mg/L		12300	10400	12000	12200	11800
Potassium	7440-09-7	1	mg/L		710	577	688	704	680
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		589	617	595	603	597
ø Total Cations	----	0.01	meq/L		715	604	698	710	687
ø Ionic Balance	----	0.01	%		9.68	1.06	7.94	8.08	6.96
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	0083_OTH108_220621	0083_OTH107_220621	0083_OTH105_220621	0083_OTH106_220621	0083_OTH110_220621
				Sampling date / time	21-Jun-2022 07:56	21-Jun-2022 08:22	21-Jun-2022 09:46	21-Jun-2022 10:00	21-Jun-2022 11:57
Compound	CAS Number	LOR	Unit		EP2207627-001	EP2207627-002	EP2207627-003	EP2207627-004	EP2207627-005
					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	0083_OTH108_220621	0083_OTH107_220621	0083_OTH105_220621	0083_OTH106_220621	0083_OTH110_220621
				Sampling date / time	21-Jun-2022 07:56	21-Jun-2022 08:22	21-Jun-2022 09:46	21-Jun-2022 10:00	21-Jun-2022 11:57
Compound	CAS Number	LOR	Unit		EP2207627-001	EP2207627-002	EP2207627-003	EP2207627-004	EP2207627-005
					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	%		**89.4**	**82.5**	**78.8**	**86.4**	**99.3**
13C8-PFOA	----	0.02	%		**105**	**99.0**	**102**	**102**	**104**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_OTH109_220621	0083_OTH101_220621	0083_OTH102_220621	----	----
				Sampling date / time	21-Jun-2022 11:57	21-Jun-2022 11:58	21-Jun-2022 11:59	----	----
Compound	CAS Number	LOR	Unit		EP2207627-006	EP2207627-007	EP2207627-008	--------	--------
					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	<1	<1	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		126	116	114	----	----
Total Alkalinity as CaCO3	----	1	mg/L		126	116	114	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2720	2770	2790	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		18900	19000	18500	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		520	497	514	----	----
Magnesium	7439-95-4	1	mg/L		1640	1560	1610	----	----
Sodium	7440-23-5	1	mg/L		12200	11600	12000	----	----
Potassium	7440-09-7	1	mg/L		704	663	687	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		592	596	582	----	----
ø Total Cations	----	0.01	meq/L		710	675	698	----	----
ø Ionic Balance	----	0.01	%		9.01	6.20	9.02	----	----
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	0083_OTH109_220621	0083_OTH101_220621	0083_OTH102_220621	----	----
				Sampling date / time	21-Jun-2022 11:57	21-Jun-2022 11:58	21-Jun-2022 11:59	----	----
Compound	CAS Number	LOR	Unit		EP2207627-006	EP2207627-007	EP2207627-008	--------	--------
					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	0083_OTH109_220621	0083_OTH101_220621	0083_OTH102_220621	----	----
				Sampling date / time	21-Jun-2022 11:57	21-Jun-2022 11:58	21-Jun-2022 11:59	----	----
Compound	CAS Number	LOR	Unit		EP2207627-006	EP2207627-007	EP2207627-008	--------	--------
					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	%		**90.3**	**91.0**	**99.9**	----	----
13C8-PFOA	----	0.02	%		**101**	**101**	**103**	----	----

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2207627**	Page	: 1 of 8
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 27-Jun-2022
C-O-C number	: 39139	Issue Date	: 07-Jul-2022
Sampler	: [redacted]		
Site	: HEHA SW/OTH - AG		
Quote number	: SY/139/19 B		
No. of samples received	: 8		
No. of samples analysed	: 8		

ilac-MRA NATA
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 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, Western Australia
Franco Lentini	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**

				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: 4442809)									
EP2207624-004	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	221	205	7.9	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	221	205	7.9	0% - 20%
EP2207626-006	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	192	195	1.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	192	195	1.6	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 4442810)									
EP2207627-008	0083_OTH102_220621	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	114	110	3.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	114	110	3.4	0% - 20%
EP2207630-008	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	119	131	9.5	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	119	131	9.5	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4424461)									
EP2207626-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	527	529	0.4	0% - 20%
EP2207627-003	0083_OTH105_220621	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2720	2720	0.4	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4424460)									
EP2207626-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2580	2560	1.1	0% - 20%
EP2207627-003	0083_OTH105_220621	ED045G: Chloride	16887-00-6	1	mg/L	19000	19500	2.9	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED093F: Dissolved Major Cations (QC Lot: 4424154)									
EP2207627-001	0083_OTH108_220621	ED093F: Calcium	7440-70-2	1	mg/L	527	515	2.3	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1650	1620	2.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12300	12000	2.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	710	696	2.1	0% - 20%
EP2207634-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	706	697	1.3	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	406	400	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	3050	3000	1.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	158	157	0.7	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4436371)									
EP2207624-011	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: 4436371)									
EP2207624-011	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4436371)									
EP2207624-011	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

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: 4436371) - continued									
EP2207624-011	Anonymous	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: 4436371)									
EP2207624-011	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
EP231P: PFAS Sums (QC Lot: 4436371)									
EP2207624-011	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4442809)								
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	108	87.8	118
				<1	200 mg/L	97.0	87.8	118
ED037P: Alkalinity by PC Titrator (QCLot: 4442810)								
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	105	87.8	118
				<1	200 mg/L	97.8	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4424461)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	89.9	112
				<1	500 mg/L	94.8	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4424460)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.6	88.6	113
				<1	1000 mg/L	95.9	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4424154)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.0	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.2	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	109	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.2	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4436371)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	113	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	129	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	134	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	119	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	132	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4436371)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	110	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	129

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4436371) - continued								
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	133	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	117	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	118	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	136	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	119	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4436371)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	134	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	128	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	113	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	117	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	121	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	133	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	131	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436371)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	126	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	109	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	134	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	138	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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4424461)							
EP2207626-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4424460)							

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: 4424460) - continued							
EP2207626-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	83.4	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4436371)							
EP2207627-007	0083_OTH101_220621	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	126	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	124	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	123	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	114	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	127	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	136	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4436371)							
EP2207627-007	0083_OTH101_220621	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	114	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	126	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	127	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	130	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	130	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	112	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	113	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	129	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	116	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	117	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	124	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4436371)							
EP2207627-007	0083_OTH101_220621	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	129	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	121	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	126	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	132	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	136	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	125	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436371)							
EP2207627-007	0083_OTH101_220621	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	118	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	118	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	130	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	139	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2207627**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Site	: HEHA SW/OTH - AG	Issue Date	: 07-Jul-2022
Sampler	: [redacted]	No. of samples received	: 8
Order number	: pfas-omp HEHA	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 SO4 2- by DA	EP2207626--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.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural							
0083_OTH108_220621,	0083_OTH107_220621,	----	----	----	06-Jul-2022	05-Jul-2022	**1**
0083_OTH105_220621,	0083_OTH106_220621,						
0083_OTH110_220621,	0083_OTH109_220621,						
0083_OTH101_220621,	0083_OTH102_220621						

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	1	20	5.00	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 / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0083_OTH108_220621,	0083_OTH107_220621,	**21-Jun-2022**	**----**	----	----	**06-Jul-2022**	05-Jul-2022	×
0083_OTH105_220621,	0083_OTH106_220621,							
0083_OTH110_220621,	0083_OTH109_220621,							
0083_OTH101_220621,	0083_OTH102_220621							

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)							
0083_OTH108_220621, 0083_OTH107_220621, 0083_OTH105_220621, 0083_OTH106_220621, 0083_OTH110_220621, 0083_OTH109_220621, 0083_OTH101_220621, 0083_OTH102_220621	**21-Jun-2022**	**----**	----	----	**05-Jul-2022**	19-Jul-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_OTH108_220621, 0083_OTH107_220621, 0083_OTH105_220621, 0083_OTH106_220621, 0083_OTH110_220621, 0083_OTH109_220621, 0083_OTH101_220621, 0083_OTH102_220621	**21-Jun-2022**	**----**	----	----	**05-Jul-2022**	19-Jul-2022	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_OTH108_220621, 0083_OTH107_220621, 0083_OTH105_220621, 0083_OTH106_220621, 0083_OTH110_220621, 0083_OTH109_220621, 0083_OTH101_220621, 0083_OTH102_220621	**21-Jun-2022**	**----**	----	----	**27-Jun-2022**	28-Jun-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH108_220621, 0083_OTH107_220621, 0083_OTH105_220621, 0083_OTH106_220621, 0083_OTH110_220621, 0083_OTH109_220621, 0083_OTH101_220621, 0083_OTH102_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH108_220621, 0083_OTH107_220621, 0083_OTH105_220621, 0083_OTH106_220621, 0083_OTH110_220621, 0083_OTH109_220621, 0083_OTH101_220621, 0083_OTH102_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_OTH108_220621, 0083_OTH107_220621, 0083_OTH105_220621, 0083_OTH106_220621, 0083_OTH110_220621, 0083_OTH109_220621, 0083_OTH101_220621, 0083_OTH102_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH108_220621, 0083_OTH107_220621, 0083_OTH105_220621, 0083_OTH106_220621, 0083_OTH110_220621, 0083_OTH109_220621, 0083_OTH101_220621, 0083_OTH102_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-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
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_OTH108_220621, 0083_OTH107_220621, 0083_OTH105_220621, 0083_OTH106_220621, 0083_OTH110_220621, 0083_OTH109_220621, 0083_OTH101_220621, 0083_OTH102_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓

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	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	20	**5.00**	**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	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	16	**6.25**	**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	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	16	**6.25**	**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 SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. 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 BaSO4 suspension is measured by a photometer and the SO4-2 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 thiocynate forms highly-coloured ferric thiocynate 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 SO4 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.

CHAIN OF CUSTODY

COC#: **39160** *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_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_MW027		21/06/2022 08:40 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0083_MW019		21/06/2022 08:41 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
003	0083_MW213		21/06/2022 08:42 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0083_MW103		21/06/2022 08:53 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0083_MW101		21/06/2022 09:08 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0083_MW102		21/06/2022 09:16 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
007	0083_MW214		21/06/2022 09:36 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		
008	0083_QC112		21/06/2022 09:37 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
009	0083_MW017		21/06/2022 10:12 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: 39160 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_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Ground Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
010	0083_QC113		21/06/2022 10:14 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
011	0083_MW104		21/06/2022 10:41 AM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		
012	0083_MW119		21/06/2022 10:57 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
013	0083_MW129		21/06/2022 01:46 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
014	0083_MW130		21/06/2022 01:49 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
015	0083_MW134		21/06/2022 01:50 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
016	0083_MW109		21/06/2022 02:25 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

(ALS) COC#: 39160 *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_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [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	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_MW027	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	0083_MW019	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	0083_MW213	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	0083_MW103	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	0083_MW101	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	0083_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)
007	0083_MW214	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	0083_QC112	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	0083_MW017	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)

CHAIN OF CUSTODY

COC#: 39160 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

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:

010	0083_QC113	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)
011	0083_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)
012	0083_MW119	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	0083_MW129	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)
014	0083_MW130	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)
015	0083_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 & ED093F - EP231X PFAS - Full Suite (28 analytes)
016	0083_MW109	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)

CHAIN OF CUSTODY

COC#: 39160 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

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? 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	0083_MW027	Clear Plastic Bottle - Natural	500 mL	00070621089810	Green	No	
001	0083_MW027	HDPE (no PTFE)	20 mL	00350821023897	Grey	No	
001	0083_MW027	HDPE (no PTFE)	20 mL	00350821023947	Grey	No	
002	0083_MW019	HDPE (no PTFE)	20 mL	00350621067306	Grey	No	
002	0083_MW019	Clear Plastic Bottle - Natural	500 mL	00070621089736	Green	No	
002	0083_MW019	HDPE (no PTFE)	20 mL	00350621067248	Grey	No	
003	0083_MW213	Clear Plastic Bottle - Natural	500 mL	00070621089942	Green	No	
003	0083_MW213	HDPE (no PTFE)	20 mL	00350821023769	Grey	No	
003	0083_MW213	HDPE (no PTFE)	20 mL	00350821023848	Grey	No	
004	0083_MW103	HDPE (no PTFE)	20 mL	00350821023822	Grey	No	
004	0083_MW103	HDPE (no PTFE)	20 mL	00350821043212	Grey	No	
004	0083_MW103	Clear Plastic Bottle - Natural	500 mL	00070621089860	Green	No	
005	0083_MW101	Clear Plastic Bottle - Natural	500 mL	00070621089766	Green	No	
005	0083_MW101	HDPE (no PTFE)	20 mL	00350821023915	Grey	No	
005	0083_MW101	HDPE (no PTFE)	20 mL	00350821023784	Grey	No	
006	0083_MW102	HDPE (no PTFE)	20 mL	00350821023806	Grey	No	
006	0083_MW102	HDPE (no PTFE)	20 mL	00350821023796	Grey	No	
006	0083_MW102	Clear Plastic Bottle - Natural	500 mL	00070621089716	Green	No	
007	0083_MW214	Clear Plastic Bottle - Natural	500 mL	00070621089637	Green	No	
007	0083_MW214	HDPE (no PTFE)	20 mL	00350821023952	Grey	No	
007	0083_MW214	HDPE (no PTFE)	20 mL	00350019165921	Grey	No	
007	0083_MW214	HDPE (no PTFE)	20 mL	00350821023866	Grey	No	
007	0083_MW214	HDPE (no PTFE)	20 mL	00350821023889	Grey	No	
008	0083_QC112	Clear Plastic Bottle - Natural	500 mL	00070621089635	Green	No	
008	0083_QC112	HDPE (no PTFE)	20 mL	00350821023824	Grey	No	
008	0083_QC112	HDPE (no PTFE)	20 mL	00350821023755	Grey	No	

CHAIN OF CUSTODY

ALS COC#: 39160 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_0082_PFASOMP

SITE: HEHA GW - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

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:

009	0083_MW017	HDPE (no PTFE)	20 mL	00352101071483	Grey	No	
009	0083_MW017	Clear Plastic Bottle - Natural	500 mL	00070621191272	Green	No	
009	0083_MW017	HDPE (no PTFE)	20 mL	00352101071020	Grey	No	
010	0083_QC113	Clear Plastic Bottle - Natural	500 mL	00070621191253	Green	No	
010	0083_QC113	HDPE (no PTFE)	20 mL	00352101071061	Grey	No	
010	0083_QC113	HDPE (no PTFE)	20 mL	00352101071080	Grey	No	
011	0083_MW104	Clear Plastic Bottle - Natural	500 mL	00070621191235	Green	No	
011	0083_MW104	HDPE (no PTFE)	20 mL	00350019165765	Grey	No	
011	0083_MW104	HDPE (no PTFE)	20 mL	00352101071179	Grey	No	
011	0083_MW104	HDPE (no PTFE)	20 mL	00350019112660	Grey	No	
011	0083_MW104	HDPE (no PTFE)	20 mL	00352101071600	Grey	No	
012	0083_MW119	HDPE (no PTFE)	20 mL	00352101071830	Grey	No	
012	0083_MW119	Clear Plastic Bottle - Natural	500 mL	00070621191201	Green	No	
012	0083_MW119	HDPE (no PTFE)	20 mL	00352101070848	Grey	No	
013	0083_MW129	HDPE (no PTFE)	20 mL	00352101071033	Grey	No	
013	0083_MW129	HDPE (no PTFE)	20 mL	00352101071490	Grey	No	
013	0083_MW129	Clear Plastic Bottle - Natural	500 mL	00070621191182	Green	No	
014	0083_MW130	HDPE (no PTFE)	20 mL	00352101071130	Grey	No	
014	0083_MW130	Clear Plastic Bottle - Natural	500 mL	00070621191239	Green	No	
014	0083_MW130	HDPE (no PTFE)	20 mL	00352101071295	Grey	No	
015	0083_MW134	Clear Plastic Bottle - Natural	500 mL	00070621191195	Green	No	
015	0083_MW134	HDPE (no PTFE)	20 mL	00352101071889	Grey	No	
015	0083_MW134	HDPE (no PTFE)	20 mL	00352101071652	Grey	No	
016	0083_MW109	Clear Plastic Bottle - Natural	500 mL	00070621089899	Green	No	
016	0083_MW109	HDPE (no PTFE)	20 mL	00350821023980	Grey	No	
016	0083_MW109	HDPE (no PTFE)	20 mL	00350821023978	Grey	No	

Total Bottle Count: ALS: 52, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2207630**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: graeme.jablonskas@alsglobal.com
Telephone	: ----	Telephone	: +6138549 9609
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 39160	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA GW - SC		
Sampler	: [redacted]		

Dates

Date Samples Received	: 23-Jun-2022 11:30	Issue Date	: 27-Jun-2022
Client Requested Due Date	: 07-Jul-2022	Scheduled Reporting Date	: **07-Jul-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.1 - Ice present
Receipt Detail	:	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
- EP231X conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: 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)
EP2207630-001	21-Jun-2022 08:40	0083_MW027_220621	✓	✓	✓	✓
EP2207630-002	21-Jun-2022 08:41	0083_MW019_220621	✓	✓	✓	✓
EP2207630-003	21-Jun-2022 08:42	0083_MW213_220621	✓	✓	✓	✓
EP2207630-004	21-Jun-2022 08:53	0083_MW103_220621	✓	✓	✓	✓
EP2207630-005	21-Jun-2022 09:08	0083_MW101_220621	✓	✓	✓	✓
EP2207630-006	21-Jun-2022 09:16	0083_MW102_220621	✓	✓	✓	✓
EP2207630-007	21-Jun-2022 09:36	0083_MW214_220621	✓	✓	✓	✓
EP2207630-008	21-Jun-2022 09:37	0083_QC112_220621	✓	✓	✓	✓
EP2207630-009	21-Jun-2022 10:12	0083_MW017_220621	✓	✓	✓	✓
EP2207630-010	21-Jun-2022 10:14	0083_QC113_220621	✓	✓	✓	✓
EP2207630-011	21-Jun-2022 10:41	0083_MW104_220621	✓	✓	✓	✓
EP2207630-012	21-Jun-2022 10:57	0083_MW119_220621	✓	✓	✓	✓
EP2207630-013	21-Jun-2022 13:46	0083_MW129_220621	✓	✓	✓	✓
EP2207630-014	21-Jun-2022 13:49	0083_MW130_220621	✓	✓	✓	✓
EP2207630-015	21-Jun-2022 13:50	0083_MW134_220621	✓	✓	✓	✓
EP2207630-016	21-Jun-2022 14:25	0083_MW109_220621	✓	✓	✓	✓

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

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2207630**	Page	: 1 of 15
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 28-Jun-2022
C-O-C number	: 39160	Issue Date	: 08-Jul-2022 10:13
Sampler	: [redacted]		
Site	: HEHA GW - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 17		
No. of samples analysed	: 17		

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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, Western Australia
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Franco Lentini	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.

- EP231X 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.
- ED041G (Sulfate - Turbidimetric): samples EP2207630-001, -007, -008, & -010 were re-filtered and re-analyzed from parent sample to confirm results.
- ED045G (Chloride): samples EP2207630-001, -007, -008, & -010 were re-filtered and re-analyzed from parent sample to confirm results.
- Ionic Balance out of acceptable limits for sample #8 due to analytes not quantified in this report. Major cations (ED093F) and major anions (ED041G/ED045G) have been confirmed by re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_MW027_220621	0083_MW019_220621	0083_MW213_220621	0083_MW103_220621	0083_MW101_220621
				Sampling date / time	21-Jun-2022 08:40	21-Jun-2022 08:41	21-Jun-2022 08:42	21-Jun-2022 08:53	21-Jun-2022 09:08
					EP2207630-001	EP2207630-002	EP2207630-003	EP2207630-004	EP2207630-005
					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		**305**	**220**	**366**	**244**	**411**
Total Alkalinity as CaCO3	----	1	mg/L		**305**	**220**	**366**	**244**	**411**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**767**	**484**	**159**	**1020**	**145**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**4580**	**2100**	**765**	**5800**	**1480**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**234**	**142**	**151**	**243**	**63**
Magnesium	7439-95-4	1	mg/L		**327**	**194**	**95**	**470**	**140**
Sodium	7440-23-5	1	mg/L		**2400**	**1230**	**402**	**3300**	**1010**
Potassium	7440-09-7	1	mg/L		**127**	**85**	**32**	**212**	**66**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**151**	**73.7**	**32.2**	**190**	**53.0**
ø Total Cations	----	0.01	meq/L		**146**	**78.7**	**33.6**	**200**	**60.3**
ø Ionic Balance	----	0.01	%		**1.69**	**3.29**	**2.21**	**2.58**	**6.45**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	<0.02	<0.02	**0.06**	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		**0.02**	<0.02	<0.02	**0.05**	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		**0.66**	**0.09**	**0.01**	**0.36**	**0.20**
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		**0.94**	**0.02**	**0.01**	**0.05**	**0.11**
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	**0.2**	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		**0.17**	<0.02	**0.02**	**0.62**	**0.17**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		**0.18**	<0.02	**0.03**	**0.57**	**0.18**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.13**	<0.02	<0.02	**0.12**	**0.12**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW027_220621	0083_MW019_220621	0083_MW213_220621	0083_MW103_220621	0083_MW101_220621
				Sampling date / time	21-Jun-2022 08:40	21-Jun-2022 08:41	21-Jun-2022 08:42	21-Jun-2022 08:53	21-Jun-2022 09:08
Compound	CAS Number	LOR	Unit		EP2207630-001	EP2207630-002	EP2207630-003	EP2207630-004	EP2207630-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.06**	<0.01	<0.01	**0.02**	**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	0083_MW027_220621	0083_MW019_220621	0083_MW213_220621	0083_MW103_220621	0083_MW101_220621
				Sampling date / time	21-Jun-2022 08:40	21-Jun-2022 08:41	21-Jun-2022 08:42	21-Jun-2022 08:53	21-Jun-2022 09:08
Compound	CAS Number	LOR	Unit		EP2207630-001	EP2207630-002	EP2207630-003	EP2207630-004	EP2207630-005
					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		**2.16**	**0.11**	**0.07**	**2.05**	**0.82**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**1.60**	**0.11**	**0.02**	**0.41**	**0.31**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**2.14**	**0.11**	**0.07**	**2.00**	**0.82**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**97.8**	**91.4**	**95.9**	**99.5**	**92.6**
13C8-PFOA	----	0.02	%		**101**	**91.5**	**98.0**	**102**	**88.8**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)			Sample ID	0083_MW102_220621	0083_MW214_220621	0083_QC112_220621	0083_MW017_220621	0083_QC113_220621
			Sampling date / time	21-Jun-2022 09:16	21-Jun-2022 09:36	21-Jun-2022 09:37	21-Jun-2022 10:12	21-Jun-2022 10:14
Compound	CAS Number	LOR	Unit	EP2207630-006	EP2207630-007	EP2207630-008	EP2207630-009	EP2207630-010
				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	**205**	**144**	**152**	**322**	**303**
Total Alkalinity as CaCO3	----	1	mg/L	**205**	**144**	**152**	**322**	**303**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**166**	**49**	**50**	**883**	**1290**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**953**	**76**	**81**	**5000**	**6940**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**74**	**46**	**47**	**214**	**292**
Magnesium	7439-95-4	1	mg/L	**77**	**20**	**21**	**412**	**628**
Sodium	7440-23-5	1	mg/L	**491**	**64**	**66**	**2740**	**4400**
Potassium	7440-09-7	1	mg/L	**28**	**8**	**8**	**178**	**286**
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**34.4**	**6.04**	**6.36**	**166**	**229**
ø Total Cations	----	0.01	meq/L	**32.1**	**6.93**	**7.15**	**168**	**265**
ø Ionic Balance	----	0.01	%	**3.50**	**6.85**	**5.82**	**0.74**	**7.35**
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	**0.13**	**0.15**
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	<0.02	<0.02	**0.13**	**0.16**
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	**0.28**	**0.03**	**0.03**	**2.59**	**3.25**
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	<0.02	<0.02	**0.15**	**0.13**
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	**0.71**	**0.21**	**0.22**	**9.45**	**6.50**
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	**2.4**	**3.0**
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	**0.22**	<0.02	<0.02	**8.70**	**10.7**
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	**0.22**	<0.02	<0.02	**9.62**	**11.5**
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	**0.28**	<0.02	<0.02	**4.68**	**5.27**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW102_220621	0083_MW214_220621	0083_QC112_220621	0083_MW017_220621	0083_QC113_220621
				Sampling date / time	21-Jun-2022 09:16	21-Jun-2022 09:36	21-Jun-2022 09:37	21-Jun-2022 10:12	21-Jun-2022 10:14
Compound	CAS Number	LOR	Unit		EP2207630-006	EP2207630-007	EP2207630-008	EP2207630-009	EP2207630-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.36**	<0.01	<0.01	**0.90**	**1.08**
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**0.31**	<0.02	<0.02	**0.07**	**0.06**
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	**3.11**	**2.84**
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	**0.55**	**0.36**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW102_220621	0083_MW214_220621	0083_QC112_220621	0083_MW017_220621	0083_QC113_220621
				Sampling date / time	21-Jun-2022 09:16	21-Jun-2022 09:36	21-Jun-2022 09:37	21-Jun-2022 10:12	21-Jun-2022 10:14
Compound	CAS Number	LOR	Unit		EP2207630-006	EP2207630-007	EP2207630-008	EP2207630-009	EP2207630-010
					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		**2.38**	**0.24**	**0.25**	**42.5**	**45.0**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.99**	**0.24**	**0.25**	**12.0**	**9.75**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**2.07**	**0.24**	**0.25**	**42.1**	**44.6**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**101**	**92.3**	**103**	**100**	**106**
13C8-PFOA	----	0.02	%		**99.0**	**96.3**	**104**	**100**	**107**

Analytical Results

Sub-Matrix: **GROUNDWATER** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	0083_MW104_220621	0083_MW119_220621	0083_MW129_220621	0083_MW130_220621	0083_MW134_220621
				Sampling date / time	21-Jun-2022 10:41	21-Jun-2022 10:57	21-Jun-2022 13:46	21-Jun-2022 13:49	21-Jun-2022 13:50
					EP2207630-011	EP2207630-012	EP2207630-013	EP2207630-014	EP2207630-015
					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		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**208**	**279**	**281**	**77**	**188**
Total Alkalinity as CaCO3	----	1	mg/L		**208**	**279**	**281**	**77**	**188**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**336**	**733**	**2620**	**2510**	**2270**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**1220**	**5950**	**18500**	**17100**	**16800**
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**166**	**192**	**547**	**490**	**459**
Magnesium	7439-95-4	1	mg/L		**158**	**485**	**1520**	**1470**	**1040**
Sodium	7440-23-5	1	mg/L		**726**	**3440**	**11000**	**10400**	**8100**
Potassium	7440-09-7	1	mg/L		**44**	**228**	**618**	**620**	**486**
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**45.6**	**189**	**582**	**536**	**525**
ø Total Cations	----	0.01	meq/L		**54.0**	**205**	**647**	**614**	**473**
ø Ionic Balance	----	0.01	%		**8.46**	**4.14**	**5.26**	**6.74**	**5.18**
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<0.02	**0.79**	<0.02	<0.02	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L		<0.02	**1.10**	<0.02	<0.02	<0.02
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		<0.01	**8.39**	<0.01	<0.01	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	**0.09**	<0.02	<0.02	<0.02
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		<0.01	**0.17**	<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	**0.4**	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		<0.02	**1.12**	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		<0.02	**3.42**	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		<0.02	**0.23**	<0.02	<0.02	<0.02

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW104_220621	0083_MW119_220621	0083_MW129_220621	0083_MW130_220621	0083_MW134_220621
				Sampling date / time	21-Jun-2022 10:41	21-Jun-2022 10:57	21-Jun-2022 13:46	21-Jun-2022 13:49	21-Jun-2022 13:50
Compound	CAS Number	LOR	Unit		EP2207630-011	EP2207630-012	EP2207630-013	EP2207630-014	EP2207630-015
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		<0.01	**0.15**	<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	0083_MW104_220621	0083_MW119_220621	0083_MW129_220621	0083_MW130_220621	0083_MW134_220621
				Sampling date / time	21-Jun-2022 10:41	21-Jun-2022 10:57	21-Jun-2022 13:46	21-Jun-2022 13:49	21-Jun-2022 13:50
Compound	CAS Number	LOR	Unit		EP2207630-011	EP2207630-012	EP2207630-013	EP2207630-014	EP2207630-015
					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		<0.01	**15.9**	<0.01	<0.01	<0.01
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	**8.56**	<0.01	<0.01	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	**14.7**	<0.01	<0.01	<0.01
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**101**	**106**	**103**	**95.8**	**98.0**
13C8-PFOA	----	0.02	%		**102**	**97.2**	**104**	**95.1**	**104**

Analytical Results

Sub-Matrix: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW109_220621	0083_MW110	----	----	----
				Sampling date / time	21-Jun-2022 14:25	[21-Jun-2022]	----	----	----
Compound	CAS Number	LOR	Unit		EP2207630-016	EP2207630-017	--------	--------	--------
					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		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		167	180	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		167	180	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2280	1870	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		17200	16400	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		444	377	----	----	----
Magnesium	7439-95-4	1	mg/L		1300	1080	----	----	----
Sodium	7440-23-5	1	mg/L		9440	7740	----	----	----
Potassium	7440-09-7	1	mg/L		560	464	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		536	505	----	----	----
ø Total Cations	----	0.01	meq/L		554	456	----	----	----
ø Ionic Balance	----	0.01	%		1.66	5.09	----	----	----
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: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW109_220621	0083_MW110	----	----	----
				Sampling date / time	21-Jun-2022 14:25	[21-Jun-2022]	----	----	----
Compound	CAS Number	LOR	Unit		EP2207630-016	EP2207630-017	--------	--------	--------
					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: GROUNDWATER (Matrix: WATER)				Sample ID	0083_MW109_220621	0083_MW110	----	----	----
				Sampling date / time	21-Jun-2022 14:25	[21-Jun-2022]	----	----	----
Compound	CAS Number	LOR	Unit		EP2207630-016	EP2207630-017	--------	--------	--------
					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	%		**102**	**91.1**	----	----	----
13C8-PFOA	----	0.02	%		**104**	**102**	----	----	----

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) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231C: Perfluoroalkyl Sulfonamides

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

(WATER) EP231P: PFAS Sums

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231S: PFAS Surrogate

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2207630**	Page	: 1 of 12
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 28-Jun-2022
C-O-C number	: 39160	Issue Date	: 08-Jul-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA GW - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 17		
No. of samples analysed	: 17		

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 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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, Western Australia
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Franco Lentini	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**

				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: 4442810)									
EP2207627-008	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	114	110	3.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	114	110	3.4	0% - 20%
EP2207630-008	0083_QC112_220621	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	152	150	1.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	152	150	1.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4424468)									
EP2207630-001	0083_MW027_220621	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	767	781	1.9	0% - 20%
EP2207630-011	0083_MW104_220621	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	336	328	2.5	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4424467)									
EP2207630-001	0083_MW027_220621	ED045G: Chloride	16887-00-6	1	mg/L	4580	4860	5.8	0% - 20%
EP2207630-011	0083_MW104_220621	ED045G: Chloride	16887-00-6	1	mg/L	1220	1230	1.1	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4424356)									
EP2207630-001	0083_MW027_220621	ED093F: Calcium	7440-70-2	1	mg/L	234	234	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	327	325	0.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2400	2390	0.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	127	126	0.0	0% - 20%
EP2207630-011	0083_MW104_220621	ED093F: Calcium	7440-70-2	1	mg/L	166	163	2.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	158	155	2.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	726	708	2.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	44	42	3.0	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: 4436371)									
EP2207624-011	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: 4437792)									
EP2207630-007	0083_MW214_220621	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.21	0.18	14.2	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
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4443465)									
EP2208159-001	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.10	0.11	0.0	0% - 50%
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.07	0.07	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: 4436371)									
EP2207624-011	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
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4437792)									
EP2207630-007	0083_MW214_220621	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: 4437792) - continued									
EP2207630-007	0083_MW214_220621	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: 4443465)									
EP2208159-001	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4436371)									
EP2207624-011	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4437792)									
EP2207630-007	0083_MW214_220621	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: 4437792) - continued									
EP2207630-007	0083_MW214_220621	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: 4443465)									
EP2208159-001	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: 4436371)									
EP2207624-011	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 4437792)									
EP2207630-007	0083_MW214_220621	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: 4443465)									
EP2208159-001	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

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: 4443465) - continued									
EP2208159-001	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
EP231P: PFAS Sums (QC Lot: 4436371)									
EP2207624-011	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	<0.01	<0.01	0.0	No Limit
EP231P: PFAS Sums (QC Lot: 4437792)									
EP2207630-007	0083_MW214_220621	EP231X: Sum of PFAS	----	0.01	µg/L	0.24	0.21	13.3	0% - 20%
EP231P: PFAS Sums (QC Lot: 4443465)									
EP2208159-001	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.20	0.21	4.9	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4442810)								
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	105	87.8	118
				<1	200 mg/L	97.8	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4424468)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	89.9	112
				<1	500 mg/L	105	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4424467)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	103	88.6	113
				<1	1000 mg/L	98.5	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4424356)								
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	101	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	107	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.1	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4436371)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	113	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	129	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	134	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	119	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	132	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4437792)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	92.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	85.4	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4443465)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	92.0	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	99.4	71.0	127

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4443465) - continued								
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	96.8	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	90.2	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	96.6	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	102	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4436371)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	110	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	119	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	126	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	133	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	115	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	117	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	118	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	136	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	119	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4437792)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	86.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	104	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	108	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	99.8	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	106	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	105	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	96.6	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4443465)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	96.8	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	95.2	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	103	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	100	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	108	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	107	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4443465) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	98.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	94.1	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4436371)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	134	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	128	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	113	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	117	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	121	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	133	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	131	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4437792)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	93.6	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	87.8	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	96.1	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	98.8	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	106	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	96.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4443465)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	111	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	97.5	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	88.9	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	122	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	87.6	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	110	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	106	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436371)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436371) - continued								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	126	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	109	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	134	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	138	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4437792)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	72.4	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	120	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	107	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	89.0	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4443465)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	102	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	102	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	102	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	91.4	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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4424468)							
EP2207630-001	0083_MW027_220621	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4424467)							
EP2207630-001	0083_MW027_220621	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4436371)							
EP2207627-007	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	126	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	124	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	123	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	114	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	127	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	136	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4437792)							
EP2207630-011	0083_MW104_220621	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	101	72.0	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
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4437792) - continued							
EP2207630-011	0083_MW104_220621	EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	88.8	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	92.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	100	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	96.2	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	94.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4436371)							
EP2207627-007	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	114	73.0	129
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.25 µg/L	126	72.0	129
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.25 µg/L	127	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	130	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	130	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	112	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	113	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	129	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	116	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	117	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	124	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4437792)							
EP2207630-011	0083_MW104_220621	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	88.2	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	105	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	107	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	96.0	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	98.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	100	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	108	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	109	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	97.6	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	90.9	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4436371)							
EP2207627-007	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	129	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	121	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	126	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	132	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	126	57.6	145

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: 4436371) - continued							
EP2207627-007	Anonymous	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	136	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	125	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4437792)							
EP2207630-011	0083_MW104_220621	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	88.8	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	69.2	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	91.0	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	93.0	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	106	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	83.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436371)							
EP2207627-007	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	118	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	118	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	130	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	139	71.4	144
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4437792)							
EP2207630-011	0083_MW104_220621	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	70.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	98.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	110	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	87.0	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2207630**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Site	: HEHA GW - SC	Issue Date	: 08-Jul-2022
Sampler	: [redacted]	No. of samples received	: 17
Order number	: pfas-omp HEHA	No. of samples analysed	: 17

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	EP2207630--001	0083_MW027_220621	**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	EP2207630--001	0083_MW027_220621	**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 / Container / Client Sample ID(s)		Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural							
0083_MW027_220621,	0083_MW019_220621,	----	----	----	06-Jul-2022	05-Jul-2022	**1**
0083_MW213_220621,	0083_MW103_220621,						
0083_MW101_220621,	0083_MW102_220621,						
0083_MW214_220621,	0083_QC112_220621,						
0083_MW017_220621,	0083_QC113_220621,						
0083_MW104_220621,	0083_MW119_220621,						
0083_MW129_220621,	0083_MW130_220621,						
0083_MW134_220621,	0083_MW109_220621,						
0083_MW110							

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count: QC	Count: Regular	Rate (%): Actual	Rate (%): Expected	Quality Control Specification
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	3	49	6.12	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	49	4.08	5.00	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 / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0083_MW027_220621, 0083_MW019_220621, 0083_MW213_220621, 0083_MW103_220621, 0083_MW101_220621, 0083_MW102_220621, 0083_MW214_220621, 0083_QC112_220621, 0083_MW017_220621, 0083_QC113_220621, 0083_MW104_220621, 0083_MW119_220621, 0083_MW129_220621, 0083_MW130_220621, 0083_MW134_220621, 0083_MW109_220621, 0083_MW110	**21-Jun-2022**	**----**	----	----	**06-Jul-2022**	05-Jul-2022	×
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0083_MW027_220621, 0083_MW019_220621, 0083_MW213_220621, 0083_MW103_220621, 0083_MW101_220621, 0083_MW102_220621, 0083_MW214_220621, 0083_QC112_220621, 0083_MW017_220621, 0083_QC113_220621, 0083_MW104_220621, 0083_MW119_220621, 0083_MW129_220621, 0083_MW130_220621, 0083_MW134_220621, 0083_MW109_220621, 0083_MW110	**21-Jun-2022**	**----**	----	----	**04-Jul-2022**	19-Jul-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_MW027_220621, 0083_MW019_220621, 0083_MW213_220621, 0083_MW103_220621, 0083_MW101_220621, 0083_MW102_220621, 0083_MW214_220621, 0083_QC112_220621, 0083_MW017_220621, 0083_QC113_220621, 0083_MW104_220621, 0083_MW119_220621, 0083_MW129_220621, 0083_MW130_220621, 0083_MW134_220621, 0083_MW109_220621, 0083_MW110	**21-Jun-2022**	**----**	----	----	**04-Jul-2022**	19-Jul-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
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_MW027_220621, 0083_MW019_220621, 0083_MW213_220621, 0083_MW103_220621, 0083_MW101_220621, 0083_MW102_220621, 0083_MW214_220621, 0083_QC112_220621, 0083_MW017_220621, 0083_QC113_220621, 0083_MW104_220621, 0083_MW119_220621, 0083_MW129_220621, 0083_MW130_220621, 0083_MW134_220621, 0083_MW109_220621, 0083_MW110	**21-Jun-2022**	**----**	----	----	**28-Jun-2022**	28-Jun-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW027_220621, 0083_MW019_220621, 0083_MW213_220621, 0083_MW103_220621, 0083_MW101_220621, 0083_MW102_220621, 0083_MW214_220621, 0083_QC112_220621, 0083_MW017_220621, 0083_QC113_220621, 0083_MW104_220621, 0083_MW119_220621, 0083_MW129_220621, 0083_MW130_220621, 0083_MW134_220621, 0083_MW109_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
HDPE (no PTFE) (EP231X)							
0083_MW110	**21-Jun-2022**	**07-Jul-2022**	18-Dec-2022	✓	**07-Jul-2022**	18-Dec-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW027_220621, 0083_MW019_220621, 0083_MW213_220621, 0083_MW103_220621, 0083_MW101_220621, 0083_MW102_220621, 0083_MW214_220621, 0083_QC112_220621, 0083_MW017_220621, 0083_QC113_220621, 0083_MW104_220621, 0083_MW119_220621, 0083_MW129_220621, 0083_MW130_220621, 0083_MW134_220621, 0083_MW109_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
HDPE (no PTFE) (EP231X)							
0083_MW110	**21-Jun-2022**	**07-Jul-2022**	18-Dec-2022	✓	**07-Jul-2022**	18-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
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_MW027_220621, 0083_MW019_220621, 0083_MW213_220621, 0083_MW103_220621, 0083_MW101_220621, 0083_MW102_220621, 0083_MW214_220621, 0083_QC112_220621, 0083_MW017_220621, 0083_QC113_220621, 0083_MW104_220621, 0083_MW119_220621, 0083_MW129_220621, 0083_MW130_220621, 0083_MW134_220621, 0083_MW109_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
HDPE (no PTFE) (EP231X)							
0083_MW110	**21-Jun-2022**	**07-Jul-2022**	18-Dec-2022	✓	**07-Jul-2022**	18-Dec-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_MW027_220621, 0083_MW019_220621, 0083_MW213_220621, 0083_MW103_220621, 0083_MW101_220621, 0083_MW102_220621, 0083_MW214_220621, 0083_QC112_220621, 0083_MW017_220621, 0083_QC113_220621, 0083_MW104_220621, 0083_MW119_220621, 0083_MW129_220621, 0083_MW130_220621, 0083_MW134_220621, 0083_MW109_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
HDPE (no PTFE) (EP231X)							
0083_MW110	**21-Jun-2022**	**07-Jul-2022**	18-Dec-2022	✓	**07-Jul-2022**	18-Dec-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_MW027_220621, 0083_MW019_220621, 0083_MW213_220621, 0083_MW103_220621, 0083_MW101_220621, 0083_MW102_220621, 0083_MW214_220621, 0083_QC112_220621, 0083_MW017_220621, 0083_QC113_220621, 0083_MW104_220621, 0083_MW119_220621, 0083_MW129_220621, 0083_MW130_220621, 0083_MW134_220621, 0083_MW109_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
HDPE (no PTFE) (EP231X)							
0083_MW110	**21-Jun-2022**	**07-Jul-2022**	18-Dec-2022	✓	**07-Jul-2022**	18-Dec-2022	✓

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	3	49	**6.12**	**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	49	**6.12**	**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	49	**6.12**	**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	49	**4.08**	**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 SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. 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 BaSO4 suspension is measured by a photometer and the SO4-2 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 thiocynate forms highly-coloured ferric thiocynate 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 SO4 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.

CHAIN OF CUSTODY

COC#: **39162** *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_0082_PFASOMP

SITE: HEHA SW/OTH - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

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:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SW113		21/06/2022 08:43 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0083_QC109		21/06/2022 08:43 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
003	0083_OTH113		21/06/2022 01:53 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0083_SW120		21/06/2022 01:54 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

(ALS) COC#: 39162 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

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? 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	0083_SW113	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	0083_QC109	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	0083_OTH113	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	0083_SW120	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#: **39162** *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

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? 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	0083_SW113	Clear Plastic Bottle - Natural	500 mL	00070621089823	Green	No	
001	0083_SW113	HDPE (no PTFE)	20 mL	00350821023981	Grey	No	
001	0083_SW113	HDPE (no PTFE)	20 mL	00350821023851	Grey	No	
002	0083_QC109	HDPE (no PTFE)	20 mL	00350821043218	Grey	No	
002	0083_QC109	Clear Plastic Bottle - Natural	500 mL	00070621089672	Green	No	
002	0083_QC109	HDPE (no PTFE)	20 mL	00350821023782	Grey	No	
003	0083_OTH113	Clear Plastic Bottle - Natural	500 mL	00070621191126	Green	No	
003	0083_OTH113	HDPE (no PTFE)	20 mL	00352101071866	Grey	No	
003	0083_OTH113	HDPE (no PTFE)	20 mL	00352101071053	Grey	No	
004	0083_SW120	Clear Plastic Bottle - Natural	500 mL	00070621191254	Green	No	
004	0083_SW120	HDPE (no PTFE)	20 mL	00352101071743	Grey	No	
004	0083_SW120	HDPE (no PTFE)	20 mL	00352101071474	Grey	No	

Total Bottle Count: ALS: 12, Non ALS: 0

ALS Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2207632**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: graeme.jablonskas@alsglobal.com
Telephone	: ----	Telephone	: +6138549 9609
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 39162	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SW/OTH - SC		
Sampler	: [redacted]		

Dates

Date Samples Received	: 23-Jun-2022 11:30	Issue Date	: 27-Jun-2022
Client Requested Due Date	: 07-Jul-2022	Scheduled Reporting Date	: **07-Jul-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.1 - Ice Bricks present
Receipt Detail	:	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 discrepencies: 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)
EP2207632-001	21-Jun-2022 08:43	0083_SW113_220621	✓	✓	✓	✓
EP2207632-002	21-Jun-2022 08:43	0083_QC109_220621	✓	✓	✓	✓
EP2207632-003	21-Jun-2022 13:53	0083_OTH113_220621	✓	✓	✓	✓
EP2207632-004	21-Jun-2022 13:54	0083_SW120_220621	✓	✓	✓	✓

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

[redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]stantec.com
- Chain of Custody (CoC) (COC) Email [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) Email [redacted]stantec.com
- EDI Format - XTab (XTAB) Email [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2207632**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 28-Jun-2022
C-O-C number	: 39162	Issue Date	: 07-Jul-2022 15:16
Sampler	: [redacted]		
Site	: HEHA SW/OTH - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 4		
No. of samples analysed	: 4		

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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Franco Lentini	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.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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	0083_SW113_220621	0083_QC109_220621	0083_OTH113_220621	0083_SW120_220621	----
				Sampling date / time	21-Jun-2022 08:43	21-Jun-2022 08:43	21-Jun-2022 13:53	21-Jun-2022 13:54	----
Compound	CAS Number	LOR	Unit		EP2207632-001	EP2207632-002	EP2207632-003	EP2207632-004	--------
					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		40	40	116	99	----
Total Alkalinity as CaCO3	----	1	mg/L		40	40	116	99	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		29	28	2720	2120	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		44	43	17900	7680	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		25	25	455	764	----
Magnesium	7439-95-4	1	mg/L		3	3	1520	599	----
Sodium	7440-23-5	1	mg/L		31	31	11000	4080	----
Potassium	7440-09-7	1	mg/L		2	2	593	220	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		2.64	2.60	564	263	----
ø Total Cations	----	0.01	meq/L		2.89	2.89	641	270	----
ø Ionic Balance	----	0.01	%		4.51	5.44	6.43	1.45	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L		<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	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L		0.05	0.04	<0.01	<0.01	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L		<0.02	<0.02	<0.02	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L		0.12	0.10	<0.01	<0.01	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L		<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	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L		0.37	0.35	<0.02	<0.02	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L		0.19	0.20	<0.02	<0.02	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW113_220621	0083_QC109_220621	0083_OTH113_220621	0083_SW120_220621	----
				Sampling date / time	21-Jun-2022 08:43	21-Jun-2022 08:43	21-Jun-2022 13:53	21-Jun-2022 13:54	----
Compound	CAS Number	LOR	Unit		EP2207632-001	EP2207632-002	EP2207632-003	EP2207632-004	--------
					Result	Result	Result	Result	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L		**0.13**	**0.13**	<0.02	<0.02	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L		**0.04**	**0.04**	<0.01	<0.01	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L		**0.03**	**0.02**	<0.02	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L		<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	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L		<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	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L		<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	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L		<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	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		<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	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		<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	----
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	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		**0.54**	**0.53**	<0.05	<0.05	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		**0.09**	**0.09**	<0.05	<0.05	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW113_220621	0083_QC109_220621	0083_OTH113_220621	0083_SW120_220621	----
				Sampling date / time	21-Jun-2022 08:43	21-Jun-2022 08:43	21-Jun-2022 13:53	21-Jun-2022 13:54	----
Compound	CAS Number	LOR	Unit		EP2207632-001	EP2207632-002	EP2207632-003	EP2207632-004	--------
					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	**----**
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		**1.56**	**1.50**	<0.01	<0.01	**----**
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		**0.17**	**0.14**	<0.01	<0.01	**----**
Sum of PFAS (WA DER List)	----	0.01	µg/L		**1.53**	**1.48**	<0.01	<0.01	**----**
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		**99.7**	**101**	**104**	**98.2**	**----**
13C8-PFOA	----	0.02	%		**99.1**	**98.3**	**101**	**104**	**----**

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2207632**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 28-Jun-2022
C-O-C number	: 39162	Issue Date	: 07-Jul-2022
Sampler	: [redacted]		
Site	: HEHA SW/OTH - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 4		
No. of samples analysed	: 4		

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 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*
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Franco Lentini	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**

				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: 4442811)									
EP2207632-002	0083_QC109_220621	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	40	41	2.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	40	41	2.6	0% - 20%
EP2207810-003	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	180	174	3.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	180	174	3.4	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4424461)									
EP2207626-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	527	529	0.4	0% - 20%
EP2207627-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2720	2720	0.4	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4424460)									
EP2207626-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2580	2560	1.1	0% - 20%
EP2207627-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	19000	19500	2.9	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4424356)									
EP2207630-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	234	234	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	327	325	0.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	2400	2390	0.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	127	126	0.0	0% - 20%
EP2207630-011	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	166	163	2.2	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	158	155	2.3	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	726	708	2.5	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	44	42	3.0	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 (%)*
ED093F: Dissolved Major Cations (QC Lot: 4424357)									
EP2207906-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	504	476	5.8	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	162	154	5.7	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	217	205	5.8	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	50	47	6.6	0% - 20%
EP2207811-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	14	14	0.0	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.0	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	32	31	0.0	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.0	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4437792)									
EP2207630-007	Anonymous	EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.03	0.03	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	0.21	0.18	14.2	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
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 4437792)									
EP2207630-007	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 (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: 4437792)									
EP2207630-007	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

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: 4437792) - continued									
EP2207630-007	Anonymous	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: 4437792)									
EP2207630-007	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: 4437792)									
EP2207630-007	Anonymous	EP231X: Sum of PFAS	----	0.01	µg/L	0.24	0.21	13.3	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4442811)								
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	103	87.8	118
				<1	200 mg/L	96.8	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4424461)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	103	89.9	112
				<1	500 mg/L	94.8	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4424460)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.6	88.6	113
				<1	1000 mg/L	95.9	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4424356)								
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	101	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	107	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.1	84.6	108
ED093F: Dissolved Major Cations (QCLot: 4424357)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	104	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	113	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4437792)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	104	72.0	130
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	<0.02	0.25 µg/L	102	71.0	127
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	0.25 µg/L	92.0	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	94.8	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	85.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4437792)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	1.25 µg/L	86.0	73.0	129
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	0.25 µg/L	104	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	108	72.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4437792) - continued								
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	99.8	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	106	69.0	133
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	<0.02	0.25 µg/L	113	72.0	134
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	105	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	96.6	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4437792)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	109	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	<0.05	0.625 µg/L	93.6	68.0	141
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	<0.05	0.625 µg/L	87.8	62.6	147
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	<0.05	0.625 µg/L	96.1	66.0	145
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	<0.05	0.625 µg/L	98.8	57.6	145
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	<0.02	0.25 µg/L	106	65.0	136
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	<0.02	0.25 µg/L	96.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4437792)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	72.4	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	120	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	107	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	89.0	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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4424461)							
EP2207626-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4424460)							
EP2207626-001	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	83.4	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4437792)							

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: 4437792) - continued							
EP2207630-011	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.25 µg/L	101	72.0	130
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.25 µg/L	88.8	71.0	127
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.25 µg/L	92.6	68.0	131
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.25 µg/L	100	69.0	134
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.25 µg/L	96.2	65.0	140
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.25 µg/L	94.6	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4437792)							
EP2207630-011	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	1.25 µg/L	88.2	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	105	72.0	129
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.25 µg/L	107	72.0	130
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.25 µg/L	96.0	71.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.25 µg/L	98.2	69.0	130
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.25 µg/L	100	71.0	129
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.25 µg/L	108	69.0	133
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.25 µg/L	109	72.0	134
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.25 µg/L	97.6	65.0	144
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.625 µg/L	90.9	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4437792)							
EP2207630-011	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.25 µg/L	103	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.625 µg/L	88.8	68.0	141
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.625 µg/L	69.2	62.6	147
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.625 µg/L	91.0	66.0	145
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.625 µg/L	93.0	57.6	145
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.25 µg/L	106	65.0	136
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.25 µg/L	83.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4437792)							
EP2207630-011	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.25 µg/L	70.4	63.0	143
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.25 µg/L	98.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.25 µg/L	110	67.0	138
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.25 µg/L	87.0	71.4	144

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2207632**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Site	: HEHA SW/OTH - SC	Issue Date	: 07-Jul-2022
Sampler	: [redacted]	No. of samples received	: 4
Order number	: pfas-omp HEHA	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

- **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	EP2207626--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.**

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural							
0083_SW113_220621,	0083_QC109_220621,	----	----	----	06-Jul-2022	05-Jul-2022	**1**
0083_OTH113_220621,	0083_SW120_220621						

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	1	17	5.88	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 / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
0083_SW113_220621,	0083_QC109_220621,	**21-Jun-2022**	**----**	----	----	**06-Jul-2022**	05-Jul-2022	×
0083_OTH113_220621,	0083_SW120_220621							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
0083_SW113_220621,	0083_QC109_220621,	**21-Jun-2022**	**----**	----	----	**05-Jul-2022**	19-Jul-2022	✓
0083_OTH113_220621,	0083_SW120_220621							

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)							
0083_SW113_220621, 0083_QC109_220621, 0083_OTH113_220621, 0083_SW120_220621	**21-Jun-2022**	**----**	----	----	**05-Jul-2022**	19-Jul-2022	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_SW113_220621, 0083_QC109_220621, 0083_OTH113_220621, 0083_SW120_220621	**21-Jun-2022**	**----**	----	----	**28-Jun-2022**	28-Jun-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_SW113_220621, 0083_QC109_220621, 0083_OTH113_220621, 0083_SW120_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_SW113_220621, 0083_QC109_220621, 0083_OTH113_220621, 0083_SW120_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_SW113_220621, 0083_QC109_220621, 0083_OTH113_220621, 0083_SW120_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_SW113_220621, 0083_QC109_220621, 0083_OTH113_220621, 0083_SW120_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_SW113_220621, 0083_QC109_220621, 0083_OTH113_220621, 0083_SW120_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓

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	35	**11.43**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**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	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**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	35	**5.71**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	17	**5.88**	**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	17	**5.88**	**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 SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. 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 BaSO4 suspension is measured by a photometer and the SO4-2 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 thiocynate forms highly-coloured ferric thiocynate 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 SO4 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.

CHAIN OF CUSTODY

(ALS) COC#: **39163** *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_0082_PFASOMP

SITE: HEHA SD - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [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	PFAS Sediments SEDIMENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SD113		21/06/2022 08:44 AM	Soil	ALS: 1 Non ALS: 0	No	X		
002	0083_QC110		21/06/2022 08:44 AM	Soil	ALS: 1 Non ALS: 0	No	X		
003	0083_SD120		21/06/2022 01:51 PM	Soil	ALS: 1 Non ALS: 0	No	X		

CHAIN OF CUSTODY

(ALS) COC#: **39163** *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_0082_PFASOMP

SITE: HEHA SD - SC

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_SD113	HDPE Soil Jar	200 mL	00621019097711	Grey	No	
002	0083_QC110	HDPE Soil Jar	200 mL	00621019097763	Grey	No	
003	0083_SD120	HDPE Soil Jar	200 mL	00620719069338	Grey	No	

Total Bottle Count: ALS: 3, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2207633**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: graeme.jablonskas@alsglobal.com
Telephone	: ----	Telephone	: +6138549 9609
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 39163	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SD - SC		
Sampler	: [redacted]		

Dates

Date Samples Received	: 23-Jun-2022 11:30	Issue Date	: 27-Jun-2022
Client Requested Due Date	: 07-Jul-2022	Scheduled Reporting Date	: **07-Jul-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.1 - Ice Bricks present
Receipt Detail	:	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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: 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)
EP2207633-001	21-Jun-2022 08:44	0083_SD113_220621	✓	✓
EP2207633-002	21-Jun-2022 08:44	0083_QC110_220621	✓	✓
EP2207633-003	21-Jun-2022 13:51	0083_SD120_220621	✓	✓

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

[redacted]
- EDI Format - ESDAT (ESDAT) Email [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) Email [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email [redacted]stantec.com
- Chain of Custody (CoC) (COC) Email [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) Email [redacted]stantec.com
- EDI Format - XTab (XTAB) Email [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2207633**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 04-Jul-2022
C-O-C number	: 39163	Issue Date	: 07-Jul-2022 09:18
Sampler	: [redacted]		
Site	: HEHA SD - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 3		
No. of samples analysed	: 3		

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*
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	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	0083_SD113_220621	0083_QC110_220621	0083_SD120_220621	----	----
			Sampling date / time	21-Jun-2022 08:44	21-Jun-2022 08:44	21-Jun-2022 13:51	----	----
Compound	CAS Number	LOR	Unit	EP2207633-001	EP2207633-002	EP2207633-003	--------	--------
				Result	Result	Result	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**12.8**	**6.4**	**22.1**	----	----
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	**0.0011**	**0.0005**	<0.0002	----	----
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	0083_SD113_220621	0083_QC110_220621	0083_SD120_220621	----	----
				Sampling date / time	21-Jun-2022 08:44	21-Jun-2022 08:44	21-Jun-2022 13:51	----	----
Compound	CAS Number	LOR	Unit		EP2207633-001	EP2207633-002	EP2207633-003	--------	--------
					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		**0.0014**	**0.0006**	<0.0005	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		**0.0015**	**0.0006**	<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		**0.0040**	**0.0017**	<0.0002	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		**0.0011**	**0.0005**	<0.0002	----	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		**0.0040**	**0.0017**	<0.0002	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**104**	**109**	**96.5**	----	----
13C8-PFOA	----	0.0002	%		**99.5**	**100**	**103**	----	----

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)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2207633**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 04-Jul-2022
C-O-C number	: 39163	Issue Date	: 07-Jul-2022
Sampler	: [redacted]		
Site	: HEHA SD - SC		
Quote number	: SY/139/19 B		
No. of samples received	: 3		
No. of samples analysed	: 3		

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 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*
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	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: 4438554)									
EP2207561-003	Anonymous	EA055: Moisture Content	----	0.1	%	4.4	4.5	0.0	0% - 20%
EP2207633-001	0083_SD113_220621	EA055: Moisture Content	----	0.1	%	12.8	13.6	6.1	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4436085)									
EP2207561-001	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	0.0003	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2207567-006	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: 4436085)									
EP2207561-001	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: 4436085) - continued									
EP2207561-001	Anonymous	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
EP2207567-006	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 (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: 4436085)									
EP2207561-001	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
EP2207567-006	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

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: 4436085)									
EP2207561-001	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
EP2207567-006	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4436085)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.4	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.0	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4436085)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	83.0	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	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	108	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	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	96.8	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	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	102	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	95.5	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4436085)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	102	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	92.8	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.5	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.6	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436085)								
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	92.8	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	102	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436085) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	100	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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4436085)							
EP2207561-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	103	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	92.8	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	100	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	94.4	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	86.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	94.8	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4436085)							
EP2207561-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	89.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	110	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	110	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	124	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	112	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	105	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	113	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	98.4	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	100	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	104	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4436085)							
EP2207561-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	104	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	100	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	86.2	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	96.5	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	91.2	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: 4436085) - continued							
EP2207561-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	88.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436085)							
EP2207561-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	86.0	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	111	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	104	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	114	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2207633**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Site	: HEHA SD - SC	Issue Date	: 07-Jul-2022
Sampler	: [redacted]	No. of samples received	: 3
Order number	: pfas-omp HEHA	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.**
- **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 / Container / Client Sample ID(s)		Sample Date	Extraction / Preparation			Analysis		
			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055)								
0083_SD113_220621, 0083_SD120_220621	0083_QC110_220621,	**21-Jun-2022**	**----**	----	----	**04-Jul-2022**	05-Jul-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
0083_SD113_220621, 0083_SD120_220621	0083_QC110_220621,	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	13-Aug-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)								
0083_SD113_220621, 0083_SD120_220621	0083_QC110_220621,	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	13-Aug-2022	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X)								
0083_SD113_220621, 0083_SD120_220621	0083_QC110_220621,	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	13-Aug-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE Soil Jar (EP231X)								
0083_SD113_220621, 0083_SD120_220621	0083_QC110_220621,	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	13-Aug-2022	✓
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X)								
0083_SD113_220621, 0083_SD120_220621	0083_QC110_220621,	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	13-Aug-2022	✓

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.

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#: 39173 *ALS Laboratory:* EP Perth

CLIENT: MWHAUS - STANTEC AUSTRALIA PTY LTD

PROJECT: WA_0082_PFASOMP

SITE: HEHA SW/OTH - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

EMAIL REPORTS TO: [redacted]

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: [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:

SAMPLE DETAILS							ANALYSIS REQUIRED		
SAMPLE	NAME	DESCRIPTION	DATE / TIME	MATRIX	TOTAL BOTTLES	ON HOLD	Surface Waters WATER	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_OTH103		21/06/2022 10:42 AM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
002	0083_OTH104		21/06/2022 03:22 PM	Water	ALS: 5 Non ALS: 0	No	Partial 4/8		extra pfas bottles for lab QC
003	0083_SW127		21/06/2022 12:13 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
004	0083_SW112		21/06/2022 12:29 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
005	0083_SW128		21/06/2022 12:36 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		
006	0083_SW126		21/06/2022 01:03 PM	Water	ALS: 3 Non ALS: 0	No	Partial 4/8		

CHAIN OF CUSTODY

ALS COC#: 39173 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_0082_PFASOMP

SITE: HEHA SW/OTH - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

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:

SAMPLE	SAMPLE NAME	PARTIAL ANALYSIS GROUP NAME	MATRIX	SELECTED ANALYSIS NAME
001	0083_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 analytes)
002	0083_OTH104	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	0083_SW127	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	0083_SW112	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	0083_SW128	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	0083_SW126	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#: 39173 *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_0082_PFASOMP

SITE: HEHA SW/OTH - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER:

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO:

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info: [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:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_OTH103	Clear Plastic Bottle - Natural	500 mL	00070621172069	Green	No	
001	0083_OTH103	HDPE (no PTFE)	20 mL	00350621041394	Grey	No	
001	0083_OTH103	HDPE (no PTFE)	20 mL	00352101057784	Grey	No	
002	0083_OTH104	Clear Plastic Bottle - Natural	500 mL	00070621191105	Green	No	
002	0083_OTH104	HDPE (no PTFE)	20 mL	00352101071910	Grey	No	
002	0083_OTH104	HDPE (no PTFE)	20 mL	00352101071931	Grey	No	
002	0083_OTH104	HDPE (no PTFE)	20 mL	00352005019790	Grey	No	
002	0083_OTH104	HDPE (no PTFE)	20 mL	00352005019623	Grey	No	
003	0083_SW127	Clear Plastic Bottle - Natural	500 mL	00070621191128	Green	No	
003	0083_SW127	HDPE (no PTFE)	20 mL	00352101071951	Grey	No	
003	0083_SW127	HDPE (no PTFE)	20 mL	00352101071569	Grey	No	
004	0083_SW112	Clear Plastic Bottle - Natural	500 mL	00070621191223	Green	No	
004	0083_SW112	HDPE (no PTFE)	20 mL	00352101071664	Grey	No	
004	0083_SW112	HDPE (no PTFE)	20 mL	00352101071632	Grey	No	
005	0083_SW128	HDPE (no PTFE)	20 mL	00352101071669	Grey	No	
005	0083_SW128	HDPE (no PTFE)	20 mL	00352101071936	Grey	No	
005	0083_SW128	Clear Plastic Bottle - Natural	500 mL	00070621191263	Green	No	
006	0083_SW126	Clear Plastic Bottle - Natural	500 mL	00070621191271	Green	No	
006	0083_SW126	HDPE (no PTFE)	20 mL	00352101071790	Grey	No	
006	0083_SW126	HDPE (no PTFE)	20 mL	00352101071976	Grey	No	

Total Bottle Count: ALS: 20, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2207634**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: graeme.jablonskas@alsglobal.com
Telephone	: ----	Telephone	: +6138549 9609
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 39173	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SW/OTH - MB		
Sampler	: [redacted]		

Dates

Date Samples Received	: 23-Jun-2022 11:30	Issue Date	: 27-Jun-2022
Client Requested Due Date	: 07-Jul-2022	Scheduled Reporting Date	: **07-Jul-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.1 - Ice present
Receipt Detail	:	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 discrepencies: 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)
EP2207634-001	21-Jun-2022 10:42	0083_OTH103_220621	✓	✓	✓	✓
EP2207634-002	21-Jun-2022 15:22	0083_OTH104_220621	✓	✓	✓	✓
EP2207634-003	21-Jun-2022 12:13	0083_SW127_220621	✓	✓	✓	✓
EP2207634-004	21-Jun-2022 12:29	0083_SW112_220621	✓	✓	✓	✓
EP2207634-005	21-Jun-2022 12:36	0083_SW128_220621	✓	✓	✓	✓
EP2207634-006	21-Jun-2022 13:03	0083_SW126_220621	✓	✓	✓	✓

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

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]esdat.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]esdat.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]esdat.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]esdat.com.au
- Chain of Custody (CoC) (COC) — Email — [redacted]esdat.com.au
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au
- EDI Format - XTab (XTAB) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2207634**	Page	: 1 of 9
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 27-Jun-2022
C-O-C number	: 39173	Issue Date	: 07-Jul-2022 15:47
Sampler	: [redacted]		
Site	: HEHA SW/OTH - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 6		
No. of samples analysed	: 6		

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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, Western Australia
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, Western Australia
Franco Lentini	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.
- ED041G (Sulfate - Turbidimetric): samples EP2207634-001, & -002 were re-filtered and re-analyzed from parent sample to confirm results.
- ED045G (Chloride): samples EP2207634-001, & -002 were re-filtered and re-analyzed from parent sample to confirm results.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- 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	0083_OTH103_220621	0083_OTH104_220621	0083_SW127_220621	0083_SW112_220621	0083_SW128_220621
				Sampling date / time	21-Jun-2022 10:42	21-Jun-2022 15:22	21-Jun-2022 12:13	21-Jun-2022 12:29	21-Jun-2022 12:36
Compound	CAS Number	LOR	Unit		EP2207634-001	EP2207634-002	EP2207634-003	EP2207634-004	EP2207634-005
					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		116	116	107	71	<1
Total Alkalinity as CaCO3	----	1	mg/L		116	116	107	71	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2570	2640	2110	1670	1870
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		19600	20100	5500	2080	6770
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		418	409	706	621	590
Magnesium	7439-95-4	1	mg/L		1330	1320	406	180	566
Sodium	7440-23-5	1	mg/L		9870	9680	3050	1300	3760
Potassium	7440-09-7	1	mg/L		542	536	158	86	220
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		609	624	201	94.9	230
ø Total Cations	----	0.01	meq/L		574	564	205	104	245
ø Ionic Balance	----	0.01	%		2.98	5.09	1.02	4.86	3.22
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	0083_OTH103_220621	0083_OTH104_220621	0083_SW127_220621	0083_SW112_220621	0083_SW128_220621
				Sampling date / time	21-Jun-2022 10:42	21-Jun-2022 15:22	21-Jun-2022 12:13	21-Jun-2022 12:29	21-Jun-2022 12:36
Compound	CAS Number	LOR	Unit		EP2207634-001	EP2207634-002	EP2207634-003	EP2207634-004	EP2207634-005
					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	0083_OTH103_220621	0083_OTH104_220621	0083_SW127_220621	0083_SW112_220621	0083_SW128_220621
				Sampling date / time	21-Jun-2022 10:42	21-Jun-2022 15:22	21-Jun-2022 12:13	21-Jun-2022 12:29	21-Jun-2022 12:36
Compound	CAS Number	LOR	Unit		EP2207634-001	EP2207634-002	EP2207634-003	EP2207634-004	EP2207634-005
					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	%		**106**	**104**	**106**	**98.8**	**109**
13C8-PFOA	----	0.02	%		**92.7**	**91.7**	**92.2**	**87.7**	**89.3**

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW126_220621	----	----	----	----
				Sampling date / time	21-Jun-2022 13:03	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2207634-006	--------	--------	--------	--------
					Result	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		**75**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**75**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**1280**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**1640**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**475**	----	----	----	----
Magnesium	7439-95-4	1	mg/L		**146**	----	----	----	----
Sodium	7440-23-5	1	mg/L		**985**	----	----	----	----
Potassium	7440-09-7	1	mg/L		**64**	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**74.4**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**80.2**	----	----	----	----
ø Ionic Balance	----	0.01	%		**3.74**	----	----	----	----
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	----	----	----	----

Analytical Results

Sub-Matrix: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW126_220621	----	----	----	----
				Sampling date / time	21-Jun-2022 13:03	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2207634-006	--------	--------	--------	--------
					Result	----	----	----	----
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
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	----	----	----	----
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: SURFACE WATER (Matrix: WATER)				Sample ID	0083_SW126_220621	----	----	----	----
				Sampling date / time	21-Jun-2022 13:03	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2207634-006	--------	--------	--------	--------
					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	%		**101**	----	----	----	----
13C8-PFOA	----	0.02	%		**82.1**	----	----	----	----

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

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2207634**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 27-Jun-2022
C-O-C number	: 39173	Issue Date	: 07-Jul-2022
Sampler	: [redacted]		
Site	: HEHA SW/OTH - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 6		
No. of samples analysed	: 6		

ilac-MRA NATA
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 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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, Western Australia
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, Western Australia
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, Western Australia
Franco Lentini	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**

				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: 4442811)									
EP2207632-002	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	40	41	2.6	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	40	41	2.6	0% - 20%
EP2207810-003	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	180	174	3.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	180	174	3.4	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4424480)									
EP2207634-001	0083_OTH103_220621	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2570	2620	2.0	0% - 20%
EP2207835-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3	3	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 4424479)									
EP2207634-001	0083_OTH103_220621	ED045G: Chloride	16887-00-6	1	mg/L	19600	20000	1.8	0% - 20%
EP2207835-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	37	37	0.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 4424154)									
EP2207627-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	527	515	2.3	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1650	1620	2.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	12300	12000	2.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	710	696	2.1	0% - 20%
EP2207634-003	0083_SW127_220621	ED093F: Calcium	7440-70-2	1	mg/L	706	697	1.3	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	406	400	1.5	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	3050	3000	1.7	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	158	157	0.7	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 (%)*
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4438110)									
EP2207634-002	0083_OTH104_220621	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: 4438110)									
EP2207634-002	0083_OTH104_220621	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 4438110)									
EP2207634-002	0083_OTH104_220621	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: 4438110)									
EP2207634-002	0083_OTH104_220621	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: 4438110) - continued									
EP2207634-002	0083_OTH104_220621	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: 4438110)									
EP2207634-002	0083_OTH104_220621	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 4442811)								
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	103	87.8	118
				<1	200 mg/L	96.8	87.8	118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4424480)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	95.3	89.9	112
				<1	500 mg/L	100	89.9	112
ED045G: Chloride by Discrete Analyser (QCLot: 4424479)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.4	88.6	113
				<1	1000 mg/L	96.9	88.6	113
ED093F: Dissolved Major Cations (QCLot: 4424154)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.0	86.5	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.2	88.4	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	109	91.4	113
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	96.2	84.6	108
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4438110)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	0.25 µg/L	111	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	103	68.0	131
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	<0.02	0.25 µg/L	104	69.0	134
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.25 µg/L	99.2	65.0	140
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	<0.02	0.25 µg/L	94.0	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4438110)								
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	108	72.0	129
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	0.25 µg/L	116	72.0	129
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	0.25 µg/L	108	72.0	130
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	0.25 µg/L	112	71.0	133
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	<0.02	0.25 µg/L	121	69.0	130
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	<0.02	0.25 µg/L	114	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	97.0	72.0	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4438110) - continued								
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	<0.02	0.25 µg/L	95.0	65.0	144
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	<0.05	0.625 µg/L	99.5	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4438110)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	<0.02	0.25 µg/L	123	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	90.0	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	97.4	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	113	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4438110)								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	0.25 µg/L	105	63.0	143
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	0.25 µg/L	111	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	118	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	110	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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4424480)							
EP2207634-001	0083_OTH103_220621	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 4424479)							
EP2207634-001	0083_OTH103_220621	ED045G: Chloride	16887-00-6	1000 mg/L	# Not Determined	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2207634**	Page	: 1 of 6
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Site	: HEHA SW/OTH - MB	Issue Date	: 07-Jul-2022
Sampler	: [redacted]	No. of samples received	: 6
Order number	: pfas-omp HEHA	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

- **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	EP2207634--001	0083_OTH103_220621	**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	EP2207634--001	0083_OTH103_220621	**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 / Container / Client Sample ID(s)		Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural							
0083_OTH103_220621,	0083_OTH104_220621,	----	----	----	06-Jul-2022	05-Jul-2022	**1**
0083_SW127_220621,	0083_SW112_220621,						
0083_SW128_220621,	0083_SW126_220621						

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	19	5.26	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	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 / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation

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
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
0083_OTH103_220621, 0083_OTH104_220621, 0083_SW127_220621, 0083_SW112_220621, 0083_SW128_220621, 0083_SW126_220621	**21-Jun-2022**	**----**	----	----	**06-Jul-2022**	05-Jul-2022	×
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
0083_OTH103_220621, 0083_OTH104_220621, 0083_SW127_220621, 0083_SW112_220621, 0083_SW128_220621, 0083_SW126_220621	**21-Jun-2022**	**----**	----	----	**29-Jun-2022**	19-Jul-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
0083_OTH103_220621, 0083_OTH104_220621, 0083_SW127_220621, 0083_SW112_220621, 0083_SW128_220621, 0083_SW126_220621	**21-Jun-2022**	**----**	----	----	**29-Jun-2022**	19-Jul-2022	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F)							
0083_OTH103_220621, 0083_OTH104_220621, 0083_SW127_220621, 0083_SW112_220621, 0083_SW128_220621, 0083_SW126_220621	**21-Jun-2022**	**----**	----	----	**27-Jun-2022**	28-Jun-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH103_220621, 0083_OTH104_220621, 0083_SW127_220621, 0083_SW112_220621, 0083_SW128_220621, 0083_SW126_220621	**21-Jun-2022**	**05-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH103_220621, 0083_OTH104_220621, 0083_SW127_220621, 0083_SW112_220621, 0083_SW128_220621, 0083_SW126_220621	**21-Jun-2022**	**05-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X)							
0083_OTH103_220621, 0083_OTH104_220621, 0083_SW127_220621, 0083_SW112_220621, 0083_SW128_220621, 0083_SW126_220621	**21-Jun-2022**	**05-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X)							
0083_OTH103_220621, 0083_OTH104_220621, 0083_SW127_220621, 0083_SW112_220621, 0083_SW128_220621, 0083_SW126_220621	**21-Jun-2022**	**05-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-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
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X)							
0083_OTH103_220621, 0083_OTH104_220621, 0083_SW127_220621, 0083_SW112_220621, 0083_SW128_220621, 0083_SW126_220621	**21-Jun-2022**	**05-Jul-2022**	18-Dec-2022	✓	**05-Jul-2022**	18-Dec-2022	✓

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	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	19	**5.26**	**10.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	**10.53**	**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	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	16	**6.25**	**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	19	**10.53**	**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	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	16	**6.25**	**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	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	0	19	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	**5.26**	**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 SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. 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 BaSO4 suspension is measured by a photometer and the SO4-2 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 thiocynate forms highly-coloured ferric thiocynate 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 SO4 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.

CHAIN OF CUSTODY

(ALS) COC#: 39184 *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_0082_PFASOMP

SITE: HEHA SD - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

QUOTE NO: SY/139/19 B / ES2022MWHAUS0002

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [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	PFAS Sediments SED/MENT	ALTERNATIVE ANALYSIS	ADDITIONAL INFORMATION
001	0083_SD127		21/06/2022 12:12 PM	Soil	ALS: 1 Non ALS: 0	No	X		
002	0083_SD112		21/06/2022 12:26 PM	Soil	ALS: 1 Non ALS: 0	No	X		
003	0083_SD128		21/06/2022 12:36 PM	Soil	ALS: 1 Non ALS: 0	No	X		
004	0083_SD126		21/06/2022 01:03 PM	Soil	ALS: 1 Non ALS: 0	No	X		

CHAIN OF CUSTODY

(ALS) COC#: 39184 *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_0082_PFASOMP

SITE: HEHA SD - MB

ORDER NO: pfas-omp HEHA

PROJECT MANAGER: [redacted]

PRIMARY SAMPLER: [redacted]

EMAIL REPORTS TO: [redacted]

EMAIL INVOICES TO: [redacted]

TURNAROUND REQUIREMENTS : 5 Days

Biohazard info:

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:

SAMPLE	SAMPLE NAME	BOTTLE NAME	VOLUME	BARCODE	TYPE	FILTERED	REASON
001	0083_SD127	HDPE Soil Jar	200 mL	00620322036433	Grey	No	
002	0083_SD112	HDPE Soil Jar	200 mL	00621019065550	Grey	No	
003	0083_SD128	HDPE Soil Jar	200 mL	00620322036366	Grey	No	
004	0083_SD126	HDPE Soil Jar	200 mL	00620322036377	Grey	No	

Total Bottle Count: ALS: 4, Non ALS: 0

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2207635**

Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
E-mail	: [redacted]stantec.com	E-mail	: graeme.jablonskas@alsglobal.com
Telephone	: ----	Telephone	: +6138549 9609
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: WA_0082_PFASOMP	Page	: 1 of 2
Order number	: pfas-omp HEHA	Quote number	: ES2022MWHAUS0002 (SY/139/19 B)
C-O-C number	: 39184	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: HEHA SD - MB		
Sampler	: [redacted]		

Dates

Date Samples Received	: 23-Jun-2022 11:30	Issue Date	: 27-Jun-2022
Client Requested Due Date	: 07-Jul-2022	Scheduled Reporting Date	: **07-Jul-2022**

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 4	Temperature	: 16.1 - Ice Bricks present
Receipt Detail	:	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
- EP231X conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepencies: 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)
EP2207635-001	21-Jun-2022 12:12	0083_SD127_220621	✓	✓
EP2207635-002	21-Jun-2022 12:26	0083_SD112_220621	✓	✓
EP2207635-003	21-Jun-2022 12:36	0083_SD128_220621	✓	✓
EP2207635-004	21-Jun-2022 13:03	0083_SD126_220621	✓	✓

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

[redacted]
- EDI Format - ESDAT (ESDAT) — Email — [redacted]esdat.com.au

[redacted]
- *AU Certificate of Analysis - NATA (COA) — Email — [redacted]stantec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) — Email — [redacted]stantec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) — Email — [redacted]stantec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) — Email — [redacted]stantec.com
- Chain of Custody (CoC) (COC) — Email — [redacted]stantec.com
- EDI Format - ESDAT (ESDAT) — Email — [redacted]stantec.com
- EDI Format - XTab (XTAB) — Email — [redacted]stantec.com

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2207635**	Page	: 1 of 5
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022 11:30
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 04-Jul-2022
C-O-C number	: 39184	Issue Date	: 07-Jul-2022 09:18
Sampler	: [redacted] [redacted]		
Site	: HEHA SD - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 4		
No. of samples analysed	: 4		

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*
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	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.

- EP231X 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	0083_SD127_220621	0083_SD112_220621	0083_SD128_220621	0083_SD126_220621	----
			Sampling date / time	21-Jun-2022 12:12	21-Jun-2022 12:26	21-Jun-2022 12:36	21-Jun-2022 13:03	----
Compound	CAS Number	LOR	Unit	EP2207635-001	EP2207635-002	EP2207635-003	EP2207635-004	--------
				Result	Result	Result	Result	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**14.9**	**19.0**	**18.2**	**41.4**	**----**
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	<0.0002	<0.0002	<0.0002	**----**
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	0083_SD127_220621	0083_SD112_220621	0083_SD128_220621	0083_SD126_220621	----
				Sampling date / time	21-Jun-2022 12:12	21-Jun-2022 12:26	21-Jun-2022 12:36	21-Jun-2022 13:03	----
Compound	CAS Number	LOR	Unit		EP2207635-001	EP2207635-002	EP2207635-003	EP2207635-004	--------
					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		<0.0002	<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	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		**102**	**108**	**108**	**97.0**	----
13C8-PFOA	----	0.0002	%		**106**	**111**	**104**	**101**	----

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)

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2207635**	Page	: 1 of 7
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Contact	: Graeme Jablonskas
Address	: GROUND FLOOR 226 ADELAIDE TERRACE PERTH 6000	Address	: 26 Rigali Way Wangara Western Australia Australia 6065
Telephone	: ----	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Order number	: pfas-omp HEHA	Date Analysis Commenced	: 04-Jul-2022
C-O-C number	: 39184	Issue Date	: 07-Jul-2022
Sampler	: [redacted] [redacted]		
Site	: HEHA SD - MB		
Quote number	: SY/139/19 B		
No. of samples received	: 4		
No. of samples analysed	: 4		

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 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*
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	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: 4438554)									
EP2207561-003	Anonymous	EA055: Moisture Content	----	0.1	%	4.4	4.5	0.0	0% - 20%
EP2207633-001	Anonymous	EA055: Moisture Content	----	0.1	%	12.8	13.6	6.1	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 4436085)									
EP2207561-001	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	0.0003	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP2207567-006	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: 4436085)									
EP2207561-001	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: 4436085) - continued									
EP2207561-001	Anonymous	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
EP2207567-006	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 (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: 4436085)									
EP2207561-001	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
EP2207567-006	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

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: 4436085)									
EP2207561-001	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
EP2207567-006	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**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4436085)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	72.0	128
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	96.4	73.0	123
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	100	67.0	130
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.0	70.0	132
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	93.6	68.0	136
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.4	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4436085)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	83.0	71.0	135
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	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	108	71.0	131
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	111	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	96.8	69.0	133
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	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	102	66.0	139
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	95.5	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4436085)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	110	67.0	137
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	102	71.6	129
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	92.8	69.8	131
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.5	68.7	130
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	88.6	65.1	134
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	112	63.0	144
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.8	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436085)								
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	92.8	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	102	65.0	137

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436085) - continued								
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	100	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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 4436085)							
EP2207561-001	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	103	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	92.8	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	100	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	94.4	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	86.4	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	94.8	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 4436085)							
EP2207561-001	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	89.2	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	110	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	110	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	124	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	112	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	105	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	113	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	98.4	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	100	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	104	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 4436085)							
EP2207561-001	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	104	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	100	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	86.2	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	96.5	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	91.2	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: 4436085) - continued							
EP2207561-001	Anonymous	EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	88.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 4436085)							
EP2207561-001	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	86.0	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	111	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	104	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	114	69.2	143

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2207635**	Page	: 1 of 4
Client	: **STANTEC AUSTRALIA PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: [redacted]	Telephone	: +6138549 9609
Project	: WA_0082_PFASOMP	Date Samples Received	: 23-Jun-2022
Site	: HEHA SD - MB	Issue Date	: 07-Jul-2022
Sampler	: [redacted]	No. of samples received	: 4
Order number	: pfas-omp HEHA	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.**
- **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 / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
HDPE Soil Jar (EA055)							
0083_SD127_220621, 0083_SD112_220621, 0083_SD128_220621, 0083_SD126_220621	**21-Jun-2022**	**----**	----	----	**04-Jul-2022**	05-Jul-2022	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0083_SD127_220621, 0083_SD112_220621, 0083_SD128_220621, 0083_SD126_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	13-Aug-2022	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE Soil Jar (EP231X)							
0083_SD127_220621, 0083_SD112_220621, 0083_SD128_220621, 0083_SD126_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	13-Aug-2022	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X)							
0083_SD127_220621, 0083_SD112_220621, 0083_SD128_220621, 0083_SD126_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	13-Aug-2022	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X)							
0083_SD127_220621, 0083_SD112_220621, 0083_SD128_220621, 0083_SD126_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	13-Aug-2022	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X)							
0083_SD127_220621, 0083_SD112_220621, 0083_SD128_220621, 0083_SD126_220621	**21-Jun-2022**	**04-Jul-2022**	18-Dec-2022	✓	**06-Jul-2022**	13-Aug-2022	✓

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.

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.

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CHAIN OF CUSTODY RECORD

CLIENT DETAILS

Company Name : Stantec Australia	[redacted]	Purchase Order : PFAS-OMP 304700525	COC Number : AS-OMP 304700525 -01
Office Address : 11 Harvest Terrace, West perth, WA, 6005		PROJECT Number : WA_0082_PFASOMP	Eurofins | mgt quote ID : NA
		PROJECT Name : WA_0082_PFASOMP	Data output format: PDF; ESDAT

[redacted]

Eurofins | mgt DI water batch number:

Analytes

	Sample ID	Date	Matrix	PFAS (28 analytes)
1	0083_QC208_220621	21/06/2022	Water	X
2	0083_QC209_220621	21/06/2022	Water	X
3	0083_QC210_220621	21/06/2022	Soil	X
4	0083_QC211_220621	21/06/2022	Water	X
5	0083_QC212_220621	21/06/2022	water	X
6	0083_QC213_220621	21/06/2022	water	X
7	0083_QC214_220621	21/06/2022	Water	X
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				

Some common holding times (with correct preservation).
For further information contact the lab

Waters		Soils	
BTEX, MAH, VOC	14 days	BTEX, MAH, VOC	14 days
TRH, PAH, Phenols, Pesticides	7 days	TRH, PAH, Phenols, Pesticides	14 days
Heavy Metals	6 months	Heavy Metals	6 months
Mercury, CrVI	28 days	Mercury, CrVI	28 days
Microbiological testing	24 hours	Microbiological testing	72 hours
BOD, Nitrate, Nitrite, Total N	2 days	Anions	28 days
Solids - TSS, TDS etc	7 days	SPOCAS, pH Field and FOX, CrS	24 hours
Ferrous iron	7 days	ASLP, TCLP	7 days

Containers:

1LP	250P	125P	1LA	40mL vial	125mL A	Jar	

Sample comments:

Laboratory Staff	Turn around time	Method Of Shipment	
Relinquished By: Stantec	Received By: Lucia Cilliers	1 DAY ☐ 2 DAY ☐ 3 DAY ☐	☑ Courier
Date & Time : 24/06/2022	Date & Time : 28/6/22 8:06	STANDARD ☑ Other:	☐ Hand Delivered
Signature:	Signature: Cilliers		☐ Postal
			Courier Consignment # : 00903KBJ52

Temperature on arrival: @6.8

Report number: 901207

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Sample Receipt Advice

Company name:	Stantec Australia Pty Ltd (WA)
Contact name:	[redacted]
Project name:	WA_0082_PFASOMP
Project ID:	WA_0082_PFASOMP
Turnaround time:	7 Day
Date/Time received	Jun 28, 2022 8:06 AM
Eurofins reference	901207

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.
X	Split sample sent to requested external lab.
X	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:

Andrew Harvey on phone : or by email: AndrewHarvey@eurofins.com

Results will be delivered electronically via email to Maella Bourdais - [redacted]stantec.com.

Note: A copy of these results will also be delivered to the general Stantec Australia Pty Ltd (WA) email address.

Global Leader - Results you can trust

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Project Name: WA_0082_PFASOMP
Project ID: WA_0082_PFASOMP

Order No.: PFAS-OMP 304700525
Report #: 901207
Phone: 0458 839 200
Fax:

Received: Jun 28, 2022 8:06 AM
Due: Jul 7, 2022
Priority: 7 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail						Moisture Set	PFAS (Full Suite) Water Low	PFAS (Full Suite) Soil
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X
Melbourne Laboratory - NATA # 1261 Site # 1254								
Sydney Laboratory - NATA # 1261 Site # 18217								
Brisbane Laboratory - NATA # 1261 Site # 20794								
Mayfield Laboratory - NATA # 1261 Site # 25079								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	0083_QC208_220621	Jun 21, 2022		Water	L22-Jn0062051		X	
2	0083_QC209_220621	Jun 21, 2022		Water	L22-Jn0062052		X	
3	0083_QC210_220621	Jun 21, 2022		Soil	L22-Jn0062053	X		X
4	0083_QC211_220621	Jun 21, 2022		Water	L22-Jn0062054		X	
5	0083_QC212_220621	Jun 21, 2022		Water	L22-Jn0062055		X	
6	0083_QC213_	Jun 21, 2022		Water	L22-		X	

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Contact Name: [redacted]

Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail						Moisture Set	PFAS (Full Suite) Water Low	PFAS (Full Suite) Soil
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X
Melbourne Laboratory - NATA # 1261 Site # 1254								
Sydney Laboratory - NATA # 1261 Site # 18217								
Brisbane Laboratory - NATA # 1261 Site # 20794								
Mayfield Laboratory - NATA # 1261 Site # 25079								
External Laboratory								
	220621				Jn0062056			
7	0083_QC214_220621	Jun 21, 2022		Water	L22-Jn0062057		X	
Test Counts						1	6	1

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: [redacted]

Report **901207-S**
Project name WA_0082_PFASOMP
Project ID WA_0082_PFASOMP
Received Date Jun 28, 2022

Client Sample ID			**0083_QC210_220621**
Sample Matrix			**Soil**
Eurofins Sample No.			**L22-Jn0062053**
Date Sampled			**Jun 21, 2022**
Test/Reference	LOR	Unit	
% Moisture	1	%	5.8
PFAS (Full Suite) Soil			
Perfluorobutanoic acid (PFBA)	0.0008	mg/kg	< 0.0008
Perfluoropentanoic acid (PFPeA)	0.0002	mg/kg	< 0.0002
Perfluorohexanoic acid (PFHxA)	0.0004	mg/kg	< 0.0004
Perfluoroheptanoic acid (PFHpA)	0.0008	mg/kg	< 0.0008
Perfluorooctanoic acid (PFOA)	0.0002	mg/kg	< 0.0002
Perfluorononanoic acid (PFNA)	0.0002	mg/kg	< 0.0002
Perfluorodecanoic acid (PFDA)	0.0002	mg/kg	< 0.0002
Perfluoroundecanoic acid (PFUnDA)	0.0002	mg/kg	< 0.0002
Perfluorododecanoic acid (PFDoDA)	0.0002	mg/kg	< 0.0002
Perfluorotridecanoic acid (PFTrDA)	0.0002	mg/kg	< 0.0002
Perfluorotetradecanoic acid (PFTeDA)	0.0002	mg/kg	< 0.0002
Perfluorobutane sulfonic acid (PFBS)	0.0004	mg/kg	< 0.0004
Perfluoropentane sulfonic acid (PFPeS)	0.0004	mg/kg	< 0.0004
Perfluorohexane sulfonic acid (PFHxS)	0.0004	mg/kg	< 0.0004
Perfluoroheptane sulfonic acid (PFHpS)	0.0004	mg/kg	< 0.0004
Perfluorooctane sulfonic acid (PFOS)	0.0004	mg/kg	0.0010
Perfluorodecane sulfonic acid (PFDS)	0.0004	mg/kg	< 0.0004
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.0005	mg/kg	< 0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.0005	mg/kg	0.0015
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.0005	mg/kg	0.0019
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.0005	mg/kg	< 0.0005
Perfluorooctane sulfonamide (FOSA)	0.0004	mg/kg	< 0.0004
N-Methyl perfluorooctane sulfonamide (Me-FOSA)	0.0004	mg/kg	< 0.0004
N-Ethyl perfluorooctane sulfonamide (Et-FOSA)	0.0004	mg/kg	< 0.0004
Perfluorooctane sulfonamidoacetic acid (FOSAA)	0.0004	mg/kg	< 0.0004
N-Methyl perfluorooctane sulfonamidoacetic acid (Me-FOSAA)	0.0004	mg/kg	< 0.0004
N-Ethyl perfluorooctane sulfonamidoacetic acid (Et-FOSAA)	0.0004	mg/kg	< 0.0004
N-Methyl perfluorooctane sulfonamidoethanol (N-Me-FOSE)	0.0008	mg/kg	< 0.0008
N-Ethyl perfluorooctane sulfonamidoethanol (N-Et-FOSE)	0.0008	mg/kg	< 0.0008
Sum of PFAS	0.0002	mg/kg	0.0044

Client Sample ID			**0083_QC210_220621**
Sample Matrix			**Soil**
Eurofins Sample No.			**L22-Jn0062053**
Date Sampled			**Jun 21, 2022**
Test/Reference	LOR	Unit	
PFAS (Full Suite) Soil			
Sum of PFHxS and PFOS	0.0004	mg/kg	0.0010
Sum of PFAS (WA DER List)	0.0002	mg/kg	0.0044

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	Welshpool	Jun 28, 2022	14 Days
- Method: ARL135 Moisture in Solids			
PFAS (Full Suite) Soil	Welshpool	Jun 28, 2022	28 Days
- Method: ARL511 - Per and Polyfluoroalkyl Substances in Soil/Sediment by LCMS			

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Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail						Moisture Set	PFAS (Full Suite) Water Low	PFAS (Full Suite) Soil
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	0083_QC208_220621	Jun 21, 2022		Water	L22-Jn0062051		X	
2	0083_QC209_220621	Jun 21, 2022		Water	L22-Jn0062052		X	
3	0083_QC210_220621	Jun 21, 2022		Soil	L22-Jn0062053	X		X
4	0083_QC211_220621	Jun 21, 2022		Water	L22-Jn0062054		X	
5	0083_QC212_220621	Jun 21, 2022		Water	L22-Jn0062055		X	
6	0083_QC213_220621	Jun 21, 2022		Water	L22-Jn0062056		X	
7	0083_QC214_220621	Jun 21, 2022		Water	L22-Jn0062057		X	
Test Counts						1	6	1

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

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 (*bis*-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.

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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							
PFAS (Full Suite) Soil							
Perfluorobutanoic acid (PFBA)	mg/kg	< 0.0008			0.0008	Pass	
Perfluoropentanoic acid (PFPeA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluorohexanoic acid (PFHxA)	mg/kg	< 0.0004			0.0004	Pass	
Perfluoroheptanoic acid (PFHpA)	mg/kg	< 0.0008			0.0008	Pass	
Perfluorooctanoic acid (PFOA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluorononanoic acid (PFNA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluorodecanoic acid (PFDA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluoroundecanoic acid (PFUnDA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluorododecanoic acid (PFDoDA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluorotridecanoic acid (PFTrDA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	< 0.0002			0.0002	Pass	
Perfluorobutane sulfonic acid (PFBS)	mg/kg	< 0.0004			0.0004	Pass	
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	< 0.0004			0.0004	Pass	
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	< 0.0004			0.0004	Pass	
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	< 0.0004			0.0004	Pass	
Perfluorooctane sulfonic acid (PFOS)	mg/kg	< 0.0004			0.0004	Pass	
Perfluorodecane sulfonic acid (PFDS)	mg/kg	< 0.0004			0.0004	Pass	
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	< 0.0005			0.0005	Pass	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	< 0.0005			0.0005	Pass	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	< 0.0005			0.0005	Pass	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	< 0.0005			0.0005	Pass	
Perfluorooctane sulfonamide (FOSA)	mg/kg	< 0.0004			0.0004	Pass	
N-Methyl perfluorooctane sulfonamide (Me-FOSA)	mg/kg	< 0.0004			0.0004	Pass	
N-Ethyl perfluorooctane sulfonamide (Et-FOSA)	mg/kg	< 0.0004			0.0004	Pass	
Perfluorooctane sulfonamidoacetic acid (FOSAA)	mg/kg	< 0.0004			0.0004	Pass	
N-Methyl perfluorooctane sulfonamidoacetic acid (Me-FOSAA)	mg/kg	< 0.0004			0.0004	Pass	
N-Ethyl perfluorooctane sulfonamidoacetic acid (Et-FOSAA)	mg/kg	< 0.0004			0.0004	Pass	
N-Methyl perfluorooctane sulfonamidoethanol (N-Me-FOSE)	mg/kg	< 0.0008			0.0008	Pass	
N-Ethyl perfluorooctane sulfonamidoethanol (N-Et-FOSE)	mg/kg	< 0.0008			0.0008	Pass	
Sum of PFAS	mg/kg	< 0.0002			0.0002	Pass	
Sum of PFHxS and PFOS	mg/kg	< 0.0004			0.0004	Pass	
Sum of PFAS (WA DER List)	mg/kg	< 0.0002			0.0002	Pass	
LCS - % Recovery							
PFAS (Full Suite) Soil							
Perfluorobutanoic acid (PFBA)	%	113			50-130	Pass	
Perfluoropentanoic acid (PFPeA)	%	98			50-130	Pass	
Perfluorohexanoic acid (PFHxA)	%	101			50-130	Pass	
Perfluorooctanoic acid (PFOA)	%	110			50-130	Pass	
Perfluorononanoic acid (PFNA)	%	109			50-130	Pass	
Perfluorodecanoic acid (PFDA)	%	110			50-130	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	107			50-130	Pass	
Perfluorododecanoic acid (PFDoDA)	%	98			50-130	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	80			50-130	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	106			50-130	Pass	
Perfluorobutane sulfonic acid (PFBS)	%	96			50-130	Pass	
Perfluoropentane sulfonic acid (PFPeS)	%	100			50-130	Pass	
Perfluorohexane sulfonic acid (PFHxS)	%	87			50-130	Pass	
Perfluoroheptane sulfonic acid (PFHpS)	%	112			50-130	Pass	
Perfluorooctane sulfonic acid (PFOS)	%	111			50-130	Pass	
Perfluorodecane sulfonic acid (PFDS)	%	99			50-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
4:2 Fluorotelomer sulfonic acid (4:2 FTS)			%	102			50-130	Pass	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)			%	111			50-130	Pass	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)			%	105			50-130	Pass	
Perfluorooctane sulfonamide (FOSA)			%	108			50-130	Pass	
N-Methyl perfluorooctane sulfonamidoacetic acid (Me-FOSAA)			%	108			50-130	Pass	
N-Ethyl perfluorooctane sulfonamidoacetic acid (Et-FOSAA)			%	109			50-130	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	L22-Jn0061995	NCP	%	39	37	6.3	30%	Pass	
Duplicate									
PFAS (Full Suite) Soil				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	L22-Jn0061995	NCP	mg/kg	< 0.0008	< 0.0008	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	L22-Jn0061995	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	L22-Jn0061995	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	L22-Jn0061995	NCP	mg/kg	< 0.0008	< 0.0008	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	L22-Jn0061995	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	L22-Jn0061995	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	L22-Jn0061995	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	L22-Jn0061995	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	L22-Jn0061995	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	L22-Jn0061995	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	L22-Jn0061995	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Perfluorobutane sulfonic acid (PFBS)	L22-Jn0061995	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Perfluoropentane sulfonic acid (PFPeS)	L22-Jn0061995	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Perfluorohexane sulfonic acid (PFHxS)	L22-Jn0061995	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Perfluoroheptane sulfonic acid (PFHpS)	L22-Jn0061995	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Perfluorooctane sulfonic acid (PFOS)	L22-Jn0061995	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Perfluorodecane sulfonic acid (PFDS)	L22-Jn0061995	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	L22-Jn0061995	NCP	mg/kg	< 0.0005	< 0.0005	<1	30%	Pass	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	L22-Jn0061995	NCP	mg/kg	< 0.0005	< 0.0005	<1	30%	Pass	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	L22-Jn0061995	NCP	mg/kg	< 0.0005	< 0.0005	<1	30%	Pass	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	L22-Jn0061995	NCP	mg/kg	< 0.0005	< 0.0005	<1	30%	Pass	
Perfluorooctane sulfonamide (FOSA)	L22-Jn0061995	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
N-Methyl perfluorooctane sulfonamide (Me-FOSA)	L22-Jn0061995	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
N-Ethyl perfluorooctane sulfonamide (Et-FOSA)	L22-Jn0061995	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Perfluorooctane sulfonamidoacetic acid (FOSAA)	L22-Jn0061995	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
N-Methyl perfluorooctane sulfonamidoacetic acid (Me-FOSAA)	L22-Jn0061995	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
N-Ethyl perfluorooctane sulfonamidoacetic acid (Et-FOSAA)	L22-Jn0061995	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	

Duplicate									
PFAS (Full Suite) Soil				Result 1	Result 2	RPD			
N-Methyl perfluorooctane sulfonamidoethanol (N-Me-FOSE)	L22-Jn0061995	NCP	mg/kg	< 0.0008	< 0.0008	<1	30%	Pass	
N-Ethyl perfluorooctane sulfonamidoethanol (N-Et-FOSE)	L22-Jn0061995	NCP	mg/kg	< 0.0008	< 0.0008	<1	30%	Pass	
Sum of PFAS	L22-Jn0061995	NCP	mg/kg	< 0.0002	< 0.0002	<1	30%	Pass	
Sum of PFHxS and PFOS	L22-Jn0061995	NCP	mg/kg	< 0.0004	< 0.0004	<1	30%	Pass	
Sum of PFAS (WA DER List)	L22-Jn0061995	NCP	mg/kg	< 0.0002	< 0.0002	<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

Authorised by:

Andrew Harvey	Analytical Services Manager
Paul Nottle	Senior Analyst-PFAS

Kim Rodgers
Business Unit Manager

Final Report – this report replaces any previously issued Report

- 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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NATA Accredited
Accreditation Number 2377
Site Number 2370

Accredited for compliance with ISO/IEC 17025 – Testing
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Attention: [redacted]

Report **901207-W**
Project name WA_0082_PFASOMP
Project ID WA_0082_PFASOMP
Received Date Jun 28, 2022

Client Sample ID			**0083_QC208_220621**	**0083_QC209_220621**	**0083_QC211_220621**	**0083_QC212_220621**
Sample Matrix			**Water**	**Water**	**Water**	**Water**
Eurofins Sample No.			**L22-Jn0062051**	**L22-Jn0062052**	**L22-Jn0062054**	**L22-Jn0062055**
Date Sampled			**Jun 21, 2022**	**Jun 21, 2022**	**Jun 21, 2022**	**Jun 21, 2022**
Test/Reference	LOR	Unit				
PFAS (Full Suite) Water Low						
Perfluorobutanoic acid (PFBA)	0.008	ug/L	< 0.008	0.12	0.024	0.039
Perfluoropentanoic acid (PFPeA)	0.002	ug/L	0.006	0.006	< 0.002	0.006
Perfluorohexanoic acid (PFHxA)	0.001	ug/L	0.007	0.12	0.001	0.007
Perfluoroheptanoic acid (PFHpA)	0.004	ug/L	< 0.004	0.057	0.006	0.005
Perfluorooctanoic acid (PFOA)	0.001	ug/L	0.004	0.072	< 0.001	0.002
Perfluorononanoic acid (PFNA)	0.002	ug/L	< 0.002	0.024	< 0.002	< 0.002
Perfluorodecanoic acid (PFDA)	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroundecanoic acid (PFUnDA)	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorododecanoic acid (PFDoDA)	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotridecanoic acid (PFTrDA)	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotetradecanoic acid (PFTeDA)	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorobutane sulfonic acid (PFBS)	0.002	ug/L	< 0.002	< 0.002	0.003	0.003
Perfluoropentane sulfonic acid (PFPeS)	0.002	ug/L	< 0.002	< 0.002	0.004	< 0.002
Perfluorohexane sulfonic acid (PFHxS)	0.002	ug/L	0.019	0.058	0.041	0.035
Perfluoroheptane sulfonic acid (PFHpS)	0.002	ug/L	0.003	< 0.002	< 0.002	0.006
Perfluorooctane sulfonic acid (PFOS)	0.004	ug/L	0.43	0.043	< 0.004	0.16
Perfluorodecane sulfonic acid (PFDS)	0.004	ug/L	< 0.004	< 0.004	< 0.004	< 0.004
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.008	ug/L	< 0.008	< 0.008	< 0.008	< 0.008
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.008	ug/L	< 0.008	0.39	< 0.008	< 0.008
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.002	ug/L	0.017	0.043	< 0.002	< 0.002
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.004	ug/L	< 0.004	< 0.004	< 0.004	< 0.004
Perfluorooctane sulfonamide (FOSA)	0.004	ug/L	< 0.004	< 0.004	< 0.004	< 0.004
N-Methyl perfluorooctane sulfonamide (Me-FOSA)	0.004	ug/L	< 0.004	< 0.004	< 0.004	< 0.004
N-Ethyl perfluorooctane sulfonamide (Et-FOSA)	0.004	ug/L	< 0.004	< 0.004	< 0.004	< 0.004
Perfluorooctane sulfonamidoacetic acid (FOSAA)	0.002	ug/L	< 0.002	< 0.002	< 0.002	< 0.002
N-Methylperfluorooctanesulfonamidoacetic acid (Me-FOSAA)	0.004	ug/L	< 0.004	< 0.004	< 0.004	< 0.004
N-Ethyl perfluorooctane sulfonamidoacetic acid (Et-FOSAA)	0.004	ug/L	< 0.004	< 0.004	< 0.004	< 0.004
N-Methyl perfluorooctane sulfonamidoethanol (N-Me-FOSE)	0.008	ug/L	< 0.008	< 0.008	< 0.008	< 0.008
N-Ethyl perfluorooctane sulfonamidoethanol (N-Et-FOSE)	0.008	ug/L	< 0.008	< 0.008	< 0.008	< 0.008
Sum of PFAS	0.001	ug/L	0.49	0.93	0.079	0.26
Sum of PFHxS and PFOS	0.002	ug/L	0.45	0.10	0.041	0.19
Sum of PFAS (WA DER List)	0.001	ug/L	0.48	0.91	0.076	0.26

Client Sample ID			0083_QC213_220621	0083_QC214_220621
Sample Matrix			Water	Water
Eurofins Sample No.			L22-Jn0062056	L22-Jn0062057
Date Sampled			Jun 21, 2022	Jun 21, 2022
Test/Reference	LOR	Unit		
PFAS (Full Suite) Water Low				
Perfluorobutanoic acid (PFBA)	0.008	ug/L	0.017	< 0.008
Perfluoropentanoic acid (PFPeA)	0.002	ug/L	1.1	< 0.002
Perfluorohexanoic acid (PFHxA)	0.001	ug/L	1.4	0.003
Perfluoroheptanoic acid (PFHpA)	0.004	ug/L	0.62	0.005
Perfluorooctanoic acid (PFOA)	0.001	ug/L	0.16	0.002
Perfluorononanoic acid (PFNA)	0.002	ug/L	0.069	< 0.002
Perfluorodecanoic acid (PFDA)	0.001	ug/L	0.001	< 0.001
Perfluoroundecanoic acid (PFUnDA)	0.001	ug/L	< 0.001	< 0.001
Perfluorododecanoic acid (PFDoDA)	0.001	ug/L	< 0.001	< 0.001
Perfluorotridecanoic acid (PFTrDA)	0.001	ug/L	< 0.001	< 0.001
Perfluorotetradecanoic acid (PFTeDA)	0.001	ug/L	< 0.001	< 0.001
Perfluorobutane sulfonic acid (PFBS)	0.002	ug/L	0.12	0.003
Perfluoropentane sulfonic acid (PFPeS)	0.002	ug/L	0.18	< 0.002
Perfluorohexane sulfonic acid (PFHxS)	0.002	ug/L	0.32	0.005
Perfluoroheptane sulfonic acid (PFHpS)	0.002	ug/L	0.15	< 0.002
Perfluorooctane sulfonic acid (PFOS)	0.004	ug/L	0.48	1.9
Perfluorodecane sulfonic acid (PFDS)	0.004	ug/L	< 0.004	< 0.004
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.008	ug/L	< 0.008	< 0.008
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.008	ug/L	0.13	< 0.008
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.002	ug/L	0.006	< 0.002
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.004	ug/L	< 0.004	< 0.004
Perfluorooctane sulfonamide (FOSA)	0.004	ug/L	< 0.004	< 0.004
N-Methyl perfluorooctane sulfonamide (Me-FOSA)	0.004	ug/L	< 0.004	< 0.004
N-Ethyl perfluorooctane sulfonamide (Et-FOSA)	0.004	ug/L	< 0.004	< 0.004
Perfluorooctane sulfonamidoacetic acid (FOSAA)	0.002	ug/L	< 0.002	< 0.002
N-Methylperfluorooctanesulfonamidoacetic acid (Me-FOSAA)	0.004	ug/L	< 0.004	< 0.004
N-Ethyl perfluorooctane sulfonamidoacetic acid (Et-FOSAA)	0.004	ug/L	< 0.004	< 0.004
N-Methyl perfluorooctane sulfonamidoethanol (N-Me-FOSE)	0.008	ug/L	< 0.008	< 0.008
N-Ethyl perfluorooctane sulfonamidoethanol (N-Et-FOSE)	0.008	ug/L	< 0.008	< 0.008
Sum of PFAS	0.001	ug/L	4.8	1.9
Sum of PFHxS and PFOS	0.002	ug/L	0.81	1.9
Sum of PFAS (WA DER List)	0.001	ug/L	4.3	1.9

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
PFAS (Full Suite) Water Low	Welshpool	Jun 28, 2022	28 Days

- Method: ARL510 - Per and Polyfluoroalkyl Substances in Water by LCMS

eurofins

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Project Name: WA_0082_PFASOMP
Project ID: WA_0082_PFASOMP

Order No.: PFAS-OMP 304700525
Report #: 901207
Phone: 0458 839 200
Fax:

Received: Jun 28, 2022 8:06 AM
Due: Jul 7, 2022
Priority: 7 Day
Contact Name: [redacted]

Eurofins Analytical Services Manager : Andrew Harvey

Sample Detail						Moisture Set	PFAS (Full Suite) Water Low	PFAS (Full Suite) Soil
Perth Laboratory - NATA # 2377 Site # 2370						X	X	X
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	0083_QC208_220621	Jun 21, 2022		Water	L22-Jn0062051		X	
2	0083_QC209_220621	Jun 21, 2022		Water	L22-Jn0062052		X	
3	0083_QC210_220621	Jun 21, 2022		Soil	L22-Jn0062053	X		X
4	0083_QC211_220621	Jun 21, 2022		Water	L22-Jn0062054		X	
5	0083_QC212_220621	Jun 21, 2022		Water	L22-Jn0062055		X	
6	0083_QC213_220621	Jun 21, 2022		Water	L22-Jn0062056		X	
7	0083_QC214_220621	Jun 21, 2022		Water	L22-Jn0062057		X	
Test Counts						1	6	1

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

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 (*bis*-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.

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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							
PFAS (Full Suite) Water Low							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.008			0.008	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.004			0.004	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.001			0.001	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.001			0.001	Pass	
Perfluorobutane sulfonic acid (PFBS)	ug/L	< 0.002			0.002	Pass	
Perfluoroheptane sulfonic acid (PFHpS)	ug/L	< 0.002			0.002	Pass	
Perfluorodecane sulfonic acid (PFDS)	ug/L	< 0.004			0.004	Pass	
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	ug/L	< 0.008			0.008	Pass	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	ug/L	< 0.008			0.008	Pass	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	ug/L	< 0.002			0.002	Pass	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	ug/L	< 0.004			0.004	Pass	
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.004			0.004	Pass	
N-Methyl perfluorooctane sulfonamide (Me-FOSA)	ug/L	< 0.004			0.004	Pass	
N-Ethyl perfluorooctane sulfonamide (Et-FOSA)	ug/L	< 0.004			0.004	Pass	
Perfluorooctane sulfonamidoacetic acid (FOSAA)	ug/L	< 0.002			0.002	Pass	
N-Methylperfluorooctanesulfonamidoacetic acid (Me-FOSAA)	ug/L	< 0.004			0.004	Pass	
N-Ethyl perfluorooctane sulfonamidoacetic acid (Et-FOSAA)	ug/L	< 0.004			0.004	Pass	
N-Methyl perfluorooctane sulfonamidoethanol (N-Me-FOSE)	ug/L	< 0.008			0.008	Pass	
N-Ethyl perfluorooctane sulfonamidoethanol (N-Et-FOSE)	ug/L	< 0.008			0.008	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

Authorised by:

Andrew Harvey	Analytical Services Manager
Paul Nottle	Senior Analyst-PFAS

Kim Rodgers
Business Unit Manager

Final Report – this report replaces any previously issued Report

- 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

Cardno

now

Stantec

Monitoring Date	Monitoring Location	Sample_ID	Screen Interval (mbTOC)	Monitoring Well Type	TOC (mAHD)	Well Depth (mbTOC)	SWL (mbTOC)	RWL (mAHD)	Observations	Sampling Method	Temp (°C)	DO (mg/L)	EC (us/Cm)	TDS (mg/L)	pH	Eh (mV)	QC Sample #	Odour	colour
21/06/2022	MW003			Single Level					Damaged. MW004 sampled instead										
21/06/2022	MW004	0083_MW004_220621	1.5-4.5_	Single Level	2.989	4.5	2.03	0.959	Sampled instead of MW003	Hydrasleeve	23.8	3.53	1164	734	8.55	32.3			Cloudy
21/06/2022	MW008	0083_MW008_220621	2.5-5.5_	Single Level	2.846	5.5	1.94	0.906	QC108/208	Hydrasleeve	25.4	1.06	30870	20091	7.32	9.1	QC108/208		Clear
21/06/2022	MW017	0083_MW017_220621	3-6_	Single Level	3.421	6	2.85	0.571	QC113, QC213	Hydrasleeve	27.4	0.69	25663	6679	7.29	11.3			Clear
21/06/2022	MW019	0083_MW019_220621	1.5-4.5_	Single Level	2.955	4.5	2.26	0.695		Hydrasleeve	27	0.92	22708	4774	7.36	47.1			Clear
21/06/2022	MW027	0083_MW027_220621	3-6_	Single Level	4.499	6	3.87	0.629		Hydrasleeve	26.9	1.92	12460	8112	7.26	72.1			Clear
21/06/2022	MW101	0083_MW101_220621	2-4.5_	Single Level	2.4356	4.5	1.795	0.641		Hydrasleeve	26.2	0.66	3722	2411	8.00	-238.9		Slightly stagnant smell	Cloudy
21/06/2022	MW102	0083_MW102_220621	1-6_	Single Level	2.6924	6	2.05	0.642		Hydrasleeve	26.8	1.54	7942	5167.5	7.76	-85.6			Clear
21/06/2022	MW103	0083_MW103_220621	1-6_	Single Level	2.7898	6	2.2	0.59		Hydrasleeve	25.9	1.32	9610	6233.5	7.71	37.6			Cloudy
21/06/2022	MW104	0083_MW104_3.5-4_220621	3.5-4_	Multi level	4.0042	4	3.6	0.404		Peristaltic Pump	26.8	3.58	5714	3711.5	7.82	-58.3		Slight stagnant smell	Cloudy,Black
21/06/2022	MW105	0083_MW105_4-4.5_220621	4-4.5_	Multi level	3.1082	4.5	2.24	0.868		Peristaltic Pump	25.9	3.41	29474	19214	7.52	55.7			Clear
21/06/2022	MW107	0083_MW107_5.5-6_220621	5.5-6_	Multi level	4.7014	6	4.01	0.691		Peristaltic Pump	26.1	1.87	51083	33280	7.55	50.2			Clear
21/06/2022	MW109	0083_MW109_220621	6.5-7_	Multi level	7.0426	7	6.17	0.873		Peristaltic Pump	26.7	4.21	48963	31785	7.56	26.3			Cloudy,Brown
21/06/2022	MW110	0083_MW110_7.5-8_220621	7.5-8_	Multi level	8.2665	8	7.4	0.867		Peristaltic Pump	26.9	4.37	43448	28242	7.60	21.1			Cloudy
21/06/2022	MW111	0083_MW111_10.5-11_220621	10.5-11_	Multi level	8.8279	11	8.14	0.688	Qc114/214	Peristaltic Pump	25.8	2.56	27997	18232	7.38	49.3	QC114/214		Clear
21/06/2022	MW112	0083_MW112_4.5-5_220621	4.5-5_	Multi level	3.0636	5	2.375	0.689		Peristaltic Pump	25.9	3.53	53371	34645	7.79	50			Clear
21/06/2022	MW113	0083_MW113_2.5-3.5_220621	2.5-3.5_	Multi level	2.97	3.5	2.22	0.75		Peristaltic Pump	26.5	3.14	33708	21911	7.83	-95.1			Brown,Cloudy
21/06/2022	MW114	0083_MW114_2-3_220621	2-3_	Multi level	2.9356	3	2.23	0.706		Peristaltic Pump	26.6	7.7	682	447.4	7.82	-81.7			Clear
21/06/2022	MW115	0083_MW115_2-3_220621	2-3_	Multi level	2.6281	3	2.03	0.5981		Peristaltic Pump	26.7	2.36	41060	26688	7.74	-125.9			Brown,Cloudy
21/06/2022	MW116	0083_MW116_220621	1.2-2.2_	Single Level	2.3875	2.2	1.3	1.0875		Hydrasleeve	25.5	2.88	50680	32943	7.78	-102.6			Clear
21/06/2022	MW117	0083_MW117_2-2.5_220621	2-2.5_	Multi level	2.591	2.5				Peristaltic Pump	24.9	3.91	8724	5672	7.82	-154.2			Cloudy,Brown
21/06/2022	MW119	0083_MW119_220621	2.1-5.1_	Single Level	3.5069	5.1	2.8	0.707		Hydrasleeve	26.6	1.64	24709	6061.5	7.52	-158.6			Clear,Cloudy
21/06/2022	MW123		0.5-4.5_	Single Level		4.5			No access, Asbestos Hazerd. Area flooded. not sampled										
21/06/2022	MW129	0083_MW129_1.5-2_220621	1.5-2_	Multi level	2.0256	2	1.55	0.476		Peristaltic Pump	25.2	2.69	50987	3150	7.39	-10.5			Cloudy,Black
21/06/2022	MW130	0083_MW130_1.4-1.9_220621	1.4-1.9_	Multi level	2.016	1.9	1.5	0.516		Peristaltic Pump	25	2.85	51622	53540	7.38	21.9			Cloudy
21/06/2022	MW134	0083_MW134_220621	6.5-12.5_	Single Level	10.0786	12.5	9.42	0.659		Hydrasleeve	27.1	2.12	40802	6520	7.48	19			Clear,Cloudy
21/06/2022	MW202	0083_MW202_220621	6.9-9.9_	Single Level	8.069	NA	7.2	0.869		Hydrasleeve	27.5	2.4	45276	29424	7.56	-262.2		Slight stagnant smell	Clear
21/06/2022	MW210	0083_MW210_220621	1.5-4_	Single Level	2.863	4	1.9	0.963		Hydrasleeve	24.3	4.92	1062	689	8.43	43.9			Clear
21/06/2022	MW212	0083_MW212_220621	1-4_	Single Level	3.513	4	2.575	0.938		Hydrasleeve	26.3	2.85	7000	4550	7.83	46.9	QC111/211		Clear
21/06/2022	MW213	0083_MW213_220621	2.5-5.5_	Single Level	4.49	5.5	3.84	0.65		Hydrasleeve	25.7	1.32	4377	2853.5	7.56	39.6			Clear,Cloudy
21/06/2022	MW214	0083_MW214_220621	2.5-5.5_	Single Level	4.29	5.5	3.68	0.61	QC112, QC212,	Hydrasleeve	26	3.73	855	546	8.18	-2.6	QC112/212		Cloudy
21/06/2022	MW217	0083_MW217_220621	1.2-4.5_	Single Level	3.658	4.5	3.06	0.598		Hydrasleeve	26.6	1.47	15675	10192	7.83	-157.8			Clear
21/06/2022	MW218	0083_MW218_220621	2.8-5.8_	Single Level	5.137	5.8	4.58	0.557		Hydrasleeve	26.5	2.06	5876	3820	8.22	-157.6			Clear
21/06/2022	OTH002								Not flowing. not sampled										
21/06/2022	OTH101	0083_OTH101_220621								Direct into Bottle	24.4	5.37	54108	35170	8.17	-181.7			Clear
21/06/2022	OTH102	0083_OTH102_220621								Direct into Bottle	24.6	4.71	54071	35146	8.19	-173.7			Clear
21/06/2022	OTH103	0083_OTH103_220621								Direct into Bottle	23.2	4.6	54674	35555	8.06	50.1			Clear
21/06/2022	OTH104	0083_OTH104_220621								Direct into Bottle	23.4	4.51	54977	35750	7.99	49.9			Clear
21/06/2022	OTH105	0083_OTH105_220621								Direct into Bottle	21.8	5.44	54057	35153	8.00	-57.6			Clear
21/06/2022	OTH106	0083_OTH106_220621								Direct into Bottle	21.5	5.02	53934	35094	8.08	-56.2			Clear
21/06/2022	OTH107	0083_OTH107_220621								Direct into Bottle	21.3	4.4	54230	35247	7.99	-68.1			Clear
21/06/2022	OTH108	0083_OTH108_220621								Direct into Bottle	21.3	4.93	52813	34333	7.78	-70.7			Brown,Cloudy
21/06/2022	OTH109	0083_OTH109_220621								Direct into Bottle	24.3	4.98	53602	34841	8.22	-155.4			Clear
21/06/2022	OTH110	0083_OTH110_220621								Direct into Bottle	25.1	5.49	53846	35000	8.14	-148.1			Clear
21/06/2022	OTH113	0083_OTH113_220621								Direct into Bottle	25.3	4.75	53566	34840	8.17	8.9			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 (mg/L)	pH	Eh (mV)	Water Colour	Turbidity
SW112	21/06/2022	0083_SW112_220621	Direct into Bottle	0.1	0.2	Slow	Taken 500m south	23.7	6.08	10276	6675.5	8.34	52	Clear	Low
SW113	21/06/2022	0083_SW113_220621	Direct into Bottle	0.1	0.5	Slow	Sampled from sump. QC109, QC209	20.2	4.53	663	429	7.77	52	Clear	Medium
SW120	21/06/2022	0083_SW120_220621	Direct into Bottle	0.1	0.2	Slow		24.4	6.78	23388	5203.5	8.06	13.4	Clear	Low
SW126	21/06/2022	0083_SW126_220621	Direct into Bottle	0.1	0.15	Slow		25.7	7.98	8192	5330	8.45	52.7	Clear	Low
SW127	21/06/2022	0083_SW127_220621	Direct into Bottle	0.1	0.2	Slow		23.1	5.5	19818	12876.5	8.17	51	Clear	Low
SW128	21/06/2022	0083_SW128_220621	Direct into Bottle	0.05	0.1	Slow		25.4	5.21	21935	14274	8.2	56.6	Clear	Low

Monitoring Location	Date	Sample ID SS	Depth of Sediment Sampling (m)	Sampling Method	Sample Condition	Sample Description	Comments
SD112	21/06/2022	0083_SD112_220621	0.1	Shovel, Trowel	Wet	Beige sand	Taken 500m south
SD113	21/06/2022	0083_SD113_220621	0.1	Shovel, Trowel	Dry	Brown/black sand, med grained, dry	QC110/210
SD120	21/06/2022	0083_SD120_220621	0.1	Shovel, Trowel	Wet	Grey, sandy CLAY, wet	
SD126	21/06/2022	0083_SD126_220621	0.1	Shovel, Trowel	Wet	Brown clay	
SD127	21/06/2022	0083_SD127_220621	0.1	Shovel, Trowel	Wet	Orange gravely clay	
SD128	21/06/2022	0083_SD128_220621	0.1	Shovel, Trowel	Wet	Beige coarse sand	

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Stantec
Contact: [redacted]

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 21D101799
Cable length: 1m 21B100351

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	✓	0.0.78
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		✓	172.10 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.01
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 10 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:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature	Check Temp NATA	Room Temp	19.5	0	°C	NA	19.5	°C
pH (21E)	pH 7.00	375757	7.01	-30.90	mV	7.02	7.01	pH
pH (21E)	pH 4.00	378281	4.00	141.20	mV	4.02	4.00	pH
Conductivity (21B100530)	2764 µs/cm at 25°C	21/1012	2764	GLP	5.02	2777	2764	µs/cm
ORP (210322SIA605102)	Zobell A & B	21/1611	241	241	mV	227.1	231	mV
Zero DO (20K100253)	NaSO3 in distilled water	10175	0.0	NA	NA	-2.1	0.0	%
100% DO (20K100253)	100% Air Saturation	Air	100.0	4.8	uA	97.2	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 15-Jun-22
Next Due: 12-Dec-22

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Stantec
Contact: [redacted]

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		✓	172.90 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58.44
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 3 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:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature	Check Temp NATA	Room Temp	18.3	-0.1	°C	NA	18.2	°C
pH (21A)	pH 7.00	375757	7.01	-29.40	mV	7.02	7.01	pH
pH (21A)	pH 4.00	378281	4.00	143.50	mV	3.99	4.00	pH
Conductivity (20K100397)	2764 µs/cm at 25°C	21/1012	2764	GLP	5.03	2770	2764	µs/cm
ORP (201005SIA605102)	Zobell A & B	21/1611	244	244	mV	243.5	240.8	mV
Zero DO (20H100139)	NaSO3 in distilled water	10175	0.0	NA	NA	0.1	0.0	%
100% DO (20H100139)	100% Air Saturation	Air	100.0	4.45	uA	95.2	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 12-Jun-22
Next Due: 09-Dec-22

Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Stantec
Contact: [redacted]

Manufacturer: YSI
Instrument: Professional Plus with Quatro cable
Serial #: 20D101040
Cable length: 1m 20B140029

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		✓	171.60 mV
pH slope		✓	55 to 60 mV/pH, ideal 59mV 58
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 3 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:

						Instrument Readings		
Parameter	**Standards**	**Reference**	**Calibration Point**	**Span**	**Units**	**Before**	**After**	**Units**
Temperature	Check Temp NATA	Room Temp	18.5	-0.1	°C	NA	18.4	°C
pH (21J)	pH 7.00	375757	7.01	-25.90	mV	6.99	7.01	pH
pH (21J)	pH 4.00	378281	4.00	145.70	mV	3.99	4.00	pH
Conductivity (20A100065)	2764 µs/cm at 25°C	21/1012	2764	GLP	5.13	2757	2764	µs/cm
ORP (200408SIA605101)	Zobell A & B	22/0103	244	244	mV	240.4	240.6	mV
Zero DO (20C100608)	NaSO3 in distilled water	10175	0.0	NA	NA	0.2	0.0	%
100% DO (20C100608)	100% Air Saturation	Air	100.0	4.34	uA	100.1	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 17-Jun-22
Next Due: 14-Dec-22

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)
20/6/22	0082	YSI # 20D101040	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: ~~1,413µS/cm~~ 35,000 (Y) / N		pH 4.00: 4.08 pH 7.00: 7.04 EC: 34,940	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N EC: (± 150µS/cm) (Y) / N		[redacted]	
20/6/22	0082	YSI # 20K104050	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: ~~1,413µS/cm~~ 35k Y / N		pH 4.00: 4.09 pH 7.00: 6.97 EC: 33,980	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N EC: (± 150µS/cm) (Y) / N		[redacted]	
20/6/22	0082	YSI # 21D101799	100% Saturation? (Y) N	0% Calibration? (Y) N NA	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: ~~1,413µS/cm~~ 35,000 (Y) / N		pH 4.00: 4.09 pH 7.00: 7.01 EC: 35,082	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N EC: (± 150µS/cm) (Y) / N		[redacted]	
21/6/22	0083	YSI # 20D10 1040	100% Saturation? (Y) N	0% Calibration? Y N (NA)	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: ~~1,413µS/cm~~ 35k Y / N		pH 4.00: 4.03 pH 7.00: 7.07 ~~Temp:~~ EC: 32490	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N EC: (± 150µS/cm) Y / N			
21/6/22	0083	YSI # 21D101799	100% Saturation? (Y) N	0% Calibration? Y N (NA)	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: ~~1,413µS/cm~~ 35k Y / N		pH 4.00: 4.10 pH 7.00: 6.98 ~~Temp:~~ EC:	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N EC: (± 150µS/cm) Y / N			
21/6/22	0083	YSI # 20K 04050	100% Saturation? (Y) N	0% Calibration? Y N (NA)	pH 4.00 (Y) / N pH 7.00 (Y) / N EC: ~~1,413µS/cm~~ 35 k (Y) / N		pH 4.00: 4.04 pH 7.00: 7.09 ~~Temp:~~ EC:	pH 4.00: (± pH 0.2) (Y) / N pH 7.00: (± pH 0.2) (Y) / N EC: (± 150µS/cm) Y / N			
[illegible]		YSI #	100% Saturation? Y N	0% Calibration? Y N NA	pH 4.00 Y / N pH 7.00 Y / N EC: 1,413µS/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: 1,413µS/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

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Data Quality Review
PFAS Ongoing Monitoring Plan
June 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 on the 21st June 2022 and is generally in accordance with the proposed scope of work, as documented in the SAQP (PFAS OMP SAQP HEH-A, Cardno, June 2021) issued to the client and in general compliance with Standards Australia 1998. AS/NZ 5667:1998 *Water quality – sampling* , NEPM "*National Environment Protection (Assessment of Site Contamination) Measure"* 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 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. Holding times were generally in compliance with required timeframes. The following holding time exceedance was reported: Alkalinity – 1 day overdue (EP2207624, EP2207626, EP2207627, EP2207630, EP2207632, EP2207634). The holding time exceedances for a minority of results are due to the remoteness of the site and the timing of the freight services. They are not considered to have adversely impacted the reliability of the results obtained, or the conclusions drawn from this assessment. Cardno ensures sample integrity by using overnight freight services where possible and keeping samples chilled with bagged ice.
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. Groundwater field parameters were taken from water collected from the hydraSleeves rather than placing the WQMs inside the wells to prevent risks of cross contamination of the monitoring wells. Non-disposable equipment was decontaminated between sample locations.
Laboratory Reports	The following laboratory reports were considered for this data quality review: ▪ ALS reports: EP2207624, EP2207626, EP2207627, EP2207630, EP2207632, EP2207633, EP2207634, EP2207635. ▪ Eurofins ARL report: 901207

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%)	5 for 42 groundwater samples (11.9%) 1 in 6 surface water samples (16.7%) 1 in 6 sediment samples (16.7%)
Interlab duplicate	1 in 10 primary samples (10%)	5 for 42 groundwater samples (11.9%) 1 in 6 surface water samples (16.7%) 1 in 6 sediment samples (16.7%)
Rinsate	1 per field personnel per day	3 for 1 days (3 field personnel) (100%)
Field Blank	1 per field personnel per day	3 for 1 days (3 field personnel) (100%)

The required QC frequency was achieved for all media sampled.

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: 42
- Blind Duplicate Samples Analysed: 5

All RPDs were within acceptance criteria with the following exception:

QC113 (PFHxS – 23%, PFOS 37%, PFBA – 22%, PFPeA – 21%). These minor exceedances are due to the low concentrations of analytes under review. This is not considered to have impacted the reliability of the dataset.

-

Surface water

- Primary surface water Samples Analysed: 6
- Blind Duplicate Samples Analysed: 1

All RPDs were within acceptance criteria.

Sediment

- Primary Sediment Samples Analysed: 6
- Blind Duplicate Samples Analysed: 1

All RPDs were within acceptance criteria with the following exceptions:

- QC110 (Sum of PFAS – 81%). Individual analytes didn't report a RPD exceedance. The primary sample reported higher concentrations therefore the results reported on are conservative.

QC Testing – Interlab Duplicates (Secondary Lab)

Groundwater

- Primary Groundwater Samples Analysed: 42
- Interlab Duplicate Samples Analysed: 5

QA/QC Aspects	Evidence & Evaluation
	All RPDs were within acceptance criteria with the following exceptions: ▪ QC208 (PFOS – 36%) ▪ QC211 (PFHxS – 69%) ▪ QC212 (PFOS – 27%) ▪ QC213 (PFPeS – 32%, PFHxS – 156%, PFOS – 181%, PFBA – 197%, PFPeA – 155%, PFHxA – 149%, PFHpA – 153%, PFOA – 140%) 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. This is not considered to have impacted the validity of the interpretation drawn upon this dataset. ***Surface water*** ▪ Primary surface water Samples Analysed: 6 ▪ Interlab Duplicate Samples Analysed: 1 All RPDs were within acceptance criteria with the following exceptions: ▪ QC209 (PFOS – 94%, PFPeA – 194%, PFHxA – 45%, PFHpA – 78%, PFOA – 57%, 6:2 FTS – 32%, 8:2 FTS – 71%). These RPDs differences are likely due to the difference of methodologies and levels of detection 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. ***Sediment*** ▪ Primary sediment Samples Analysed: 6 ▪ Interlab Duplicate Samples Analysed: 1 All RPDs were within acceptance criteria.
Field Blanks	Field Blanks were collected at a rate of one per fieldwork team per 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 of 70% to 130% with the exception of the following: ▪ EP2207624, EP2204626, EP2207627, EP2207630, EP2207632, EP2207632, EP2207634: - Samples ID: anonymous, MW117, MW027, OTH103: Sulfate and Chloride matrix spike recovery not determined due to the background concentrations exceeding 4x spike level. The following quality control samples frequency outliers were reported: ▪ EP2207624, EP2207626, EP2207627, EP2207630, EP2207634: - Laboratory Duplicates: PFAS by LCMSMS, expected frequency of 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. It was noted that the secondary laboratory applied a limit of reporting one order of magnitude lower than the primary laboratory for PFAS in water. This is not considered to have impacted the reliability of the data collected as part of this monitoring event.
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

QA/QC Aspects	Evidence & Evaluation
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.

APPENDIX

D

DATA ASSESSMENT

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Location ID	Screen Interval Multilevel Well	Date Time	Water Depth (mbTOC)	Elevation (mAHD)	Comments
MW003	-	11/23/2021			Bore damaged at 1mbTOC. unable to sample
MW004	-	6/21/2022	2.03	0.959	
MW004	-	11/23/2021	2.62	0.369	Sampled instead of MW003
MW008	-	6/21/2022	1.94	0.906	
MW008	-	11/23/2021	2.51	0.336	Gatic lid destroyed
MW017	-	6/21/2022	2.85	0.571	
MW017	-	11/23/2021	3.428	-0.007	
MW019	-	6/21/2022	2.26	0.695	
MW019	-	11/23/2021	2.91	0.045	
MW027	-	6/21/2022	3.87	0.629	
MW027	-	11/23/2021	4.47	0.029	Ant nest in well
MW101	-	6/21/2022	1.795	0.641	
MW101	-	11/23/2021	2.364	0.0716	
MW102	-	6/21/2022	2.05	0.642	
MW102	-	11/23/2021	2.628	0.0644	
MW103	-	6/21/2022	2.2	0.59	
MW103	-	11/23/2021	2.742	0.0478	
MW104	3.5-4.0	6/21/2022	3.6	0.404	
MW104	5.5-6_	11/23/2021	4.011	-0.0207	QC114 lost in transit to lab
MW105	4.0-4.5	6/21/2022	2.24	0.868	
MW105	6-6.5_	11/23/2021	2.82	0.2779	
MW107	5.5-6.0	6/21/2022	4.01	0.691	
MW107	5.5-6_	11/23/2021	4.246	0.4554	
MW109	6.5-7.0	6/21/2022	6.17	0.873	
MW109	6.5-7_	11/24/2021	6.702	0.3406	
MW110	7.5-8.0	6/21/2022	7.4	0.867	
MW110	9-9.5_	11/24/2021	7.984	0.2967	
MW111	10.5-11.0	6/21/2022	8.14	0.688	
MW111	10.5-11_	11/23/2021	8.543	0.2849	
MW112	4.5-5.0	6/21/2022	2.375	0.689	
MW112	4.5-5_	11/23/2021	2.592	0.4716	
MW113	2.5-3.5	6/21/2022	2.22	0.75	
MW113	2.5-3.5_	11/23/2021	2.643	0.327	
MW114	2.0-3.0	6/21/2022	2.23	0.706	
MW114	2-3_	11/23/2021	2.501	0.4346	
MW115	2.3-2.8	6/21/2022	2.03	0.598	
MW115	2-3_	11/23/2021	2.568	0.0601	
MW116	4.5-5.0_	11/23/2021	2.277	0.1115	
MW117	2.0-2.5	6/21/2022			Not recorded
MW117	-	11/23/2021	2.503	0.1524	QC110 lost in transit to lab
MW119	-	6/21/2022	2.8	0.707	
MW119	-	11/23/2021	3.35	0.1569	
MW123	-	6/21/2022			No access
MW123	-	11/23/2021	0.48	0.0556	
MW129	1.5-2.0	6/21/2022	1.55	0.476	
MW129	-	11/23/2021	1.843	0.1826	
MW130	1.4-1.9	6/21/2022	1.5	0.516	
MW130	-	11/23/2021	1.762	0.2935	
MW134	-	6/21/2022	9.42	0.659	
MW134	-	11/23/2021	9.859	0.2196	
MW202	-	6/21/2022	7.2	0.869	
MW202	-	11/23/2021	6.598	1.471	
MW210	-	6/21/2022	1.9	0.963	
MW210	-	11/23/2021	2.51	0.353	
MW212	-	6/21/2022	2.575	0.938	
MW212	-	11/23/2021	2.99	0.523	
MW213	-	6/21/2022	3.84	0.65	
MW213	-	11/23/2021	4.47	0.02	Not enough water to fill hydrasleeve.
MW214	-	6/21/2022	3.68	0.61	
MW214	-	11/23/2021	4.3	-0.01	Not enough water to fill hydrasleeve.
MW217	-	6/21/2022	3.06	0.598	
MW217	-	11/23/2021	2.9	0.758	
MW218	-	6/21/2022	4.58	0.557	
MW218	-	11/23/2021	4.92	0.217	

		Field Parameters				
		Temperature (Field)	pH (Field)	DO (Field)	Electrical Conductivity (field)	Redox Potential (Field)
		°C	pH Units	mg/L	µS/cm	mV
Location ID	Date					
MW003	28/02/2018	27.8	7.4	0.06	27,632	-67.4
MW003	15/06/2018	28.9	7.37	0.03	27,989	-122.4
MW003	26/06/2020	26.8	7.41	1.29	27,566	-143.2
MW003	17/11/2020	29.4	6.21	1.16	28,147	-18.8
MW003	22/06/2021	25.6	7.6	2.05	30,232	-14.8
MW004	11/23/2021	28.3	7.49	0.01	17164	-187.6
MW008	28/02/2018	27.6	7.45	0.03	27,218	-81.3
MW008	15/06/2018	29.2	7.33	0.11	14,954	-122.3
MW008	9/10/2018	27.7	7.83	6.63	26,282	
MW008	23/08/2019	27.5	7.36	0.09	14,748	
MW008	30/11/2019	30.5	7.89		1,397.50	7.17
MW008	17/03/2020	32.3	7.41	0.79	30,004	
MW008	26/06/2020	26.1	7.39	1.29	17,516	-136.2
MW008	17/11/2020	30.7	5.8	1.52	35,426	21.2
MW008	22/06/2021	26.1	7.62	1.11	31,499	-69.8
MW008	11/23/2021	28.1	7.58	0.7	30158	-43.9
MW008	18/01/2022	28.1	7.58	0.7	30,158	-43.9
MW008	21/06/2022	25.4	7.32	1.06	30,870	9.1
MW017	28/02/2018	29.7	7.26	0.37	28,441	-123.7
MW017	16/06/2018	28.8	7.23	0.03	30,509	-182.5
MW017	5/10/2018	28	7.23	0.23	22,602	
MW017	28/11/2019	27.7	7.36	3.12	18,261	-33.6
MW017	25/06/2020	29.1	7.24	1.52	25,362	-187
MW017	18/11/2020	27	7.38	2.05	23,984	-153.7
MW017	22/06/2021	27.3	7.48	1.82	16,215	7.8
MW017	11/23/2021	28.9	7.92	1.63	27429	-164
MW017	18/01/2022	28.9	7.92	1.63	27,429	-164
MW017	21/06/2022	27.4	7.29	0.69	25,663	11.3
MW019	23/02/2018	30	7.27	0.11	14,900	-103.2
MW019	16/06/2018	29.1	7.24	0.01	28,517	-153.5
MW019	11/10/2018	27.6	7.3	0	20,312	
MW019	27/08/2019	26.2	7.03	0.1	27,424	
MW019	17/03/2020	30.8	7.22	0.66	26,575	
MW019	25/06/2020	26	7.11	1.04	24,557	-99.1
MW019	18/11/2020	26.5	6.9	0.85	31,502	-126.3
MW019	23/06/2021	25.3	7.27	1.89	21,372	-57.2
MW019	11/23/2021	25.8	7.3	1.85	21802	118.9
MW019	18/01/2022	25.8	7.3	1.85	21,802	118.9
MW019	21/06/2022	27	7.36	0.92	22,708	47.1
MW027	23/02/2018	29.4	7.14	0.14	20,910	-62.3
MW027	16/06/2018	29.5	7.2	0.08	26,573	-177
MW027	11/10/2018	28.4	7.41	0.22	21,131	
MW027	27/08/2019	28.7	7.12	0.09	23,065	
MW027	28/11/2019	28.8	7.37	4.58	16,884	4.9
MW027	25/06/2020	26.2	7.13	1.3	24,953	-47.4
MW027	18/11/2020	28	7.14	1.01	28,811	-116.9
MW027	23/06/2021	24	6.62	0.83	26,933	-228.8
MW027	11/23/2021	27.6	7.32	1.9	12126	87.1
MW027	18/01/2022	27.6	7.32	1.9	12,126	87.1
MW027	21/06/2022	26.9	7.26	1.92	12,460	72.1
MW101	28/02/2018	29.8	7.24	0.19	21,519	-270.2
MW101	16/06/2018	29.3	7.26	0.06	17,762	-259.8
MW101	16/10/2018	27.5	7.53	0.05	19,640	
MW101	27/08/2019	26.4	7.11	0	23,481	
MW101	25/06/2020	30.8	7.16	0.59	27,221	-218.4
MW101	18/11/2020	28.7	7.11	4.09	27,325	-156.9
MW101	23/06/2021	24.6	7.38	0.98	12,612	-263.4
MW101	11/23/2021	29.6	7.3	0.56	20043	-231.4
MW101	18/01/2022	29.6	7.3	0.56	20,043	-231.4
MW101	21/06/2022	26.2	8	0.66	3,722	-238.9
MW102	28/02/2018	30.4	7.4	0.36	15,358	-31.2
MW102	16/06/2018	29.5	7.2	0.09	17,975	-73.2
MW102	27/08/2019	28.2	7.37	4.63	26,341	
MW102	25/06/2020	27.8	7.17	0.66	27,697	-159.7
MW102	18/11/2020	28.1	7.11	0.81	26,164	-93.2
MW102	22/06/2021	26.5	7.84	1.99	7,129	74.5
MW102	11/23/2021	28	7.31	0.64	24717	-80.1
MW102	18/01/2022	28	7.31	0.64	24,717	-80.1
MW102	21/06/2022	26.8	7.76	1.54	7,942	-85.6
MW103	28/02/2018	29.8	7.41	0.34	12,916	-13
MW103	16/06/2018	29.3	7.06	0.11	16,267	-83.9
MW103	25/08/2019	28.1	7.24	0.12	10,101	
MW103	28/11/2019	28.2	7.57	2.79	12,896	-32.9
MW103	25/06/2020	27.1	7.26	1.07	19,519	-82.7
MW103	18/11/2020	28.8	7.22	1.27	24,780	-118
MW103	22/06/2021	25.6	7.48	1.44	15,212	70.7
MW103	11/23/2021	28.9	7.32	0.79	22702	-42.2
MW103	18/01/2022	28.9	7.32	0.79	22,702	-42.2
MW103	21/06/2022	25.9	7.71	1.32	9,610	37.6
MW104	28/02/2018	32.5	7.56	0.55	14,530	-218.3
MW104	28/02/2018	30.7	7.34	0.58	32,008	-173.9
MW104	18/06/2018	28.8	7.56	0.08	16,265	-173
MW104	18/06/2018	29	7.44	0.17	15,296	-95.5
MW104	18/06/2018	28.6	7.33	0.26	31,465	-156.2
MW104	18/06/2018	27.2	7.71	6.14	5,409	-2.2
MW104	28/11/2019	28.5	7.62	2.53	13,371	-39.9
MW104	25/06/2020	29	7.4	1.79	15,518	-182.1
MW104	18/11/2020	27.8	7.62	1.75	17,742	27
MW104	22/06/2021	22.8	7.74	2.37	18,136	46.7
MW104	11/23/2021	29.9	7.62	1.02	18842	-345.7
MW104	18/01/2022	29.9	7.62	1.02	18,842	-345.7
MW104	21/06/2022	26.8	7.82	3.58	5,714	-58.3
MW105	3/03/2018	30.9	7.04	0.05	32,660	-284.3
MW105	3/03/2018	30.2	7.37	0.06	27,320	-178.5
MW105	3/03/2018	30.7	7.27	0.08	32,590	-257.6
MW105	2/06/2018	29.1	8.81	0.14	30,387	
MW105	2/06/2018	28.7	9.68	0.21	35,675	
MW105	2/06/2018	28.5	9.46	0.23	9,974	
MW105	13/10/2018	28.5	7.41	0	30,165	
MW105	29/08/2019	26.9	7.24	0.1	32,044	
MW105	28/11/2019	29.1	7.4	3.94	31,389	15.4
MW105	26/06/2020	27.8	7.37	1.98	28,761	-131.7
MW105	17/11/2020	33.6	7.42	0.79	42,161	-119.8
MW105	22/06/2021	27.5	7.53	2.54	15,597	-68
MW105	11/23/2021	28.9	7.63	1.05	31853	-55.8
MW105	18/01/2022	28.9	7.63	1.05	31,853	-55.8
MW105	21/06/2022	25.9	7.52	3.41	29,474	55.7
MW107	3/03/2018	25.5	8.13	0.25	54,125	-24.5
MW107	3/03/2018	25.2	7.98	2.37	54,044	-9.9
MW107	17/06/2018	27	7.88	0.49	55,010	-146.7
MW107	17/06/2018	27.1	7.85	2.75	55,022	-93.1

		Field Parameters				
		Temperature (Field)	pH (Field)	DO (Field)	Electrical Conductivity (field)	Redox Potential (Field)
		°C	pH Units	mg/L	µS/cm	mV
Location ID	Date					
MW107	8/10/2018	28.1	7.55	111.8	48,307	
MW107	22/08/2019	27.4	7.19	0.48	18,464	
MW107	30/11/2019	29.1	7.57	3.2	56,570	-406.3
MW107	26/06/2020	26.5	7.44	1.58	54,126	42.9
MW107	17/11/2020	30.3	7.5	1.52	55,033	-2
MW107	22/06/2021	20.3	7.56	4.06	52,872	14.7
MW107	11/23/2021	27.8	7.38	0.71	52824	-243.2
MW107	18/01/2022	27.8	7.38	0.71	52,824	-243.2
MW107	21/06/2022	26.1	7.55	1.87	51,083	50.2
MW109	1/03/2018	25.3	7.72	4.71	55,019	-0.5
MW109	26/08/2019	25	7.39	7.1	49,602	
MW109	30/11/2019	29.7	7.57	2.25	59,279	-411
MW109	27/06/2020	25.8	7.51	4.01	53,797	-34.1
MW109	18/11/2020	28.4	7.69	3.09	62,657	-61.7
MW109	22/06/2021	23	7.57	3.69	53,084	74.8
MW109	11/24/2021	26.3	7.74	8.23	48490	5.6
MW109	18/01/2022	26.3	7.74	8.23	48,490	5.6
MW109	21/06/2022	26.7	7.56	4.21	48,963	26.3
MW110	1/03/2018	26.6	8.36	4.05	54,447	6.9
MW110	20/06/2018	27.6		1.9	53,473	-156.9
MW110	20/06/2018	27		3.22	27,884	-68.3
MW110	26/08/2019	26.4	7.4	4.9	30,702	
MW110	26/06/2020	27.6	7.42	3.07	51,376	-74.6
MW110	18/11/2020	29.1	7.59	2.1	61,560	-108.1
MW110	22/06/2021	22.3	7.67	3.01	31,422	-28.4
MW110	11/24/2021	26.9	7.63	3.02	27565	-43.2
MW110	18/01/2022	26.9	7.63	3.02	27,565	-43.2
MW110	21/06/2022	26.9	7.6	4.37	43,448	21.1
MW111	3/03/2018	27.1	8.23	1.73	52,908	-11.6
MW111	17/06/2018	28.4	7.76	1.57	46,321	1
MW111	17/06/2018	28.2	7.92	1.62	55,172	-111.9
MW111	8/10/2018	31.5	7.9	2.65	41,699	
MW111	22/08/2019	28.4	7.41	2.22	46,689	
MW111	28/11/2019	29.7	7.58	5.6	21,874	-54
MW111	26/06/2020	27.8	7.42	3.38	45,245	21.1
MW111	18/11/2020	28.9	7.65	1.76	57,640	-226.6
MW111	22/06/2021	21.3	7.78	0.55	53,150	-313.6
MW111	11/23/2021	30.2	7.34	0.39	53016	-281.8
MW111	18/01/2022	30.2	7.34	0.39	53,016	-281.8
MW111	21/06/2022	25.8	7.38	2.56	27,997	49.3
MW112	3/03/2018	26.5	7.73	1.02	55,225	-13.7
MW112	3/03/2018	26.8	7.82		54,980	-138.2
MW112	3/03/2018	26.9	7.76		54,249	-32.3
MW112	17/06/2018	27.7	7.79	0.03	54,437	-132.2
MW112	17/06/2018	27.6	7.76	0.09	55,159	-243.3
MW112	17/06/2018	27.9	7.97	1.11	34,429	-45.7
MW112	17/06/2018	27.6	7.78	1.29	55,206	-50.5
MW112	28/11/2019	28.4	7.5	1.51	55,973	-7.5
MW112	26/06/2020	27.5	7.5	1.68	51,703	-174.9
MW112	18/11/2020	27.3	4.57	1.96	59,319	244.2
MW112	22/06/2021	20.6	7.68	4.43	53,824	89.4
MW112	11/23/2021	28.7	7.74	2.63	53831	17.4
MW112	18/01/2022	28.7	7.74	2.63	53,831	17.4
MW112	21/06/2022	25.9	7.79	3.53	53,371	50
MW113	1/03/2018	26.5	7.61	0.01	55,349	-127.7
MW113	1/03/2018	26.4	7.68	0.23	55,184	-67.2
MW113	17/06/2018	27.6	7.63	0.21	56,716	-250.2
MW113	17/06/2018	27.8	7.73	0.32	56,677	-272.4
MW113	17/06/2018	28.3	7.7	1.27	56,219	-27.5
MW113	28/11/2019	30.5	7.22	9.91	1,333	1,058
MW113	25/06/2020	25.4	7.82	2.92	53,514	-6.3
MW113	18/11/2020	28.5	7.72	1.03	584	172.3
MW113	22/06/2021	25.7	7.67	4.27	29,895	135.3
MW113	11/23/2021	28.6	7.61	5.39	29068	-22.5
MW113	18/01/2022	28.6	7.61	5.39	29,068	-22.5
MW113	21/06/2022	26.5	7.83	3.14	33,708	-95.1
MW114	28/02/2018	26.7	7.64	0.22	53,127	-92.2
MW114	28/02/2018	26.6	7.66	0.5	55,911	-129
MW114	28/02/2018	27.1	7.72		53,840	70.9
MW114	17/06/2018	27.3	7.63	0.36	55,807	-163.7
MW114	17/06/2018	29.3	7.79	0.39	5,948	-96.5
MW114	17/06/2018	27.9	7.59	2.04	55,185	48.3
MW114	17/06/2018	27.8	7.66	2.52	56,159	-114
MW114	28/11/2019	30.3	7.52	8.83	4,800	1,070
MW114	25/06/2020	25.1	7.82	1	54,412	-112.6
MW114	18/11/2020	28.3	7.61	2.18	54,934	138
MW114	22/06/2021	27.2	7.81	5.38	30,347	133.5
MW114	11/23/2021	29.4	7.58	5.17	29104	-18.2
MW114	18/01/2022	29.4	7.58	5.17	29,104	-18.2
MW114	21/06/2022	26.6	7.82	7.7	682	-81.7
MW115	2/03/2018	26.9	7.76	0.09	50,980	-88.2
MW115	2/03/2018	27	7.63	0.17	54,894	-98.7
MW115	2/03/2018	26.1	7.69	0.57	53,980	-93.6
MW115	17/06/2018	28.5	6.98	0.16	51,200	-96.6
MW115	17/06/2018	28.2	7	0.16	51,487	-139.9
MW115	17/06/2018	27.8	7.01	0.19	53,115	-120.9
MW115	17/06/2018	27.6	6.98	0.28	53,062	-149.7
MW115	28/11/2019	27.5	7.46	2.02	26,039	28.1
MW115	25/06/2020	24.6	7.73	2.07	51,870	31.3
MW115	18/11/2020	28.7	7.57	1.35	64,480	156.8
MW115	22/06/2021	23.8	7.88	4.73	42,122	130.5
MW115	11/23/2021	31.4	8.13	4.31	16767	3.7
MW115	18/01/2022	31.4	8.13	4.31	16,767	3.7
MW115	21/06/2022	26.7	7.74	2.36	41,060	-125.9
MW116	3/03/2018	29.7	7.59	0.17	45,420	-145.2
MW116	3/03/2018	32	7.6	0.18	32,520	-174.9
MW116	3/03/2018	28.7	7.7	1.01	34,355	-129.8
MW116	17/06/2018	27.8	6.87	0.38	55,339	-23.5
MW116	17/06/2018	27	6.87	0.76	53,955	28.5
MW116	17/06/2018	27.3	6.89	1.58	56,151	-7.7
MW116	17/06/2018	26.5	6.89	3.81	47,409	39.6
MW116	28/11/2019	24.8	7.54	7.1		
MW116	25/06/2020	21.9	7.91	2.92	50,898	40.8
MW116	22/06/2021	24.6	7.86	4.37	36,072	146.9
MW116	11/23/2021	24.6	7.81	4.83	55074	54.3
MW116	18/01/2022	24.6	7.81	4.83	55,074	54.3
MW116	21/06/2022	25.5	7.78	2.88	50,680	-102.6
MW117	3/03/2018	26	7.56	0.19	49,600	-132.2
MW117	3/03/2018	25.7	7.64	0.84	53,600	-113.8
MW117	3/03/2018	25.6	7.6	0.9	53,500	-107.3
MW117	17/06/2018	27.1	6.96	1.14	55,731	24.3
MW117	17/06/2018	26.9	6.96	1.41	55,272	30.6
MW117	17/06/2018	28.3	6.98	2.03	56,174	33.1

		Field Parameters				
		Temperature (Field)	pH (Field)	DO (Field)	Electrical Conductivity (field)	Redox Potential (Field)
		°C	pH Units	mg/L	µS/cm	mV
Location ID	Date					
MW117	17/06/2018	28.3	7.02	2.73	55,138	41.2
MW117	28/11/2019	23.8	7.9	6.43	1,468	32.2
MW117	23/06/2020	28.2	7.45	2.74	53,907	-88.9
MW117	17/11/2020	28.7	7.73	4.1	54,013	191.2
MW117	22/06/2021	24.1	7.72	3.22	38,020	139.9
MW117	11/23/2021	25.6	8.33	6.96	6465	-26.1
MW117	18/01/2022	25.6	8.33	6.96	6,465	-26.1
MW117	21/06/2022	24.9	7.82	3.91	8,724	-154.2
MW119	1/03/2018	33.1	7.37	0.13	19,840	-144.8
MW119	17/06/2018	29.4	7.43	0.17	25,789	-111.9
MW119	26/08/2019	28.4	7.3	0.12	29,882	
MW119	28/11/2019	28.6	7.51	2.87	17,077	-39.3
MW119	25/06/2020	27.4	7.35	1.64	23,063	-110
MW119	17/11/2020	2.4	8.34	1.95	98,983	-94.8
MW119	23/06/2021	25.2	7.63	1.53	27,112	-117.1
MW119	11/23/2021	28.7	7.44	0.94	25175	-26.2
MW119	18/01/2022	28.7	7.44	0.94	25,175	-26.2
MW119	21/06/2022	26.6	7.52	1.64	24,709	-158.6
MW123	28/02/2018	31.1	7.31	0.05	60,500	-210.6
MW123	15/06/2018	28.2	7.33	0.04	64,541	-133.6
MW123	28/11/2019	28.9	7.2	1.8	34,262	157
MW123	25/06/2020	27.6	7.13	0.94	59,337	-107.8
MW123	18/11/2020	28.1	7.22	0.86	81,271	-80.5
MW123	11/23/2021	28.3	7.35	0.42	70621	-56.7
MW123	18/01/2022	28.3	7.35	0.42	70,621	-56.7
MW129	28/11/2019	27.2	7.68	4.17	47,120	45.6
MW129	23/06/2020	27.3	7.45	3.55	44,189	-13.9
MW129	17/11/2020	29.4	6.93	1.1	53,939	-106.8
MW129	22/06/2021	23.2	7.33	1.73	26,907	57.8
MW129	11/23/2021	28.5	7.37	2	49658	-103.3
MW129	18/01/2022	28.5	7.37	2	49,658	-103.3
MW129	21/06/2022	25.2	7.39	2.69	50,987	-10.5
MW130	28/11/2019	27.4	7.22	2	51,288	-107.5
MW130	23/06/2020	25.1	7.47	1.69	49,022	17.1
MW130	17/11/2020	28.2	7.22	2.61	50,748	4.5
MW130	22/06/2021	21.9	7.32	3.5	31,585	105.3
MW130	11/23/2021	27.5	7.51	3.9	48679	62
MW130	18/01/2022	27.5	7.51	3.9	48,679	62
MW130	21/06/2022	25	7.38	2.85	51,622	21.9
MW134	28/11/2019	29.8	7.34	1.76	45,162	-32.7
MW134	23/06/2020	27.1	7.4	2.1	41,773	120.5
MW134	17/11/2020	27.4	7.12	1.86	41,465	41.8
MW134	22/06/2021	22.4	7.41	1.38	43,477	63.3
MW134	11/23/2021	30.2	7.45	1.74	43202	41.5
MW134	18/01/2022	30.2	7.45	1.74	43,202	41.5
MW134	21/06/2022	27.1	7.48	2.12	40,802	19
MW202	3/03/2018	27.4	7.64	0.84	43,896	-152.8
MW202	28/11/2019	30.2	7.4	3.06	20,936	-167
MW202	26/06/2020	27.5	7.36	2.41	43,602	-133.6
MW202	18/11/2020	28.6	7.7	1.08	47,777	-136.6
MW202	22/06/2021	24.4	7.72	4.8	27,869	116.6
MW202	11/23/2021	28.1	7.01	0.02	42415	-326.3
MW202	18/01/2022	28.1	7.01	0.02	42,415	-326.3
MW202	21/06/2022	27.5	7.56	2.4	45,276	-262.2
MW210	28/02/2018	27.2	7.29	0.06	26,097	-73.8
MW210	13/06/2018	28.5	7.38	0.37	24,805	-144.9
MW210	28/11/2019	28.5	7.37	3.51	25,060	12.5
MW210	18/03/2020	30.5	7.45	2.43	24,296	
MW210	26/06/2020	27.3	7.36	1.5	23,993	-112.4
MW210	17/11/2020	29.2	7.9	1.52	30,426	-73.7
MW210	22/06/2021	26.9	7.44	0.78	27,551	20.7
MW210	11/23/2021	28.1	7.84	2.58	12272	-10.7
MW210	18/01/2022	28.1	7.84	2.58	12,272	-10.7
MW210	21/06/2022	24.3	8.43	4.92	1,062	43.9
MW212	3/03/2018	30.2	7.46	0.14	27,470	-149.2
MW212	2/06/2018	28.9	9.19	0.12	26,826	-149
MW212	13/10/2018	28.1	7.51	0	30,183	
MW212	23/08/2019	28	7.31	0.09	34,067	
MW212	28/11/2019	30	7.53	4.45	28,179	25.5
MW212	18/03/2020	31.2	7.03	2.24	32,903	
MW212	26/06/2020	27.9	7.42	1.71	26,845	-109.5
MW212	17/11/2020	30	7.33	1.71	37,518	14.9
MW212	22/06/2021	26.5	7.52	0.87	28,374	53.1
MW212	11/23/2021	27.4	7.49	1.1	27271	131.5
MW212	18/01/2022	27.4	7.49	1.1	27,271	131.5
MW212	21/06/2022	26.3	7.83	2.85	7,000	46.9
MW213	23/02/2018	29.5	7.14	0.6	5,220	-77.2
MW213	16/06/2018	29.2	7.3	0.23	6,257	-127
MW213	6/10/2018	28.2	7.89	0.99	4,130	
MW213	29/08/2019	26.2	7.63	1	5,115	
MW213	28/11/2019	28	7.82	3.81	4,292	-48
MW213	25/06/2020	28.2	7.62	2.56	6,261	-185.8
MW213	18/11/2020	27.3	8.12	3.19	9,389	38.3
MW213	23/06/2021	23.6	7.35	2.1	5,367	-51.3
MW213	11/23/2021	26.7	7.49	1.65	3647	79.5
MW213	18/01/2022	26.7	7.49	1.65	3,647	79.5
MW213	21/06/2022	25.7	7.56	1.32	4,377	39.6
MW214	27/02/2018	30.1	7.69	0.68	2,749	
MW214	16/06/2018	29.3	7.69	0.26	4,795	
MW214	9/10/2018	28	7.68	0.3	4,192	
MW214	29/08/2019	28.1	7.38	0.52	4,088	
MW214	28/11/2019	27.9	8.02	2.97	4,584	-48
MW214	22/06/2021	25.2	8.25	3.9	5,867	103.1
MW214	11/23/2021	27.1	7.9	1.56	3160	90.4
MW214	18/01/2022	27.1	7.9	1.56	3,160	90.4
MW214	21/06/2022	26	8.18	3.73	855	-2.6
MW217	2/03/2018	27	7.45	3.92	70,327	-3.5
MW217	18/06/2018	28.7	7.57	3.03	47,418	65.6
MW217	28/11/2019	27.8	7.4	7.8	1,104	28.7
MW217	26/06/2020	27.6	7.45	2.15	39,145	47.6
MW217	18/11/2020	25.5	7.67	2.3	37,920	127.2
MW217	22/06/2021	24.4	7.62	3.58	43,182	136.8
MW217	11/23/2021	26	7.3	1.94	39274	133.6
MW217	18/01/2022	26	7.3	1.94	39,274	133.6
MW217	21/06/2022	26.6	7.83	1.47	15,675	-157.8
MW218	2/03/2018	26	7.63	0.18	25,438	-9.7
MW218	18/06/2018	27.8	7.66	1.46	22,768	53.1
MW218	28/11/2019	37.6	7.72	7.46	1,103	155
MW218	26/06/2020	27.4	7.65	3.49	23,708	14.4
MW218	17/11/2020	27.4	7.39	3.53	29,933	-24
MW218	22/06/2021	25.6	7.86	4.39	10,748	119.4
MW218	11/23/2021	26.7	7.66	3.74	19129	124.4
MW218	18/01/2022	26.7	7.66	3.74	19,129	124.4

		Field Parameters				
		Temperature (Field)	pH (Field)	DO (Field)	Electrical Conductivity (field)	Redox Potential (Field)
		°C	pH Units	mg/L	µS/cm	mV
Location ID	Date					
MW218	21/06/2022	26.5	8.22	2.06	5,876	-157.6
OTH002	27/06/2020	24.5	8.19	4.82	54,000	54
OTH002	17/11/2020	28.6	8.13	4.17	55,836	82.4
OTH002	22/06/2021	21.4	7.87	4.63	54,620	47.2
OTH002	11/23/2021	25.7	8.11	4.38	54923	18.8
OTH101	20/06/2018	21.5	8.3	5.62	49,259	
OTH101	28/11/2019	29.4	7.88	5.24	23,998	-53.9
OTH101	27/06/2020	24.4	8.18	4.94	53,222	52.6
OTH101	18/11/2020	29.1	8.15	4.67	63,065	2.7
OTH101	22/06/2021	21.6	8.1	5.05	29,512	-62.9
OTH101	11/24/2021	24.2	8.17	5.56	54645	18
OTH101	21/06/2022	24.4	8.17	5.37	54,108	-181.7
OTH102	20/06/2018	21.1	8.36	5.29	48,596	
OTH102	28/11/2019	28.8	8.08	5.46	23,737	-48.8
OTH102	28/06/2020	24.5	8.23	5	53,630	52.9
OTH102	18/11/2020	27.5	8.21	4.3	61,330	7.3
OTH102	22/06/2021	22.3	8.08	4.07	54,611	-163.5
OTH102	11/23/2021	26.8	8.25	4.68	54368	91.6
OTH102	21/06/2022	24.6	8.19	4.71	54,071	-173.7
OTH103	27/06/2020	23.9	8.2	5.27	53,807	54
OTH103	17/11/2020	28.4	8.21	4.84	29,130	94.2
OTH103	22/06/2021	19.4	7.97	5.37	54,942	60.7
OTH103	11/23/2021	26.9	8.11	3.55	55057	35.2
OTH103	21/06/2022	23.2	8.06	4.6	54,674	50.1
OTH104	9/06/2018	22.5	8.32	5.88	53,000	
OTH104	28/11/2019	29.4	8.05	3.77	59,053	-395.8
OTH104	27/06/2020	24.7	8.18	5.11	54,104	56.1
OTH104	18/11/2020	26.3	7.88	1.49	60,892	93.1
OTH104	22/06/2021	21.6	8.05	4.85	55,187	117.1
OTH104	11/23/2021	26.1	8.07	4.82	54374	36.6
OTH104	21/06/2022	23.4	7.99	4.51	54,977	49.9
OTH105	9/06/2018	22.7	8.32	4.16	50,815	
OTH105	28/11/2019	30.6	7.94	6.15	60,226	-47.8
OTH105	27/06/2020	24.2	8.19	12.38	53,852	55.3
OTH105	17/11/2020	28.6	8.18	5.34	54,876	167.6
OTH105	22/06/2021	22.1	8.05	4.72	55,423	127.2
OTH105	11/23/2021	25.9	8.04	5.58	55072	2.5
OTH105	21/06/2022	21.8	8	5.44	54,057	-57.6
OTH106	9/06/2018	22.7	8.32	4.33	51,155	
OTH106	28/11/2019	32.9	7.96	3.15	62,938	-337.1
OTH106	27/06/2020	24.6	8.1	4.97	54,272	54.7
OTH106	17/11/2020	28	8.19	4.27	8.19	170.4
OTH106	22/06/2021	19.3	8.09	5.78	28,920	133.1
OTH106	11/23/2021	26.8	8.05	5.54	55104	-3
OTH106	21/06/2022	21.5	8.08	5.02	53,934	-56.2
OTH107	23/06/2018	20.1	8.33	4.91	47,999	
OTH107	28/11/2019	32.2	7.05	2.77	61,951	-364.2
OTH107	27/06/2020	24.1	8.13	6.6	54,195	51.9
OTH107	17/11/2020	28.4	8.18	4.28	55,681	186.7
OTH107	22/06/2021	18.4	8.05	6.13	55,382	132.6
OTH107	11/23/2021	26.1	8.03	5.76	55084	-2.2
OTH107	21/06/2022	21.3	7.99	4.4	54,230	-68.1
OTH108	28/11/2019	33.8	6.43	3.9	64,330	86
OTH108	17/11/2020	30.4	8.13	3.66	55,493	190.3
OTH108	22/06/2021	17.4	7.99	6.04	36,420	136.3
OTH108	11/23/2021	24.5	8.03	5.55	54390	51
OTH108	21/06/2022	21.3	7.78	4.93	52,813	-70.7
OTH109	20/06/2018	21.1	8.37	5.65	48,894	
OTH109	28/11/2019	27.9	8.03	4.79	58,036	12.5
OTH109	26/06/2020	27.3	8.09	4.01	53,044	-154.1
OTH109	18/11/2020	28.5	8.22	3.73	62,615	-15.9
OTH109	22/06/2021	24.1	7.99	4.22	51,999	116.7
OTH109	11/24/2021	24.2	8.18	5.55	54800	-4.6
OTH109	21/06/2022	24.3	8.22	4.98	53,602	-155.4
OTH110	20/06/2018	21.1	8.34	4.52	48,751	
OTH110	28/11/2019	31.1	8.04	2.76	61,428	17.3
OTH110	26/06/2020	27.6	8.11	3.68	53,620	-110.5
OTH110	18/11/2020	28.4	8.21	1.1	61,587	7.1
OTH110	22/06/2021	22.9	8	4.58	54,161	88.5
OTH110	11/24/2021	24.4	8.15	5.49	54795	-3.5
OTH110	21/06/2022	25.1	8.14	5.49	53,846	-148.1
OTH113	10/06/2018	22.4	8.08	4.67	50,028	
OTH113	28/11/2019	27.6	8.42	4.49	57,149	35.8
OTH113	28/06/2020	24.7	8.17	4.69	52,667	59.1
OTH113	17/11/2020	26.6	7.86	4.35	55,753	50
OTH113	22/06/2021	20.8	8.1	3.99	54,859	94.9
OTH113	11/23/2021	26.3	8.29	4.37	54459	61
OTH113	21/06/2022	25.3	8.17	4.75	53,566	8.9

		Field Parameters				
		Temperature (Field)	pH (Field)	DO (Field)	Electrical Conductivity (field)	Redox Potential (Field)
		°C	pH Units	mg/L	µS/cm	mV
Location Code	**Date**					
SW112	**28/02/2018**	35.1	8.46	2.59	142,300	-109.6
SW112	**8/06/2018**	19.3	7.38	4.16	11,535	85.6
SW112	**28/11/2019**	37.4	7.25	0.39	279,596	172.6
SW112	**26/05/2020**	22.9	8.07	3.49	83,592	165.5
SW112	**25/06/2020**	25.9	8.13	2.49	106,531	-119.1
SW112	**18/11/2020**	27.7	7.63	1.26	236,394	97.8
SW112	**5/03/2021**	26.4	7.38	2.11	27,607	142.2
SW112	**22/06/2021**	20.5	8.02	5.83	71,983	118
SW112	**16/05/2022**	21.7	7.9	4.76	16,889	62
SW112	**21/06/2022**	23.7	8.34	6.08	10,276	52
SW113	**1/03/2018**	32.6	7.8	1.92	4,870	-88.6
SW113	**4/06/2018**	24.6	7.12	4.85	1,240	110.9
SW113	**26/05/2020**	24	7.28	1.13	3,879	168.1
SW113	**5/03/2021**	25.1	8.58	3.07	1,120	120.4
SW113	**23/06/2021**	13.5	8.07	7.07	485.9	17.5
SW113	**23/11/2021**	24.4	6.91	0.72	1,507	96.6
SW113	**16/05/2022**	22.4		6.06	1,137	200.9
SW113	**21/06/2022**	20.2	7.77	4.53	663	52
SW120	**8/06/2018**	21.9	7.91	6.26	9,471	118
SW120	**27/05/2020**	25.5	8.16	3.81	81,516	156.1
SW120	**3/03/2021**	27.4	7.7	2.7	18,663	113.4
SW120	**22/06/2021**	18.5	8.21	6.71	26,081	95.2
SW120	**16/05/2022**	23.6	7.69	4.83	18,636	64.3
SW120	**21/06/2022**	24.4	8.06	6.78	23,388	13.4
SW126	**8/06/2018**	24.8	7.81	4.02	7,414	-99.3
SW126	**21/06/2022**	25.7	8.45	7.98	8,192	52.7
SW127	**6/06/2018**	25.5	7.33	3.89	4,760	-11.2
SW127	**26/05/2020**	23.8	8.38	5.4	46,810	147.6
SW127	**3/03/2021**	30.8	8.01	2.98	15,376	82.1
SW127	**22/06/2021**	15.9	8.05	7	21,870	129.4
SW127	**16/05/2022**	22.5		5.64	8,541	243.5
SW127	**21/06/2022**	23.1	8.17	5.5	19,818	51
SW128	**4/06/2018**	28.3	7.47	5	169,602	55.6
SW128	**27/05/2020**	24.2	8.4	3.27	62,435	141.9
SW128	**3/03/2021**	30.3	8.14	4.6	18,145	113.6
SW128	**22/06/2021**	15	8.14	6.79	14,142	119.2
SW128	**23/11/2021**	36.5	7.71	0.17	233,502	92.7
SW128	**16/05/2022**	26.3		5.16	13,511	69.7
SW128	**21/06/2022**	25.4	8.2	5.21	21,935	56.6

Table 4 - Water Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perf		
						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)	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)
						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						0.0004	0.001	0.0002	0.001	0.0002	0.002	0.002	0.002	0.0004	0.0004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0004	0.0004	0.001	0.004	0.004	0.002
PFAS NEMP 2020 Interim Marine 99%										0.00023						19													
PFAS NEMP 2020 Recreational Water																**10**													
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																								
Pol Storage	**MW004**	**11/23/2021**	**0083_MW004_211123**	**Normal**	**EP2114296**	<0.02	<0.02	0.03	<0.02	0.21	<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	<0.05	<0.02	<0.05	<0.02
	MW004	**6/21/2022**	**0083_MW004_220621**	**Normal**	**EP2207624**	<0.02	<0.02	0.02	<0.02	0.35	<0.02	<0.1	<0.02	0.02	0.04	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
Pol Storage	**MW008**	**2/28/2018**	**0083_MW8_180228**	**Normal**	**207612**	0.012	0.016	0.23	0.022	1.9	<0.002	0.027	0.047	0.13	0.035	0.05	0.005	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.04	0.097	<0.001	<0.01	<0.005	0.003
	MW008	**6/16/2018**	**0083_MW8_180616**	**Normal**	**212374**	0.082	0.12	2.0	0.15	13	0.034	0.20	0.43	1.0	0.29	0.36	0.050	0.009	<0.002	<0.01	<0.02	<0.05	0.001	0.24	0.26	<0.001	0.07	<0.02	<0.002
	MW008	**11/30/2019**	**0083_MW8_7.5-8.0_191130**	**Normal**	**EP1912681**	0.08	0.10	1.50	0.08	7.42	<0.02	0.6	1.79	2.52	1.40	0.51	0.08	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.31	0.16	<0.05	0.02	<0.05	<0.02
	MW008	**3/17/2020**	**MW08_200317**	**Normal**	**EP2002947**	<0.02	<0.02	0.06	<0.02	0.56	<0.02	<0.1	0.06	0.07	0.03	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
	MW008	**6/26/2020**	**0083_MW008_200626**	**Normal**	**EP2006686**	0.07	0.08	1.07	0.04	7.47	<0.02	0.3	0.92	1.18	0.59	0.27	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.30	0.25	<0.05	0.04	<0.05	<0.02
	MW008	**6/26/2020**	**0083_QC101_200626**	**Field Duplicate**	**EP2006686**	0.06	0.07	1.00	0.05	7.28	<0.02	0.3	0.89	1.13	0.56	0.26	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.31	0.24	<0.05	0.04	<0.05	<0.02
	MW008	**6/26/2020**	**0083_QC201_200626**	**Interlab Duplicate**	**729409**	0.05	0.07	0.75	0.04	6.3	<0.01	0.26	0.62	0.79	0.38	0.18	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.24	0.12	<0.01	<0.05	<0.05	<0.05
	MW008	**11/17/2020**	**0083_MW008_201117**	**Normal**	**EP2012749**	<0.02	<0.02	<0.02	<0.02	0.40	<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	<0.05	<0.02	<0.05	<0.02
	MW008	**6/22/2021**	**0083_MW008_210622**	**Normal**	**EP2107184**	<0.02	<0.02	<0.02	<0.02	0.08	<0.02	<0.1	0.06	0.06	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.08	<0.05	<0.05	<0.02	<0.05	<0.02
	MW008	**11/23/2021**	**0083_MW008_211123**	**Normal**	**EP2114296**	<0.02	<0.02	0.01	<0.02	0.37	<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	<0.05	<0.02	<0.05	<0.02
	MW008	**6/21/2022**	**0083_MW008_220621**	**Normal**	**EP2207624**	<0.02	<0.02	<0.01	<0.02	0.62	<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	<0.05	<0.02	<0.05	<0.02
	MW008	**6/21/2022**	**0083_QC108_220621**	**Field Duplicate**	**EP2207624**	<0.02	<0.02	0.01	<0.02	0.62	<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	<0.05	<0.02	<0.05	<0.02
	MW008	**6/21/2022**	**0083_QC208_220621**	**Interlab Duplicate**	**901207**	<0.002	<0.002	0.019	0.003	0.43	<0.004	<0.008	0.006	0.007	<0.004	0.004	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.008	<0.008	0.017	<0.004	<0.004	<0.004	<0.004
Powerhouse	**MW017**	**2/28/2018**	**0083_MW17_180228**	**Normal**	**207612**	0.27	0.34	5.8	0.82	7.8	<0.01	2.5	7.2	8.1	2.6	2.1	0.08	<0.01	<0.01	<0.02	<0.05	<0.2	0.059	21	0.34	<0.005	<0.05	<0.02	<0.01
	MW017	**6/16/2018**	**0083_MW17_180616**	**Normal**	**212374**	0.24	0.27	5.8	0.77	12	<0.002	1.9	8.0	8.8	2.5	1.6	0.068	<0.002	<0.002	<0.005	<0.01	<0.05	0.048	24	0.30	<0.001	<0.02	<0.01	<0.002
	MW017	**11/28/2019**	**0083_MW17_191128**	**Normal**	**EP1912603**	0.17	0.19	2.96	0.52	14.2	<0.02	0.6	3.66	3.42	1.14	0.92	0.11	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	12.2	0.82	<0.05	<0.02	<0.05	<0.02
	MW017	**6/25/2020**	**0083_MW017_200625**	**Normal**	**EP2006683**	0.08	0.07	1.40	0.19	10.1	<0.02	1.0	3.34	3.42	1.32	0.78	0.06	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	7.12	0.49	<0.05	<0.02	<0.05	<0.02
	MW017	**6/25/2020**	**0083_QC103_200625**	**Field Duplicate**	**EP2006683**	0.08	0.08	1.47	0.20	10.4	<0.02	1.0	3.36	3.22	1.26	0.77	0.06	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	7.16	0.48	<0.05	<0.02	<0.05	<0.02
	MW017	**6/25/2020**	**0083_QC203_200625**	**Interlab Duplicate**	**729352**	0.06	0.13	1.5	0.22	9.0	<0.01	0.92	2.6	2.8	1.1	0.59	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.05	0.33	<0.01	<0.05	<0.05	<0.05
	MW017	**11/18/2020**	**0083_MW017_201118**	**Normal**	**EP2012802**	0.05	0.06	1.59	0.18	15.4	<0.02	1.0	3.89	3.35	1.34	0.80	0.08	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	3.38	0.30	<0.05	<0.02	<0.05	<0.02
	MW017	**6/22/2021**	**0083_MW017_210622**	**Normal**	**EP2107095**	0.04	0.05	0.98	0.17	9.72	<0.02	0.6	2.20	2.08	0.84	0.54	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	5.06	0.81	<0.05	<0.02	<0.05	<0.02
	MW017	**11/23/2021**	**0083_MW017_211123**	**Normal**	**EP2114300**	0.06	0.04	0.96	0.15	14.2	<0.02	0.6	1.93	2.38	0.77	0.50	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	5.20	0.88	<0.05	<0.02	<0.05	<0.02
	MW017	**6/21/2022**	**0083_MW017_220621**	**Normal**	**EP2207630**	0.13	0.13	2.59	0.15	9.45	<0.02	2.4	8.70	9.62	4.68	0.90	0.07	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	3.11	0.55	<0.05	<0.02	<0.05	<0.02
	MW017	**6/21/2022**	**0083_QC113_220621**	**Field Duplicate**	**EP2207630**	0.15	0.16	3.25	0.13	6.50	<0.02	3.0	10.7	11.5	5.27	1.08	0.06	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	2.84	0.36	<0.05	<0.02	<0.05	<0.02
	MW017	**6/21/2022**	**0083_QC213_220621**	**Interlab Duplicate**	**901207**	0.12	0.18	0.32	0.15	0.48	<0.004	0.017	1.1	1.4	0.62	0.16	0.069	0.001	<0.001	<0.001	<0.001	<0.001	<0.008	0.13	0.006	<0.004	<0.004	<0.004	<0.004
Powerhouse	**MW019**	**2/23/2018**	**0083_MW19_180223**	**Normal**	**207659**	0.022	0.012	0.10	<0.001	0.016	<0.002	0.072	<0.002	0.046	0.040	<0.001	<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
	MW019	**6/16/2018**	**0083_MW19_180616**	**Normal**	**212374**	0.014	0.013	0.077	<0.001	0.016	<0.002	<0.02	0.027	0.028	<0.01	<0.01	<0.01	<0.02	<0.04	<0.1	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.1	<0.1	<0.02
	MW019	**3/17/2020**	**MW19_200317**	**Normal**	**EP2002947**	<0.02	<0.02	0.06	<0.02	<0.01	<0.02	<0.1	0.05	<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
	MW019	**6/25/2020**	**0083_MW019_200625**	**Normal**	**EP2006683**	<0.02	<0.02	0.07	<0.02	0.03	<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	<0.05	<0.02	<0.05	<0.02
	MW019	**11/18/2020**	**0083_MW019_201118**	**Normal**	**EP2012802**	<0.02	<0.02	0.03	<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	<0.05	<0.02	<0.05	<0.02
	MW019	**6/23/2021**	**0083_MW019_210623**	**Normal**	**EP2107188**	<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	<0.05	<0.02	<0.05	<0.02
	MW019	**11/23/2021**	**0083_MW019_211123**	**Normal**	**EP2114296**	<0.02	<0.02	0.05	<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	<0.05	<0.02	<0.05	<0.02
	MW019	**6/21/2022**	**0083_MW019_220621**	**Normal**	**EP2207630**	<0.02	<0.02	0.09	<0.02	0.02	<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	<0.05	<0.02	<0.05	<0.02
Powerhouse	**MW027**	**2/23/2018**	**0083_MW27_180223**	**Normal**	**207359**	0.022	0.020	0.39	0.008	0.14	<0.002	0.10	0.23	0.30	0.15	0.031	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
	MW027	**6/16/2018**	**0083_MW27_180616**	**Normal**	**212374**	0.018	0.019	0.20	0.003	0.088	<0.002	0.046	0.12	0.089	0.059	0.012	0.003	<0.004	<0.004	<0.01	<0.02	<0.05	<0.001	0.002	<0.001	<0.001	<0.1	<0.02	<0.004
	MW027	**11/28/2019**	**0083_MW27_191128**	**Normal**	**EP1912603**	0.03	<0.02	0.30	<0.02	0.09	<0.02	<0.1	0.15	0.12	0.07	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
	MW027	**11/28/2019**	**0083_QC101_191128**	**Field Duplicate**	**EP1912603**	<0.02	<0.02	0.33	<0.02	0.10	<0.02	0.2	0.22	0.14	0.06	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
	MW027	**11/28/2019**	**0083_QC201_191128**	**Interlab Duplicate**	**691456**	0.14	0.02	0.22	<0.01	0.09	<0.01	0.05	0.11	0.12	0.06	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	MW027	**6/25/2020**	**0083_MW027_200625**	**Normal**	**EP2006683**	<0.02	<0.02	0.23	<0.02	0.10	<0.02	<0.1	0.12	0.06	0.05	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
	MW027	**11/18/2020**	**0083_MW027_201118**	**Normal**	**EP2012802**	<0.02	<0.02	0.24	<0.02	0.09	<0.02	<0.1	0.04	0.08	0.04	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
	MW027	**6/23/2021**	**0083_MW027_210623**	**Normal**	**EP2107188**	<0.02	<0.02	0.17	<0.02	0.10	<0.02	<0.1	<0.02	0.03	0.04	<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
	MW027	**11/23/2021**	**0083_MW027_211123**	**Normal**	**EP2114296**	<0.02	<0.02	0.44	<0.02	0.12	<0.02	<0.1	0.19	0.21	0.12	0.03	<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
	MW027	**6/21/2022**	**0083_MW027_220621**	**Normal**	**EP2207630**	<0.02	0.02	0.66	<0.02	0.94	<0.02	<0.1	0.17	0.18	0.13	0.06	<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
Powerhouse	**MW101**	**2/28/2018**	**0083_MW101_180228**	**Normal**	**207612**	0.013	<0.005	0.45	<0.005	0.041	<0.01	0.67	0.21	0.29	0.22	0.11	<0.005	<0.01	<0.01	<0.02	<0.05	<0.2	<0.005	0.052	<0.005	<0.005	<0.5	<0.2	<0.1
	MW101	**2/28/2018**	**0083_QC2301_180228**	**Interlab Duplicate**	**588076**	0.02	0.04	0.37	<0.01	0.07	<0.01	0.15	0.31	0.22	0.11	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	MW101	**6/16/2018**	**0083_MW101_180616**	**Normal**	**212374**	0.022	0.016	0.49	<0.002	0.047	<0.004	0.25	0.40	0.32	0.17	0.047	<0.02	<0.04	<0.04	<0.1	<0.2	<0.2	<0.001	0.042	<0.001	<0.001	<0.2	<0.1	<0.04
	MW101	**6/25/2020**	**0083_MW101_200625**	**Normal**	**EP2006683**	<0.02	<0.02	0.17	<0.02	<0.01	<0.02	1.0	0.37	<0.02	0.12	0.03	<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
	MW101	**6/25/2020**	**0083_QC102_200625**	**Field Duplicate**	**EP2006683**	<0.02	<0.02	0.20	<0.02	<0.01	<0.02	1.1	0.28	<0.02	0.15	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
	MW101	**6/25/2020**	**0083_QC202_200625**	**Interlab Duplicate**	**729352**	0.02	<0.01	0.18	<0.01	0.03	<0.01	0.11	0.30	0.19	0.10	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	MW101	**11/18/2020**	**0083_MW101_201118**	**Normal**	**EP2012802**	<0.02	<0.02	0.25	<0.02	<0.01	<0.02	<0.1	<0.02	0.22	0.10	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
	MW101	**6/23/2021**	**0083_MW101_210623**	**Normal**	**EP2107188**	0.02	<0.02	0.31	<0.02	<0.01	<0.02	<0.1	<0.02	0.29	0.23	0.05	<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
	MW101	**11/23/2021**	**0083_MW101_211123**	**Normal**	**EP2114295**	<0.02	<0.02	0.28	<0.02	<0.01	<0.02	<0.1	<0.02	0.20	0.14	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
	MW101	**6/21/2022**	**0083_MW101_220621**	**Normal**	**EP2207630**	<0.02	<0.02	0.20	<0.02	0.11	<0.02	<0.1	0.17	0.18	0.12	0.04	<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
Powerhouse	**MW102**	**2/28/2018**	**0083_MW102_180228**	**Normal**	**207612**	0.055	0.049	0.66	<0.005	0.084	<0.01	0.54	1.3	0.85	0.55	0.12	0.013	<0.01	<0.01	<0.02	<0.05	<0.2	<0.005	0.016	<0.005	<0.005	<0.05	<0.02	<0.01
	MW102	**6/16/2018**	**0083_MW102_180616**	**Normal**	**212374**	0.037	0.031	0.50	0.006	0.040	<0.002	0.55	1.3	0.93	0.63	0.13	0.021	<0.02	<0.02	<0.02	<0.02	<0.05	<0.001	0.014	<0.001	<0.001	<0.1	<0.1	<0.02
	MW102	**6/25/2020**	**0083_MW102_200625**	**Normal**	**EP2006683**	<0.02	<0.02	0.17	<0.02	0.05	<0.02	<0.1	0.23	<0.02	0.10	<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
	MW102	**11/18/2020**	**0083_MW102_201118**	**Normal**	**EP2012802**	<0.02	0.03	0.39	<0.02	0.06	<0.02	<0.1	0.32	0.45	0.27	0.06	<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
	MW102	**6/22/2021**	**0083_MW102_210622**	**Normal**	**EP2107184**	<0.02	<0.02	0.31	<0.02	0.05	<0.02	<0.1	0.80	0.60	0.43	0.10	<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
	MW102	**11/23/2021**	**0083_MW102_211123**	**Normal**	**EP2114295**	<0.02	<0.02	0.33	<0.02	0.05	<0.02	<0.1	<0.02	0.35	0.30	0.06	<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
	MW102	**6/21/2022**	**0083_MW102_220621**	**Normal**	**EP2207630**	<0.02	<0.02	0.28	<0.02	0.71	<0.02	<0.1	0.22	0.22	0.28	0.36	0.31	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
Powerhouse	**MW103**	**2/28/2018**	**0083_MW103_180228**	**Normal**	**207612**	0.27	0.23	1.2	<0.005	0.11	<0.01	0.97	2.7	2.6	0.56	0.084	0.006	<0.01	<0.01	<0.02	<0.05	<0.2	<0.005	0.039	<0.005	<0.005	<0.05	<0.02	<0.01
	MW103	**6/16/2018**	**0083_MW103_180616**	**Normal**	**212374**	0.15	0.22	0.93	0.012	0.078	<0.002	0.76	1.9	2.1	0.37	0.051	0.003	<0.002	<0.004	<0.01	<0.01	<0.05	<0.001	0.037	<0.001	<0.001	<0.02	<0.01	<0.002
	MW103	**6/16/2018**	**0083_QC149_180616**	**Field Duplicate**	**212374**	0.17	0.20	0.93	0.014	0.091	<0.002	0.83	2.2	1.9	0.42	0.050	0.003	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.029	<0.001	<0.001	<0.02	<0.01	<0.002
	MW103	**6/16/2018**	**0083_QC249_180616**	**Interlab Duplicate**	**604955**	0.22	0.17	1.1	<0.01	0.14	<0.01	0.62	2.2	1.8	0.35	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	MW103	**11/28/2019**	**0083_MW103_191128**	**Normal**	**EP1912603**	0.20	0.24	1.17	0.02	0.06	<0.02	0.8	2.55	2.08	0.36	0.04	<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
	MW103	**11/28/2019**	**0083_QC102_191128**	**Field Duplicate**	**EP1912603**	0.24	0.19	1.04	<0.02	0.08	<0.02	0.9	2.54	2.13	0.38	0.04	<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
	MW103	**11/28/2019**	**0083_QC202_191128**	**Interlab Duplicate**	**691456**	0.21	0.21	0.91	<0.01	0.07	<0.01	0.74	2.1	2.0	0.39	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	MW103	**6/25/2020**	**0083_MW103_200625**	**Normal**	**EP2006683**	0.12	0.11	0.60	<0.02	0.08	<0.02	0.4	1.12	1.02	0.21	0.03	<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
	MW103	**11/18/2020**	**0083_MW103_201118**	**Normal**	**EP2012802**	0.10	0.07	0.45	<0.02	0.06	<0.02	0.3	0.94	0.84	0.18	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
	MW103	**6/22/2021**	**0083_MW103_210622**	**Normal**	**EP2107184**	0.09	0.08	0.50	<0.02	0.09	<0.02	0.4	1.48	1.21	0.27	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.11	<0.05	<0.05	<0.02	<0.05	<0.02
	MW103	**6/22/2021**	**0083_QC106_210622**	**Field Duplicate**	**EP2107184**	0.09	0.08	0.52	<0.02	0.09	<0.02	0.5	1.55	1.29	0.28	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.11	<0.05	<0.05	<0.02	<0.05	<0.02
	MW103	**6/22/2021**	**0083_QC206_210622**	**Interlab Duplicate**	**805492**	0.09	0.08	0.51	<0.01	0.08	<0.01	0.50	1.3	1.1	0.23	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.10	<0.01	<0.01	<0.05	<0.05	<0.05
	MW103	**11/23/2021**	**0083_MW103_211123**	**Normal**	**EP2114295**	0.12	0.10	0.59	<0.02	0.05	<0.02	0.3	1.31	1.19	0.28	0.03	<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
	MW103	**6/21/2022**	**0083_MW103_220621**	**Normal**	**EP2207630**	0.06	0.05	0.36	<0.02	0.05	<0.02	0.2	0.62	0.57	0.12	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
Powerhouse	**MW104**	**2/28/2018**	**0083_MW104_5.5-6.0_180228**	**Normal**	**207612**	0.003	0.002	0.003	<0.001	0.002	<0.002	0.01	<0.002	0.005	0.001	0.003	<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
	MW104	**2/28/2018**	**0083_MW104_7.5-8.0_180228**	**Normal**	**207612**	0.007	0.003	<0.001	<0.001	0.002	<0.002	0.007	<0.002	0.002	<0.001	0.001	<0.001	<0.002

Table 4 - Water Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perf		
						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)	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)
						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
	MW105	11/17/2020	0083_MW105_201117	Normal	EP2012749	<0.02	<0.02	0.09	<0.02	0.22	<0.02	<0.1	0.12	0.17	0.06	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.58	<0.05	<0.05	<0.02	<0.05	<0.02
	MW105	11/17/2020	0083_QC106_201117	Field Duplicate	EP2012749	0.02	<0.02	0.12	<0.02	0.20	<0.02	<0.1	0.20	0.26	0.11	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.55	<0.05	<0.05	<0.02	<0.05	<0.02
	MW105	11/17/2020	0083_QC206_201117	Interlab Duplicate	758001	0.02	0.01	0.20	<0.01	0.24	<0.01	0.11	0.23	0.23	0.12	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.60	<0.01	<0.01	<0.05	<0.05	<0.05
	MW105	6/22/2021	0083_MW105_210622	Normal	EP2107184	<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	<0.05	<0.02	<0.05	<0.02
	MW105	11/23/2021	0083_MW105_6-6.5_211123	Normal	EP2114296	<0.02	<0.02	0.08	<0.02	0.05	<0.02	<0.1	0.04	0.09	<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
	MW105	6/21/2022	0083_MW105_4-4.5_220621	Normal	EP2207624	<0.02	<0.02	0.03	<0.02	0.14	<0.02	<0.1	0.16	0.15	0.04	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
POL Pathway	MW107	3/3/2018	0083_MW107_3.1-4.1_180303	Normal	207818	0.004	0.01	0.18	0.013	0.22	<0.002	0.071	0.022	0.05	0.024	0.016	<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
	MW107	3/3/2018	0083_MW107_5.5-6.0_180303	Normal	207818	<0.001	<0.001	<0.001	<0.001	0.013	<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	<0.001	<0.01	<0.005	<0.002
	MW107	3/3/2018	0083_MW107_7.5-8.0_180303	Normal	207818	<0.001	<0.001	0.029	0.014	0.088	<0.002	0.003	0.006	0.008	0.002	0.008	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.009	<0.001	<0.001	<0.01	<0.005	<0.002
	MW107	6/17/2018	0083_MW107_5.5-6.0_180617	Normal	212374	<0.001	<0.001	<0.001	<0.001	0.004	<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	<0.001	<0.02	<0.01	<0.002
	MW107	6/17/2018	0083_MW107_7.5-8.0_180617	Normal	212374	<0.001	0.001	0.027	0.006	0.15	<0.002	0.002	0.002	0.003	<0.001	0.003	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.005	<0.001	<0.001	<0.01	<0.01	<0.002
	MW107	11/30/2019	0083_MW107_5.5-6.0_191130	Normal	EP1912681	<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	<0.05	<0.02	<0.05	<0.02
	MW107	6/26/2020	0083_MW107_7.5_200626	Normal	EP2006690	<0.02	<0.02	0.05	<0.02	0.34	<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	<0.05	<0.02	<0.05	<0.02
	MW107	11/17/2020	0083_MW107_201117	Normal	EP2012742	<0.02	<0.02	<0.02	<0.02	0.05	<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	<0.05	<0.02	<0.05	<0.02
	MW107	6/22/2021	0083_MW107_210622	Normal	EP2107185	<0.02	<0.02	<0.02	<0.02	0.05	<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	<0.05	<0.02	<0.05	<0.02
	MW107	11/23/2021	0083_MW107_211123	Normal	EP2114295	<0.02	<0.02	<0.01	<0.02	0.03	<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	<0.05	<0.02	<0.05	<0.02
	MW107	6/21/2022	0083_MW107_5.5-6_220621	Normal	EP2207624	<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	<0.05	<0.02	<0.05	<0.02
POL Pathway	MW109	3/1/2018	0083_MW109_6.5-7.0_180301	Normal	207818	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	MW109	3/1/2018	0083_MW109_9.3-9.8_180301	Normal	207818	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	MW109	6/20/2018	0083_MW109_6.5-7.0_180620	Normal	212571	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002
	MW109	6/20/2018	0083_MW109_9.3-9.8_180620	Normal	212571	<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	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002
	MW109	11/30/2019	0083_MW109_6.5-7.0_191130	Normal	EP1912681	<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	<0.05	<0.02	<0.05	<0.02
	MW109	6/28/2020	0083_MW109_200628	Normal	EP2006692	<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	<0.05	<0.02	<0.05	<0.02
	MW109	11/18/2020	0083_MW109_201118	Normal	EP2012854	<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	<0.05	<0.02	<0.05	<0.02
	MW109	6/22/2021	0083_MW109_210622	Normal	EP2107185	<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	<0.05	<0.02	<0.05	<0.02
	MW109	11/24/2021	0083_MW109_211124	Normal	EP2114519	<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	<0.05	<0.02	<0.05	<0.02
	MW109	6/21/2022	0083_MW109_220621	Normal	EP2207630	<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	<0.05	<0.02	<0.05	<0.02
POL Pathway	MW110	3/1/2018	0083_MW110_7.5-8.0_180301	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	0.003	<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	<0.01	<0.005	<0.002
	MW110	3/1/2018	0083_MW110_9.0-9.5_180301	Normal	207818	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	MW110	6/20/2018	0083_MW110_7.5-8.0_180620	Normal	212571	<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	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002
	MW110	6/20/2018	0083_MW110_9.0-9.5_180620	Normal	212571	<0.001	<0.001	0.003	<0.001	0.004	<0.002	<0.002	<0.002	0.002	0.001	0.002	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	0.002	<0.001	<0.001	<0.01	<0.01	<0.002
	MW110	6/26/2020	0083_MW110_200626	Normal	EP2006686	<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	<0.05	<0.02	<0.05	<0.02
	MW110	11/18/2020	0083_MW110_201118	Normal	EP2012854	<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	<0.05	<0.02	<0.05	<0.02
	MW110	6/22/2021	0083_MW110_210622	Normal	EP2107185	<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	<0.05	<0.02	<0.05	<0.02
	MW110	11/24/2021	0083_MW110_211124	Normal	EP2114519	<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	<0.05	<0.02	<0.05	<0.02
	MW110	6/21/2022	0083_MW110_220621	Normal	EP2207630	<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	<0.05	<0.02	<0.05	<0.02
POL Pathway	MW111	3/3/2018	0083_MW111_8.5-9.0_180303	Normal	207818	<0.001	<0.001	0.003	<0.001	0.007	<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	<0.001	<0.01	<0.005	<0.002
	MW111	3/3/2018	0083_MW111_10.5-11.0_180303	Normal	207818	<0.001	<0.001	0.003	<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	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002
	MW111	6/17/2018	0083_MW111_8.5-9.0_180617	Normal	212374	<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	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002
	MW111	6/17/2018	0083_MW111_10.5-11.0_180617	Normal	212374	<0.001	<0.001	0.003	<0.001	0.006	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW111	6/17/2018	0083_QC155_180617	Field Duplicate	212374	<0.001	<0.001	0.003	<0.001	0.007	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.02	<0.002
	MW111	6/17/2018	0083_QC255_180617	Interlab Duplicate	604955	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	MW111	11/28/2019	0083_MW111_8.5-9.0_191128	Normal	EP1912603	<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	<0.05	<0.02	<0.05	<0.02
	MW111	6/26/2020	0083_MW111_10.5_200626	Normal	EP2006690	<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	<0.05	<0.02	<0.05	<0.02
	MW111	11/18/2020	0083_MW111_201118	Normal	EP2012854	<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	<0.05	<0.02	<0.05	<0.02
	MW111	6/22/2021	0083_MW111_210622	Normal	EP2107185	<0.02	<0.02	<0.02	<0.02	0.02	<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	<0.05	<0.02	<0.05	<0.02
	MW111	11/23/2021	0083_MW111_211123	Normal	EP2114295	<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	<0.05	<0.02	<0.05	<0.02
	MW111	6/21/2022	0083_MW111_10.5-11_220621	Normal	EP2207624	<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	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	MW111	6/21/2022	0083_QC214_220621	Field Duplicate	EP2207624	<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	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.02
	MW111	6/21/2022	0083_QC214_220621	Interlab Duplicate	901207	0.003	<0.002	0.005	<0.002	1.9	<0.004	<0.008	<0.002	0.003	0.005	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.008	<0.008	<0.002	<0.004	<0.004	<0.004	<0.004
POL Pathway	MW112	3/3/2018	0083_MW112_2.0-3.0_180303	Normal	207818	<0.001	<0.001	<0.001	<0.001	0.005	<0.002	0.009	<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	<0.01	<0.005	<0.002
	MW112	3/3/2018	0083_MW112_4.5-5.0_180303	Normal	207818	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	MW112	3/3/2018	0083_MW112_6.5-7.0_180303	Normal	207818	<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	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002
	MW112	3/3/2018	0083_MW112_8.5-9.0_180303	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.02	<0.002	<0.01	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002
	MW112	6/17/2018	0083_MW112_2.0-3.0_180617	Normal	212374	<0.001	<0.001	0.002	<0.001	0.007	<0.002	0.01	<0.002	0.002	0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.01	<0.01	<0.002
	MW112	6/17/2018	0083_MW112_4.5-5.0_180617	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002
	MW112	6/17/2018	0083_MW112_6.5-7.0_180617	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.01	<0.02	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002
	MW112	6/17/2018	0083_MW112_8.5-9.0_180617	Normal	212374	<0.001	<0.001	<0.001	<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	<0.001	<0.02	<0.01	<0.002
	MW112	11/28/2019	0083_MW112_4.5-5.0_191128	Normal	EP1912600	<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	<0.05	<0.02	<0.05	<0.02
	MW112	6/26/2020	0083_MW112_200626	Normal	EP2006686	<0.02	<0.02	<0.02	<0.02	0.02	<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	0.17	<0.05	<0.05	<0.02	<0.05	<0.02
	MW112	11/18/2020	0083_MW112_201118	Normal	EP2012904	<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	<0.05	<0.02	<0.05	<0.02
	MW112	6/22/2021	0083_MW112_210622	Normal	EP2107185	<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	<0.05	<0.02	<0.05	<0.02
	MW112	11/23/2021	0083_MW112_211123	Normal	EP2114295	<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	<0.05	<0.02	<0.05	<0.02
	MW112	6/21/2022	0083_MW112_4.5-5_220621	Normal	EP2207624	<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	<0.05	<0.02	<0.05	<0.02
Powerhouse Pathway	MW113	3/1/2018	0083_MW113_2.5-3.5_180301	Normal	207818	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	MW113	3/1/2018	0083_MW113_5.0-5.5_180301	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.02	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.1	<0.005	<0.02
	MW113	3/1/2018	0083_MW113_7.0-7.5_180301	Normal	207818	<0.001	<0.001	0.001	<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	<0.001	<0.01	<0.005	<0.002
	MW113	6/17/2018	0083_MW113_2.5-3.5_180617	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW113	6/17/2018	0083_MW113_5.0-5.5_180617	Normal	212374	<0.001	<0.001	<0.002	<0.002	<0.002	<0.002	<0.01	<0.2	<0.02	<0.02	<0.02	<0.005	<0.004	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.1	<0.02	<0.004
	MW113	6/17/2018	0083_MW113_7.0-7.5_180617	Normal	212374	0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.02	<0.002
	MW113	11/28/2019	0083_MW113_2.5-3.5_191128	Normal	EP1912604	<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	<0.05	<0.02	<0.05	<0.02
	MW113	6/25/2020	0083_MW113_200625	Normal	EP2006594	<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	<0.05	<0.02	<0.05	<0.02
	MW113	11/18/2020	0083_MW113_201118	Normal	EP2012854	<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	<0.05	<0.02	<0.05	<0.02
	MW113	6/22/2021	0083_MW113_2.5-3.5_210622	Normal	EP2107095	<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	<0.05	<0.02	<0.05	<0.02
	MW113	11/23/2021	0083_MW113_2.5-3.5_211123	Normal	EP2114300	<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	<0.05	<0.02	<0.05	<0.02
	MW113	6/21/2022	0083_MW113_2.5-3.5_220621	Normal	EP2207626	<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	<0.05	<0.02	<0.05	<0.02
Powerhouse Pathway	MW114	3/1/2018	0083_MW114_2.0-3.0_180301	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	0.01	<0.002	0.001	<0.001	<0.001	<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
	MW114	3/1/2018	0083_MW114_4.5-5.0_180301	Normal	207818	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	MW114	3/1/2018	0083_MW114_6.5-7.0_180301	Normal	207818	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	MW114	3/1/2018	0083_MW114_8.5-9.0_180301	Normal	207818	<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

Table 4 - Water Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perf		
						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)	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)
						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
	MW115	6/21/2022	0083_MW115_2-3_220621	Normal	EP2207626	<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	<0.05	<0.02	<0.05	<0.02
Powerhouse Pathway	MW116	3/3/2018	0083_MW116_1.2-2.2_180303	Normal	207818	<0.001	<0.001	<0.001	<0.001	0.003	<0.002	<0.002	<0.002	<0.001	0.005	0.001	<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
	MW116	3/3/2018	0083_MW116_4.5-5.0_180303	Normal	207818	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	0.004	<0.002	<0.001	0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.01	<0.001	<0.001	<0.01	<0.005	<0.002
	MW116	3/3/2018	0083_MW116_6.5 -7.0_180303	Normal	207818	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	0.01	<0.002	0.002	<0.001	0.001	<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
	MW116	3/3/2018	0083_MW116_8.5-9.0_180303	Normal	207818	<0.001	<0.001	<0.001	<0.001	0.003	<0.002	0.006	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.007	<0.001	<0.001	<0.01	<0.005	<0.002
	MW116	6/17/2018	0083_MW116_1.2-2.2_180617	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW116	6/17/2018	0083_MW116_4.5-5.0_180617	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW116	6/17/2018	0083_MW116_6.5-7.0_180617	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW116	6/17/2018	0083_MW116_8.5-9.0_180617	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW116	11/28/2019	0083_MW116_4.5-5.0_191128	Normal	EP1912604	<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	<0.05	<0.02	<0.05	<0.02
	MW116	6/25/2020	0083_MW116_200625	Normal	EP2006594	<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	<0.05	<0.02	<0.05	<0.02
	MW116	6/22/2021	0083_MW116_4.5-5.0_210622	Normal	EP2107095	<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	<0.05	<0.02	<0.05	<0.02
	MW116	11/23/2021	0083_MW116_4.5-5.0_211123	Normal	EP2114300	<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	<0.05	<0.02	<0.05	<0.02
	MW116	6/21/2022	0083_MW116_220621	Normal	EP2207626	<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	<0.05	<0.02	<0.05	<0.02
Powerhouse Pathway	MW117	3/3/2018	0083_MW117_2.0-2.5_180303	Normal	207818	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	MW117	3/3/2018	0083_MW117_4.0-4.5_180303	Normal	207818	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	0.003	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.006	<0.001	<0.001	<0.01	<0.005	<0.002
	MW117	3/3/2018	0083_MW117_6.0-6.5_180303	Normal	207818	<0.001	<0.001	<0.001	<0.001	0.002	<0.002	0.005	<0.002	<0.001	<0.001	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.019	<0.001	<0.001	<0.01	<0.005	<0.002
	MW117	3/3/2018	0083_MW117_7.4-7.9_180303	Normal	207818	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	MW117	6/17/2018	0083_MW117_2.0-2.5_180617	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW117	6/17/2018	0083_MW117_4.0-4.5_180617	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW117	6/17/2018	0083_MW117_6.0-6.5_180617	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW117	6/17/2018	0083_MW117_7.4-7.9_180617	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW117	6/17/2018	0083_QC147_180617	Field Duplicate	212374	<0.001	<0.001	<0.001	<0.001	0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW117	6/17/2018	0083_QC247_180617	Interlab Duplicate	604955	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	MW117	11/28/2019	0083_MW117_4.0-4.5_191128	Normal	EP1912604	<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	<0.05	<0.02	<0.05	<0.02
	MW117	6/23/2020	0083_MW117_200623	Normal	EP2006520	<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	<0.05	<0.02	<0.05	<0.02
	MW117	11/17/2020	0083_MW117_201117	Normal	EP2012742	<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	<0.05	<0.02	<0.05	<0.02
	MW117	6/22/2021	0083_MW117_6.0-6.5_210622	Normal	EP2107095	<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	<0.05	<0.02	<0.05	<0.02
	MW117	11/23/2021	0083_MW117_4-4.5_211123	Normal	EP2114300	<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	<0.05	<0.02	<0.05	<0.02
	MW117	11/23/2021	0083_QC210_211123	Interlab Duplicate	844500	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	MW117	6/21/2022	0083_MW117_2-2.5_220621	Normal	EP2207626	<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	<0.05	<0.02	<0.05	<0.02
Pol Storage	MW119	3/1/2018	0083_MW119_180301	Normal	207818	0.89	1.4	9.6	0.068	0.067	<0.002	0.26	0.68	3.1	0.21	0.13	<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
	MW119	3/1/2018	0083_QC117_180301	Field Duplicate	207818	0.89	1.4	10	0.072	0.074	<0.002	0.27	0.66	3.1	0.23	0.13	<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
	MW119	3/1/2018	0083_QC217_180301	Interlab Duplicate	588874	1	1.4	12	0.07	0.12	<0.01	0.29	0.66	3.4	0.19	0.16	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	MW119	6/17/2018	0083_MW119_180617	Normal	212374	0.87	1.2	10	0.18	0.091	<0.002	0.30	0.67	2.5	0.21	0.13	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW119	11/28/2019	0083_MW119_191128	Normal	EP1912603	0.47	0.60	4.18	0.04	0.06	<0.02	0.4	0.47	1.52	0.06	0.04	<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
	MW119	6/25/2020	0083_MW119_200625	Normal	EP2006683	1.15	1.62	12.4	0.13	0.19	<0.02	0.5	1.40	4.83	0.29	0.22	<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
	MW119	11/17/2020	0083_MW119_201117	Normal	EP2012749	0.95	1.82	8.02	0.09	0.10	<0.02	0.4	1.21	3.96	0.24	0.14	<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
	MW119	6/23/2021	0083_MW119_210623	Normal	EP2107188	0.94	1.26	7.73	0.07	0.11	<0.02	0.4	1.04	2.99	0.26	0.16	<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
	MW119	11/23/2021	0083_MW119_211123	Normal	EP2114296	1.15	1.53	10.8	0.16	0.24	<0.02	0.4	1.48	5.60	0.26	0.21	<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
	MW119	11/23/2021	0083_QC113_211123	Field Duplicate	EP2114296	0.78	0.97	7.66	0.10	0.17	<0.02	0.3	0.94	3.88	0.19	0.12	<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
	MW119	11/23/2021	0083_QC213_211123	Interlab Duplicate	844500	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	MW119	6/21/2022	0083_MW119_220621	Normal	EP2207630	0.79	1.10	8.39	0.09	0.17	<0.02	0.4	1.12	3.42	0.23	0.15	<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
Broader Area	MW129	6/17/2018	0083_MW129_1.5-2.0_180617	Normal	212374	<0.001	<0.001	0.004	<0.001	0.008	<0.002	0.023	<0.01	<0.005	<0.005	0.007	<0.005	<0.004	<0.004	<0.01	<0.01	<0.05	<0.001	0.006	<0.001	<0.001	<0.1	<0.02	<0.004
	MW129	6/17/2018	0083_MW129_5.5-6.0_180617	Normal	212374	0.001	<0.001	0.006	<0.001	0.010	<0.002	0.004	0.003	0.009	0.003	0.011	0.002	0.006	<0.004	<0.01	<0.01	<0.05	<0.001	0.006	<0.001	<0.001	<0.02	<0.01	<0.002
	MW129	6/17/2018	0083_MW129_9.5-10.0_180617	Normal	212374	<0.001	<0.001	0.004	<0.001	0.002	<0.002	0.002	<0.002	<0.005	<0.005	0.014	<0.005	<0.004	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.1	<0.02	<0.004
	MW129	6/17/2018	0083_MW129_13.5-14.0_18017	Normal	212374	0.001	<0.001	0.012	<0.001	0.018	<0.002	0.008	0.002	0.013	0.004	0.016	0.003	0.004	<0.004	<0.01	<0.01	<0.05	<0.001	0.009	<0.001	<0.001	<0.02	<0.02	<0.002
	MW129	11/28/2019	0083_MW129_5.5-6.0_191128	Normal	EP1912600	<0.02	<0.02	0.04	<0.02	0.07	<0.02	<0.1	<0.02	0.07	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	2.30	<0.05	<0.05	<0.02	<0.05	<0.02
	MW129	11/28/2019	0083_QC103_191128	Field Duplicate	EP1912600	<0.02	<0.02	<0.02	<0.02	0.02	<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	0.91	<0.05	<0.05	<0.02	<0.05	<0.02
	MW129	11/28/2019	0083_QC203_191128	Interlab Duplicate	691456	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.05	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.73	<0.01	<0.01	<0.05	<0.05	<0.05
	MW129	6/23/2020	0083_MW129_200623	Normal	EP2006520	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.1	0.16	0.06	0.04	<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
	MW129	11/17/2020	0083_MW129_201117	Normal	EP2012743	<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	<0.05	<0.02	<0.05	<0.02
	MW129	11/17/2020	0083_QC102_201117	Field Duplicate	EP2012743	<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	<0.05	<0.02	<0.05	<0.02
	MW129	11/17/2020	0083_QC202_201117	Interlab Duplicate	758001	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	MW129	6/22/2021	0083_MW129_210622	Normal	EP2107184	<0.02	<0.02	0.03	<0.02	0.72	<0.02	<0.1	0.03	0.03	<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
	MW129	11/23/2021	0083_MW129_1.5-2_211123	Normal	EP2114300	<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	<0.05	<0.02	<0.05	<0.02
	MW129	6/21/2022	0083_MW129_220621	Normal	EP2207630	<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	<0.05	<0.02	<0.05	<0.02
Broader Area	MW130	6/17/2018	0083_MW130_1.4-1.9_180617	Normal	212374	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	0.003	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW130	6/17/2018	0083_MW130_3.4-3.9_180617	Normal	212374	<0.001	<0.001	0.002	<0.001	0.005	<0.002	0.005	<0.002	<0.01	<0.01	<0.01	<0.01	<0.02	<0.02	<0.05	<0.02	<0.05	<0.001	0.004	<0.001	<0.001	<0.1	<0.1	<0.02
	MW130	6/17/2018	0083_MW130_5.4-5.9_180617	Normal	212374	<0.001	<0.001	0.002	<0.001	0.003	<0.002	0.003	<0.002	0.002	<0.001	<0.001	<0.001	<0.002	<0.004	<0.01	<0.02	<0.05	<0.001	0.002	<0.001	<0.001	<0.05	<0.02	<0.002
	MW130	6/17/2018	0083_MW130_7.4-7.9_180617	Normal	212374	<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	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.02	<0.002
	MW130	11/28/2019	0083_MW130_3.4-3.9_191128	Normal	EP1912600	<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	0.25	<0.05	<0.05	<0.02	<0.05	<0.02
	MW130	6/23/2020	0083_MW130_200623	Normal	EP2006455	<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	<0.05	<0.02	<0.05	<0.02
	MW130	11/17/2020	0083_MW130_201117	Normal	EP2012743	<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	<0.05	<0.02	<0.05	<0.02
	MW130	11/17/2020	0083_QC103_201117	Field Duplicate	EP2012743	<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	<0.05	<0.02	<0.05	<0.02
	MW130	11/17/2020	0083_QC203_201117	Interlab Duplicate	758001	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	MW130	6/22/2021	0083_MW130_210622	Normal	EP2107184	<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	<0.05	<0.02	<0.05	<0.02
	MW130	11/23/2021	0083_MW130_3.4-3.9_211123	Normal	EP2114296	<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	<0.05	<0.02	<0.05	<0.02
	MW130	6/21/2022	0083_MW130_220621	Normal	EP2207630	<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	<0.05	<0.02	<0.05	<0.02
Broader Area	MW134	6/23/2018	0083_MW134_180623	Normal	212781	<0.001	<0.001	0.002	<0.001	0.005	<0.002	0.002	0.006	0.004	0.001	0.003	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.002	<0.001	<0.001	<0.02	<0.01	<0.004
	MW134	11/28/2019	0083_MW134_191128	Normal	EP1912600	<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	0.06	<0.05	<0.05	<0.02	<0.05	<0.02
	MW134	6/23/2020	0083_MW134_200623	Normal	EP2006455	<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	<0.05	<0.02	<0.05	<0.02
	MW134	11/17/2020	0083_MW134_201117	Normal	EP2012743	<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	<0.05	<0.02	<0.05	<0.02
	MW134	11/17/2020	0083_QC105_201117	Field Duplicate	EP2012743	<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	<0.05	<0.02	<0.05	<0.02
	MW134	11/17/2020	0083_QC205_201117	Interlab Duplicate	758001	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	MW134	6/22/2021	0083_MW134_210622	Normal	EP2107184	<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	<0.05	<0.02	<0.05	<0.02
	MW134	11/23/2021	0083_MW134_211123	Normal	EP2114295	<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	<0.05	<0.02	<0.05	<0.02
	MW134	6/21/2022	0083_MW134_220621	Normal	EP2207630	<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	<0.05	<0.02	<0.05	<0.02
POL Pathway	MW202	3/3/2018	0083_AB20_180303	Normal	207818	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	MW202	3/3/2018	0083_QC1212_180303	Field Duplicate	207818	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	MW202	3/3/2018

Table 4 - Water Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perf		
						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)	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)
						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
	MW212	6/26/2020	0083_MW212_200626	Normal	EP2006686	<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	<0.05	<0.02	<0.05	<0.02
	MW212	11/17/2020	0083_MW212_201117	Normal	EP2012749	<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	<0.05	<0.02	<0.05	<0.02
	MW212	11/17/2020	0083_QC104_201117	Field Duplicate	EP2012749	<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	<0.05	<0.02	<0.05	<0.02
	MW212	11/17/2020	0083_QC204_201117	Interlab Duplicate	758001	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.05	<0.05
	MW212	6/22/2021	0083_MW212_210622	Normal	EP2107184	<0.02	<0.02	0.03	<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	<0.05	<0.02	<0.05	<0.02
	MW212	6/22/2021	0083_QC105_210622	Field Duplicate	EP2107184	<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	<0.05	<0.02	<0.05	<0.02
	MW212	6/22/2021	0083_QC205_210622	Interlab Duplicate	805492	<0.01	<0.01	0.02	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.05	<0.05
	MW212	11/23/2021	0083_MW212_211123	Normal	EP2114296	<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	<0.05	<0.02	<0.05	<0.02
	MW212	6/21/2022	0083_MW212_220621	Normal	EP2207624	<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	<0.05	<0.02	<0.05	<0.02
	MW212	6/21/2022	0083_QC111_220621	Field Duplicate	EP2207624	<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	<0.05	<0.02	<0.05	<0.02
	MW212	6/21/2022	0083_QC211_220621	Interlab Duplicate	901207	0.003	0.004	0.041	<0.002	<0.004	<0.004	0.024	<0.002	0.001	0.006	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.008	<0.008	<0.002	<0.004	<0.004	<0.004	<0.004
Powerhouse	MW213	2/23/2018	0083_BDDBO5_180223	Normal	207359	0.010	0.009	0.063	<0.001	0.027	<0.002	0.34	0.18	<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	<0.01	<0.005	<0.002
	MW213	6/16/2018	0083_BODB5_180616	Normal	212374	0.012	0.009	0.071	<0.001	0.020	<0.002	0.020	<0.02	0.017	<0.01	0.004	<0.002	<0.004	<0.004	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.1	<0.02	<0.004
	MW213	11/28/2019	0083_BDDBO5_191128	Normal	EP1912603	<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	<0.05	<0.02	<0.05	<0.02
	MW213	6/23/2021	0083_MW213_210623	Normal	EP2107188	<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	<0.05	<0.02	<0.05	<0.02
	MW213	11/23/2021	0083_MW213_211123	Normal	EP2114296	<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	<0.05	<0.02	<0.05	<0.02
	MW213	6/21/2022	0083_MW213_220621	Normal	EP2207630	<0.02	<0.02	0.01	<0.02	0.01	<0.02	<0.1	0.02	0.03	<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
Powerhouse	MW214	2/27/2018	0083_B05_180227	Normal	207612	0.009	0.004	0.017	<0.001	0.011	<0.002	0.027	0.008	0.01	0.01	0.004	<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
	MW214	6/16/2018	0083_B05_180616	Normal	212374	0.008	0.004	0.030	<0.001	0.013	<0.002	0.031	0.020	0.024	0.018	0.006	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW214	11/28/2019	0083_B05_191128	Normal	EP1912603	<0.02	<0.02	0.02	<0.02	0.04	<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	<0.05	<0.02	<0.05	<0.02
	MW214	6/25/2020	0083_MW213_200625	Normal	EP2006683	<0.02	<0.02	0.03	<0.02	0.04	<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	<0.05	<0.02	<0.05	<0.02
	MW214	6/25/2020	0083_QC104_200625	Field Duplicate	EP2006683	<0.02	<0.02	0.03	<0.02	0.05	<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	<0.05	<0.02	<0.05	<0.02
	MW214	6/25/2020	0083_QC204_200625	Interlab Duplicate	729352	<0.01	<0.01	0.01	<0.01	0.04	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.05	<0.05
	MW214	11/18/2020	0083_MW213_201118	Normal	EP2012904	<0.02	<0.02	<0.02	<0.02	0.03	<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	<0.05	<0.02	<0.05	<0.02
	MW214	6/22/2021	0083_MW214_210622	Normal	EP2107095	<0.02	<0.02	0.04	<0.02	0.02	<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	<0.05	<0.02	<0.05	<0.02
	MW214	11/23/2021	0083_MW214_211123	Normal	EP2114296	<0.02	<0.02	0.02	<0.02	0.02	<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	<0.05	<0.02	<0.05	<0.02
	MW214	11/23/2021	0083_QC111_211123	Field Duplicate	EP2114296	<0.02	<0.02	0.02	<0.02	0.02	<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	<0.05	<0.02	<0.05	<0.02
	MW214	11/23/2021	0083_QC211_211123	Interlab Duplicate	844500	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.05	<0.05
	MW214	6/21/2022	0083_MW214_220621	Normal	EP2207630	<0.02	<0.02	0.03	<0.02	0.21	<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	<0.05	<0.02	<0.05	<0.02
	MW214	6/21/2022	0083_QC112_220621	Field Duplicate	EP2207630	<0.02	<0.02	0.03	<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	<0.05	<0.02	<0.05	<0.02
	MW214	6/21/2022	0083_QC212_220621	Interlab Duplicate	901207	0.003	<0.002	0.035	0.006	0.16	<0.004	0.039	0.006	0.007	0.005	0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.008	<0.008	<0.002	<0.004	<0.004	<0.004	<0.004
Powerhouse Pathway	MW217	3/2/2018	0083_B09_180302	Normal	207818	<0.001	<0.001	0.001	<0.001	0.004	<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	<0.001	<0.01	<0.005	<0.002
	MW217	6/16/2018	0083_B09_180618	Normal	212374	<0.001	<0.001	<0.001	<0.001	0.003	<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	<0.001	<0.02	<0.01	<0.002
	MW217	11/28/2019	0083_B09_191128	Normal	EP1912604	<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	<0.05	<0.02	<0.05	<0.02
	MW217	6/26/2020	0083_MW217_200626	Normal	EP2006690	<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	<0.05	<0.02	<0.05	<0.02
	MW217	11/18/2020	0083_MW217_201118	Normal	EP2012854	<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	<0.05	<0.02	<0.05	<0.02
	MW217	6/22/2021	0083_MW217_210622	Normal	EP2107095	<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	<0.05	<0.02	<0.05	<0.02
	MW217	11/23/2021	0083_MW217_211123	Normal	EP2114296	<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	<0.05	<0.02	<0.05	<0.02
	MW217	6/21/2022	0083_MW217_220621	Normal	EP2207626	<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	<0.05	<0.02	<0.05	<0.02
Powerhouse Pathway	MW218	3/2/2018	0083_B10_180302	Normal	207818	<0.001	<0.001	0.001	<0.001	0.003	<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	<0.001	<0.01	<0.005	<0.002
	MW218	6/16/2018	0083_B10_180618	Normal	212374	<0.001	<0.001	0.001	<0.001	0.003	<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	<0.001	<0.02	<0.01	<0.002
	MW218	6/18/2018	0083_QC157_180618	Field Duplicate	212374	<0.001	<0.001	0.001	<0.001	0.002	<0.002	0.003	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.02	<0.01	<0.002
	MW218	6/18/2018	0083_QC257_180618	Interlab Duplicate	604955	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.05	<0.05
	MW218	11/28/2019	0083_B10_191128	Normal	EP1912604	<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	<0.05	<0.02	<0.05	<0.02
	MW218	6/26/2020	0083_MW218_200626	Normal	EP2006690	<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	<0.05	<0.02	<0.05	<0.02
	MW218	11/17/2020	0083_MW218_201117	Normal	EP2012743	<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	<0.05	<0.02	<0.05	<0.02
	MW218	6/22/2021	0083_MW218_210622	Normal	EP2107095	<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	<0.05	<0.02	<0.05	<0.02
	MW218	11/23/2021	0083_MW218_211123	Normal	EP2114296	<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	<0.05	<0.02	<0.05	<0.02
	MW218	6/21/2022	0083_MW218_220621	Normal	EP2207626	<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	<0.05	<0.02	<0.05	<0.02
	OTH002	2/27/2018	0083_OTH002_180227	Normal	207612	<0.001	<0.001	<0.001	<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	0.003	<0.001	<0.001	<0.01	<0.005	<0.002
	OTH002	6/6/2018	0083_OTH002_180606	Normal	212095	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01	<0.05	<0.001	0.009	0.002	<0.001	<0.01	<0.005	<0.002
	OTH002	6/12/2018	0082_QC246_180612	Interlab Duplicate	604214	<0.01	<0.01	<0.01	<0.01	0.25	<0.01	<0.05	<0.01	<0.01	<0.01	0.01	0.47	0.02	0.23	<0.01	<0.01	<0.01	<0.01	<0.05	0.02	<0.01	<0.05	<0.05	<0.05
	OTH002	11/17/2020	0083_OTH002_201117	Normal	EP2012742	<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	<0.05	<0.02	<0.05	<0.02
	OTH002	6/22/2021	0083_OTH002_210622	Normal	EP2107185	<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	<0.05	<0.02	<0.05	<0.02
	OTH002	6/22/2021	0083_QC103_210622	Field Duplicate	EP2107185	<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	<0.05	<0.02	<0.05	<0.02
	OTH002	6/22/2021	0083_QC203_210622	Interlab Duplicate	805492	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.05	<0.05
	OTH002	11/23/2021	0083_OTH002_211123	Normal	EP2114295	<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	<0.05	<0.02	<0.05	<0.02
	OTH101	2/12/2018	0083_OTH101_180212	Normal	206780	<0.0004	<0.001	0.001	<0.001	0.0030	<0.002	<0.002	<0.002	<0.0004	<0.0004	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.021	<0.0004	<0.001	<0.01	<0.005	<0.002
	OTH101	6/20/2018	0083_OTH101_A_180620	Normal	212571	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002
	OTH101	6/20/2018	0083_OTH101_B_180620	Normal	212571	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002
	OTH101	11/28/2019	0083_OTH101_191128	Normal	EP1912603	<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	<0.05	<0.02	<0.05	<0.02
	OTH101	6/28/2020	0083_OTH101_200628	Normal	EP2006692	<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	<0.05	<0.02	<0.05	<0.02
	OTH101	11/18/2020	0083_OTH101_201118	Normal	EP2012854	<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	<0.05	<0.02	<0.05	<0.02
	OTH101	6/22/2021	0083_OTH101_210622	Normal	EP2107185	<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	<0.05	<0.02	<0.05	<0.02
	OTH101	11/24/2021	0083_OTH101_211124	Normal	EP2114391	<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	<0.05	<0.02	<0.05	<0.02
	OTH101	6/21/2022	0083_OTH101_220621	Normal	EP2207627	<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	<0.05	<0.02	<0.05	<0.02
	OTH102	2/12/2018	0083_OTH102_180212	Normal	206780	<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.002	<0.0004	0.003	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.001	<0.01	<0.005	<0.002
	OTH102	6/20/2018	0083_OTH102_A_180620	Normal	212571	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002
	OTH102	6/20/2018	0083_OTH102_B_180620	Normal	212571	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002
	OTH102	11/28/2019	0083_OTH102_191128	Normal	EP1912603	<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	<0.05	<0.02	<0.05	<0.02
	OTH102	6/27/2020	0083_OTH002_200627	Normal	EP2006692	<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	<0.05	<0.02	<0.05	<0.02
	OTH102	6/28/2020	0083_OTH102_200628	Normal	EP2006692	<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	<0.05	<0.02	<0.05	<0.02
	OTH102	11/18/2020	0083_OTH102_201118	Normal	EP2012854	<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	<0.05	<0.02	<0.05	<0.02
	OTH102	6/22/2021	0083_OTH102_210622	Normal	EP2107185	<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	<0.05	<0.02	<0.05	<0.02
	OTH102	11/23/2021	0083_OTH102_211123	Normal	EP2114295	<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	<0.05	<0.02	<0.05	<0.02
	OTH102	6/21/2022	0083_OTH102_220621	Normal	EP2207627	<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	<0.05	<0.02	<0.05	<0.02
	OTH103	2/12/2018	0083_OTH103_180212	Normal	206780	<0.0004	<0.001	0.0020	<0.001	0.0040	<0.002	<0.002	<0.002	0.001	0.003	0.003	0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	0.0050	<0.0004	<0.001	<0.01	<0.005	<0.002
	OTH103	6/9/2018	0083_OTH103_A_180609	Normal	212095	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	OTH103	6/9/2018	0083_OTH103_B_180609	Normal	212095	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	OTH103	11/30/2019	0083_OTH103_191130	Normal	EP1912684	<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	<0.05	<0.02	<0.05	<0.02
	OTH103	6/27/2020	0083_OTH103_200627	Normal	EP2006692	<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	<0.05	<0.02	<0.05	<0.02
	OTH

Table 4 - Water Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perf		
						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)	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)
						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
	OTH106	6/9/2018	0083_OTH106_B_180609	Normal	212095	<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	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.005	<0.002
	OTH106	11/28/2019	0083_OTH106_191128	Normal	EP1912605	<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	<0.05	<0.02	<0.05	<0.02
	OTH106	6/27/2020	0083_OTH106_200627	Normal	EP2006692	<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	<0.05	<0.02	<0.05	<0.02
	OTH106	11/17/2020	0083_OTH106_201117	Normal	EP2012742	<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	<0.05	<0.02	<0.05	<0.02
	OTH106	6/22/2021	0083_OTH106_210622	Normal	EP2107095	<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	<0.05	<0.02	<0.05	<0.02
	OTH106	11/23/2021	0083_OTH106_211123	Normal	EP2114301	<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	<0.05	<0.02	<0.05	<0.02
	OTH106	6/21/2022	0083_OTH106_220621	Normal	EP2207627	<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	<0.05	<0.02	<0.05	<0.02
	OTH107	2/12/2018	0083_OTH107_180212	Normal	206780	<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.002	<0.0004	<0.0004	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.001	<0.01	<0.005	<0.002
	OTH107	6/23/2018	0083_OTH107_A_180623	Normal	212781	<0.001	<0.001	<0.001	<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	<0.001	<0.02	<0.01	<0.004
	OTH107	6/23/2018	0083_OTH107_B_180623	Normal	212781	<0.001	<0.001	<0.001	<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	<0.001	<0.02	<0.01	<0.004
	OTH107	6/23/2018	0083_QC778_180623	Interlab Duplicate	605978	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	OTH107	11/28/2019	0083_OTH107_191128	Normal	EP1912605	<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	<0.05	<0.02	<0.05	<0.02
	OTH107	6/27/2020	0083_OTH107_200627	Normal	EP2006692	<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	<0.05	<0.02	<0.05	<0.02
	OTH107	11/17/2020	0083_OTH107_201117	Normal	EP2012742	<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	<0.05	<0.02	<0.05	<0.02
	OTH107	6/22/2021	0083_OTH107_210622	Normal	EP2107095	<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	<0.05	<0.02	<0.05	<0.02
	OTH107	11/23/2021	0083_OTH107_211123	Normal	EP2114301	<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	<0.05	<0.02	<0.05	<0.02
	OTH107	6/21/2022	0083_OTH107_220621	Normal	EP2207627	<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	<0.05	<0.02	<0.05	<0.02
	OTH108	2/12/2018	0083_OTH108_180212	Normal	206780	<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.002	<0.0004	<0.0004	0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.001	<0.01	<0.005	<0.002
	OTH108	2/12/2018	0083_QC1201_180212	Field Duplicate	206780	<0.0004	<0.001	<0.0002	<0.001	<0.0002	<0.002	<0.002	<0.002	<0.0004	<0.0004	<0.001	<0.001	<0.002	<0.002	<0.005	<0.01	<0.05	<0.001	<0.0004	<0.0004	<0.001	<0.01	<0.005	<0.002
	OTH108	6/10/2018	0083_OTH108_A_180610	Normal	212095	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	OTH108	6/10/2018	0083_OTH108_B_180610	Normal	212095	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	OTH108	11/28/2019	0083_OTH108_191128	Normal	EP1912605	<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	<0.05	<0.02	<0.05	<0.02
	OTH108	6/27/2020	0083_OTH108_200627	Normal	EP2006692	<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	<0.05	<0.02	<0.05	<0.02
	OTH108	11/17/2020	0083_OTH108_201117	Normal	EP2012742	<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	<0.05	<0.02	<0.05	<0.02
	OTH108	6/22/2021	0083_OTH108_210622	Normal	EP2107095	<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	<0.05	<0.02	<0.05	<0.02
	OTH108	11/23/2021	0083_OTH108_211123	Normal	EP2114301	<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	<0.05	<0.02	<0.05	<0.02
	OTH108	6/21/2022	0083_OTH108_220621	Normal	EP2207627	<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	<0.05	<0.02	<0.05	<0.02
	OTH109	6/20/2018	0083_OTH109_A_180620	Normal	212571	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002
	OTH109	6/20/2018	0083_OTH109_B_180620	Normal	212571	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002
	OTH109	11/28/2019	0083_OTH109_191128	Normal	EP1912600	<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	<0.05	<0.02	<0.05	<0.02
	OTH109	6/26/2020	0083_OTH109_200626	Normal	EP2006686	<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	<0.05	<0.02	<0.05	<0.02
	OTH109	11/18/2020	0083_OTH109_201118	Normal	EP2012854	<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	<0.05	<0.02	<0.05	<0.02
	OTH109	6/22/2021	0083_OTH109_210622	Normal	EP2107185	<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	<0.05	<0.02	<0.05	<0.02
	OTH109	11/24/2021	0083_OTH109_211124	Normal	EP2114391	<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	<0.05	<0.02	<0.05	<0.02
	OTH109	6/21/2022	0083_OTH109_220621	Normal	EP2207627	<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	<0.05	<0.02	<0.05	<0.02
	OTH110	6/20/2018	0083_OTH110_A_180620	Normal	212571	<0.001	<0.001	<0.001	<0.001	0.003	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002
	OTH110	6/20/2018	0083_OTH110_B_180620	Normal	212571	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.001	<0.002	<0.002	<0.01	<0.02	<0.05	<0.001	<0.001	<0.001	<0.001	<0.01	<0.01	<0.002
	OTH110	11/28/2019	0083_OTH110_191128	Normal	EP1912600	<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	<0.05	<0.02	<0.05	<0.02
	OTH110	6/26/2020	0083_OTH110_200626	Normal	EP2006686	<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	<0.05	<0.02	<0.05	<0.02
	OTH110	11/18/2020	0083_OTH110_201118	Normal	EP2012904	<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	<0.05	<0.02	<0.05	<0.02
	OTH110	6/22/2021	0083_OTH110_210622	Normal	EP2107185	<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	<0.05	<0.02	<0.05	<0.02
	OTH110	11/24/2021	0083_OTH110_211124	Normal	EP2114391	<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	<0.05	<0.02	<0.05	<0.02
	OTH110	6/21/2022	0083_OTH110_220621	Normal	EP2207627	<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	<0.05	<0.02	<0.05	<0.02
	OTH113	6/10/2018	0082_QC257_180610	Interlab Duplicate	604115	<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	<0.05	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	OTH113	6/10/2018	0083_OTH113_A_180610	Normal	212095	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	OTH113	6/10/2018	0083_OTH113_B_180610	Normal	212095	<0.001	<0.001	<0.001	<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	<0.001	<0.01	<0.005	<0.002
	OTH113	6/10/2018	0083_QC157_180310	Field Duplicate	212095	<0.001	<0.001	<0.001	<0.001	0.004	<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	<0.001	<0.01	<0.005	<0.002
	OTH113	11/28/2019	0083_OTH113_191128	Normal	EP1912600	<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	<0.05	<0.02	<0.05	<0.02
	OTH113	6/28/2020	0083_OTH113_200628	Normal	EP2006748	<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	<0.05	<0.02	<0.05	<0.02
	OTH113	11/17/2020	0083_OTH113_201117	Normal	EP2012743	<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	<0.05	<0.02	<0.05	<0.02
	OTH113	6/22/2021	0083_OTH113_210622	Normal	EP2107184	<0.02	<0.02	0.02	<0.02	0.54	<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	<0.05	<0.02	<0.05	<0.02
	OTH113	5/16/2022	0083_OTH113_220516	Normal	EP2205863	<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	<0.05	<0.02	<0.05	<0.02
	OTH113	6/21/2022	0083_OTH113_220621	Normal	EP2207632	<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	<0.05	<0.02	<0.05	<0.02
	SW112	2/28/2018	0083_SW112_180228	Normal	207612	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	0.004	<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	<0.01	<0.005	<0.002
	SW112	6/8/2018	0083_SW112_180608	Normal	212095	<0.001	<0.001	<0.001	<0.001	0.008	<0.002	<0.002	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.02	<0.05	<0.1	<0.5	<0.001	<0.001	<0.001	<0.001	<0.1	<0.05	<0.02
	SW112	11/28/2019	0083_SW112_191128	Normal	EP1912672	<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	<0.05	<0.02	<0.05	<0.02
	SW112	5/26/2020	0083_SW112_200526	Normal	EP2005405	<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	<0.05	<0.02	<0.05	<0.02
	SW112	6/25/2020	0083_QC101_200625	Field Duplicate	EP2006682	<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	<0.05	<0.02	<0.05	<0.02
	SW112	6/25/2020	0083_QC201_200625	Interlab Duplicate	729352	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	SW112	6/25/2020	0083_SW112_200625	Normal	EP2006682	<0.02	<0.02	<0.02	<0.02	0.05	<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	<0.05	<0.02	<0.05	<0.02
	SW112	11/17/2020	0083_QC207_201117	Interlab Duplicate	760299	<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	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	SW112	11/18/2020	0083_QC107_201118	Field Duplicate	EP2012855	<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	<0.05	<0.02	<0.05	<0.02
	SW112	11/18/2020	0083_SW112_201118	Normal	EP2012855	<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	<0.05	<0.02	<0.05	<0.02
	SW112	3/5/2021	0083_SW112_210305	Normal	EP2102350	<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	<0.05	<0.02	<0.05	<0.02
	SW112	6/22/2021	0083_SW112_210622	Normal	EP2107186	<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	<0.05	<0.02	<0.05	<0.02
	SW112	5/16/2022	0083_SW112_220516	Normal	EP2205864	<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	<0.05	<0.02	<0.05	<0.02
	SW112	6/21/2022	0083_SW112_220621	Normal	EP2207634	<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	<0.05	<0.02	<0.05	<0.02
	SW113	3/1/2018	0083_SW113_180301	Normal	207818	<0.05	<0.05	1.3	<0.05	1.1	<0.1	1.6	5.5	4.8	2.5	0.86	0.2	<0.1	<0.1	<0.2	<0.5	<2.5	<0.05	33	3.3	<0.05	<0.9	<0.2	<0.1
	SW113	6/4/2018	0083_QC133_180604	Field Duplicate	211639	0.051	0.041	0.40	0.038	0.82	<0.002	0.26	1.9	1.5	0.96	0.28	0.13	<0.002	<0.002	<0.005	<0.01	<0.05	0.006	8.3	0.78	<0.001	<0.01	<0.005	<0.002
	SW113	6/4/2018	0083_QC233_180604	Interlab Duplicate	602341	<0.01	0.02	0.43	<0.01	0.96	<0.01	0.34	1.6	1.2	0.74	0.26	0.17	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	6.9	0.81	<0.01	<0.05	<0.05	<0.05
	SW113	6/4/2018	0083_SW113_180604	Normal	211639	0.041	0.040	0.50	0.040	0.81	<0.002	0.56	2.1	1.6	1.1	0.31	0.23	<0.02	<0.002	<0.005	<0.01	<0.05	<0.001	10	0.66	<0.001	<0.01	<0.005	<0.002
	SW113	5/26/2020	0083_SW113_200526	Normal	EP2005405	0.25	<0.02	0.31	<0.02	0.34	<0.02	<0.1	1.81	1.14	0.70	0.22	0.07	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	3.90	0.72	<0.05	<0.02	<0.05	<0.02
	SW113	3/5/2021	0083_SW113_210305	Normal	EP2102350	<0.02	<0.02	0.14	<0.02	0.21	<0.02	<0.1	0.95	0.54	0.35	0.12	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	1.98	0.43	<0.05	<0.02	<0.05	<0.02
	SW113	6/23/2021	0083_SW113_210623	Normal	EP2107191	<0.02	<0.02	0.03	<0.02	0.10	<0.02	<0.1	0.36	0.25	0.16	0.07	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.84	0.15	<0.05	<0.02	<0.05	<0.02
	SW113	11/23/2021	0083_QC108_211123	Field Duplicate	EP2114297	<0.02	<0.02	0.32	<0.02	0.53	<0.02	<0.1	0.89	0.94	0.40	0.12	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	1.53	0.55	<0.05	<0.02	<0.05	<0.02
	SW113	11/23/2021	0083_QC208_211123	Interlab Duplicate	844500	0.02	0.01	0.32	0.01	0.45	<0.01	0.33	0.94	0.44	0.39	0.13	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.7	0.97	<0.01	<0.05	<0.05	<0.05
	SW113	11/23/2021	0083_SW113_211123	Normal	EP2114297	<0.02	<0.02	0.30	<0.02	0.54	<0.02	<0.1	0.87	0.96	0.39	0.12	0.05	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	1.58	0.56	<0.05	<0.02	<0.05	<0.02
	SW113	5/16/2022	0083_QC103_220516	Field Duplicate	EP2205864	<0.02	<0.02	0.08	<0.02	0.22	<0.02	0.1	0.39	0.25	0.17	0.06	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.70	0.26	<0.05	<0.02	<0.05	<0.02
	SW113	5/16/2022	0083_QC203_220516	Interlab Duplicate	890774	<0.1	<0.1	<0.1	<0.2	<0.2	<0.2	<0.1	0.30	0.17	<0.1	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	0.5	<0.2	<0.2	<0.2	<0.2	<0.2
	SW113	5/16/2022	0083_SW113_220516	Normal	EP2205864	<0.02	<0.02	0.08	<0.02	0.22	<0.02	0.1	0.41	0.24	0.17	0.06	0.04	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.72	0.31	<0.05	<0.02	<0.05	<0.02
	SW113	6/21/2022	0083_QC109_220621	Field Duplicate	EP2207632	<0.02	<0.02	0.04	<0.02	0.10	<0.02	<0.1	0.35	0.20	0.13	0.04	0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.05	0.53	0.09	<0.05	<0.02	<0.

Table 4 - Water Analytical Results

						PFAS - Perfluoroalkyl Sulfonic Acids						PFAS - Perfluoroalkyl Carboxylic Acids										PFAS - (n:2) Fluorotelomer Sulfonic Acids				PFAS - Perfl		
						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)	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)
						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
	SW128	3/3/2021	0083_SW128_210303	Normal	EP2102201	<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	<0.05	<0.02	<0.05	<0.02
	SW128	6/22/2021	0083_QC102_210622	Field Duplicate	EP2107094	<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	<0.05	<0.02	<0.05	<0.02
	SW128	6/22/2021	0083_QC202_210622	Interlab Duplicate	805492	<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	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	<0.05	<0.05
	SW128	6/22/2021	0083_SW128_210622	Normal	EP2107094	<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	<0.05	<0.02	<0.05	<0.02
	SW128	11/23/2021	0083_SW128_211123	Normal	EP2114297	<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	<0.05	<0.02	<0.05	<0.02
	SW128	5/16/2022	0083_SW128_220516	Normal	EP2205864	<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	<0.05	<0.02	<0.05	<0.02
	SW128	6/21/2022	0083_SW128_220621	Normal	EP2207634	<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	<0.05	<0.02	<0.05	<0.02

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%

HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Note:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

Table 4 - Water Analytical Results

						Fluoroalkyl Sulfonamides				PFAS			Inorganics											Metals			
						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	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)	Sulphate	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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
LOR - Limit of Reporting						0.005	0.004	0.002	0.008	0.001	0.001	0.001	1	1	1	1	0.01	0.01	1	0.01	1	1	0.1	0.1	0.1	0.5
PFAS NEMP 2020 Interim Marine 99%																										
PFAS NEMP 2020 Recreational Water										**2**																
Monitoring Area	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**																					
Pol Storage	**MW004**	**11/23/2021**	**0083_MW004_211123**	**Normal**	**EP2114296**	<0.05	<0.05	<0.02	<0.05	0.24	0.28	0.28	<1	222	<1	222	297	323	9,400	4.11	1,340		272	765	265	5,510
	MW004	**6/21/2022**	**0083_MW004_220621**	**Normal**	**EP2207624**	<0.05	<0.05	<0.02	<0.05	0.37	0.45	0.45	<1	104	<1	104	2.56	2.24	4	6.87	18		27	7	2	6
Pol Storage	**MW008**	**2/28/2018**	**0083_MW8_180228**	**Normal**	**207612**	<0.005	<0.01	<0.002	<0.05					220					8,700	0.94		1,500	240	620	180	5,000
	MW008	**6/16/2018**	**0083_MW8_180616**	**Normal**	**212374**	<0.01	<0.05	<0.004	<0.05					260					5,700	1.8		860	190	370	110	3,400
	MW008	**11/30/2019**	**0083_MW8_7.5-8.0_191130**	**Normal**	**EP1912681**	<0.05	<0.05	<0.02	<0.05	**8.92**	16.3	16.6	<1	235	<1	235	138	139	4,330	0.42	528		161	308	116	2,360
	MW008	**3/17/2020**	**MW08_200317**	**Normal**	**EP2002947**	<0.05	<0.05	<0.02	<0.05	0.62	0.79	0.79									1,290					
	MW008	**6/26/2020**	**0083_MW008_200626**	**Normal**	**EP2006686**	<0.05	<0.05	<0.02	<0.05	**8.54**	12.4	12.6	<1	242	<1	242	213	197	6,790	3.97	819		214	441	156	3,360
	MW008	**6/26/2020**	**0083_QC101_200626**	**Field Duplicate**	**EP2006686**	<0.05	<0.05	<0.02	<0.05	**8.28**	12.0	12.2	<1	237	<1	237	279	267	8,860	2.08	1,150		271	606	249	4,540
	MW008	**6/26/2020**	**0083_QC201_200626**	**Interlab Duplicate**	**729409**	<0.05	<0.05	<0.05	<0.05	**7.05**	9.69	9.85	<10	1,200					8,600			1,100				
	MW008	**11/17/2020**	**0083_MW008_201117**	**Normal**	**EP2012749**	<0.05	<0.05	<0.02	<0.05	0.40	0.40	0.40	<1	226	<1	226	310	309	9,860	0.08	1,300		269	732	282	5,250
	MW008	**6/22/2021**	**0083_MW008_210622**	**Normal**	**EP2107184**	<0.05	<0.05	<0.02	<0.05	0.08	0.28	0.28	<1	218	<1	218	329	330	10,500	0.14	1,380		294	784	306	5,590
	MW008	**11/23/2021**	**0083_MW008_211123**	**Normal**	**EP2114296**	<0.05	<0.05	<0.02	<0.05	0.38	0.38	0.38	<1	204	<1	204	309	318	9,750	1.32	1,450		262	767	255	5,400
	MW008	**6/21/2022**	**0083_MW008_220621**	**Normal**	**EP2207624**	<0.05	<0.05	<0.02	<0.05	0.62	0.62	0.62	<1	221	<1	221	288	324	8,980	6.01	1,430		305	802	303	5,410
	MW008	**6/21/2022**	**0083_QC108_220621**	**Field Duplicate**	**EP2207624**	<0.05	<0.05	<0.02	<0.05	0.63	0.63	0.63	<1	209	<1	209	305	349	9,530	6.81	1,520		320	856	324	5,850
	MW008	**6/21/2022**	**0083_QC208_220621**	**Interlab Duplicate**	**901207**	<0.008	<0.004	<0.004	<0.008	0.45	0.48	0.49														
Powerhouse	**MW017**	**2/28/2018**	**0083_MW17_180228**	**Normal**	**207612**	<0.02	<0.05	<0.01	<0.2					290					8,900	1.6		1,800	260	610	220	5,400
	MW017	**6/16/2018**	**0083_MW17_180616**	**Normal**	**212374**	<0.005	<0.02	<0.004	<0.05					290					9,300	1.3		1,600	270	620	220	5,500
	MW017	**11/28/2019**	**0083_MW17_191128**	**Normal**	**EP1912603**	<0.05	<0.05	<0.02	<0.05	**17.2**	40.1	40.9	<1	297	<1	297	297	349	9,210	7.99	1,520		341	801	352	5,910
	MW017	**6/25/2020**	**0083_MW017_200625**	**Normal**	**EP2006683**	<0.05	<0.05	<0.02	<0.05	**11.5**	29.0	29.4	<1	387	<1	387	261	257	7,930	0.74	1,410		274	577	256	4,350
	MW017	**6/25/2020**	**0083_QC103_200625**	**Field Duplicate**	**EP2006683**	<0.05	<0.05	<0.02	<0.05	**11.9**	29.2	29.5	<1	324	<1	324	255	245	7,790	1.91	1,380		259	550	245	4,160
	MW017	**6/25/2020**	**0083_QC203_200625**	**Interlab Duplicate**	**729352**	<0.05	<0.05	<0.05	<0.05	**10.5**	18.9	19.37	<10	360					8,500			1,300				
	MW017	**11/18/2020**	**0083_MW017_201118**	**Normal**	**EP2012802**	<0.05	<0.05	<0.02	<0.05	**17.0**	31.1	31.4	<1	368	<1	368	205	219	6,300	3.36	964		238	494	232	3,700
	MW017	**6/22/2021**	**0083_MW017_210622**	**Normal**	**EP2107095**	<0.05	<0.05	<0.02	<0.05	**10.7**	22.9	23.1	<1	281	<1	281	298	304	9,340	0.88	1,410		316	707	312	5,100
	MW017	**11/23/2021**	**0083_MW017_211123**	**Normal**	**EP2114300**	<0.05	<0.05	<0.02	<0.05	**15.2**	27.5	27.7	<1	295	<1	295	277	279	8,600	0.36	1,370		300	647	265	4,690
	MW017	**6/21/2022**	**0083_MW017_220621**	**Normal**	**EP2207630**	<0.05	<0.05	<0.02	<0.05	**12.0**	42.1	42.5	<1	322	<1	322	166	168	5,000	0.74	883		214	412	178	2,740
	MW017	**6/21/2022**	**0083_QC113_220621**	**Field Duplicate**	**EP2207630**	<0.05	<0.05	<0.02	<0.05	**9.75**	44.6	45.0	<1	303	<1	303	229	265	6,940	7.35	1,290		292	628	286	4,400
	MW017	**6/21/2022**	**0083_QC213_220621**	**Interlab Duplicate**	**901207**	<0.008	<0.004	<0.004	<0.008	0.81	4.3	4.8														
Powerhouse	**MW019**	**2/23/2018**	**0083_MW19_180223**	**Normal**	**207359**	<0.005	<0.01	<0.002	<0.05					330					4,300	0.43		740	150	300	98	2,500
	MW019	**6/16/2018**	**0083_MW19_180616**	**Normal**	**212374**	<0.1	<0.2	<0.04	<0.1					360					8,700	1.1		1,300	250	600	190	5,000
	MW019	**3/17/2020**	**MW19_200317**	**Normal**	**EP2002947**	<0.05	<0.05	<0.02	<0.05	0.06	0.11	0.11														
	MW019	**6/25/2020**	**0083_MW019_200625**	**Normal**	**EP2006683**	<0.05	<0.05	<0.02	<0.05	0.10	0.12	0.12	<1	334	<1	334	239	218	7,450	4.50	1,060		212	482	211	3,740
	MW019	**11/18/2020**	**0083_MW019_201118**	**Normal**	**EP2012802**	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	330	<1	330	306	318	9,600	1.98	1,380		282	710	314	5,470
	MW019	**6/23/2021**	**0083_MW019_210623**	**Normal**	**EP2107188**	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	317	<1	317	296	323	9,300	4.51	1,290		286	718	306	5,570
	MW019	**11/23/2021**	**0083_MW019_211123**	**Normal**	**EP2114296**	<0.05	<0.05	<0.02	<0.05	0.06	0.06	0.06	<1	208	<1	208	200	194	6,280	1.56	900		184	442	171	3,310
	MW019	**6/21/2022**	**0083_MW019_220621**	**Normal**	**EP2207630**	<0.05	<0.05	<0.02	<0.05	0.11	0.11	0.11	<1	220	<1	220	73.7	78.7	2,100	3.29	484		142	194	85	1,230
Powerhouse	**MW027**	**2/23/2018**	**0083_MW27_180223**	**Normal**	**207359**	0.01	<0.01	<0.002	<0.05					340					5,300	-2.1		1,100	210	360	110	3,000
	MW027	**6/16/2018**	**0083_MW27_180616**	**Normal**	**212374**	<0.02	<0.05	<0.004	<0.05					320					7,900	2.3		1,400	260	530	170	4,800
	MW027	**11/28/2019**	**0083_MW27_191128**	**Normal**	**EP1912603**	<0.05	<0.05	<0.02	<0.05	0.39	0.78	0.78	<1	334	<1	334	251	275	7,710	4.71	1,270		318	637	257	4,610
	MW027	**11/28/2019**	**0083_QC101_191128**	**Field Duplicate**	**EP1912603**	<0.05	<0.05	<0.02	<0.05	0.43	1.07	1.07	<1	334	<1	334	245	272	7,580	5.23	1,160		316	631	254	4,540
	MW027	**11/28/2019**	**0083_QC201_191128**	**Interlab Duplicate**	**691456**	<0.05	<0.05	<0.05	<0.05	0.31	0.81	0.83	<10	360					10,000			1,200				
	MW027	**6/25/2020**	**0083_MW027_200625**	**Normal**	**EP2006683**	<0.05	<0.05	<0.02	<0.05	0.33	0.57	0.57	<1	336	<1	336	239	218	7,350	4.41	1,180		260	487	209	3,680
	MW027	**11/18/2020**	**0083_MW027_201118**	**Normal**	**EP2012802**	<0.05	<0.05	<0.02	<0.05	0.33	0.50	0.50	<1	355	<1	355	277	280	8,690	0.48	1,210		295	624	272	4,760
	MW027	**6/23/2021**	**0083_MW027_210623**	**Normal**	**EP2107188**	<0.05	<0.05	<0.02	<0.05	0.27	0.34	0.34	<1	356	<1	356	280	328	8,770	7.78	1,240		341	730	304	5,580
	MW027	**11/23/2021**	**0083_MW027_211123**	**Normal**	**EP2114296**	<0.05	<0.05	<0.02	<0.05	0.56	1.11	1.11	<1	304	<1	304	132	140	3,840	2.85	848		198	316	117	2,320
	MW027	**6/21/2022**	**0083_MW027_220621**	**Normal**	**EP2207630**	<0.05	<0.05	<0.02	<0.05	1.60	2.14	2.16	<1	305	<1	305	151	146	4,580	1.69	767		234	327	127	2,400
Powerhouse	**MW101**	**2/28/2018**	**0083_MW101_180228**	**Normal**	**207612**	<0.02	<0.5	<0.1	<0.2					700					6,800	3.2		420	160	460	140	4,100
	MW101	**2/28/2018**	**0083_QC2301_180228**	**Interlab Duplicate**	**588076**	<0.05	<0.05	<0.05	<0.05	0.44	1.28	1.32	<10	770	<10	770			6,800			350				
	MW101	**6/16/2018**	**0083_MW101_180616**	**Normal**	**212374**	<0.2	<0.1	<0.04	<0.5					520					5,700	-0.0081		550	150	370	110	3,300
	MW101	**6/25/2020**	**0083_MW101_200625**	**Normal**	**EP2006683**	<0.05	<0.05	<0.02	<0.05	0.24	0.40	0.40	<1	705	<1	705	280	265	8,830	2.74	788		202	611	249	4,550
	MW101	**6/25/2020**	**0083_QC102_200625**	**Field Duplicate**	**EP2006683**	<0.05	<0.05	<0.02	<0.05	0.20	1.75	1.75	<1	715	<1	715	278	270	8,760	1.28	778		208	624	258	4,650
	MW101	**6/25/2020**	**0083_QC202_200625**	**Interlab Duplicate**	**729352**	<0.05	<0.05	<0.05	<0.05	0.21	0.95	0.95	<10	640					9,000			650				
	MW101	**11/18/2020**	**0083_MW101_201118**	**Normal**	**EP2012802**	<0.05	<0.05	<0.02	<0.05	0.25	0.59	0.59	<1	686	<1	686	258	278	8,100	3.81	754		218	651	267	4,760
	MW101	**6/23/2021**	**0083_MW101_210623**	**Normal**	**EP2107188**	<0.05	<0.05	<0.02	<0.05	0.31	0.90	0.90	<1	772	<1	772	229	234	7,300	0.98	389		182	542	213	4,020
	MW101	**11/23/2021**	**0083_MW101_211123**	**Normal**	**EP2114295**	<0.05	<0.05	<0.02	<0.05	0.28	0.64	0.64	<1	762	<1	762	256	260	8,050	0.86	637		190	629	221	4,440
	MW101	**6/21/2022**	**0083_MW101_220621**	**Normal**	**EP2207630**	<0.05	<0.05	<0.02	<0.05	0.31	0.82	0.82	<1	411	<1	411	53.0	60.3	1,480	6.45	145		63	140	66	1,010
Powerhouse	**MW102**	**2/28/2018**	**0083_MW102_180228**	**Normal**	**207612**	<0.02	<0.05	<0.01	<0.2					270					4,700	0.8		970	180	310	110	2,800
	MW102	**6/16/2018**	**0083_MW102_180616**	**Normal**	**212374**	<0.05	<0.1	<0.02	<0.1					280					5,600	0.031		920	190	350	120	3,300
	MW102	**6/25/2020**	**0083_MW102_200625**	**Normal**	**EP2006683**	<0.05	<0.05	<0.02	<0.05	0.22	0.55	0.55	<1	343	<1	343	274	258	8,520	2.99	1,290		257	562	249	4,430
	MW102	**11/18/2020**	**0083_MW102_201118**	**Normal**	**EP2012802**	<0.05	<0.05	<0.02	<0.05	0.45	1.55	1.58	<1	285	<1	285	242	238	7,580	0.79	1,070		254	525	233	4,050
	MW102	**6/22/2021**	**0083_MW102_210622**	**Normal**	**EP2107184**	<0.05	<0.05	<0.02	<0.05	0.36	2.29	2.29	<1	231	<1	231	126	120	3,950	2.68	496		143	268	123	2,010
	MW102	**11/23/2021**	**0083_MW102_211123**	**Normal**	**EP2114295**	<0.05	<0.05	<0.02	<0.05	0.38	1.09	1.09	<1	314	<1	314	246	235	7,700	2.28	1,080		234	542	201	3,990
	MW102	**6/21/2022**	**0083_MW102_220621**	**Normal**	**EP2207630**	<0.05	<0.05	<0.02	<0.05	0.99	2.07	2.38	<1	205	<1	205	34.4	32.1	953	3.50	166		74	77	28	491
Powerhouse	**MW103**	**2/28/2018**	**0083_MW103_180228**	**Normal**	**207612**	<0.02	<0.05	<0.01	<0.2					300					3,700	0.44		910	180	280	92	2,200
	MW103	**6/16/2018**	**0083_MW103_180616**	**Normal**	**212374**	<0.01	<0.02	<0.002	<0.05					280					4,900	-0.41		920	190	320	110	2,800
	MW103	**6/16/2018**	**0083_QC149_180616**	**Field Duplicate**	**212374**	<0.005	<0.02	<0.002	<0.05					280					4,700	2.4		1,100	200	340	110	2,900
	MW103	**6/16/2018**	**0083_QC249_180616**	**Interlab Duplicate**	**604955**	<0.05	<0.05	<0.05	<0.05	1.24	6.48	6.65	<10	330					4,900			1,000				
	MW103	**11/28/2019**	**0083_MW103_191128**	**Normal**	**EP1912603**	<0.05	<0.05	<0.02	<0.05	1.23	7.26	7.52	<1	362	<1	362	136	140	3,940	1.13	875		190	318	123	2,320
	MW103	**11/28/2019**	**0083_QC102_191128**	**Field Duplicate**	**EP1912603**	<0.05	<0.05	<0.02	<0.05	1.12	7.35	7.54	<1	308	<1	308	142	144	4,160	0.98	872		192	326	126	2,410
	MW103	**11/28/2019**	**0083_QC202_191128**	**Interlab Duplicate**	**691456**	<0.05	<0.05	<0.05	<0.05	0.98	6.47	6.76	<10	1,300					5,600			860				
	MW103	**6/25/2020**	**0083_MW103_200625**	**Normal**	**EP2006683**	<0.05	<0.05	<0.02	<0.05	0.68	3.58	3.69	<1	284	<1	284	214	189	6,530	6.02	1,140		233	422	183	3,180
	MW103	**11/18/2020**	**0083_MW103_201118**	**Normal**	**EP2012802**	<0.05	<0.05	<0.02	<0.05	0.51	2.89	2.96	<1	307	<1	307	223	222	6,920	0.40	1,060		261	500	220	3,720
	MW103	**6/22/2021**	**0083_MW103_210622**	**Normal**	**EP2107184**	<0.05	<0.05	<0.02	<0.05	0.59	4.19	4.27	<1	284	<1	284	218	181	6,790	9.48	1,020		226	404	185	3,020
	MW103	**6/22/2021**	**0083_QC106_210622**	**Field Duplicate**	**EP2107184**	<0.05	<0.05	<0.02	<0.05	0.61	4.47	4.55	<1	288	<1	288	284	251	8,960	6.29	1,250		261	544	218	4,310
	MW103	**6/22/2021**	**0083_QC206_210622**	**Interlab Duplicate**	**805492**	<0.05	<0.05	<0.05	<0.05	0.59	3.94	4.04	<10	600	<20	600			8,600			1,400				
	MW103	**11/23/2021**	**0083_MW103_211123**	**Normal**	**EP2114295**	<0.05	<0.05	<0.02	<0.05	0.64	3.87	3.97	<1	297	<1	297	227	218	7,000	2.08	1,140		258	513	190	3,630
	MW103	**6/21/2022**	**0083_MW103_220621**	**Normal**	**EP2207630**	<0.05	<0.05	<0.02	<0.05	0.41	2.00	2.05	<1	244	<1	244	190	200	5,800	2.58	1,020		243	470	212	3,300
Powerhouse	**MW104**	**2/28/2018**	**0083_MW104_5.5-6.0_180228**	**Normal**	**207612**	<0.005	<0.01	<0.002	<0.05					270					4,100	75		1,200	770	2,000	640	18,000
	MW104	**2/28/2018**	**0083_MW104_7.5-8.0_180228**	**Normal**	**207612**	0.008	<0.01	<0.002	<0.05					250					4,200	0.98		1,300	140	330	110	2,700
	MW104	**2/28/2018**	**0083_MW104_9.5-10.0_180228**	**Normal**	**207612**	<0.005	<0.01	<0.002	<0.05					250					11,000	1.2		2,000	280	710	240	6,300
	MW104	**6/18/2018**	**0083_MW104_3.5-4.0_180618**	**Normal**	**212374**	<0.005	<0.02	<0.002	<0.05					910					2,800	-11		870	200	220	59	1,400
	MW104	**6/18/2018**	**0083_MW104_5.5-6.0_180618**	**Normal**	**212374**	<0.005	<0.02	<0.002	<0.05					280					4,200	0.28		990	200	320	93	2,400
	MW104	**6/18/2018**	**0083_MW104_7.5-8.0_180618**	**Normal**	**212374**	<0.005	<0.02	<0.002	<0.05					250					4,400	1.4		1,100	150	340	110	2,700
	MW104	**6/18/2018**	**0083_MW104_9.5-10.0_180618**	**Normal**	**212374**	<0.005	<0.02	<0.002	<0.05					250					11,000	1.6		1,800	290	730	230	6,200
	MW104	**11/28/2019**	**0083_MW104_5.5-6.0_191128**	**Normal**	**EP1912603**	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	225	<1	225	146	148	4,250	0.79	1,020		179	360	127	2,440
	MW104	**6/25/2020**	**0083_MW104_200625**	**Normal**	**EP2006683**	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	266	<1	266	174	158	5,190	4.79	1,070		193	391	159	2,580
	MW104	**11/18/2020**	**0083_MW104_201118**	**Normal**	**EP2012904**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	245	<1	245	161	158	4,820	0.84	956		179	383	143	2,620
	MW104	**6/22/2021**	**0083_MW104_210622**	**Normal**	**EP2107184**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	257	<1	257	160	162	4,810	0.51	934		189	393	173	2,660
	MW104	**6/22/2021**	**0083_QC107_210622**	**Field Duplicate**	**EP2107184**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	283	<1	283	200	187	6,220	3.45	905		235	428	188	3,100
	MW104	**6/22/2021**	**0083_QC207_210622**	**Interlab Duplicate**	**805492**	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	<10	870	<20	870			5,000			990				
	MW104	**11/23/2021**	**0083_MW104_5.5-6_211123**	**Normal**	**EP2114300**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	925	<1	925	183	185	5,220	0.57	827		258	465	185	2,970
	MW104	**11/23/2021**	**0083_QC214_211123**	**Interlab Duplicate**	**844500**	<0.05	<0.05	<0.05	<0.05	0.02	<0.05	<0.1														
	MW104	**6/21/2022**	**0083_MW104_220621**	**Normal**	**EP2207630**	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	208	<1	208	45.6	54.0	1,220	8.46	336		166	158	44	726
Pol Storage	**MW105**	**3/3/2018**	**0083_MW105_2.0-2.5_180303**	**Normal**	**207818**	<0.005	<0.01	<0.002	<0.05	1.2				490					1,400	-3.1		120	120	82	33	810
	MW105	**3/3/2018**	**0083_MW105_4.0-4.5_180303**	**Normal**	**207818**	<0.005	<0.01	<0.002	<0.05	0.2				270					9,900	-1.5		1,400	240	640	190	5,400
	MW105	**3/3/2018**	**0083_MW105_6.0-6.5_180303**	**Normal**	**207818**	<0.005	<0.01	<0.002	<0.05	0.2				420					12,000	-0.91		1,800	370	630	180	6,600
	MW105	**3/3/2018**	**0083_MW105_8.0-8.5_180303**	**Normal**	**207818**	<0.005	<0.01	<0.002	<0.05	<0.001				300					12,000	-1.4		1,600	290	760	230	6,600
	MW105	**6/2/2018**	**0083_MW105-4.0-4.5_180602**	**Normal**	**211639**	<0.005	<0.01	<0.002	<0.05	0.25				340					9,500	1.1		1,400	250	680	200	5,500
	MW105	**6/2/2018**	**0083_MW105-6.0-6.5_180602**	**Normal**	**211639**	<0.005	<0.01	<0.002	<0.05	0.11				720					11,000	0.15		1,500	330	740	210	6,600
	MW105	**6/2/2018**	**0083_MW105-8.0-8.5_180602**	**Normal**	**211639**	<0.005	<0.01	<0.002	<0.05	0.038				310					11,000	2.9		1,500	280	790	230	6,600
	MW105	**11/28/2019**	**0083_MW105_4.0-4.5_191128**	**Normal**	**EP1912600**	<0.05	<0.05	<0.02	<0.05	0.40	1.30	1.30	<1	265	<1	265	302	340	9,550	5.90	1,330		312	815	312	5,740
	MW105	**6/26/2020**	**0083_MW105_200626**	**Normal**	**EP2006686**	<0.05	<0.05	<0.02	<0.05	0.14	0.42	0.42	<1	258	<1	258	328	304	10,400	3.75	1,420		273	704	293	5,180

Table 4 - Water Analytical Results

						Fluoroalkyl Sulfonamides				PFAS			Inorganics										Metals			
						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	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)	Sulphate	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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
	MW105	11/17/2020	0083_MW105_201117	Normal	EP2012749	<0.05	<0.05	<0.02	<0.05	0.31	1.27	1.27	<1	269	<1	269	338	325	10,800	1.92	1,320		287	771	305	5,500
	MW105	11/17/2020	0083_QC106_201117	Field Duplicate	EP2012749	<0.05	<0.05	<0.02	<0.05	0.32	1.50	1.50	<1	315	<1	315	342	334	10,900	1.13	1,350		292	773	317	5,700
	MW105	11/17/2020	0083_QC206_201117	Interlab Duplicate	758001	<0.05	<0.05	<0.05	<0.05	0.44	1.8	1.81	<10	710	<20	710			12,000			1,600				
	MW105	6/22/2021	0083_MW105_210622	Normal	EP2107184	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	244	<1	244	332	326	10,700	1.02	1,230		288	789	309	5,480
	MW105	11/23/2021	0083_MW105_6-6.5_211123	Normal	EP2114296	<0.05	<0.05	<0.02	<0.05	0.13	0.26	0.26	<1	250	<1	250	324	341	10,200	2.52	1,530		280	814	283	5,820
	MW105	6/21/2022	0083_MW105_4-4.5_220621	Normal	EP2207624	<0.05	<0.05	<0.02	<0.05	0.17	0.53	0.53	<1	228	<1	228	298	342	9,270	6.90	1,540		325	845	321	5,710
POL Pathway	MW107	3/3/2018	0083_MW107_3.1-4.1_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	0.4				260					4,800	-1.7		360	130	290	97	2,500
	MW107	3/3/2018	0083_MW107_5.5-6.0_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				740					20,000	-1.6		3,400	410	1,300	390	11,000
	MW107	3/3/2018	0083_MW107_7.5-8.0_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	0.1				130					20,000	-0.57		3,400	420	1,300	390	11,000
	MW107	6/17/2018	0083_MW107_5.5-6.0_180617	Normal	212374	<0.005	<0.01	<0.002	<0.05					130					20,000	1.1		2,700	400	1,300	370	11,000
	MW107	6/17/2018	0083_MW107_7.5-8.0_180617	Normal	212374	0.006	<0.01	<0.002	<0.05					130					20,000	0.49		2,800	410	1,300	370	11,000
	MW107	11/30/2019	0083_MW107_5.5-6.0_191130	Normal	EP1912681	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	167	<1	167	590	700	19,000	8.52	2,440		487	1,610	662	12,100
	MW107	6/26/2020	0083_MW107_7.5_200626	Normal	EP2006690	<0.05	<0.05	<0.02	<0.05	0.39	0.39	0.39	<1	129	<1	129	586	583	18,700	0.32	2,710		641	1,140	521	10,200
	MW107	11/17/2020	0083_MW107_201117	Normal	EP2012742	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05	<1	166	<1	166	611	652	19,500	3.21	2,770		498	1,450	621	11,300
	MW107	6/22/2021	0083_MW107_210622	Normal	EP2107185	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05	<1	153	<1	153	601	675	19,200	5.80	2,720		492	1,520	658	11,700
	MW107	11/23/2021	0083_MW107_211123	Normal	EP2114295	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	201	<1	201	584	596	18,700	1.05	2,530		402	1,350	509	10,400
	MW107	6/21/2022	0083_MW107_5.5-6_220621	Normal	EP2207624	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	135	<1	135	581	542	18,700	3.47	2,430		411	1,260	511	9,300
POL Pathway	MW109	3/1/2018	0083_MW109_6.5-7.0_180301	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				140					16,000	-1.1		2,100	340	1,000	290	8,800
	MW109	3/1/2018	0083_MW109_9.3-9.8_180301	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				150					20,000	-1.5		2,700	390	1,300	390	11,000
	MW109	6/20/2018	0083_MW109_6.5-7.0_180620	Normal	212571	<0.005	<0.02	<0.002	<0.05	<0.001				120					17,000	8.8		2,200	390	1,300	380	11,000
	MW109	6/20/2018	0083_MW109_9.3-9.8_180620	Normal	212571	<0.005	<0.02	<0.002	<0.05	0.002				110					18,000	10		2,300	400	1,300	420	12,000
	MW109	11/30/2019	0083_MW109_6.5-7.0_191130	Normal	EP1912681	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	125	<1	125	629	703	20,200	5.54	2,720		468	1,600	664	12,200
	MW109	6/28/2020	0083_MW109_200628	Normal	EP2006692	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	134	<1	134	591	662	18,900	5.73	2,640		490	1,480	629	11,500
	MW109	11/18/2020	0083_MW109_201118	Normal	EP2012854	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1	116	600	642	19,200	3.34	2,710		450	1,440	536	11,200
	MW109	6/22/2021	0083_MW109_210622	Normal	EP2107185	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	104	<1	104	591	635	18,900	3.62	2,660		448	1,440	614	11,000
	MW109	11/24/2021	0083_MW109_211124	Normal	EP2114519	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	104	<1	104	654	635	21,100	1.51	2,750		434	1,410	567	11,100
	MW109	6/21/2022	0083_MW109_220621	Normal	EP2207630	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	167	<1	167	536	554	17,200	1.66	2,280		444	1,300	560	9,440
POL Pathway	MW110	3/1/2018	0083_MW110_7.5-8.0_180301	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				290					6,000	1.9		620	150	360	130	3,600
	MW110	3/1/2018	0083_MW110_9.0-9.5_180301	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				56					19,000	-0.6		2,600	370	1,200	360	11,000
	MW110	6/20/2018	0083_MW110_7.5-8.0_180620	Normal	212571	<0.005	<0.02	<0.002	<0.05	0.002				230					8,800	8.5		1,100	230	620	210	5,900
	MW110	6/20/2018	0083_MW110_9.0-9.5_180620	Normal	212571	<0.005	<0.02	<0.002	<0.05	0.007				110					18,000	7.6		2,300	390	1,300	400	12,000
	MW110	6/26/2020	0083_MW110_200626	Normal	EP2006686	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	154	<1	154	580	621	18,600	3.41	2,500		481	1,380	523	10,800
	MW110	11/18/2020	0083_MW110_201118	Normal	EP2012854	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	208	<1	208	584	621	18,600	3.12	2,630		475	1,390	518	10,800
	MW110	6/22/2021	0083_MW110_210622	Normal	EP2107185	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	154	<1	154	582	625	18,600	3.56	2,620		466	1,420	605	10,800
	MW110	11/24/2021	0083_MW110_211124	Normal	EP2114519	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	112	<1	112	578	666	18,600	7.16	2,430		484	1,490	594	11,600
	MW110	6/21/2022	0083_MW110_220621	Normal	EP2207630	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	180	<1	180	505	456	16,400	5.09	1,870		377	1,080	464	7,740
POL Pathway	MW111	3/3/2018	0083_MW111_8.5-9.0_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				200					15,000	3.9		2,500	350	1,100	300	9,300
	MW111	3/3/2018	0083_MW111_10.5-11.0_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				100					20,000	2.2		3,400	410	1,400	410	12,000
	MW111	6/17/2018	0083_MW111_8.5-9.0_180617	Normal	212374	<0.005	<0.01	<0.002	<0.05					170					16,000	2.0		2,100	350	1,100	310	9,300
	MW111	6/17/2018	0083_MW111_10.5-11.0_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					120					19,000	0.51		2,700	390	1,300	360	11,000
	MW111	6/17/2018	0083_QC155_180617	Field Duplicate	212374	<0.01	<0.02	<0.002	<0.05					120					19,000	1.5		2,600	400	1,300	370	11,000
	MW111	6/17/2018	0083_QC255_180617	Interlab Duplicate	604955	<0.05	<0.05	<0.05	<0.05	0.01	<0.05	<0.1	<10	290					18,000			2,300				
	MW111	11/28/2019	0083_MW111_8.5-9.0_191128	Normal	EP1912603	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	198	<1	198	422	502	13,500	8.60	1,800		367	1,150	453	8,670
	MW111	6/26/2020	0083_MW111_10.5_200626	Normal	EP2006690	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	165	<1	165	475	471	15,200	0.36	2,050		402	1,010	482	8,180
	MW111	11/18/2020	0083_MW111_201118	Normal	EP2012854	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	360	<1	360	524	548	16,700	2.22	2,190		443	1,180	594	9,500
	MW111	6/22/2021	0083_MW111_210622	Normal	EP2107185	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	666	<1	666	569	638	18,000	5.74	2,290		496	1,440	636	11,000
	MW111	11/23/2021	0083_MW111_211123	Normal	EP2114295	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	305	<1	305	583	613	18,600	2.57	2,490		421	1,380	524	10,700
	MW111	6/21/2022	0083_MW111_10.5-11_220621	Normal	EP2207624	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	90	<1	90	579	694	18,600	9.03	2,510		535	1,600	692	11,900
	MW111	6/21/2022	0083_QC114_220621	Field Duplicate	EP2207624	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02														
	MW111	6/21/2022	0083_QC214_220621	Interlab Duplicate	901207	<0.008	<0.004	<0.004	<0.008	1.9	1.9	1.9														
POL Pathway	MW112	3/3/2018	0083_MW112_2.0-3.0_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				120					18,000	2		3,200	440	1,200	380	11,000
	MW112	3/3/2018	0083_MW112_4.5-5.0_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				140					20,000	1.2		3,300	430	1,300	400	11,000
	MW112	3/3/2018	0083_MW112_6.5-7.0_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				130					20,000	2.5		3,400	450	1,400	420	12,000
	MW112	3/3/2018	0083_MW112_8.5-9.0_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				190					20,000	-3.3		3,500	470	1,200	350	11,000
	MW112	6/17/2018	0083_MW112_2.0-3.0_180617	Normal	212374	<0.005	<0.01	<0.002	<0.05					130					11,000	-0.067		1,500	260	690	230	6,400
	MW112	6/17/2018	0083_MW112_4.5-5.0_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					140					20,000	0.17		2,700	410	1,300	370	11,000
	MW112	6/17/2018	0083_MW112_6.5-7.0_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					130					20,000	0.19		2,700	410	1,300	360	11,000
	MW112	6/17/2018	0083_MW112_8.5-9.0_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					180					19,000	2.7		2,600	460	1,300	360	11,000
	MW112	11/28/2019	0083_MW112_4.5-5.0_191128	Normal	EP1912600	<0.05	<0.05	<0.02	<0.05	<0.01	0.05	0.05	<1	160	<1	160	558	637	17,900	6.58	2,400		482	1,440	612	11,000
	MW112	6/26/2020	0083_MW112_200626	Normal	EP2006686	<0.05	<0.05	<0.02	<0.05	0.02	0.19	0.19	<1	150	<1	150	599	620	19,200	1.74	2,600		464	1,380	526	10,800
	MW112	11/18/2020	0083_MW112_201118	Normal	EP2012904	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	135	<1	135	596	649	19,000	4.23	2,750		461	1,460	545	11,300
	MW112	6/22/2021	0083_MW112_210622	Normal	EP2107185	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	130	<1	130	589	664	18,800	6.04	2,680		481	1,500	653	11,500
	MW112	11/23/2021	0083_MW112_211123	Normal	EP2114295	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	111	<1	111	599	640	19,200	3.28	2,650		420	1,430	540	11,200
	MW112	6/21/2022	0083_MW112_4.5-5_220621	Normal	EP2207624	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	110	<1	110	564	670	18,100	8.58	2,470		493	1,560	663	11,500
Powerhouse Pathway	MW113	3/1/2018	0083_MW113_2.5-3.5_180301	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				300					20,000	-2.1		2,800	400	1,300	380	11,000
	MW113	3/1/2018	0083_MW113_5.0-5.5_180301	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				170					20,000	-0.73		2,900	520	1,100	320	11,000
	MW113	3/1/2018	0083_MW113_7.0-7.5_180301	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				150					21,000	-3.2		2,800	420	1,200	380	11,000
	MW113	6/17/2018	0083_MW113_2.5-3.5_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					120					20,000	-1.7		2,600	390	1,200	360	11,000
	MW113	6/17/2018	0083_MW113_5.0-5.5_180617	Normal	212374	<0.005	<0.02	<0.004	<0.05					200					20,000	1.2		2,700	520	1,200	330	12,000
	MW113	6/17/2018	0083_MW113_7.0-7.5_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					170					20,000	1.9		2,500	430	1,300	410	11,000
	MW113	11/28/2019	0083_MW113_2.5-3.5_191128	Normal	EP1912604	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	147	<1	147	532	595	16,900	5.64	2,490		453	1,330	586	10,300
	MW113	6/25/2020	0083_MW113_200625	Normal	EP2006594	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	144	<1	144	602	602	19,200	0.03	2,780		427	1,350	503	10,500
	MW113	11/18/2020	0083_MW113_201118	Normal	EP2012854	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	140	<1	140	586	626	18,700	3.27	2,680		444	1,410	524	10,900
	MW113	6/22/2021	0083_MW113_2.5-3.5_210622	Normal	EP2107095	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	133	<1	133	556	671	17,900	9.36	2,330		491	1,520	655	11,600
	MW113	11/23/2021	0083_MW113_2.5-3.5_211123	Normal	EP2114300	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	131	<1	131	535	611	17,200	6.59	2,290		447	1,380	552	10,600
	MW113	6/21/2022	0083_MW113_2.5-3.5_220621	Normal	EP2207626	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	155	<1	155	307	301	9,740	0.95	1,400		252	706	307	5,120
Powerhouse Pathway	MW114	3/1/2018	0083_MW114_2.0-3.0_180301	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				2,600					20,000	-5.1		2,600	560	1,200	320	11,000
	MW114	3/1/2018	0083_MW114_4.5-5.0_180301	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				2,100					20,000	-5.1		2,700	400	1,300	380	11,000
	MW114	3/1/2018	0083_MW114_6.5-7.0_180301	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				140					17,000	7		2,300	410	1,300	380	11,000
	MW114	3/1/2018	0083_MW114_8.5-9.0_180301	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				220					20,000	-2.1		2,800	410	1,300	380	11,000
	MW114	6/17/2018	0083_MW114_2.0-3.0_180617	Normal	212374	<0.005	<0.02	<0.004	<0.05					150					19,000	-0.37		2,300	410	1,300	380	10,000
	MW114	6/17/2018	0083_MW114_4.5-5.0_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					130					8,900	38		1,200	410	1,300	370	11,000
	MW114	6/17/2018	0083_MW114_6.5-7.0_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					140					20,000	-0.46		2,600	400	1,200	360	11,000
	MW114	6/17/2018	0083_MW114_8.5-9.0_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					130					21,000	-3.3		2,600	390	1,200	370	11,000
	MW114	11/28/2019	0083_MW114_2.0-3.0_191128	Normal	EP1912604	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	129	<1	129	579	574	18,400	0.44	2,770		411	1,320	566	9,900
	MW114	6/25/2020	0083_MW114_200625	Normal	EP2006594	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	160	<1	160	610	641	19,500	2.44	2,750		456	1,430	528	11,200
	MW114	11/18/2020	0083_MW114_201118	Normal	EP2012854	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	158	<1	158	581	656	18,400	6.08	2,810		482	1,480	553	11,400
	MW114	6/22/2021	0083_MW114_2.0-3.0_210622	Normal	EP2107095	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	157	<1	157	598	526	19,300	6.44	2,420		390	1,220	490	9,040
	MW114	11/23/2021	0083_MW114_2.0-3.0_211123	Normal	EP2114300	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	143	<1	143	558	646	17,900	7.24	2,440		470	1,460	589	11,200
	MW114	6/21/2022	0083_MW114_2-3_220621	Normal	EP2207626	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	120	<1	120	584	676	18,600	7.31	2,730		503	1,570	669	11,600
Powerhouse Pathway	MW115	3/2/2018	0083_MW115_2.0-3.0_190302	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				1,900					19,000	-5.4		2,600	540	1,200	290	10,000
	MW115	3/2/2018	0083_MW115_4-5-5.0_190302	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				2,600					19,000	-5		2,600	390	1,200	360	10,000
	MW115	3/2/2018	0083_MW115_6.5-7.0_190302	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				410					19,000	-0.36		2,600	400	1,200	370	11,000
	MW115	3/2/2018	0083_MW115_8.5-9.0_190302	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				160					19,000	-0.65		2,600	400	1,200	360	11,000
	MW115	6/17/2018	0083_MW115_2.0-3.0_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					170					19,000	-2.3		2,200	390	1,200	330	10,000
	MW115	6/17/2018	0083_MW115_4.5-5.0_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					160					19,000	-2.9		2,400	380	1,200	330	10,000
	MW115	6/17/2018	0083_MW115_6.5-7.0_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					150					20,000	-2.7		2,400	380	1,200	340	10,000
	MW115	6/17/2018	0083_MW115_8.5-9.0_180617	Normal	212374	<0.005	<0.01	<0.002	<0.05					150					20,000	-3.7		2,500	380	1,200	340	10,000
	MW115	11/28/2019	0083_MW115_2.0-3.0_191128	Normal	EP1912604	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	184	<1	184	541	594	17,200	4.67	2,490		487	1,350	572	10,200
	MW115	11/28/2019	0083_QC104_191128	Field Duplicate	EP1912604	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	175	<1	175	541	609	17,200	5.98	2,500		486	1,380	584	10,500
	MW115	11/28/2019	0083_QC204_191128	Interlab Duplicate	691456	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	<10	5,300					18,000			2,600				
	MW115	6/25/2020	0083_MW115_200625	Normal	EP2006594	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	174	<1	174	599	604	19,100	0.45	2,720		452	1,360	511	10,500
	MW115	11/18/2020	0083_MW115_201118	Normal	EP2012854	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	171	<1	171	585	615	18,700	2.50	2,580		452	1,380	512	10,700
	MW115	6/22/2021	0083_MW115_8.5-9.0_210622	Normal	EP2107095	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	168	<1	168	544	638	17,500	7.98	2,250		472	1,460	623	11,000
	MW115	11/23/2021	0083_MW115_2-3_211123	Normal	EP2114300	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	167	<1	167	510	576	16,300	6.05	2,270		436	1,290	518	10,000

Table 4 - Water Analytical Results

						Fluoroalkyl Sulfonamides				PFAS			Inorganics										Metals			
						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	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)	Sulphate	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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
	MW115	6/21/2022	0083_MW115_2-3_220621	Normal	EP2207626	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	200	<1	200	438	486	13,800	5.18	2,140		375	1,080	479	8,410
Powerhouse Pathway	MW116	3/3/2018	0083_MW116_1.2-2.2_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				1,000					20,000	-1.3		2,300	410	1,300	390	11,000
	MW116	3/3/2018	0083_MW116_4.5-5.0_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				150					21,000	-1.2		2,800	420	1,300	380	11,000
	MW116	3/3/2018	0083_MW116_6.5 -7.0_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				140					21,000	-3.6		3,800	420	1,300	380	11,000
	MW116	3/3/2018	0083_MW116_8.5-9.0_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				120					21,000	-0.86		2,700	410	1,300	380	11,000
	MW116	6/17/2018	0083_MW116_1.2-2.2_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					110					18,000	-5.5		2,200	330	1,100	310	9,100
	MW116	6/17/2018	0083_MW116_4.5-5.0_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					120					20,000	-0.39		2,600	400	1,300	370	11,000
	MW116	6/17/2018	0083_MW116_6.5-7.0_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					120					20,000	2.0		2,600	430	1,300	390	12,000
	MW116	6/17/2018	0083_MW116_8.5-9.0_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					120					20,000	-1.0		2,600	390	1,200	360	11,000
	MW116	11/28/2019	0083_MW116_4.5-5.0_191128	Normal	EP1912604	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	133	<1	133	573	665	18,300	7.38	2,620		489	1,500	657	11,500
	MW116	6/25/2020	0083_MW116_200625	Normal	EP2006594	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	133	<1	133	611	636	19,500	2.00	2,820		448	1,430	527	11,100
	MW116	6/22/2021	0083_MW116_4.5-5.0_210622	Normal	EP2107095	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	110	<1	110	581	646	18,800	5.35	2,310		458	1,460	630	11,200
	MW116	11/23/2021	0083_MW116_4.5-5.0_211123	Normal	EP2114300	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1	116	585	703	18,800	9.14	2,520		498	1,590	643	12,200
	MW116	6/21/2022	0083_MW116_220621	Normal	EP2207626	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	112	<1	112	538	641	17,100	8.78	2,550		473	1,490	646	11,000
Powerhouse Pathway	MW117	3/3/2018	0083_MW117_2.0-2.5_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				920					20,000	-1.6		2,700	430	1,300	390	11,000
	MW117	3/3/2018	0083_MW117_4.0-4.5_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				150					20,000	0.41		2,600	410	1,300	390	11,000
	MW117	3/3/2018	0083_MW117_6.0-6.5_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				150					21,000	-1.8		2,700	440	1,300	370	11,000
	MW117	3/3/2018	0083_MW117_7.4-7.9_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				140					21,000	-2		2,800	410	1,300	380	11,000
	MW117	6/17/2018	0083_MW117_2.0-2.5_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					130					20,000	-0.13		2,600	400	1,200	360	11,000
	MW117	6/17/2018	0083_MW117_4.0-4.5_180617	Normal	212374	<0.005	<0.02	<0.004	<0.05					130					20,000	1.1		2,600	400	1,300	380	11,000
	MW117	6/17/2018	0083_MW117_6.0-6.5_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					130					20,000	-0.78		2,600	400	1,300	370	11,000
	MW117	6/17/2018	0083_MW117_7.4-7.9_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					130					21,000	-4.2		3,900	400	1,300	370	11,000
	MW117	6/17/2018	0083_QC147_180617	Field Duplicate	212374	<0.005	<0.02	<0.002	<0.05					130					20,000	1.9		2,700	420	1,300	390	12,000
	MW117	6/17/2018	0083_QC247_180617	Interlab Duplicate	604955	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	<10	210					20,000			2,400				
	MW117	11/28/2019	0083_MW117_4.0-4.5_191128	Normal	EP1912604	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	150	<1	150	582	653	18,600	5.76	2,620		488	1,470	648	11,300
	MW117	6/23/2020	0083_MW117_200623	Normal	EP2006520	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	151	<1	151	614	690	19,600	5.86	2,790		468	1,490	541	12,200
	MW117	11/17/2020	0083_MW117_201117	Normal	EP2012742	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	128	<1	128	600	713	19,100	8.63	2,810		510	1,590	682	12,400
	MW117	6/22/2021	0083_MW117_6.0-6.5_210622	Normal	EP2107095	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	136	<1	136	610	692	19,700	6.36	2,460		493	1,560	686	12,000
	MW117	11/23/2021	0083_MW117_4-4.5_211123	Normal	EP2114300	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	154	<1	154	398	444	12,800	5.38	1,650		349	1,030	399	7,620
	MW117	11/23/2021	0083_QC210_211123	Interlab Duplicate	844500	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1														
	MW117	6/21/2022	0083_MW117_2-2.5_220621	Normal	EP2207626	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	251	<1	251	88.8	81.0	2,580	4.58	527		61	154	103	1,440
Pol Storage	MW119	3/1/2018	0083_MW119_180301	Normal	207818	<0.005	<0.01	<0.002	<0.05	**9.7**				280					7,400	-1.2		810	190	460	150	4,000
	MW119	3/1/2018	0083_QC117_180301	Field Duplicate	207818	<0.005	<0.01	<0.002	<0.05	**10**																
	MW119	3/1/2018	0083_QC217_180301	Interlab Duplicate	588874	<0.05	<0.05	<0.05	<0.05	**12.12**	17.82	19.29														
	MW119	6/17/2018	0083_MW119_180617	Normal	212374	**0.005**	<0.02	<0.002	<0.05					270					7,900	-0.26		1,100	190	490	140	4,500
	MW119	11/28/2019	0083_MW119_191128	Normal	EP1912603	<0.05	<0.05	<0.02	<0.05	**4.24**	7.20	7.84	<1	291	<1	291	258	281	8,250	4.13	957		243	641	277	4,800
	MW119	6/25/2020	0083_MW119_200625	Normal	EP2006683	<0.05	<0.05	<0.02	<0.05	**12.6**	21.0	22.7	<1	282	<1	282	240	229	7,680	2.47	880		184	499	237	3,970
	MW119	11/17/2020	0083_MW119_201117	Normal	EP2012749	<0.05	<0.05	<0.02	<0.05	**8.12**	15.0	16.9	<1	266	<1	266	260	242	8,370	3.49	890		203	551	252	4,150
	MW119	6/23/2021	0083_MW119_210623	Normal	EP2107188	<0.05	<0.05	<0.02	<0.05	**7.84**	13.6	15.0	<1	272	<1	272	249	268	8,010	3.65	857		214	604	265	4,620
	MW119	11/23/2021	0083_MW119_211123	Normal	EP2114296	<0.05	<0.05	<0.02	<0.05	**11.0**	20.1	21.8	<1	282	<1	282	253	258	8,050	0.97	998		209	602	244	4,420
	MW119	11/23/2021	0083_QC113_211123	Field Duplicate	EP2114296	<0.05	<0.05	<0.02	<0.05	**7.83**	14.0	15.1														
	MW119	11/23/2021	0083_QC213_211123	Interlab Duplicate	844500	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1														
	MW119	6/21/2022	0083_MW119_220621	Normal	EP2207630	<0.05	<0.05	<0.02	<0.05	**8.56**	14.7	15.9	<1	279	<1	279	189	205	5,950	4.14	733		192	485	228	3,440
Broader Area	MW129	6/17/2018	0083_MW129_1.5-2.0_180617	Normal	212374	<0.005	<0.02	<0.004	<0.05					280					15,000	1.1		2,100	470	880	250	8,700
	MW129	6/17/2018	0083_MW129_5.5-6.0_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					98					9,500	1.3		1,400	260	600	200	5,500
	MW129	6/17/2018	0083_MW129_9.5-10.0_180617	Normal	212374	<0.01	<0.02	<0.004	<0.05					150					18,000	7.2		2,500	500	1,300	370	12,000
	MW129	6/17/2018	0083_MW129_13.5-14.0_18017	Normal	212374	<0.005	<0.02	<0.002	<0.05					70					15,000	4.0		1,800	420	960	290	8,900
	MW129	11/28/2019	0083_MW129_5.5-6.0_191128	Normal	EP1912600	<0.05	<0.05	<0.02	<0.05	0.11	2.48	2.48	<1	152	<1	152	486	565	15,600	7.48	2,070		460	1,240	513	9,810
	MW129	11/28/2019	0083_QC103_191128	Field Duplicate	EP1912600	<0.05	<0.05	<0.02	<0.05	0.02	0.93	0.93	<1	145	<1	145	462	539	14,900	7.70	1,880		446	1,180	489	9,370
	MW129	11/28/2019	0083_QC203_191128	Interlab Duplicate	691456	<0.05	<0.05	<0.05	<0.05	0.02	0.76	0.76	<10	250					17,000			2,300				
	MW129	6/23/2020	0083_MW129_200623	Normal	EP2006520	<0.05	<0.05	<0.02	<0.05	0.02	0.28	0.28	<1	161	<1	161	500	549	16,000	4.64	2,180		436	1,140	452	9,690
	MW129	11/17/2020	0083_MW129_201117	Normal	EP2012743	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	260	<1	260	599	562	19,400	3.17	2,250		468	1,270	513	9,690
	MW129	11/17/2020	0083_QC102_201117	Field Duplicate	EP2012743	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	263	<1	263	608	586	19,600	1.89	2,410		484	1,320	535	10,100
	MW129	11/17/2020	0083_QC202_201117	Interlab Duplicate	758001	<0.05	<0.05	<0.05	<0.05	0.01	<0.05	<0.1							36,000			2,600				
	MW129	6/22/2021	0083_MW129_210622	Normal	EP2107184	<0.05	<0.05	<0.02	<0.05	0.75	0.81	0.81	<1	308	<1	308	561	626	18,200	5.43	2,000		539	1,390	572	10,800
	MW129	11/23/2021	0083_MW129_1.5-2_211123	Normal	EP2114300	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	296	<1	296	555	624	17,800	5.84	2,270		540	1,390	513	10,800
	MW129	6/21/2022	0083_MW129_220621	Normal	EP2207630	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	281	<1	281	582	647	18,500	5.26	2,620		547	1,520	618	11,000
Broader Area	MW130	6/17/2018	0083_MW130_1.4-1.9_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					340					17,000	-3.1		2,500	370	1,100	300	9,000
	MW130	6/17/2018	0083_MW130_3.4-3.9_180617	Normal	212374	<0.1	<0.1	<0.02	<0.5					260					17,000	2.1		2,600	500	1,100	300	10,000
	MW130	6/17/2018	0083_MW130_5.4-5.9_180617	Normal	212374	<0.02	<0.05	<0.002	<0.05					250					18,000	1.6		2,600	420	1,200	350	10,000
	MW130	6/17/2018	0083_MW130_7.4-7.9_180617	Normal	212374	<0.005	<0.02	<0.002	<0.05					220					19,000	-0.13		3,800	430	1,200	370	11,000
	MW130	11/28/2019	0083_MW130_3.4-3.9_191128	Normal	EP1912600	<0.05	<0.05	<0.02	<0.05	0.01	0.26	0.26	<1	266	<1	266	538	648	17,100	9.28	2,420		489	1,480	576	11,200
	MW130	6/23/2020	0083_MW130_200623	Normal	EP2006455	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	272	<1	272	554	611	17,700	4.90	2,370		456	1,340	499	10,700
	MW130	11/17/2020	0083_MW130_201117	Normal	EP2012743	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	285	<1	285	593	583	19,000	0.87	2,480		440	1,360	553	10,000
	MW130	11/17/2020	0083_QC103_201117	Field Duplicate	EP2012743	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	288	<1	288	590	571	19,000	1.56	2,300		431	1,330	538	9,810
	MW130	11/17/2020	0083_QC203_201117	Interlab Duplicate	758001	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	93	5,600	<20	5,700			26,000			2,900				
	MW130	6/22/2021	0083_MW130_210622	Normal	EP2107184	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	326	<1	326	579	614	18,700	2.96	2,150		482	1,440	579	10,500
	MW130	11/23/2021	0083_MW130_3.4-3.9_211123	Normal	EP2114296	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	309	<1	309	548	571	17,500	2.04	2,310		422	1,320	474	9,860
	MW130	6/21/2022	0083_MW130_220621	Normal	EP2207630	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	77	<1	77	536	614	17,100	6.74	2,510		490	1,470	620	10,400
Broader Area	MW134	6/23/2018	0083_MW134_180623	Normal	212781	<0.01	<0.02	<0.004	<0.05	0.008		0.020		180					14,000	9.3		1,700	430	940	330	9,200
	MW134	11/28/2019	0083_MW134_191128	Normal	EP1912600	<0.05	<0.05	<0.02	<0.05	<0.01	0.06	0.06	<1	187	<1	187	432	522	13,900	9.38	1,750		442	1,070	482	9,180
	MW134	6/23/2020	0083_MW134_200623	Normal	EP2006455	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	262	<1	262	478	500	15,200	2.29	2,120		424	988	498	8,860
	MW134	11/17/2020	0083_MW134_201117	Normal	EP2012743	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	176	<1	176	485	483	15,600	0.16	1,980		428	1,000	469	8,450
	MW134	11/17/2020	0083_QC105_201117	Field Duplicate	EP2012743	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	209	<1	209	456	486	14,600	3.16	1,930		432	1,010	471	8,490
	MW134	11/17/2020	0083_QC205_201117	Interlab Duplicate	758001	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	2,800	58,000	<20	61,000			17,000			2,500				
	MW134	6/22/2021	0083_MW134_210622	Normal	EP2107184	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	184	<1	184	430	510	13,900	8.49	1,670		465	1,060	505	8,900
	MW134	11/23/2021	0083_MW134_211123	Normal	EP2114295	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	193	<1	193	474	459	15,200	1.61	2,000		394	965	390	8,050
	MW134	6/21/2022	0083_MW134_220621	Normal	EP2207630	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	188	<1	188	525	473	16,800	5.18	2,270		459	1,040	486	8,100
POL Pathway	MW202	3/3/2018	0083_AB20_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				210					16,000	-2.6		2,100	340	1,000	310	8,100
	MW202	3/3/2018	0083_QC1212_180303	Field Duplicate	207818	<0.005	<0.01	<0.002	<0.05	<0.001				160					16,000	0.13		2,700	330	1,000	300	9,200
	MW202	3/3/2018	0083_QC2212_180303	Interlab Duplicate	588874	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	<10	170	<10	170			17,000			1,900				
	MW202	6/20/2018	0083_AB20_180620	Normal	212571	<0.005	<0.02	<0.002	<0.05	<0.001				170					14,000	1.9		1,800	300	930	280	8,100
	MW202	11/28/2019	0083_AB20_191128	Normal	EP1912603	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	348	<1	348	399	465	12,800	7.67	1,490		321	1,020	444	8,140
	MW202	6/26/2020	0083_MW202_200626	Normal	EP2006686	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	304	<1	304	415	418	13,300	0.43	1,610		313	880	449	7,330
	MW202	11/18/2020	0083_MW202_201118	Normal	EP2012854	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	253	<1	253	503	519	16,100	1.54	2,120		373	1,160	548	8,990
	MW202	6/22/2021	0083_MW202_210622	Normal	EP2107185	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04	<1	174	<1	174	568	654	18,200	6.98	2,470		461	1,490	641	11,300
	MW202	11/23/2021	0083_MW202_211123	Normal	EP2114295	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	608	<1	608	467	450	14,900	1.79	1,640		309	988	400	7,890
	MW202	6/21/2022	0083_MW202_220621	Normal	EP2207626	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	150	<1	150	513	600	16,400	7.85	2,280		454	1,390	604	10,300
Pol Storage	MW210	2/28/2018	0083_B02_180228	Normal	207612	<0.005	<0.01	<0.002	<0.05					310					8,100	3.4		1,300	240	590	180	5,000
	MW210	6/13/2018	0083_B02_180613	Normal	212152	<0.005	<0.01	<0.002	<0.05	0.079				300					7,300	30		980	1,100	2,400	37	4,100
	MW210	11/28/2019	0083_B02_191128	Normal	EP1912600	<0.05	<0.05	<0.02	<0.05	<0.01	0.08	0.08	<1	294	<1	294	242	276	7,630	6.48	1,020		275	644	255	4,660
	MW210	3/17/2020	B02_200317	Normal	EP2002947	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01									1,020					
	MW210	6/26/2020	0083_MW210_200626	Normal	EP2006686	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	264	<1	264	264	245	8,390	3.73	1,060		250	543	236	4,180
	MW210	11/17/2020	0083_MW210_201117	Normal	EP2012749	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	259	<1	259	268	270	8,540	0.34	1,080		263	642	254	4,550
	MW210	6/22/2021	0083_MW210_210622	Normal	EP2107184	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	265	<1	265	284	292	9,100	1.30	1,070		289	689	276	4,910
	MW210	11/23/2021	0083_MW210_211123	Normal	EP2114296	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	225	<1	225	200	182	6,270	4.70	879		183	445	147	3,040
	MW210	11/23/2021	0083_QC112_211123	Field Duplicate	EP2114296	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01														
	MW210	11/23/2021	0083_QC212_211123	Interlab Duplicate	844500	<0.05	<0.05	<0.05	<0.05	0.04	<0.05	<0.1														
	MW210	6/21/2022	0083_MW210_220621	Normal	EP2207624	<0.05	<0.05	<0.02	<0.05	0.03	0.19	0.19	<1	91	<1	91	22.8	21.2	671	3.80	101		51	50	20	322
Pol Storage	MW212	3/3/2018	0083_B04_180303	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				200					9,900	-3.3		1,200	220	590	190	5,200
	MW212	6/2/2018	0083_B04	Normal	211639	<0.005	<0.01	<0.002	<0.05	0.006				240					8,600	-0.44		1,100	210	530	170	4,800
	MW212	11/28/2019	0083_B04_191128	Normal	EP1912600	<0.05	<0.05	<0.02	<0.05	0.02	0.15	0.15	<1	254	<1	254	258	279	8,260	4.00	954		256	638	261	4,770
	MW212	3/17/2020	B04_200317	Normal	EP2002947	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01									1,350					
	MW212	3/17/2020	QC101_200317	Field Duplicate	EP2002947	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02									1,350					
	MW212	3/17/2020	QC201_200317	Interlab Duplicate	709124	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1										1,500				

Table 4 - Water Analytical Results

						Fluoroalkyl Sulfonamides				PFAS			Inorganics										Metals			
						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	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)	Sulphate	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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
	MW212	6/26/2020	0083_MW212_200626	Normal	EP2006686	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	238	<1	238	282	263	9,070	3.41	1,020		245	565	258	4,550
	MW212	11/17/2020	0083_MW212_201117	Normal	EP2012749	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	214	<1	214	357	350	11,500	0.96	1,370		290	808	330	6,000
	MW212	11/17/2020	0083_QC104_201117	Field Duplicate	EP2012749	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	212	<1	212	365	328	11,800	5.40	1,350		269	758	310	5,610
	MW212	11/17/2020	0083_QC204_201117	Interlab Duplicate	758001	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	<10	230	<20	230			15,000			1,600				
	MW212	6/22/2021	0083_MW212_210622	Normal	EP2107184	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	216	<1	216	374	343	12,200	4.30	1,230		297	797	326	5,850
	MW212	6/22/2021	0083_QC105_210622	Field Duplicate	EP2107184	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	226	<1	226	375	382	12,100	0.82	1,420		319	891	361	6,510
	MW212	6/22/2021	0083_QC205_210622	Interlab Duplicate	805492	<0.05	<0.05	<0.05	<0.05	0.02	<0.05	<0.1	<10	220	<20	220			10,000			1,300				
	MW212	11/23/2021	0083_MW212_211123	Normal	EP2114296	<0.05	<0.05	<0.02	<0.05	0.01	0.01	0.01	<1	224	<1	224	333	354	10,600	3.10	1,420		281	832	291	6,080
	MW212	6/21/2022	0083_MW212_220621	Normal	EP2207624	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	221	<1	221	379	452	12,100	8.87	1,580		385	1,080	431	7,660
	MW212	6/21/2022	0083_QC111_220621	Field Duplicate	EP2207624	<0.05	<0.05	<0.02	<0.05	0.02	0.02	0.02	<1	208	<1	208	275	329	8,640	8.88	1,320		306	803	312	5,510
	MW212	6/21/2022	0083_QC211_220621	Interlab Duplicate	901207	<0.008	<0.004	<0.004	<0.008	0.041	0.076	0.079														
Powerhouse	MW213	2/23/2018	0083_BDDBO5_180223	Normal	207359	<0.005	<0.01	<0.002	<0.05					530					1,200	0.43		120	130	110	35	720
	MW213	6/16/2018	0083_BODB5_180616	Normal	212374	<0.02	<0.02	<0.004	<0.1					460					1,500	-0.70		220	140	140	40	830
	MW213	11/28/2019	0083_BDDBO5_191128	Normal	EP1912603	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	324	<1	324	32.1	31.5	810	0.97	135		102	84	35	428
	MW213	6/23/2021	0083_MW213_210623	Normal	EP2107188	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	471	<1	471	49.7	44.2	1,360	5.78	91		130	119	49	614
	MW213	11/23/2021	0083_MW213_211123	Normal	EP2114296	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	385	<1	385	36.1	34.7	881	2.02	171		117	101	32	453
	MW213	6/21/2022	0083_MW213_220621	Normal	EP2207630	<0.05	<0.05	<0.02	<0.05	0.02	0.07	0.07	<1	366	<1	366	32.2	33.6	765	2.21	159		151	95	32	402
Powerhouse	MW214	2/27/2018	0083_B05_180227	Normal	207612	<0.005	<0.01	<0.002	<0.05					210					620	-2.3		170	63	67	20	340
	MW214	6/16/2018	0083_B05_180616	Normal	212374	<0.005	<0.02	<0.002	<0.05					200					1,100	-4.0		280	77	95	27	610
	MW214	11/28/2019	0083_B05_191128	Normal	EP1912603	<0.05	<0.05	<0.02	<0.05	0.06	0.06	0.06	<1	194	<1	194	37.8	39.5	1,030	2.25	233		77	105	40	598
	MW214	6/25/2020	0083_MW213_200625	Normal	EP2006683	<0.05	<0.05	<0.02	<0.05	0.07	0.07	0.07	<1	208	<1	208	60.4	58.9	1,740	1.30	346		103	142	58	933
	MW214	6/25/2020	0083_QC104_200625	Field Duplicate	EP2006683	<0.05	<0.05	<0.02	<0.05	0.08	0.08	0.08	<1	205	<1	205	52.6	52.2	1,510	0.40	284		98	126	51	819
	MW214	6/25/2020	0083_QC204_200625	Interlab Duplicate	729352	<0.05	<0.05	<0.05	<0.05	0.05	0.05	<0.1	<10	810					1,800			350				
	MW214	11/18/2020	0083_MW213_201118	Normal	EP2012904	<0.05	<0.05	<0.02	<0.05	0.03	0.03	0.03	<1	176	<1	176	43.6	42.6	1,240	1.14	244		90	108	42	647
	MW214	6/22/2021	0083_MW214_210622	Normal	EP2107095	<0.05	<0.05	<0.02	<0.05	0.06	0.06	0.06														
	MW214	11/23/2021	0083_MW214_211123	Normal	EP2114296	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04	<1	171	<1	171	31.2	30.9	861	0.48	168		74	84	30	449
	MW214	11/23/2021	0083_QC111_211123	Field Duplicate	EP2114296	<0.05	<0.05	<0.02	<0.05	0.04	0.04	0.04														
	MW214	11/23/2021	0083_QC211_211123	Interlab Duplicate	844500	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1														
	MW214	6/21/2022	0083_MW214_220621	Normal	EP2207630	<0.05	<0.05	<0.02	<0.05	0.24	0.24	0.24	<1	144	<1	144	6.04	6.93	76	6.85	49		46	20	8	64
	MW214	6/21/2022	0083_QC112_220621	Field Duplicate	EP2207630	<0.05	<0.05	<0.02	<0.05	0.25	0.25	0.25	<1	152	<1	152	6.36	7.15	81	5.82	50		47	21	8	66
	MW214	6/21/2022	0083_QC212_220621	Interlab Duplicate	901207	<0.008	<0.004	<0.004	<0.008	0.19	0.26	0.26														
Powerhouse Pathway	MW217	3/2/2018	0083_B09_180302	Normal	207818	<0.005	<0.01	<0.002	<0.05	<0.001				160					26,000	-0.73		3,500	570	1,600	500	15,000
	MW217	6/16/2018	0083_B09_180618	Normal	212374	<0.005	<0.02	<0.002	<0.05					190					17,000	-1.8		2,200	390	1,000	320	9,300
	MW217	11/28/2019	0083_B09_191128	Normal	EP1912604	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	259	<1	259	360	406	11,600	5.97	1,340		330	948	361	6,950
	MW217	6/26/2020	0083_MW217_200626	Normal	EP2006690	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	222	<1	222	414	423	13,300	1.12	1,640		306	952	382	7,350
	MW217	11/18/2020	0083_MW217_201118	Normal	EP2012854	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	201	<1	201	370	416	12,000	5.80	1,340		342	918	417	7,190
	MW217	6/22/2021	0083_MW217_210622	Normal	EP2107095	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	147	<1	147	478	537	15,500	5.78	1,840		415	1,190	532	9,310
	MW217	11/23/2021	0083_MW217_211123	Normal	EP2114296	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	190	<1	190	363	415	11,600	6.67	1,540		331	908	361	7,230
	MW217	6/21/2022	0083_MW217_220621	Normal	EP2207626	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	244	<1	244	109	104	3,320	2.50	525		98	210	109	1,820
Powerhouse Pathway	MW218	3/2/2018	0083_B10_180302	Normal	207818	0.005	<0.01	<0.002	<0.05	<0.001				190					8,600	-0.46		1,200	190	550	170	4,800
	MW218	6/16/2018	0083_B10_180618	Normal	212374	<0.005	<0.02	<0.002	<0.05					210					7,800	-3.7		960	190	460	130	4,000
	MW218	6/18/2018	0083_QC157_180618	Field Duplicate	212374	<0.005	<0.02	<0.002	<0.05					210					6,100	2.2		900	180	410	120	3,600
	MW218	6/18/2018	0083_QC257_180618	Interlab Duplicate	604955	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	<10	230					5,700			840				
	MW218	11/28/2019	0083_B10_191128	Normal	EP1912604	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	204	<1	204	214	220	6,750	1.44	941		184	496	180	3,810
	MW218	6/26/2020	0083_MW218_200626	Normal	EP2006690	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	200	<1	200	191	183	6,060	1.96	758		173	400	154	3,170
	MW218	11/17/2020	0083_MW218_201117	Normal	EP2012743	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	190	<1	190	272	261	8,720	2.04	1,060		237	614	249	4,420
	MW218	6/22/2021	0083_MW218_210622	Normal	EP2107095	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	188	<1	188	239	251	7,640	2.32	962		245	575	244	4,250
	MW218	11/23/2021	0083_MW218_211123	Normal	EP2114296	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	192	<1	192	244	246	7,760	0.54	1,000		218	574	211	4,200
	MW218	6/21/2022	0083_MW218_220621	Normal	EP2207626	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	192	<1	192	135	130	4,260	1.97	538		141	272	122	2,240
	OTH002	2/27/2018	0083_OTH002_180227	Normal	207612	<0.005	<0.01	<0.002	<0.05					170					26,000	1.7		4,200	610	1,700	540	15,000
	OTH002	6/6/2018	0083_OTH002_180606	Normal	212095	<0.005	<0.01	<0.002	<0.05	<0.001				170					29,000	-4.1		4,500	600	1,700	540	15,000
	OTH002	6/12/2018	0082_QC246_180612	Interlab Duplicate	604214	<0.05	<0.05	<0.05	<0.05	0.25	0.28	1	<10	32		32			13							
	OTH002	11/17/2020	0083_OTH002_201117	Normal	EP2012742	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	119	<1	119	617	687	19,700	5.36	2,830		496	1,550	663	11,900
	OTH002	6/22/2021	0083_OTH002_210622	Normal	EP2107185	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	114	<1	114	594	674	19,000	6.30	2,700		475	1,520	655	11,700
	OTH002	6/22/2021	0083_QC103_210622	Field Duplicate	EP2107185	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1	116	595	681	19,000	6.76	2,730		488	1,540	665	11,800
	OTH002	6/22/2021	0083_QC203_210622	Interlab Duplicate	805492	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	<10	140	<20	140			20,000			3,000				
	OTH002	11/23/2021	0083_OTH002_211123	Normal	EP2114295	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	593	623	19,000	2.50	2,620		409	1,400	529	10,900
	OTH101	2/12/2018	0083_OTH101_180212	Normal	206780	<0.005	<0.01	<0.002	<0.05					160					21,000	-1.6		2,600	400	1,300	380	11,000
	OTH101	6/20/2018	0083_OTH101_A_180620	Normal	212571	<0.005	<0.02	<0.002	<0.05	<0.001				120					16,000	9.8		2,200	380	1,300	380	11,000
	OTH101	6/20/2018	0083_OTH101_B_180620	Normal	212571	<0.005	<0.02	<0.002	<0.05	<0.001				120					18,000	8.2		2,400	390	1,300	400	12,000
	OTH101	11/28/2019	0083_OTH101_191128	Normal	EP1912603	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	117	<1	117	579	643	18,500	5.20	2,650		476	1,460	631	11,100
	OTH101	6/28/2020	0083_OTH101_200628	Normal	EP2006692	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	120	<1	120	564	656	18,000	7.53	2,610		476	1,470	620	11,400
	OTH101	11/18/2020	0083_OTH101_201118	Normal	EP2012854	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	113	<1	113	600	660	19,200	4.80	2,680		467	1,490	546	11,500
	OTH101	6/22/2021	0083_OTH101_210622	Normal	EP2107185	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	117	<1	117	591	688	18,900	7.57	2,670		494	1,560	674	11,900
	OTH101	11/24/2021	0083_OTH101_211124	Normal	EP2114391	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1	116	579	610	18,600	2.55	2,510		436	1,370	547	10,600
	OTH101	6/21/2022	0083_OTH101_220621	Normal	EP2207627	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1	116	596	675	19,000	6.20	2,770		497	1,560	663	11,600
	OTH102	2/12/2018	0083_OTH102_180212	Normal	206780	<0.005	<0.01	<0.002	<0.05					140					21,000	-2.0		2,700	400	1,300	370	11,000
	OTH102	6/20/2018	0083_OTH102_A_180620	Normal	212571	<0.005	<0.02	<0.002	<0.05	<0.001				120					17,000	13		2,200	410	1,300	420	12,000
	OTH102	6/20/2018	0083_OTH102_B_180620	Normal	212571	<0.005	<0.02	<0.002	<0.05	<0.001				120					17,000	13		2,300	420	1,400	430	13,000
	OTH102	11/28/2019	0083_OTH102_191128	Normal	EP1912603	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	122	<1	122	603	724	19,100	9.14	2,960		481	1,640	670	12,600
	OTH102	6/27/2020	0083_OTH002_200627	Normal	EP2006692	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	132	<1	132	580	668	18,400	7.11	2,780		484	1,500	630	11,600
	OTH102	6/28/2020	0083_OTH102_200628	Normal	EP2006692	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	136	<1	136	579	656	18,500	6.30	2,600		476	1,470	623	11,400
	OTH102	11/18/2020	0083_OTH102_201118	Normal	EP2012854	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	125	<1	125	588	648	18,800	4.83	2,670		455	1,460	539	11,300
	OTH102	6/22/2021	0083_OTH102_210622	Normal	EP2107185	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	115	<1	115	588	697	18,800	8.47	2,680		492	1,570	676	12,100
	OTH102	11/23/2021	0083_OTH102_211123	Normal	EP2114295	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1	116	598	611	19,200	1.05	2,620		399	1,370	512	10,700
	OTH102	6/21/2022	0083_OTH102_220621	Normal	EP2207627	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	114	<1	114	582	698	18,500	9.02	2,790		514	1,610	687	12,000
	OTH103	2/12/2018	0083_OTH103_180212	Normal	206780	<0.005	<0.01	<0.002	<0.05					260					21,000	-0.48		2,700	410	1,300	390	12,000
	OTH103	6/9/2018	0083_OTH103_A_180609	Normal	212095	<0.005	<0.01	<0.002	<0.05	<0.001				210					20,000	1.3		2,700	420	1,300	400	12,000
	OTH103	6/9/2018	0083_OTH103_B_180609	Normal	212095	<0.005	<0.01	<0.002	<0.05	<0.001				150					20,000	1.7		2,600	410	1,300	390	12,000
	OTH103	11/30/2019	0083_OTH103_191130	Normal	EP1912684	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	119	<1	119	620	731	19,800	8.23	2,820		484	1,660	685	12,700
	OTH103	6/27/2020	0083_OTH103_200627	Normal	EP2006692	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	128	<1	128	579	678	18,400	7.87	2,780		492	1,510	640	11,800
	OTH103	11/17/2020	0083_OTH103_201117	Normal	EP2012742	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	617	645	19,700	2.25	2,830		464	1,450	616	11,200
	OTH103	6/22/2021	0083_oth103_210622	Normal	EP2107185	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	123	<1	123	592	658	18,900	5.34	2,700		474	1,490	641	11,400
	OTH103	11/23/2021	0083_OTH103_211123	Normal	EP2114295	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	112	<1	112	588	631	18,800	3.55	2,640		418	1,430	536	11,000
	OTH103	6/21/2022	0083_OTH103_220621	Normal	EP2207634	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1	116	609	574	19,600	2.98	2,570		418	1,330	542	9,870
	OTH104	2/12/2018	0083_OTH104_180212	Normal	206780	<0.005	<0.01	<0.002	<0.05					160					21,000	-1.2		2,700	400	1,300	370	11,000
	OTH104	6/9/2018	0083_OTH104_A_180609	Normal	212095	<0.005	<0.01	<0.002	<0.05	<0.001				190					20,000	1.0		2,700	410	1,300	390	11,000
	OTH104	6/9/2018	0083_OTH104_B_180609	Normal	212095	<0.005	<0.01	<0.002	<0.05	<0.001				130					20,000	2.4		2,600	420	1,300	400	12,000
	OTH104	11/28/2019	0083_OTH104_191128	Normal	EP1912605	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	123	<1	123	606	707	19,500	7.66	2,580		472	1,600	647	12,300
	OTH104	6/27/2020	0083_OTH104_200627	Normal	EP2006692	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	141	<1	141	568	673	18,000	8.49	2,750		492	1,500	638	11,700
	OTH104	11/18/2020	0083_OTH104_201118	Normal	EP2012904	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	121	<1	121	611	664	19,500	4.18	2,810		462	1,490	550	11,600
	OTH104	6/22/2021	0083_OTH104_210622	Normal	EP2107185	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	119	<1	119	600	664	19,200	5.02	2,710		474	1,500	647	11,500
	OTH104	11/23/2021	0083_OTH104_211123	Normal	EP2114295	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	600	619	19,300	1.49	2,580		407	1,400	523	10,800
	OTH104	6/21/2022	0083_OTH104_220621	Normal	EP2207634	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1	116	624	564	20,100	5.09	2,640		409	1,320	536	9,680
	OTH105	2/21/2018	0083_OTH105_180221	Normal	207287	<0.005	<0.01	<0.002	<0.05																	
	OTH105	6/9/2018	0083_OTH105_A_180609	Normal	212095	<0.005	<0.01	<0.002	<0.05	<0.001				120					19,000	1.0		2,600	400	1,300	380	11,000
	OTH105	6/9/2018	0083_OTH105_B_180609	Normal	212095	<0.005	<0.01	<0.002	<0.05	<0.001				120					20,000	1.8		2,600	410	1,300	390	12,000
	OTH105	11/28/2019	0083_OTH105_191128	Normal	EP1912605	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	130	<1	130	612	747	19,700	9.90	2,600		494	1,690	696	13,000
	OTH105	6/27/2020	0083_OTH105_200627	Normal	EP2006692	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	132	<1	132	587	639	18,700	4.25	2,730		465	1,430	600	11,100
	OTH105	11/17/2020	0083_OTH105_201117	Normal	EP2012742	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1	116	619	686	19,800	5.12	2,790		496	1,540	649	11,900
	OTH105	6/22/2021	0083_OTH105_210622	Normal	EP2107095	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	117	<1	117	599	677	19,300	6.14	2,490		462	1,490	531	11,900
	OTH105	11/23/2021	0083_OTH105_211123	Normal	EP2114301	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	108	<1	108	582	616	18,700	2.78	2,540		442	1,390	549	10,700
	OTH105	6/21/2022	0083_OTH105_220621	Normal	EP2207627	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	119	<1	119	595	698	19,000	7.94	2,720		511	1,610	688	12,000
	OTH106	2/21/2018	0083_OTH106_180221	Normal	207287	<0.005	<0.01	<0.002	<0.05																	
	OTH106	6/9/2018	0083_OTH106_A_180609	Normal	212095	<0.005	<0.01	<0.002	<0.05	<0.001				140					20,000	0.056		2,700	410	1,300	390	11,000

Table 4 - Water Analytical Results

						Fluoroalkyl Sulfonamides				PFAS			Inorganics										Metals			
						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	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)	Sulphate	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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
	OTH106	6/9/2018	0083_OTH106_B_180609	Normal	212095	<0.005	<0.01	<0.002	<0.05	0.002				120					20,000	-1.4		2,700	400	1,200	380	11,000
	OTH106	11/28/2019	0083_OTH106_191128	Normal	EP1912605	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	126	<1	126	603	670	19,300	5.30	2,680		494	1,510	652	11,600
	OTH106	6/27/2020	0083_OTH106_200627	Normal	EP2006692	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	127	<1	127	607	681	19,400	5.72	2,750		498	1,530	651	11,800
	OTH106	11/17/2020	0083_OTH106_201117	Normal	EP2012742	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1	116	619	686	19,800	5.12	2,790		496	1,540	652	11,900
	OTH106	6/22/2021	0083_OTH106_210622	Normal	EP2107095	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	583	664	18,800	6.46	2,420		468	1,500	647	11,500
	OTH106	11/23/2021	0083_OTH106_211123	Normal	EP2114301	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	117	<1	117	582	593	18,700	0.89	2,530		424	1,340	528	10,300
	OTH106	6/21/2022	0083_OTH106_220621	Normal	EP2207627	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	108	<1	108	603	710	19,300	8.08	2,730		519	1,640	704	12,200
	OTH107	2/12/2018	0083_OTH107_180212	Normal	206780	<0.005	<0.01	<0.002	<0.05					190					21,000	-2.0		2,700	410	1,300	380	12,000
	OTH107	6/23/2018	0083_OTH107_A_180623	Normal	212781	<0.01	<0.02	<0.004	<0.05	<0.001		<0.001		120					20,000	-0.49		2,800	400	1,300	390	11,000
	OTH107	6/23/2018	0083_OTH107_B_180623	Normal	212781	<0.01	<0.02	<0.004	<0.05	<0.001		<0.001		120					20,000	5.7		2,700	450	1,500	450	13,000
	OTH107	6/23/2018	0083_QC778_180623	Interlab Duplicate	605978	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	<10	130					19,000			2,300				
	OTH107	11/28/2019	0083_OTH107_191128	Normal	EP1912605	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	123	<1	123	606	698	19,400	7.13	2,680		511	1,570	682	12,100
	OTH107	6/27/2020	0083_OTH107_200627	Normal	EP2006692	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	130	<1	130	587	697	18,700	8.55	2,750		511	1,560	662	12,100
	OTH107	11/17/2020	0083_OTH107_201117	Normal	EP2012742	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1	116	616	680	19,700	5.00	2,770		495	1,530	652	11,800
	OTH107	6/22/2021	0083_OTH107_210622	Normal	EP2107095	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	129	<1	129	601	687	19,400	6.68	2,450		492	1,550	670	11,900
	OTH107	11/23/2021	0083_OTH107_211123	Normal	EP2114301	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	117	<1	117	580	644	18,600	5.24	2,550		460	1,450	580	11,200
	OTH107	6/21/2022	0083_OTH107_220621	Normal	EP2207627	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	617	604	19,900	1.06	2,570		438	1,400	577	10,400
	OTH108	2/12/2018	0083_OTH108_180212	Normal	206780	<0.005	<0.01	<0.002	<0.05					390					21,000	-3.3		2,600	390	1,200	360	11,000
	OTH108	2/12/2018	0083_QC1201_180212	Field Duplicate	206780	<0.005	<0.01	<0.002	<0.05					210					21,000	-1.8		2,700	400	1,300	370	11,000
	OTH108	6/10/2018	0083_OTH108_A_180610	Normal	212095	<0.005	<0.01	<0.002	<0.05	<0.001				220					20,000	3.5		2,600	430	1,300	410	12,000
	OTH108	6/10/2018	0083_OTH108_B_180610	Normal	212095	<0.005	<0.01	<0.002	<0.05	<0.001				170					21,000	2.0		2,800	430	1,400	420	12,000
	OTH108	11/28/2019	0083_OTH108_191128	Normal	EP1912605	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	127	<1	127	610	728	19,500	8.80	2,780		479	1,640	667	12,700
	OTH108	6/27/2020	0083_OTH108_200627	Normal	EP2006692	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	129	<1	129	581	674	18,500	7.46	2,700		495	1,510	639	11,700
	OTH108	11/17/2020	0083_OTH108_201117	Normal	EP2012742	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	154	<1	154	619	662	19,800	3.36	2,760		479	1,480	634	11,500
	OTH108	6/22/2021	0083_OTH108_210622	Normal	EP2107095	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	119	<1	119	616	692	19,900	5.82	2,510		491	1,560	676	12,000
	OTH108	11/23/2021	0083_OTH108_211123	Normal	EP2114301	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	117	<1	117	582	633	18,700	4.20	2,520		455	1,430	569	11,000
	OTH108	6/21/2022	0083_OTH108_220621	Normal	EP2207627	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	589	715	19,400	9.68	1,890		527	1,650	710	12,300
	OTH109	6/20/2018	0083_OTH109_A_180620	Normal	212571	<0.005	<0.02	<0.002	<0.05	<0.001				120					16,000	18		2,100	420	1,400	430	13,000
	OTH109	6/20/2018	0083_OTH109_B_180620	Normal	212571	<0.005	<0.02	<0.002	<0.05	<0.001				120					17,000	11		2,400	410	1,300	410	12,000
	OTH109	11/28/2019	0083_OTH109_191128	Normal	EP1912600	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	120	<1	120	590	596	18,900	0.55	2,600		414	1,340	504	10,400
	OTH109	6/26/2020	0083_OTH109_200626	Normal	EP2006686	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	124	<1	124	608	661	19,500	4.23	2,650		490	1,490	551	11,500
	OTH109	11/18/2020	0083_OTH109_201118	Normal	EP2012854	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	115	<1	115	597	643	19,100	3.67	2,700		452	1,450	536	11,200
	OTH109	6/22/2021	0083_OTH109_210622	Normal	EP2107185	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	117	<1	117	591	635	18,900	3.60	2,670		452	1,440	613	11,000
	OTH109	11/24/2021	0083_OTH109_211124	Normal	EP2114391	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	115	<1	115	591	610	19,000	1.64	2,520		436	1,380	546	10,600
	OTH109	6/21/2022	0083_OTH109_220621	Normal	EP2207627	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	126	<1	126	592	710	18,900	9.01	2,720		520	1,640	704	12,200
	OTH110	6/20/2018	0083_OTH110_A_180620	Normal	212571	<0.005	<0.02	<0.002	<0.05	0.003				120					17,000	8.5		2,300	390	1,300	390	12,000
	OTH110	6/20/2018	0083_OTH110_B_180620	Normal	212571	0.009	<0.02	<0.002	<0.05	<0.001				120					18,000	6.6		2,300	380	1,300	390	11,000
	OTH110	11/28/2019	0083_OTH110_191128	Normal	EP1912600	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	128	<1	128	607	740	19,300	9.92	2,870		492	1,670	674	12,900
	OTH110	6/26/2020	0083_OTH110_200626	Normal	EP2006686	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	124	<1	124	610	665	19,600	4.27	2,650		492	1,480	551	11,600
	OTH110	11/18/2020	0083_OTH110_201118	Normal	EP2012904	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	118	<1	118	602	647	19,200	3.63	2,780		452	1,450	537	11,300
	OTH110	6/22/2021	0083_OTH110_210622	Normal	EP2107185	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	120	<1	120	597	646	19,100	3.97	2,680		462	1,460	622	11,200
	OTH110	11/24/2021	0083_OTH110_211124	Normal	EP2114391	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	117	<1	117	585	586	18,800	0.10	2,530		418	1,320	523	10,200
	OTH110	6/21/2022	0083_OTH110_220621	Normal	EP2207627	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	106	<1	106	597	687	19,100	6.96	2,710		504	1,590	680	11,800
	OTH113	6/10/2018	0082_QC257_180610	Interlab Duplicate	604115	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	<10	110		110			19,000			2,300				
	OTH113	6/10/2018	0083_OTH113_A_180610	Normal	212095	<0.005	<0.01	<0.002	<0.05	0.005				110					20,000	-2.4		2,600	380	1,200	370	11,000
	OTH113	6/10/2018	0083_OTH113_B_180610	Normal	212095	<0.005	<0.01	<0.002	<0.05	<0.001				110					20,000	6.9		2,600	450	1,400	430	13,000
	OTH113	6/10/2018	0083_QC157_180310	Field Duplicate	212095	<0.005	<0.01	<0.002	<0.05	0.004				110					20,000	10		2,600	480	1,500	460	13,000
	OTH113	11/28/2019	0083_OTH113_191128	Normal	EP1912600	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	7	110	<1	117	599	691	19,200	7.15	2,650		466	1,580	630	12,000
	OTH113	6/28/2020	0083_OTH113_200628	Normal	EP2006748	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	111	<1	111	607	656	19,500	3.88	2,650		476	1,470	619	11,400
	OTH113	11/17/2020	0083_OTH113_201117	Normal	EP2012743	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	111	<1	111	623	657	20,000	2.62	2,720		457	1,480	631	11,400
	OTH113	6/22/2021	0083_OTH113_210622	Normal	EP2107184	<0.05	<0.05	<0.02	<0.05	0.56	0.58	0.58	<1	113	<1	113	610	681	19,800	5.52	2,350		480	1,540	665	11,800
	OTH113	5/16/2022	0083_OTH113_220516	Normal	EP2205863	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01														
	OTH113	6/21/2022	0083_OTH113_220621	Normal	EP2207632	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	116	<1	116	564	641	17,900	6.43	2,720		455	1,520	593	11,000
	SW112	2/28/2018	0083_SW112_180228	Normal	207612	<0.005	<0.01	<0.002	<0.05					82					65,000	1.4		11,000	1,400	4,300	1,300	38,000
	SW112	6/8/2018	0083_SW112_180608	Normal	212095	<0.05	<0.1	<0.02	<0.5	0.008				54					3,600	0.17		1,300	430	230	95	2,000
	SW112	11/28/2019	0083_SW112_191128	Normal	EP1912672	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	262	<1	262	4,500	5,490	149,000	9.93	14,000		796	12,700	5,290	98,200
	SW112	5/26/2020	0083_SW112_200526	Normal	EP2005405	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	206	<1	206	958	1,160	29,800	9.53	5,440		1,270	2,470	1,080	19,900
	SW112	6/25/2020	0083_QC101_200625	Field Duplicate	EP2006682	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	132	<1	132	1,380	1,520	43,600	4.99	6,890		1,540	3,260	1,230	26,300
	SW112	6/25/2020	0083_QC201_200625	Interlab Duplicate	729352	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	670	7,900					18,000			2,800				
	SW112	6/25/2020	0083_SW112_200625	Normal	EP2006682	<0.05	<0.05	<0.02	<0.05	0.05	0.05	0.05	<1	130	<1	130	1,360	1,520	43,000	5.82	6,840		1,520	3,280	1,240	26,400
	SW112	11/17/2020	0083_QC207_201117	Interlab Duplicate	760299	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	<10	220	<20	220			97,000			9,500				
	SW112	11/18/2020	0083_QC107_201118	Field Duplicate	EP2012855	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	200	<1	200	3,290	4,100	107,000	11.0	12,700		1,060	9,420	4,270	72,600
	SW112	11/18/2020	0083_SW112_201118	Normal	EP2012855	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	201	<1	201	3,230	3,960	105,000	10.2	12,600		1,020	9,150	4,130	70,200
	SW112	3/5/2021	0083_SW112_210305	Normal	EP2102350	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	90	<1	90	314	308	9,330	1.00	2,380		685	534	291	5,120
	SW112	6/22/2021	0083_SW112_210622	Normal	EP2107186	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	181	<1	181	832	962	26,200	7.23	4,310		1,150	2,060	858	16,400
	SW112	5/16/2022	0083_SW112_220516	Normal	EP2205864	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	90	<1	90	179	179	4,780	0.04	2,030		687	318	147	2,640
	SW112	6/21/2022	0083_SW112_220621	Normal	EP2207634	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	71	<1	71	94.9	104	2,080	4.86	1,670		621	180	86	1,300
	SW113	3/1/2018	0083_SW113_180301	Normal	207818	<0.2	<0.5	<0.1	<2.5	2.4				300					1,000	3.2		770	490	54	27	580
	SW113	6/4/2018	0083_QC133_180604	Field Duplicate	211639	<0.005	<0.01	<0.002	<0.05	1.2				98					170	4.3		230	120	13	6.8	120
	SW113	6/4/2018	0083_QC233_180604	Interlab Duplicate	602341	<0.05	<0.05	<0.05	<0.05	1.39	13.24	13.43	<10	94		94			170			210				
	SW113	6/4/2018	0083_SW113_180604	Normal	211639	<0.005	<0.01	<0.002	<0.05	1.3				97					170	4.3		230	120	13	7.0	120
	SW113	5/26/2020	0083_SW113_200526	Normal	EP2005405	<0.05	<0.05	<0.02	<0.05	0.65	9.39	9.46	<1	78	<1	78	15.8	17.0	278	3.65	309		157	18	11	171
	SW113	3/5/2021	0083_SW113_210305	Normal	EP2102350	<0.05	<0.05	<0.02	<0.05	0.35	4.72	4.77	<1	53	<1	53	5.98	6.32	108	2.79	90		48	6	5	76
	SW113	6/23/2021	0083_SW113_210623	Normal	EP2107191	<0.05	<0.05	<0.02	<0.05	0.13	1.96	1.98	<1	80	<1	80	4.80	4.99	72	1.98	56		44	5	3	53
	SW113	11/23/2021	0083_QC108_211123	Field Duplicate	EP2114297	<0.05	<0.05	<0.02	<0.05	0.85	5.28	5.33														
	SW113	11/23/2021	0083_QC208_211123	Interlab Duplicate	844500	<0.05	<0.05	<0.05	<0.05	0.77	5.69	5.77														
	SW113	11/23/2021	0083_SW113_211123	Normal	EP2114297	<0.05	<0.05	<0.02	<0.05	0.84	5.32	5.37	<1	77	<1	77	11.7	12.5	176	3.17	252		142	15	6	93
	SW113	5/16/2022	0083_QC103_220516	Field Duplicate	EP2205864	<0.05	<0.05	<0.02	<0.05	0.30	2.23	2.27	<1	54	<1	54	2.92	2.82	43	1.60	30		27	2	2	29
	SW113	5/16/2022	0083_QC203_220516	Interlab Duplicate	890774	<0.2	<0.2	<0.2	<0.2	<0.1	1.0	1.0														
	SW113	5/16/2022	0083_SW113_220516	Normal	EP2205864	<0.05	<0.05	<0.02	<0.05	0.30	2.31	2.35	<1	51	<1	51	2.83	3.04	42	3.67	30		28	3	2	31
	SW113	6/21/2022	0083_QC109_220621	Field Duplicate	EP2207632	<0.05	<0.05	<0.02	<0.05	0.14	1.48	1.50	<1	40	<1	40	2.60	2.89	43	5.44	28		25	3	2	31
	SW113	6/21/2022	0083_QC209_220621	Interlab Duplicate	901207	<0.008	<0.004	<0.004	<0.008	0.10	0.91	0.93														
	SW113	6/21/2022	0083_SW113_220621	Normal	EP2207632	<0.05	<0.05	<0.02	<0.05	0.17	1.53	1.56	<1	40	<1	40	2.64	2.89	44	4.51	29		25	3	2	31
	SW120	6/8/2018	0082_QC271_180608	Interlab Duplicate	604115	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	<10	41		41			2,400			790				
	SW120	6/8/2018	0083_QC171_180608	Field Duplicate	212095	<0.005	<0.01	<0.002	<0.05	<0.001				41					2,800	1.8		820	280	190	71	1,600
	SW120	6/8/2018	0083_SW120_180608	Normal	212095	<0.005	<0.01	<0.002	<0.05	0.002				42					2,800	3.6		820	270	180	66	1,700
	SW120	5/27/2020	0083_SW120_200527	Normal	EP2005486	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	154	<1	154	949	1,000	29,800	2.83	5,080		1,190	2,120	891	17,200
	SW120	3/3/2021	0083_SW120_210303	Normal	EP2102201	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	68	<1	68	201	192	6,080	2.30	1,350		421	345	182	3,170
	SW120	6/22/2021	0083_SW120_210622	Normal	EP2107186	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	69	<1	69	297	294	8,670	0.46	2,450		965	551	247	4,470
	SW120	5/16/2022	0083_SW120_220516	Normal	EP2205864	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	78	<1	78	186	195	5,440	2.49	1,470		490	374	162	3,120
	SW120	6/21/2022	0083_SW120_220621	Normal	EP2207632	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	99	<1	99	263	270	7,680	1.45	2,120		764	599	220	4,080
	SW126	6/8/2018	0083_SW126_180608	Normal	212095	<0.005	<0.01	<0.002	<0.05	0.003				110					1,600	2.1		900	360	99	43	980
	SW126	6/21/2022	0083_SW126_220621	Normal	EP2207634	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	75	<1	75	74.4	80.2	1,640	3.74	1,280		475	146	64	985
	SW127	6/6/2018	0083_SW127_180606	Normal	212095	<0.005	<0.01	<0.002	<0.05	0.002				57					1,000	2.1		660	220	80	33	630
	SW127	5/26/2020	0083_SW127_200526	Normal	EP2005405	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	78	<1	78	514	581	15,500	6.03	3,640		1,190	889	512	10,000
	SW127	3/3/2021	0083_QC104_210303	Field Duplicate	EP2102194	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	52	<1	52	160	154	4,280	1.83	1,850		569	223	132	2,400
	SW127	3/3/2021	0083_QC204_210303	Interlab Duplicate	779429	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	<10	61	<20	61			14			5.0				
	SW127	3/3/2021	0083_SW127_210303	Normal	EP2102194	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	60	<1	60	156	151	4,170	1.72	1,800		558	220	129	2,340
	SW127	6/22/2021	0083_SW127_210622	Normal	EP2107094	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	108	<1	108	245	228	6,800	3.64	2,460		882	459	188	3,250
	SW127	5/16/2022	0083_SW127_220516	Normal	EP2205864	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	71	<1	71	83.1	83.2	1,950	0.10	1,280		474	152	72	1,040
	SW127	6/21/2022	0083_SW127_220621	Normal	EP2207634	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	107	<1	107	201	205	5,500	1.02	2,110		706	406	158	3,050
	SW128	6/4/2018	0083_SW128_180604	Normal	211639	<0.005	<0.01	<0.002	<0.05	<0.001				140					79,000	3.7		13,000	1,500	4,500	1,300	51,000
	SW128	5/27/2020	0083_QC101_200527	Field Duplicate	EP2005486	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	94	<1	94	668	795	20,500	8.71	4,210		1,120	1,500	609	13,800
	SW128	5/27/2020	0083_QC201_200527	Interlab Duplicate	723348	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	<10	150					22,000			4,500				
	SW128	5/27/2020	0083_SW128_200527	Normal	EP2005486	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	94	<1	94	667	799	20,500	8.96	4,190		1,120	1,490	613	13,900

Table 4 - Water Analytical Results

						Fluoroalkyl Sulfonamides				PFAS			Inorganics										Metals			
						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	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)	Sulphate	Calcium (filtered)	Magnesium (filtered)	Potassium (filtered)	Sodium (filtered)
						µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	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
	SW128	3/3/2021	0083_SW128_210303	Normal	EP2102201	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	50	<1	50	202	191	5,860	2.83	1,720		494	380	145	3,020
	SW128	6/22/2021	0083_QC102_210622	Field Duplicate	EP2107094	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	59	<1	59	142	151	3,870	3.26	1,500		600	310	118	2,130
	SW128	6/22/2021	0083_QC202_210622	Interlab Duplicate	805492	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	<0.1	<10	70	<20	70			3,700			1,900				
	SW128	6/22/2021	0083_SW128_210622	Normal	EP2107094	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	59	<1	59	142	148	3,860	1.95	1,550		589	305	118	2,080
	SW128	11/23/2021	0083_SW128_211123	Normal	EP2114297	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	352	<1	352	5,320	5,510	174,000	1.72	19,600		422	14,200	4,970	96,400
	SW128	5/16/2022	0083_SW128_220516	Normal	EP2205864	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	59	<1	59	133	135	3,810	0.66	1,170		409	279	105	2,040
	SW128	6/21/2022	0083_SW128_220621	Normal	EP2207634	<0.05	<0.05	<0.02	<0.05	<0.01	<0.01	<0.01	<1	<1	<1	<1	230	245	6,770	3.22	1,870		590	566	220	3,760

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Interim Marine 99%

HEPA, January 2020, PFAS NEMP 2020 Recreational Water

Note:

First Time detect of PFOA or PFHxS+PFOS

New exceedance of guideline value

	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)	Perfluorotetradecanoic acid (PFTeDA)
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting	0.0001	0.0001	0.0001	0.0002	0.0001	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0002
PFAS NEMP 2020 Ecological direct exposure					1						10						
PFAS NEMP 2020 Ecological indirect exposure					*0.01*												
PFAS NEMP 2020 Industrial/ commercial (HIL D)											**50**						
Site ID	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**												
0083	**SS112**	**2/28/2018**	**0083_SS112_0.0_180228**	**Normal**	**207612**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005
0083	**SS112**	**6/8/2018**	**0083_SD112_0.0_180608**	**Normal**	**212095**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005
0083	**SS112**	**6/8/2018**	**0083_SD112_0.2_180608**	**Normal**	**212095**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005
0083	**SD112**	**5/26/2020**	**0083_SD112_200526**	**Normal**	**EP2005404**	<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	<0.0002	<0.0005
0083	**SD112**	**6/25/2020**	**0083_SD112_0.00-0.10_20**	**Normal**	**EP2006684**	<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	<0.0002	<0.0005
0083	**SD112**	**11/18/2020**	**0083_SD112_0.00-0.10_20**	**Normal**	**EP2012856**	<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	<0.0002	<0.0005
0083	**SD112**	**3/5/2021**	**0083_SD112_210305**	**Normal**	**EP2102349**	<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	<0.0002	<0.0005
0083	**SD112**	**6/22/2021**	**0083_SD112_210622**	**Normal**	**EP2107187**	<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	<0.0002	<0.0005
0083	**SD112**	**5/16/2022**	**0083_SD112_220516**	**Normal**	**EP2206114**	<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	<0.0002	<0.0005
0083	**SD112**	**6/21/2022**	**0083_SD112_220621**	**Normal**	**EP2207635**	<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	<0.0002	<0.0005
0083	**SS113**	**3/1/2018**	**0083_SS113_0.0_180301**	**Normal**	**207818-B**	0.0011	0.0011	0.0052	<0.0010	*0.024*	<0.0020	0.0007	0.0021	0.0025	0.0013	0.0013	<0.0010	<0.0050	<0.0050	<0.0050	<0.0050	<0.005
0083	**SS113**	**6/4/2018**	**0083_SS113_0.0_180604**	**Normal**	**211639**	<0.0001	<0.0001	0.0007	<0.0001	0.0053	0.0006	0.0003	0.001	0.0009	0.0006	0.0005	0.0004	<0.0005	<0.0005	<0.0005	<0.0005	<0.005
0083	**SS113**	**6/4/2018**	**0083_SS113_0.5_180604**	**Normal**	**211639**	<0.0001	<0.0001	0.0003	<0.0001	0.0005	<0.0002	<0.0002	0.0003	0.0002	0.0002	0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005
0083	**SD113**	**5/26/2020**	**0083_SD113_200526**	**Normal**	**EP2005404**	<0.0002	<0.0002	0.0011	<0.0002	0.0082	<0.0002	<0.001	0.0018	0.0016	0.0120	0.0007	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
0083	**SD113**	**6/25/2020**	**0083_SD113_0.00-0.10_20**	**Normal**	**EP2006684**	<0.0002	<0.0002	0.0005	<0.0002	0.0020	<0.0002	<0.001	0.0023	0.0016	0.0008	0.0003	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
0083	**SD113**	**11/18/2020**	**0083_SD113_201118**	**Normal**	**EP2012801**	0.0004	<0.0002	0.0012	<0.0002	0.0073	<0.0002	<0.001	0.0032	0.0020	0.0009	0.0009	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
0083	**SD113**	**3/5/2021**	**0083_SD113_210305**	**Normal**	**EP2102349**	<0.0002	<0.0002	0.0002	<0.0002	0.0009	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
0083	**SD113**	**6/23/2021**	**0083_SD113_210623**	**Normal**	**EP2107192**	<0.0002	<0.0002	<0.0002	<0.0002	0.0013	<0.0002	<0.001	0.0005	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
0083	**SD113**	**11/23/2021**	**0083_QC108_211123**	**Field Duplicate**	**EP2114299**	<0.0002	<0.0002	0.0012	<0.0002	0.0046	<0.0002	<0.001	0.0011	0.0008	0.0005	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
0083	**SD113**	**11/23/2021**	**0083_QC209_211123**	**Interlab Duplicate**	**844500**	<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	<0.005
0083	**SD113**	**11/23/2021**	**0083_SD113_211123**	**Normal**	**EP2114299**	<0.0002	<0.0002	0.0012	<0.0002	0.0051	<0.0002	<0.001	0.0019	0.0015	0.0008	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
0083	**SD113**	**5/16/2022**	**0083_SD113_220516**	**Normal**	**EP2206114**	<0.0002	<0.0002	0.0002	<0.0002	0.0012	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
0083	**SD113**	**6/21/2022**	**0083_QC110_220621**	**Field Duplicate**	**EP2207633**	<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	<0.0002	<0.0005
0083	**SD113**	**6/21/2022**	**0083_QC210_220621**	**Interlab Duplicate**	**901207**	<0.0004	<0.0004	<0.0004	<0.0004	0.0010	<0.0004	<0.0008	<0.0002	<0.0004	<0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
0083	**SD113**	**6/21/2022**	**0083_SD113_220621**	**Normal**	**EP2207633**	<0.0002	<0.0002	<0.0002	<0.0002	0.0011	<0.0002	<0.001	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0005
0083	**SD120**	**6/8/2018**	**0083_SD120_0.0_180608**	**Normal**	**212095**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005
0083	**SD120**	**6/8/2018**	**0083_SD120_0.4_180608**	**Normal**	**212095**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005
0083	**SD120**	**5/27/2020**	**0083_SD120_200527**	**Normal**	**EP2005480**	<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	<0.0002	<0.0005
0083	**SD120**	**6/26/2020**	**0083_QC103_200626**	**Field Duplicate**	**EP2006689**	<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	<0.0002	<0.0005
0083	**SD120**	**6/26/2020**	**0083_QC203_200626**	**Interlab Duplicate**	**729409**	<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	<0.005
0083	**SD120**	**6/26/2020**	**0083_SD120_0.00-0.10_20**	**Normal**	**EP2006689**	<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	<0.0002	<0.0005
0083	**SD120**	**11/18/2020**	**0083_SD120_0.00-0.10_20**	**Normal**	**EP2012856**	<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	<0.0002	<0.0005
0083	**SD120**	**3/3/2021**	**0083_QC103_210303**	**Field Duplicate**	**EP2102202**	<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	<0.0002	<0.0005
0083	**SD120**	**3/3/2021**	**0083_QC203_210303**	**Interlab Duplicate**	**779429**	<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	<0.005
0083	**SD120**	**3/3/2021**	**0083_SD120_210303**	**Normal**	**EP2102202**	<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	<0.0002	<0.0005
0083	**SD120**	**6/22/2021**	**0083_SD120_210622**	**Normal**	**EP2107187**	<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	<0.0002	<0.0005
0083	**SD120**	**11/23/2021**	**0083_SD120_211123**	**Normal**	**EP2114302**	<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	<0.0002	<0.0005
0083	**SD120**	**5/16/2022**	**0083_SD120_220516**	**Normal**	**EP2206114**	<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	<0.0002	<0.0005
0083	**SD120**	**6/21/2022**	**0083_SD120_220621**	**Normal**	**EP2207633**	<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	<0.0002	<0.0005
0083	**SS126**	**6/4/2018**	**0083_SS126_0.0_180604**	**Normal**	**211639**	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	<0.0002	<0.0002	<0.0002	0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005
0083	**SS126**	**6/4/2018**	**0083_SS126_0.5_180604**	**Normal**	**211639**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005
0083	**SD126**	**5/27/2020**	**0083_SD126_200527**	**Normal**	**EP2005480**	<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	<0.0002	<0.0005
0083	**SD126**	**6/23/2020**	**0083_SD126_200623**	**Normal**	**EP2006452**	<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	<0.0002	<0.0005
0083	**SD126**	**11/17/2020**	**0083_SD126_201117**	**Normal**	**EP2012744**	<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	<0.0002	<0.0005
0083	**SD126**	**3/3/2021**	**0083_SD126_210303**	**Normal**	**EP2102349**	<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	<0.0002	<0.0005
0083	**SD126**	**6/22/2021**	**0083_SD126_210622**	**Normal**	**EP2107187**	<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	<0.0002	<0.0005
0083	**SD126**	**11/23/2021**	**0083_SD126_211123**	**Normal**	**EP2114299**	<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	<0.0002	<0.0005
0083	**SD126**	**5/16/2022**	**0083_SD126_220516**	**Normal**	**EP2206114**	<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	<0.0002	<0.0005
0083	**SD126**	**6/21/2022**	**0083_SD126_220621**	**Normal**	**EP2207635**	<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	<0.0002	<0.0005
0083	**SS127**	**6/4/2018**	**0083_SS127_0.0_180604**	**Normal**	**211639**	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005
0083	**SS127**	**6/4/2018**	**0083_SS127_0.5_180604**	**Normal**	**211639**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005
0083	**SD127**	**11/28/2019**	**0083_SD127_191128**	**Normal**	**EP1912608**	<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	<0.0002	<0.0005
0083	**SD127**	**5/26/2020**	**0083_SD127_200526**	**Normal**	**EP2005404**	<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	<0.0002	<0.0005
0083	**SD127**	**6/23/2020**	**0083_SD127_200623**	**Normal**	**EP2006452**	<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	<0.0002	<0.0005
0083	**SD127**	**11/17/2020**	**0083_QC101_201117**	**Field Duplicate**	**EP2012741**	<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	<0.0002	<0.0005
0083	**SD127**	**11/17/2020**	**0083_QC201_201117**	**Interlab Duplicate**	**758001**	<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	<0.005
0083	**SD127**	**11/17/2020**	**0083_SD127_201117**	**Normal**	**EP2012741**	<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	<0.0002	<0.0005
0083	**SD127**	**3/3/2021**	**0083_SD127_210303**	**Normal**	**EP2102349**	<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	<0.0002	<0.0005
0083	**SD127**	**6/22/2021**	**0083_SD127_210622**	**Normal**	**EP2107093**	<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	<0.0002	<0.0005
0083	**SD127**	**11/23/2021**	**0083_SD127_211123**	**Normal**	**EP2114299**	<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	<0.0002	<0.0005
0083	**SD127**	**5/16/2022**	**0083_QC104_220516**	**Field Duplicate**	**EP2206114**	<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	<0.0002	<0.0005
0083	**SD127**	**5/16/2022**	**0083_QC204_220516**	**Interlab Duplicate**	**890774**	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0008	<0.0002	<0.0004	<0.0008	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
0083	**SD127**	**5/16/2022**	**0083_SD127_220516**	**Normal**	**EP2206114**	<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	<0.0002	<0.0005
0083	**SD127**	**6/21/2022**	**0083_SD127_220621**	**Normal**	**EP2207635**	<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	<0.0002	<0.0005
0083	**SS128**	**6/4/2018**	**0083_SS128_0.0_180604**	**Normal**	**211639**	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005
0083	**SD128**	**11/28/2019**	**0083_SD128_191128**	**Normal**	**EP1912608**	<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	<0.0002	<0.0005
0083	**SD128**	**5/27/2020**	**0083_QC102_200527**	**Field Duplicate**	**EP2005480**	<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	<0.0002	<0.0005
0083	**SD128**	**5/27/2020**	**0083_QC202_200527**	**Interlab Duplicate**	**723348**	<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	<0.005
0083	**SD128**	**5/27/2020**	**0083_SD128_200527**	**Normal**	**EP2005480**	<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	<0.0002	<0.0005

						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)	Perfluorotetradecanoic acid (PFTeDA)
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
0083	**SD128**	**6/23/2020**	**0083_SD128_200623**	**Normal**	**EP2006452**	<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	<0.0002	<0.0005
0083	**SD128**	**11/17/2020**	**0083_SD128_201117**	**Normal**	**EP2012741**	<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	<0.0002	<0.0005
0083	**SD128**	**3/3/2021**	**0083_SD128_210303**	**Normal**	**EP2102202**	<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	<0.0002	<0.0005
0083	**SD128**	**6/22/2021**	**0083_QC101_210622**	**Field Duplicate**	**EP2107093**	<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	<0.0002	<0.0005
0083	**SD128**	**6/22/2021**	**0083_QC201_210622**	**Interlab Duplicate**	**805492**	<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	<0.005
0083	**SD128**	**6/22/2021**	**0083_SD128_210622**	**Normal**	**EP2107093**	<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	<0.0002	<0.0005
0083	**SD128**	**11/23/2021**	**0083_SD128_211123**	**Normal**	**EP2114299**	<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	<0.0002	<0.0005
0083	**SD128**	**5/16/2022**	**0083_SD128_220516**	**Normal**	**EP2206114**	<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	<0.0002	<0.0005
0083	**SD128**	**6/21/2022**	**0083_SD128_220621**	**Normal**	**EP2207635**	<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	<0.0002	<0.0005

Note:

First Time detect of PFOA or PFHxS+PFOS

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Ecological direct exposure

HEPA, January 2020, PFAS NEMP 2020 Ecological indirect exposure

HEPA, January 2020, PFAS NEMP 2020 Industrial/ commercial (HIL D)

	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
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
LOR - Limit of Reporting	0.0001	0.0001	0.0001	0.0001	0.0002	0.0004	0.0002	0.0005	0.0004	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**		
Site ID	**Location Code**	**Date**	**Field ID**	**Sample Type**	**Lab Report Number**									
0083	**SS112**	**2/28/2018**	**0083_SS112_0.0_180228**	**Normal**	**207612**	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
0083	**SS112**	**6/8/2018**	**0083_SD112_0.0_180608**	**Normal**	**212095**	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
0083	**SS112**	**6/8/2018**	**0083_SD112_0.2_180608**	**Normal**	**212095**	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
0083	**SD112**	**5/26/2020**	**0083_SD112_200526**	**Normal**	**EP2005404**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD112**	**6/25/2020**	**0083_SD112_0.00-0.10_20**	**Normal**	**EP2006684**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD112**	**11/18/2020**	**0083_SD112_0.00-0.10_20**	**Normal**	**EP2012856**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD112**	**3/5/2021**	**0083_SD112_210305**	**Normal**	**EP2102349**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0003	0.0003	0.0003
0083	**SD112**	**6/22/2021**	**0083_SD112_210622**	**Normal**	**EP2107187**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD112**	**5/16/2022**	**0083_SD112_220516**	**Normal**	**EP2206114**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD112**	**6/21/2022**	**0083_SD112_220621**	**Normal**	**EP2207635**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SS113**	**3/1/2018**	**0083_SS113_0.0_180301**	**Normal**	**207818-B**	<0.0001	0.021	0.032	0.0003	<0.01	<0.01	<0.002	<0.01	<0.01	<0.002	<0.01			
0083	**SS113**	**6/4/2018**	**0083_SS113_0.0_180604**	**Normal**	**211639**	<0.0001	0.013	0.014	0.0002	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
0083	**SS113**	**6/4/2018**	**0083_SS113_0.5_180604**	**Normal**	**211639**	<0.0001	<0.0001	0.0019	0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
0083	**SD113**	**5/26/2020**	**0083_SD113_200526**	**Normal**	**EP2005404**	<0.0005	0.0590	0.0517	0.0006	0.0004	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0093	0.136	0.137
0083	**SD113**	**6/25/2020**	**0083_SD113_0.00-0.10_20**	**Normal**	**EP2006684**	<0.0005	0.0153	0.0128	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0025	0.0356	0.0358
0083	**SD113**	**11/18/2020**	**0083_SD113_201118**	**Normal**	**EP2012801**	<0.0005	0.0200	0.0152	<0.0005	0.0003	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0085	0.0511	0.0518
0083	**SD113**	**3/5/2021**	**0083_SD113_210305**	**Normal**	**EP2102349**	<0.0005	0.0012	0.0016	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0011	0.0039	0.0039
0083	**SD113**	**6/23/2021**	**0083_SD113_210623**	**Normal**	**EP2107192**	<0.0005	0.0022	0.0044	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0013	0.0086	0.0086
0083	**SD113**	**11/23/2021**	**0083_QC108_211123**	**Field Duplicate**	**EP2114299**	<0.0005	0.0059	0.0080	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0058	0.0223	0.0223
0083	**SD113**	**11/23/2021**	**0083_QC209_211123**	**Interlab Duplicate**	**844500**	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.05
0083	**SD113**	**11/23/2021**	**0083_SD113_211123**	**Normal**	**EP2114299**	<0.0005	0.0066	0.0088	0.0006	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0063	0.0263	0.0269
0083	**SD113**	**5/16/2022**	**0083_SD113_220516**	**Normal**	**EP2206114**	<0.0005	0.0009	0.0011	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0014	0.0034	0.0034
0083	**SD113**	**6/21/2022**	**0083_QC110_220621**	**Field Duplicate**	**EP2207633**	<0.0005	0.0006	0.0006	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0005	0.0017	0.0017
0083	**SD113**	**6/21/2022**	**0083_QC210_220621**	**Interlab Duplicate**	**901207**	<0.0005	0.0015	0.0019	<0.0005	<0.0004	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0008	0.0010	0.0044	0.0044
0083	**SD113**	**6/21/2022**	**0083_SD113_220621**	**Normal**	**EP2207633**	<0.0005	0.0014	0.0015	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	0.0011	0.0040	0.0040
0083	**SD120**	**6/8/2018**	**0083_SD120_0.0_180608**	**Normal**	**212095**	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
0083	**SD120**	**6/8/2018**	**0083_SD120_0.4_180608**	**Normal**	**212095**	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
0083	**SD120**	**5/27/2020**	**0083_SD120_200527**	**Normal**	**EP2005480**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD120**	**6/26/2020**	**0083_QC103_200626**	**Field Duplicate**	**EP2006689**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD120**	**6/26/2020**	**0083_QC203_200626**	**Interlab Duplicate**	**729409**	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.05
0083	**SD120**	**6/26/2020**	**0083_SD120_0.00-0.10_20**	**Normal**	**EP2006689**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD120**	**11/18/2020**	**0083_SD120_0.00-0.10_20**	**Normal**	**EP2012856**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD120**	**3/3/2021**	**0083_QC103_210303**	**Field Duplicate**	**EP2102202**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD120**	**3/3/2021**	**0083_QC203_210303**	**Interlab Duplicate**	**779429**	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.05
0083	**SD120**	**3/3/2021**	**0083_SD120_210303**	**Normal**	**EP2102202**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD120**	**6/22/2021**	**0083_SD120_210622**	**Normal**	**EP2107187**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD120**	**11/23/2021**	**0083_SD120_211123**	**Normal**	**EP2114302**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD120**	**5/16/2022**	**0083_SD120_220516**	**Normal**	**EP2206114**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD120**	**6/21/2022**	**0083_SD120_220621**	**Normal**	**EP2207633**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SS126**	**6/4/2018**	**0083_SS126_0.0_180604**	**Normal**	**211639**	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
0083	**SS126**	**6/4/2018**	**0083_SS126_0.5_180604**	**Normal**	**211639**	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
0083	**SD126**	**5/27/2020**	**0083_SD126_200527**	**Normal**	**EP2005480**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD126**	**6/23/2020**	**0083_SD126_200623**	**Normal**	**EP2006452**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD126**	**11/17/2020**	**0083_SD126_201117**	**Normal**	**EP2012744**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD126**	**3/3/2021**	**0083_SD126_210303**	**Normal**	**EP2102349**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD126**	**6/22/2021**	**0083_SD126_210622**	**Normal**	**EP2107187**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD126**	**11/23/2021**	**0083_SD126_211123**	**Normal**	**EP2114299**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD126**	**5/16/2022**	**0083_SD126_220516**	**Normal**	**EP2206114**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD126**	**6/21/2022**	**0083_SD126_220621**	**Normal**	**EP2207635**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SS127**	**6/4/2018**	**0083_SS127_0.0_180604**	**Normal**	**211639**	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
0083	**SS127**	**6/4/2018**	**0083_SS127_0.5_180604**	**Normal**	**211639**	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
0083	**SD127**	**11/28/2019**	**0083_SD127_191128**	**Normal**	**EP1912608**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD127**	**5/26/2020**	**0083_SD127_200526**	**Normal**	**EP2005404**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD127**	**6/23/2020**	**0083_SD127_200623**	**Normal**	**EP2006452**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD127**	**11/17/2020**	**0083_QC101_201117**	**Field Duplicate**	**EP2012741**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD127**	**11/17/2020**	**0083_QC201_201117**	**Interlab Duplicate**	**758001**	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.05
0083	**SD127**	**11/17/2020**	**0083_SD127_201117**	**Normal**	**EP2012741**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD127**	**3/3/2021**	**0083_SD127_210303**	**Normal**	**EP2102349**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD127**	**6/22/2021**	**0083_SD127_210622**	**Normal**	**EP2107093**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD127**	**11/23/2021**	**0083_SD127_211123**	**Normal**	**EP2114299**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD127**	**5/16/2022**	**0083_QC104_220516**	**Field Duplicate**	**EP2206114**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD127**	**5/16/2022**	**0083_QC204_220516**	**Interlab Duplicate**	**890774**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0004	<0.0004	<0.0004	<0.0008	<0.0004	<0.0004	<0.0008	<0.0004	<0.0002	<0.0002
0083	**SD127**	**5/16/2022**	**0083_SD127_220516**	**Normal**	**EP2206114**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD127**	**6/21/2022**	**0083_SD127_220621**	**Normal**	**EP2207635**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SS128**	**6/4/2018**	**0083_SS128_0.0_180604**	**Normal**	**211639**	<0.0001	<0.0001	<0.0001	<0.0001	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.005			
0083	**SD128**	**11/28/2019**	**0083_SD128_191128**	**Normal**	**EP1912608**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD128**	**5/27/2020**	**0083_QC102_200527**	**Field Duplicate**	**EP2005480**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	**SD128**	**5/27/2020**	**0083_QC202_200527**	**Interlab Duplicate**	**723348**	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.05
0083	**SD128**	**5/27/2020**	**0083_SD128_200527**	**Normal**	**EP2005480**	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002

						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
						mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
0083	SD128	6/23/2020	0083_SD128_200623	Normal	EP2006452	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	SD128	11/17/2020	0083_SD128_201117	Normal	EP2012741	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	SD128	3/3/2021	0083_SD128_210303	Normal	EP2102202	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	SD128	6/22/2021	0083_QC101_210622	Field Duplicate	EP2107093	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	SD128	6/22/2021	0083_QC201_210622	Interlab Duplicate	805492	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.05
0083	SD128	6/22/2021	0083_SD128_210622	Normal	EP2107093	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	SD128	11/23/2021	0083_SD128_211123	Normal	EP2114299	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	SD128	5/16/2022	0083_SD128_220516	Normal	EP2206114	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002
0083	SD128	6/21/2022	0083_SD128_220621	Normal	EP2207635	<0.0005	<0.0005	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002

Note:

First Time detect of PFOA or PFHxS+PFOS

Environmental Standards

HEPA, January 2020, PFAS NEMP 2020 Ecological direct exposure

HEPA, January 2020, PFAS NEMP 2020 Ecological indirect exposure

HEPA, January 2020, PFAS NEMP 2020 Industrial/ commercial (HIL D)

Trend Report

Report Date & Time: 2023-03-03 04:08:08

Data File Name: input2022.csv

Report Title: Groundwater Trend

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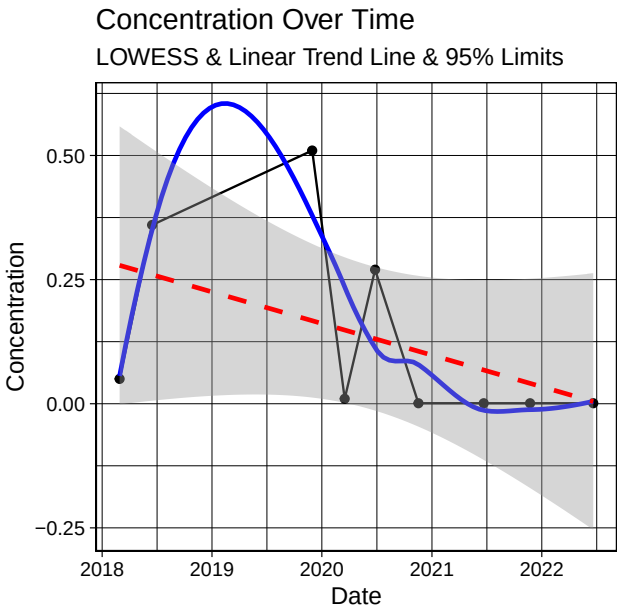
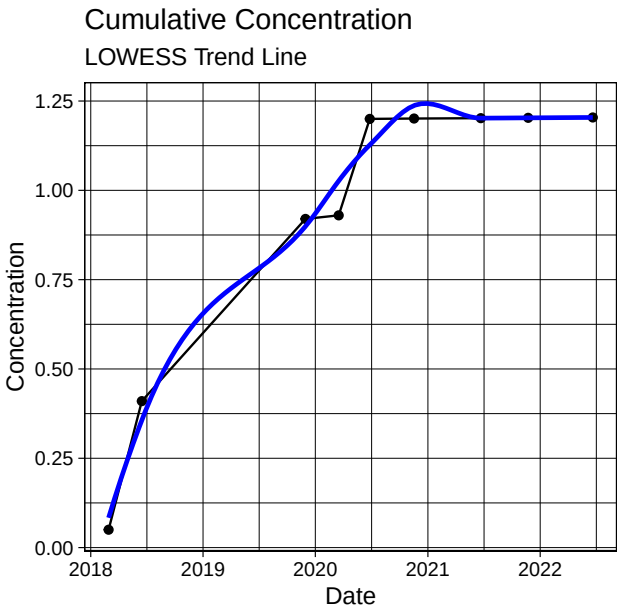
Kendall Trend Test Results Continuous	
n	9
z	-2.08
p	0.04
S	-20
varS	83.33
tau	-0.61
mean	0.13
sd	0.19
cov	1.46
results	DECREASING

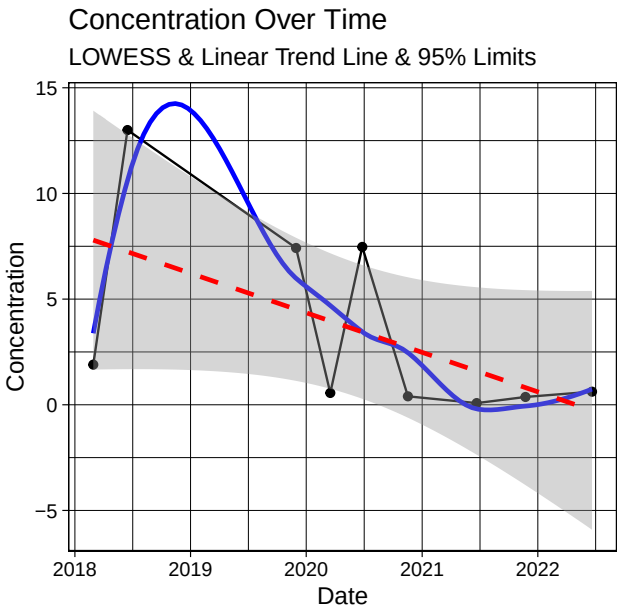
Report for ID : MW008 and Analyte : PFOA

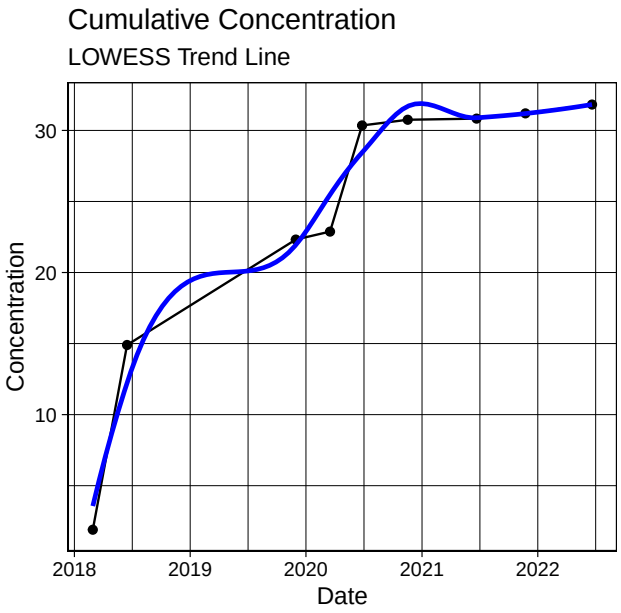




Kendall Trend Test Results Continuous	
n	9
z	-1.56
p	0.12
S	-16
varS	92
tau	-0.44
mean	3.54
sd	4.64
cov	1.31
results	NO CLEAR TREND

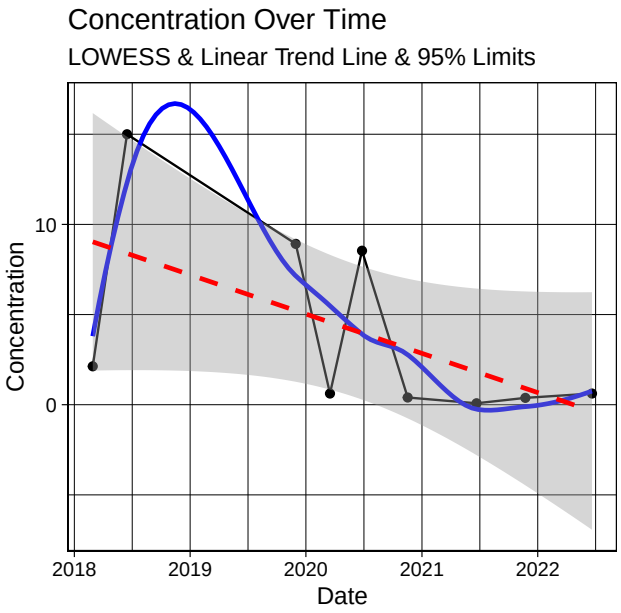
Report for ID : MW008 and Analyte : PFOS

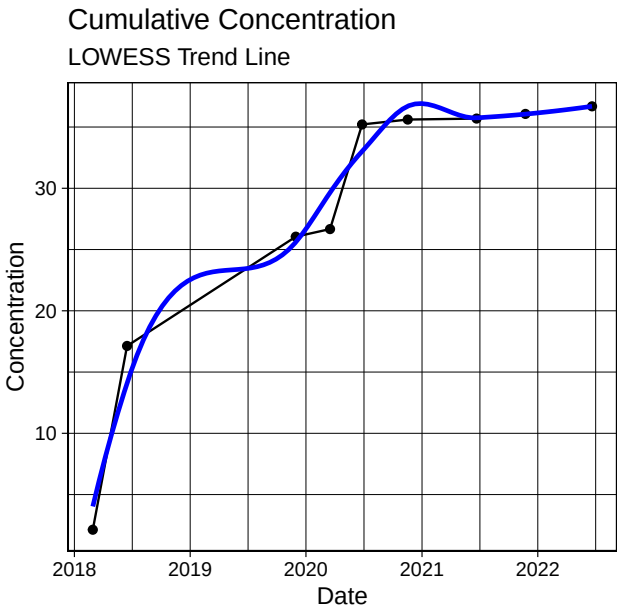




Kendall Trend Test Results Continuous	
n	9
z	-1.89
p	0.06
S	-19
varS	91
tau	-0.54
mean	4.08
sd	5.4
cov	1.33
results	POSSIBLY DECREASING

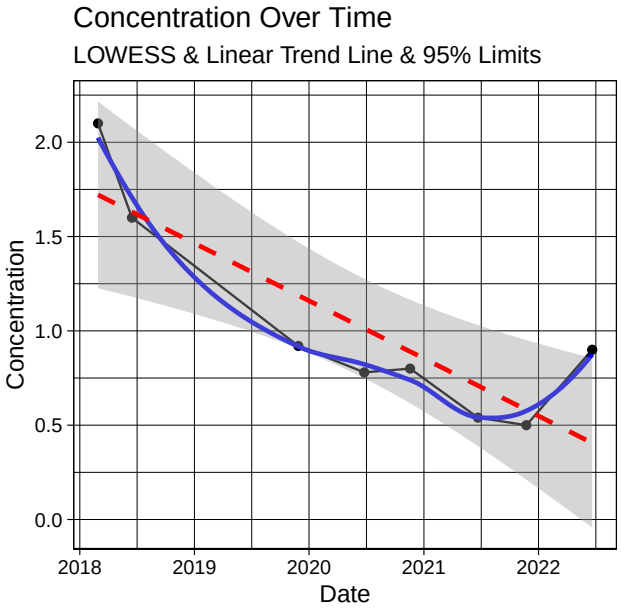
Report for ID : MW008 and Analyte : SumofPFOSandPFHxS

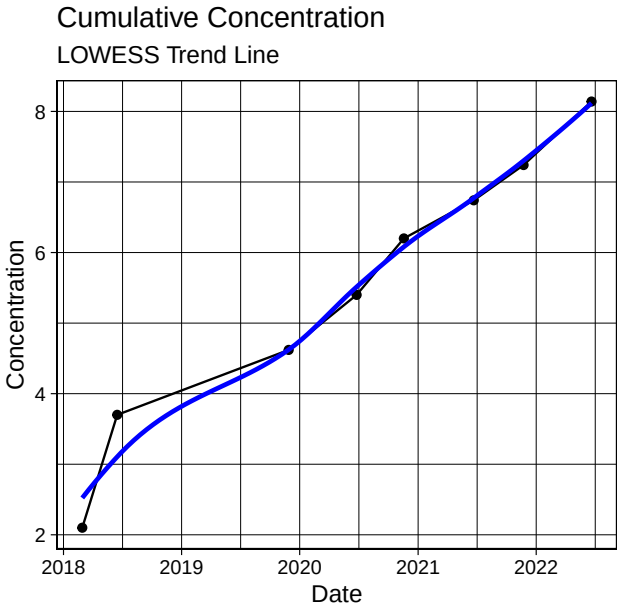




Kendall Trend Test Results Continuous	
n	8
z	-2.1
p	0.04
S	-18
varS	65.33
tau	-0.64
mean	1.02
sd	0.55
cov	0.54
results	DECREASING

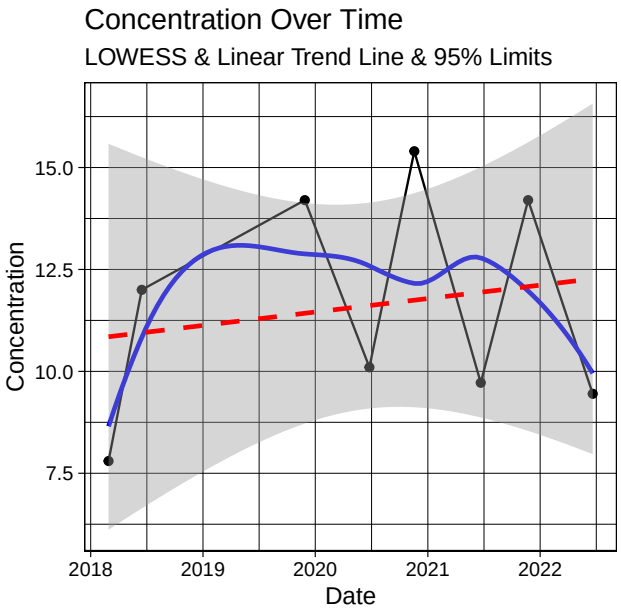
Report for ID : MW017 and Analyte : PFOA

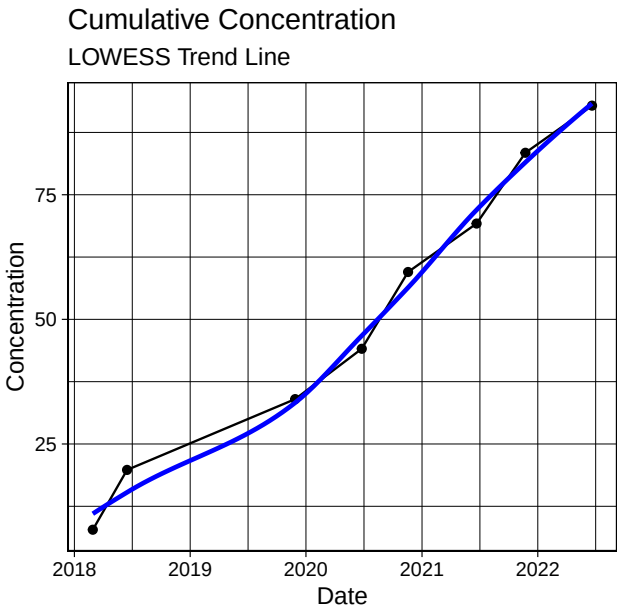




Kendall Trend Test Results Continuous	
n	8
z	0
p	1
S	1
varS	64.33
tau	0.04
mean	11.61
sd	2.75
cov	0.24
results	NO CLEAR TREND

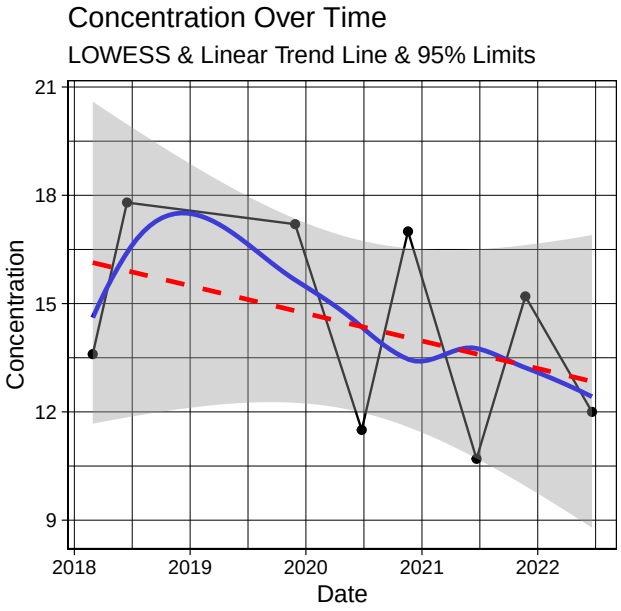
Report for ID : MW017 and Analyte : PFOS

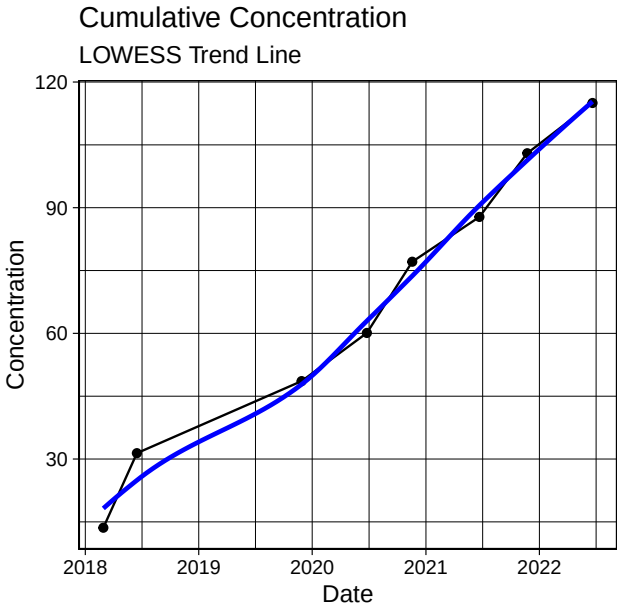




Kendall Trend Test Results Continuous	
n	8
z	-1.11
p	0.27
S	-10
varS	65.33
tau	-0.36
mean	14.38
sd	2.81
cov	0.2
results	STABLE

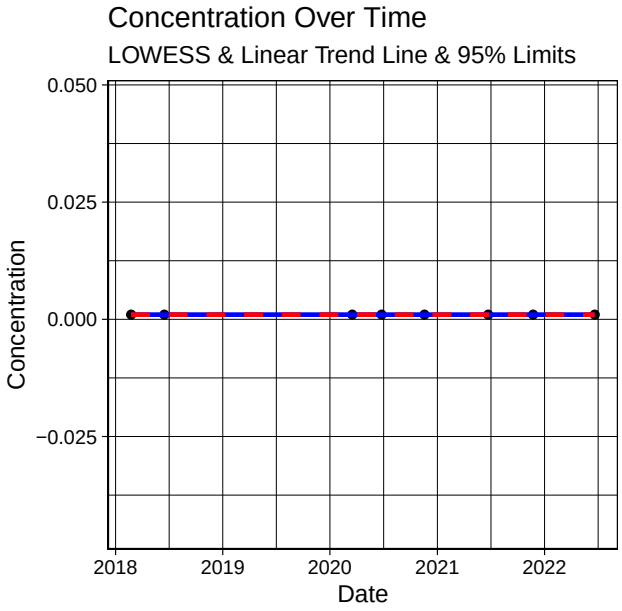
Report for ID : MW017 and Analyte : SumofPFOSandPFHxS

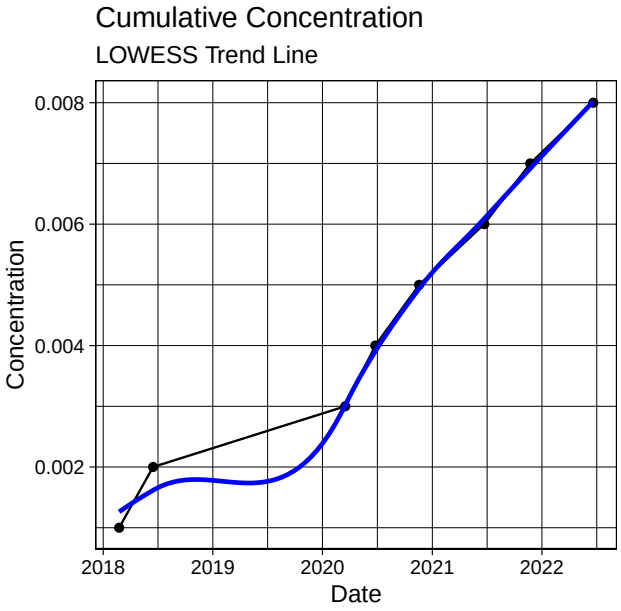




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

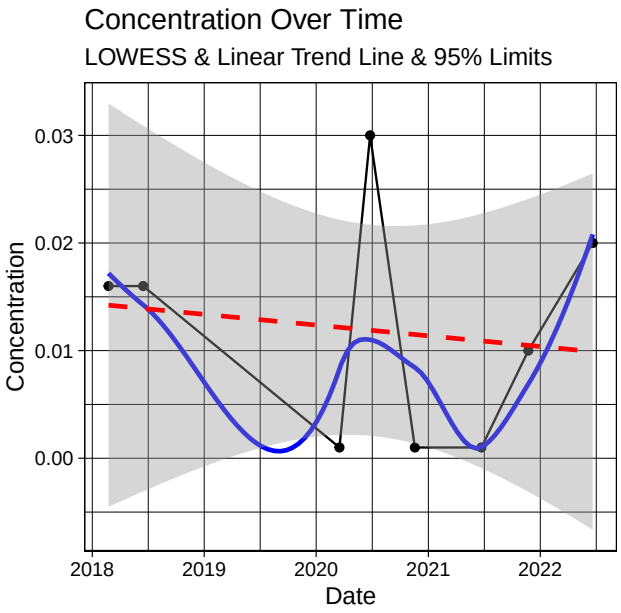
Report for ID : MW019 and Analyte : PFOA

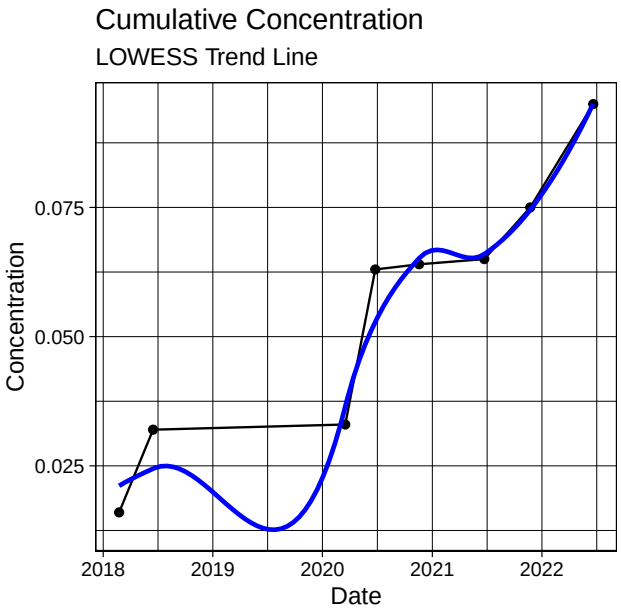




Kendall Trend Test Results Continuous	
n	8
z	0
p	1
S	0
varS	60.67
tau	0
mean	0.01
sd	0.01
cov	0.89
results	STABLE

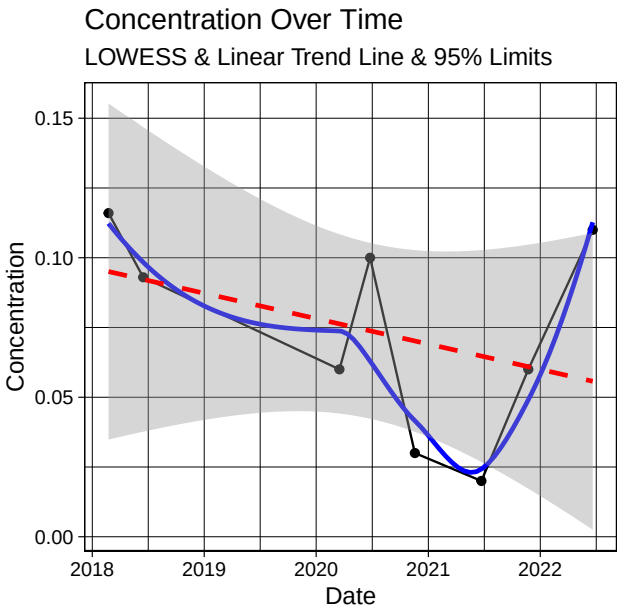
Report for ID : MW019 and Analyte : PFOS

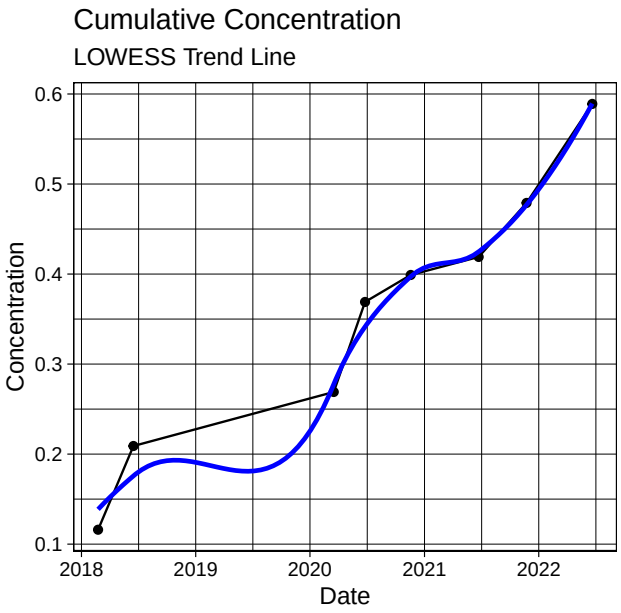




Kendall Trend Test Results Continuous	
n	8
z	-0.75
p	0.45
S	-7
varS	64.33
tau	-0.25
mean	0.07
sd	0.04
cov	0.5
results	STABLE

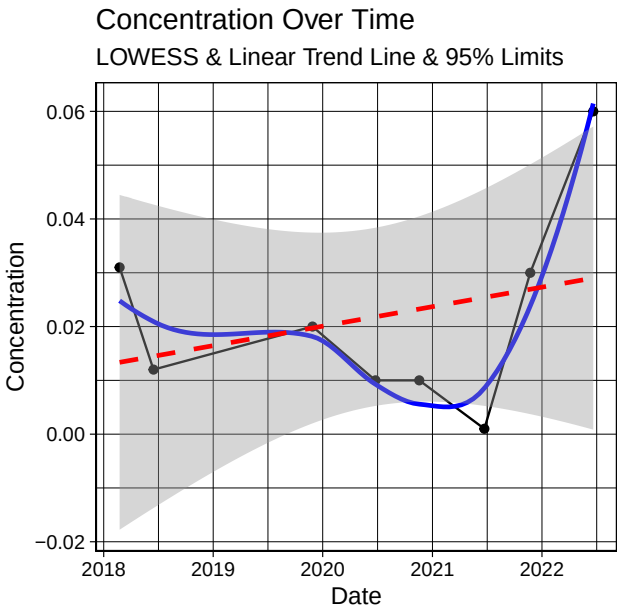
Report for ID : MW019 and Analyte : SumofPFOSandPFHxS

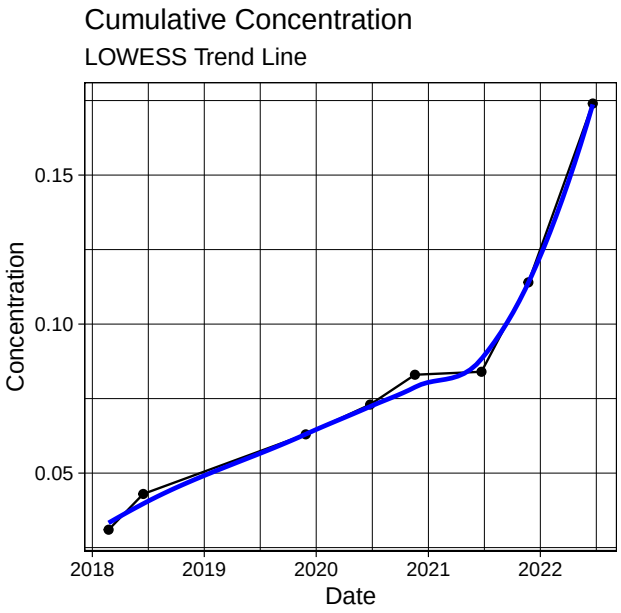




Kendall Trend Test Results Continuous	
n	8
z	0
p	1
S	-1
varS	64.33
tau	-0.04
mean	0.02
sd	0.02
cov	0.86
results	STABLE

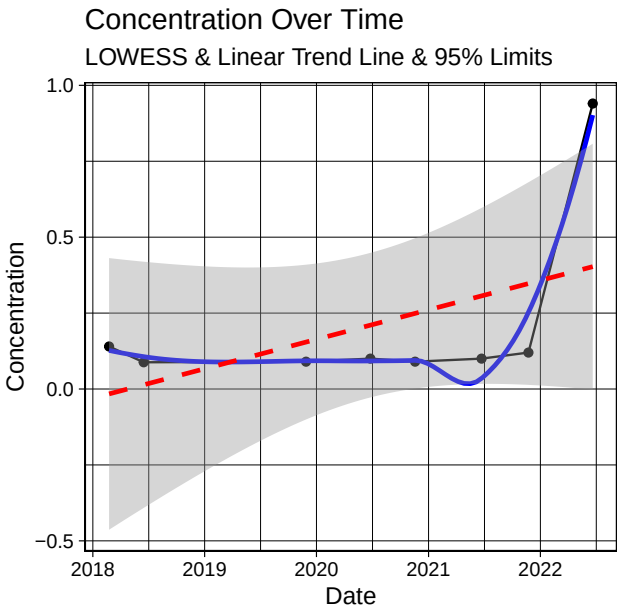
Report for ID : MW027 and Analyte : PFOA

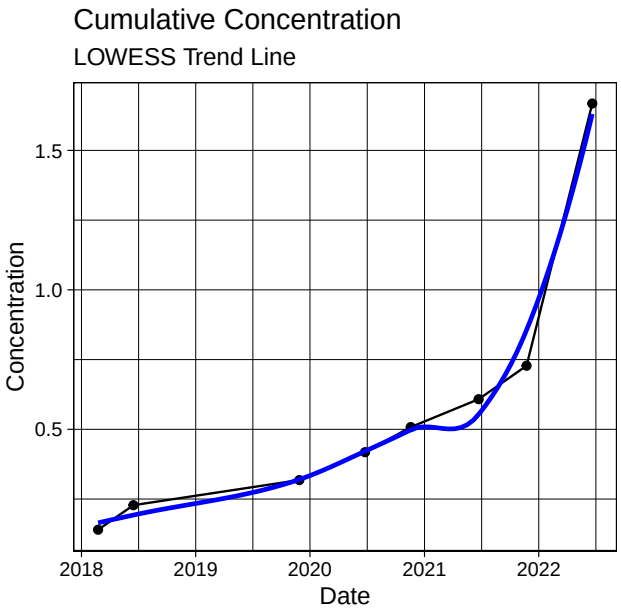




Kendall Trend Test Results Continuous	
n	8
z	1.38
p	0.17
S	12
varS	63.33
tau	0.44
mean	0.21
sd	0.3
cov	1.42
results	NO CLEAR TREND

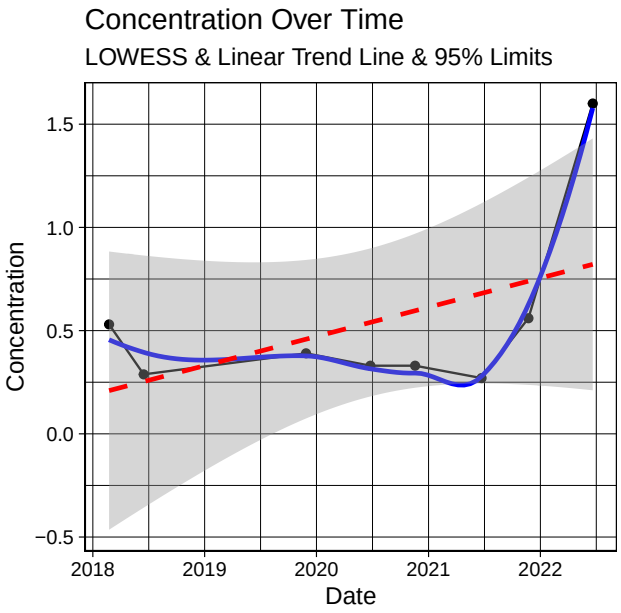
Report for ID : MW027 and Analyte : PFOS

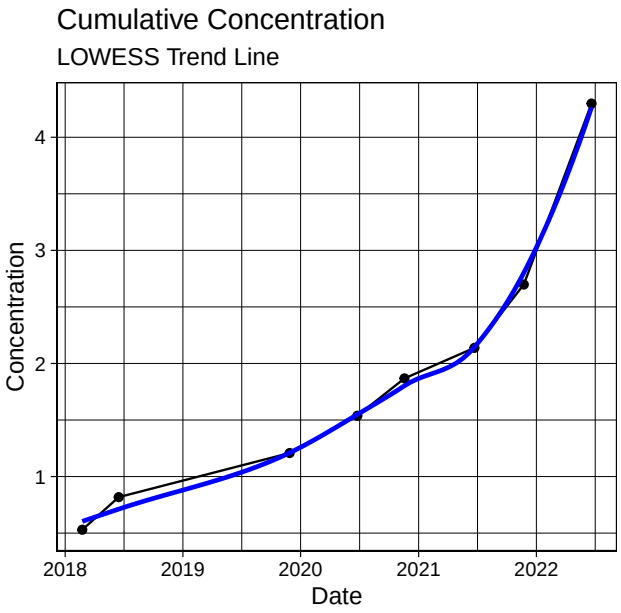




Kendall Trend Test Results Continuous	
n	8
z	0.5
p	0.62
S	5
varS	64.33
tau	0.18
mean	0.54
sd	0.44
cov	0.82
results	NO CLEAR TREND

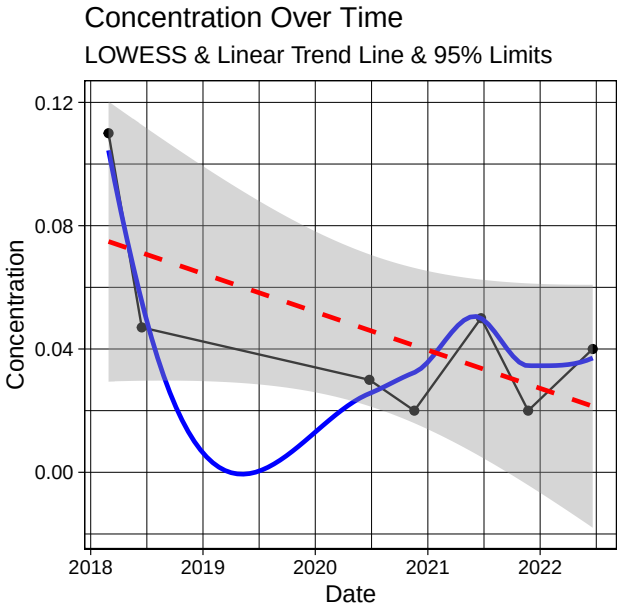
Report for ID : MW027 and Analyte : SumofPFOSandPFHxS

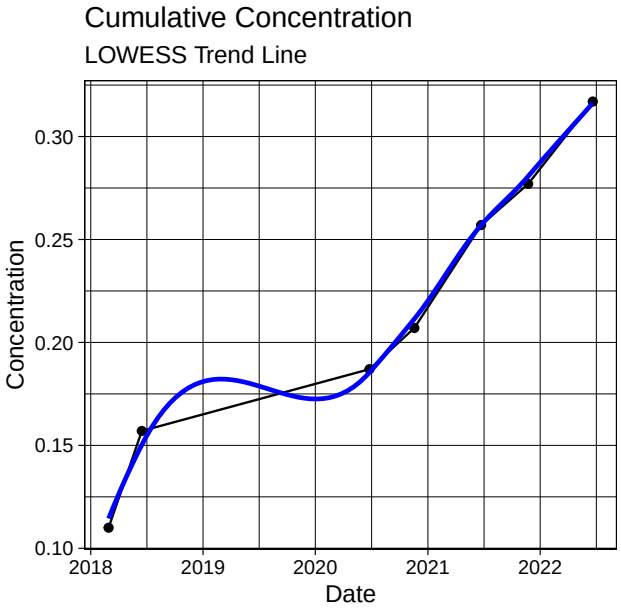




Kendall Trend Test Results Continuous	
n	7
z	-1.06
p	0.29
S	-8
varS	43.33
tau	-0.39
mean	0.05
sd	0.03
cov	0.68
results	STABLE

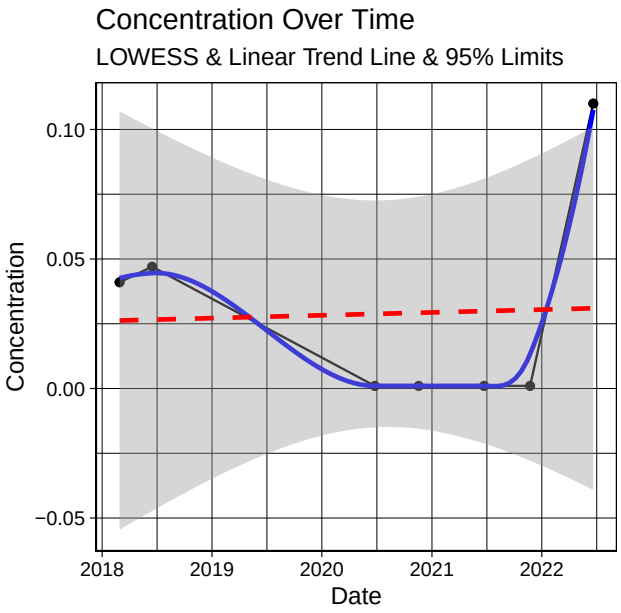
Report for ID : MW101 and Analyte : PFOA

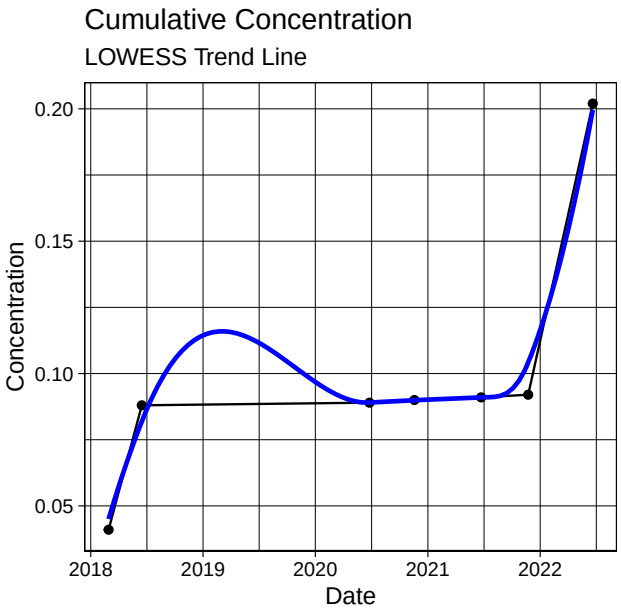




Kendall Trend Test Results Continuous	
n	7
z	0
p	1
S	-1
varS	35.67
tau	-0.06
mean	0.03
sd	0.04
cov	1.43
results	NO CLEAR TREND

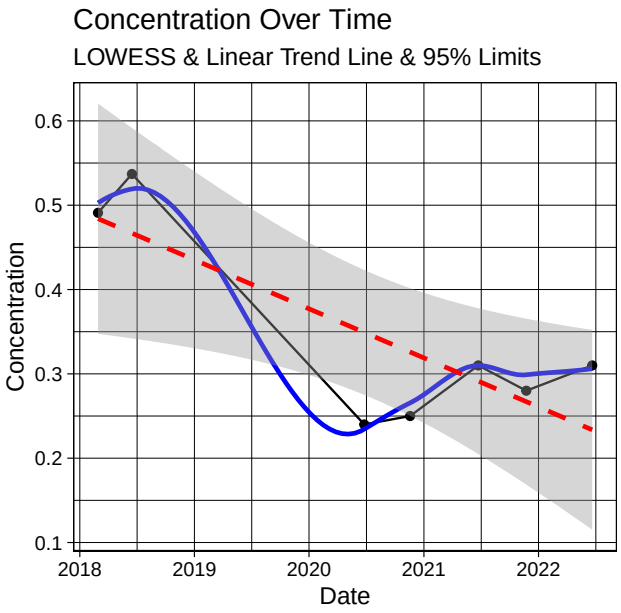
Report for ID : MW101 and Analyte : PFOS

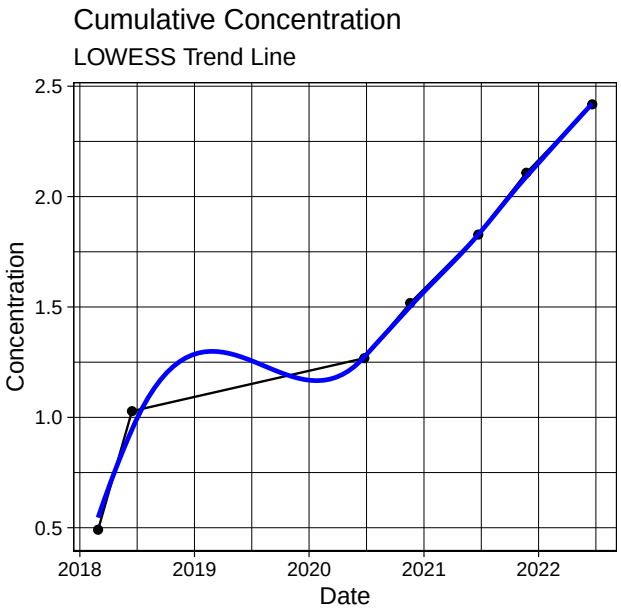




Kendall Trend Test Results Continuous	
n	7
z	-0.15
p	0.88
S	-2
varS	43.33
tau	-0.1
mean	0.35
sd	0.12
cov	0.34
results	STABLE

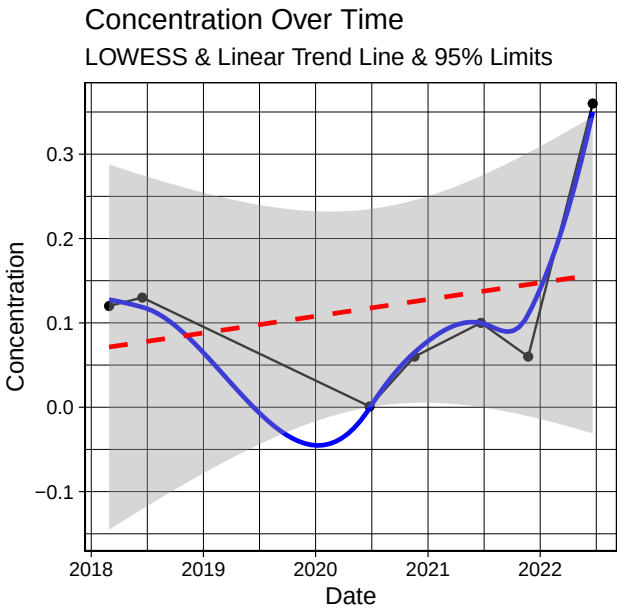
Report for ID : MW101 and Analyte : SumofPFOSandPFHxS

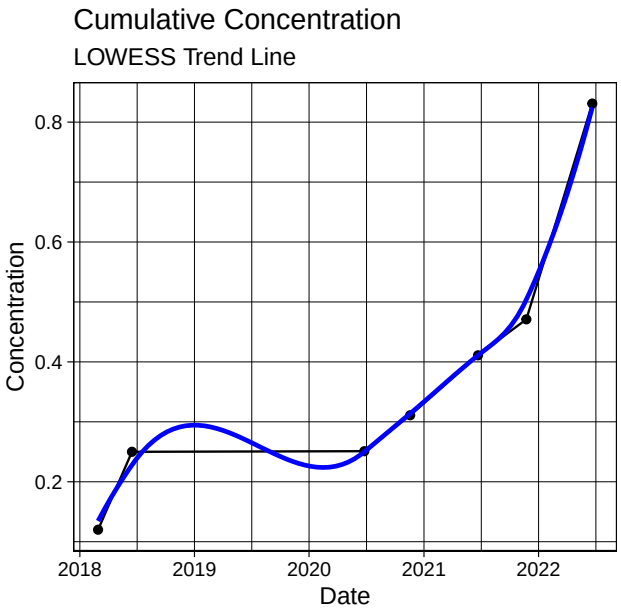




Kendall Trend Test Results Continuous	
n	7
z	0.15
p	0.88
S	2
varS	43.33
tau	0.1
mean	0.12
sd	0.12
cov	0.97
results	NO CLEAR TREND

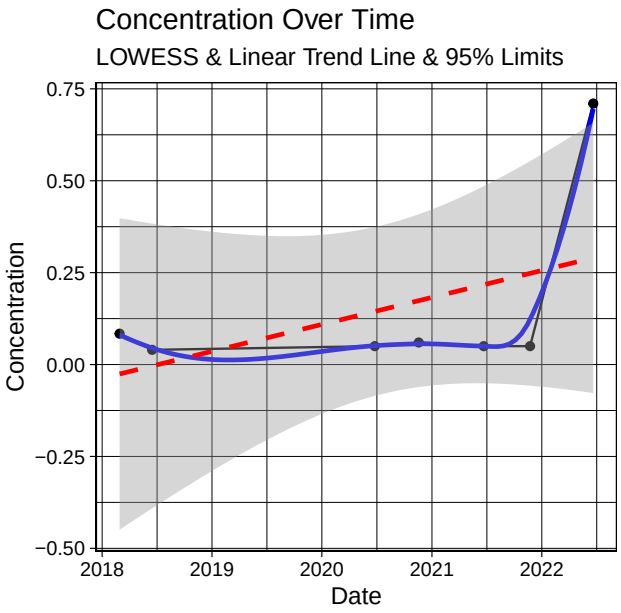
Report for ID : MW102 and Analyte : PFOA

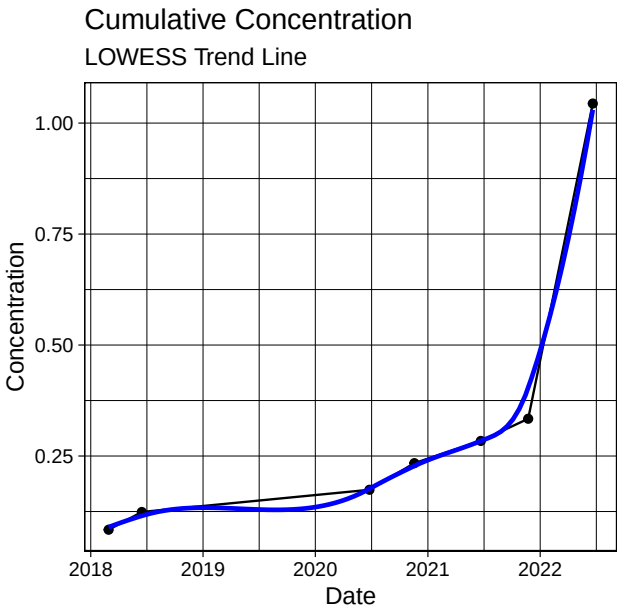




Kendall Trend Test Results Continuous	
n	7
z	0.47
p	0.64
S	4
varS	40.67
tau	0.21
mean	0.15
sd	0.25
cov	1.66
results	NO CLEAR TREND

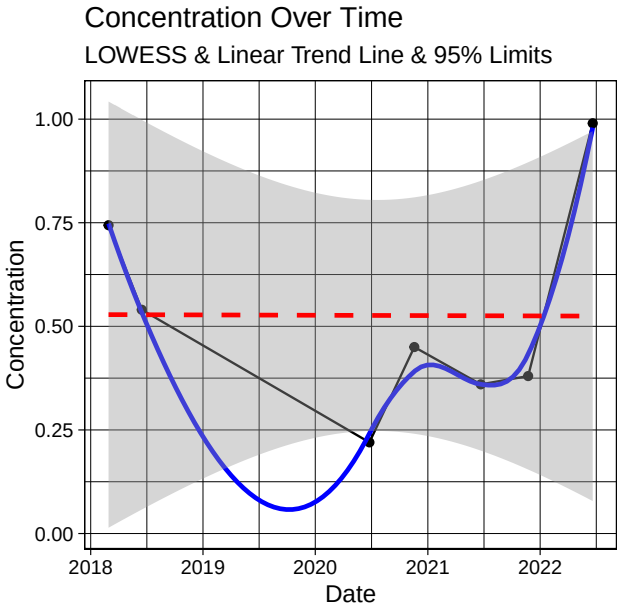
Report for ID : MW102 and Analyte : PFOS

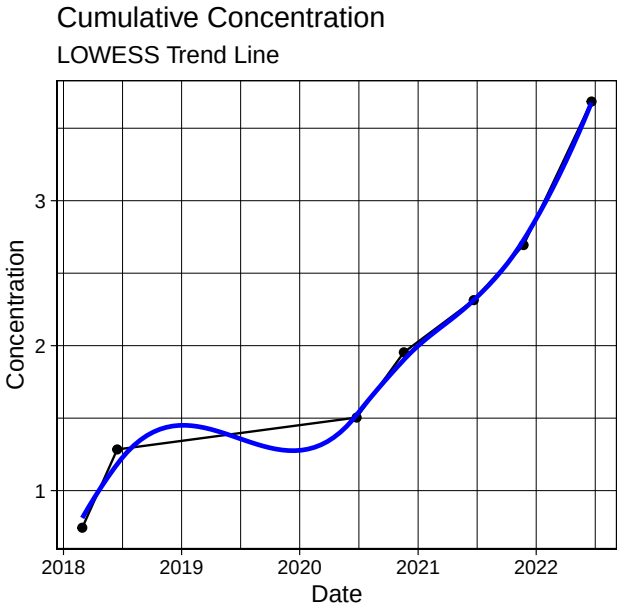




Kendall Trend Test Results Continuous	
n	7
z	0
p	1
S	-1
varS	44.33
tau	-0.05
mean	0.53
sd	0.26
cov	0.5
results	STABLE

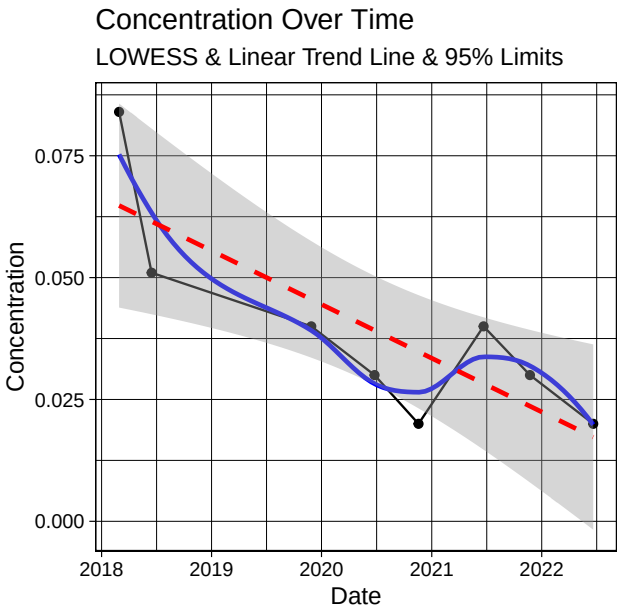
Report for ID : MW102 and Analyte : SumofPFOSandPFHxS

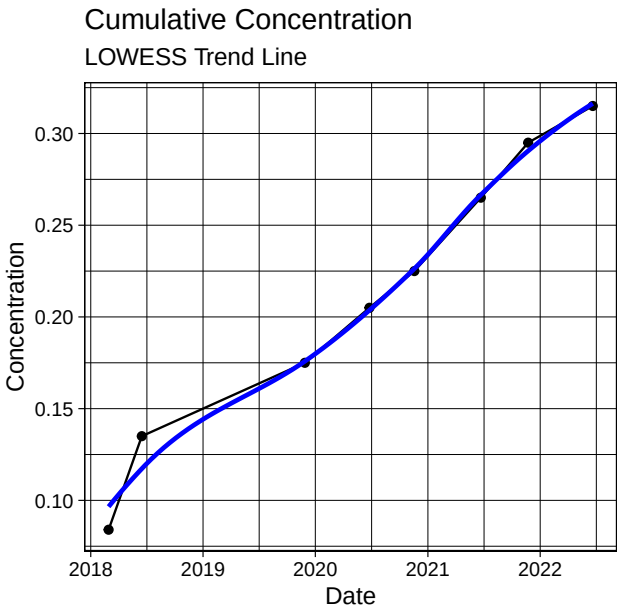




Kendall Trend Test Results Continuous	
n	8
z	-2.28
p	0.02
S	-19
varS	62.33
tau	-0.72
mean	0.04
sd	0.02
cov	0.53
results	DECREASING

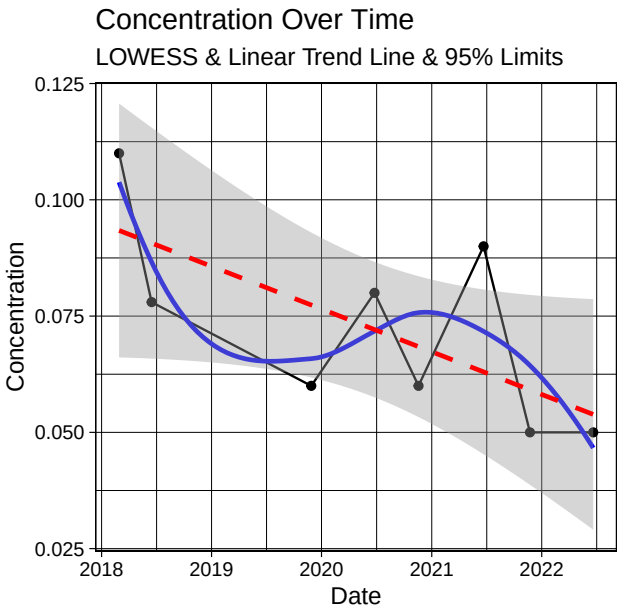
Report for ID : MW103 and Analyte : PFOA

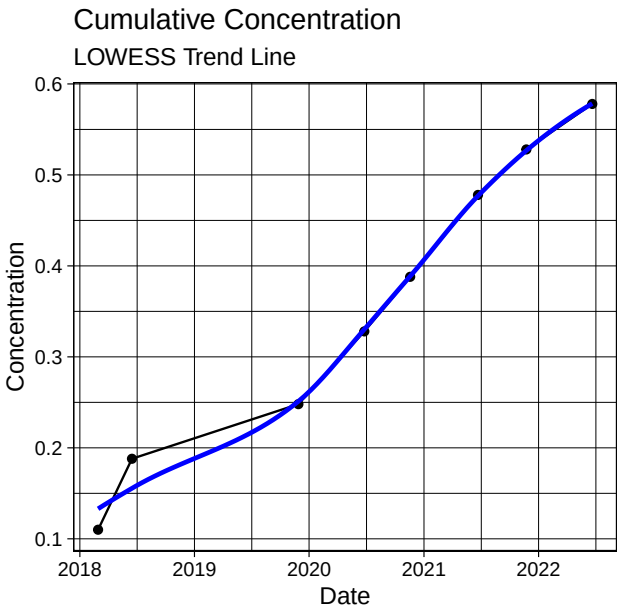




Kendall Trend Test Results Continuous	
n	8
z	-1.63
p	0.1
S	-14
varS	63.33
tau	-0.52
mean	0.07
sd	0.02
cov	0.29
results	STABLE

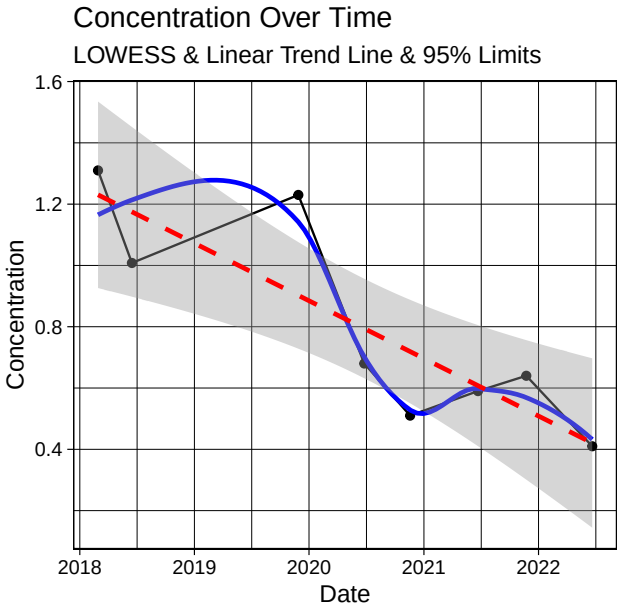
Report for ID : MW103 and Analyte : PFOS

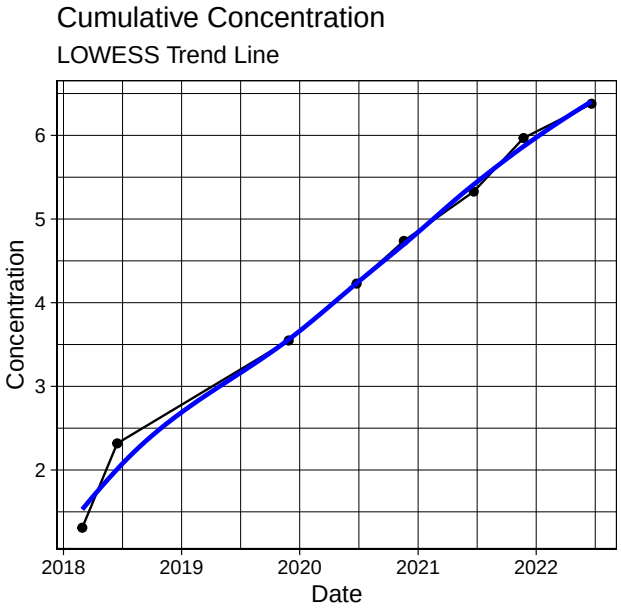




Kendall Trend Test Results Continuous	
n	8
z	-2.35
p	0.02
S	-20
varS	65.33
tau	-0.71
mean	0.8
sd	0.34
cov	0.43
results	DECREASING

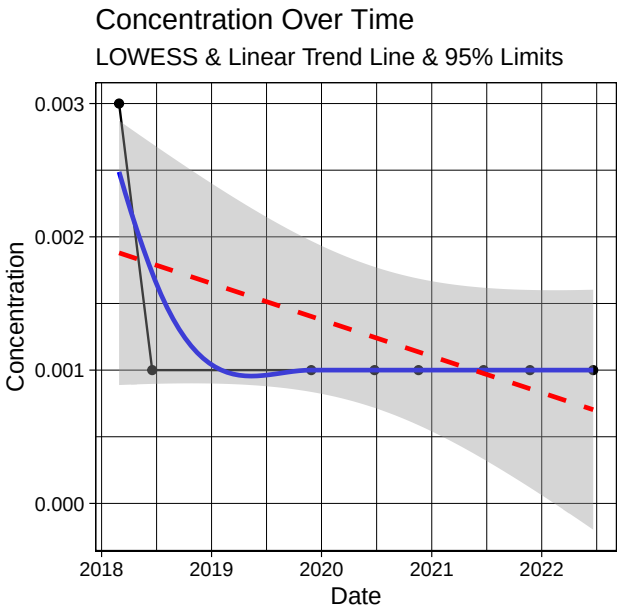
Report for ID : MW103 and Analyte : SumofPFOSandPFHxS

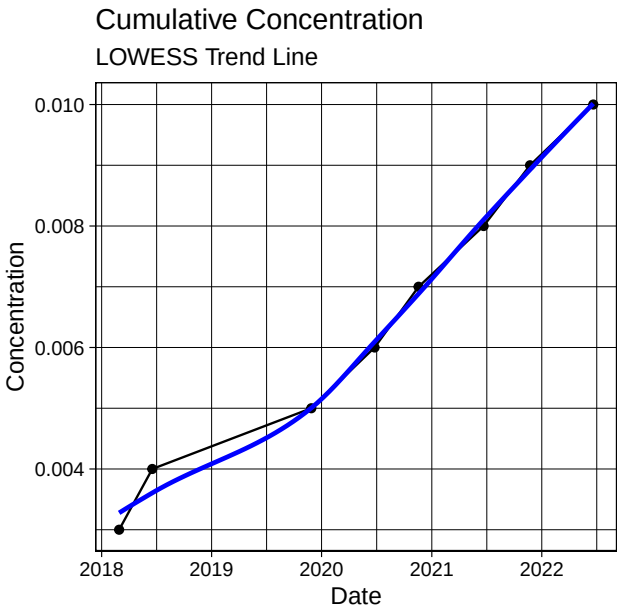




Kendall Trend Test Results Continuous	
n	8
z	-1.31
p	0.19
S	-7
varS	21
tau	-0.5
mean	0
sd	0
cov	0.57
results	STABLE

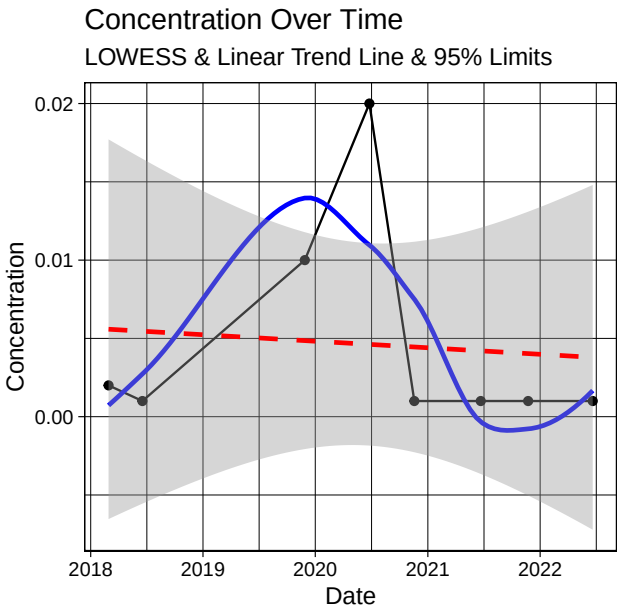
Report for ID : MW104 and Analyte : PFOA

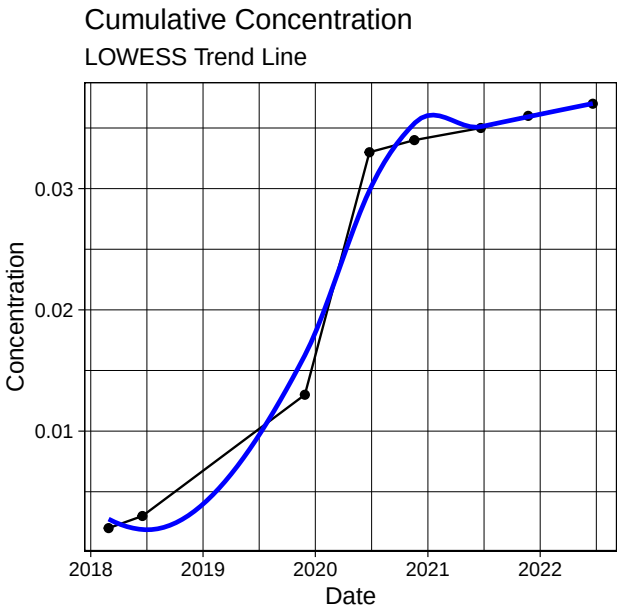




Kendall Trend Test Results Continuous	
n	8
z	-1
p	0.32
S	-8
varS	48.67
tau	-0.36
mean	0
sd	0.01
cov	1.5
results	NO CLEAR TREND

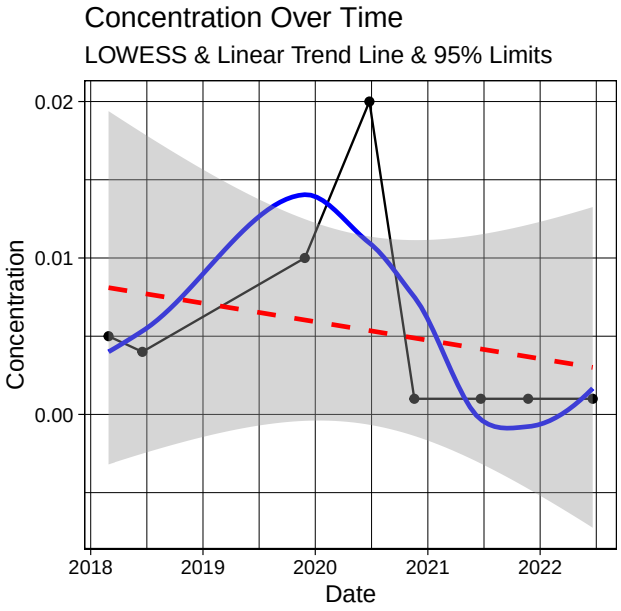
Report for ID : MW104 and Analyte : PFOS

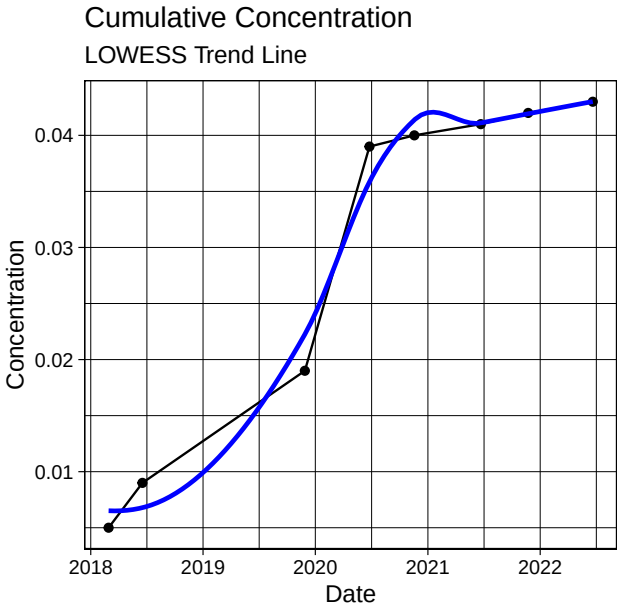




Kendall Trend Test Results Continuous	
n	8
z	-1.46
p	0.14
S	-12
varS	56.67
tau	-0.48
mean	0.01
sd	0.01
cov	1.25
results	NO CLEAR TREND

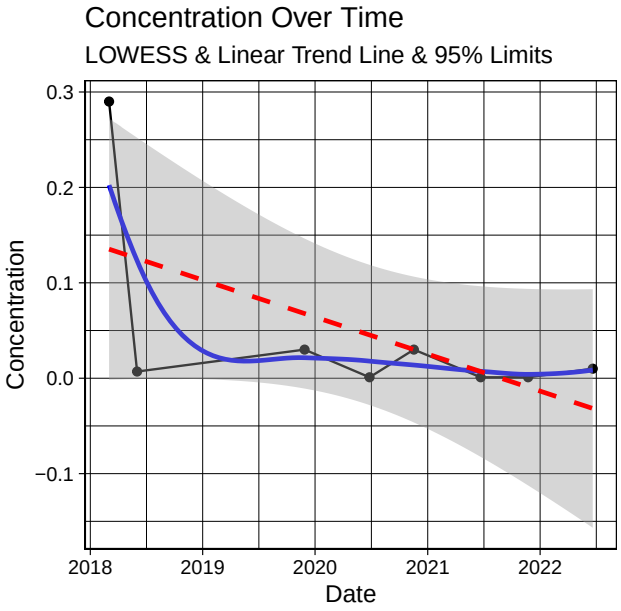
Report for ID : MW104 and Analyte : SumofPFOSandPFHxS

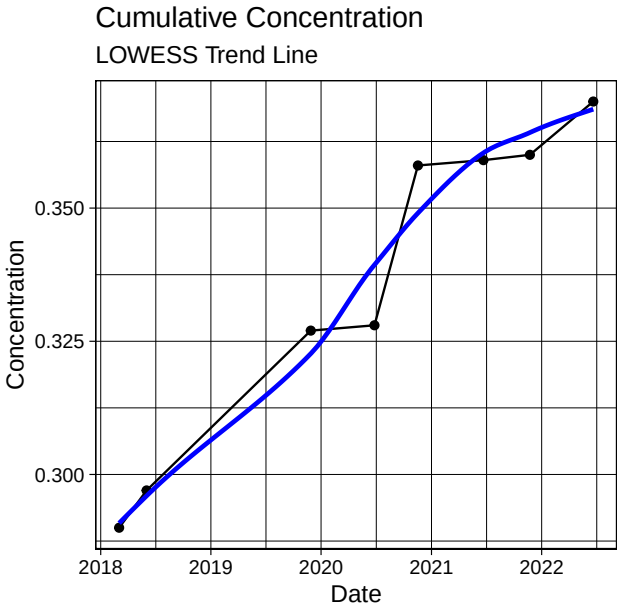




Kendall Trend Test Results Continuous	
n	8
z	-1.16
p	0.25
S	-10
varS	60.67
tau	-0.39
mean	0.05
sd	0.1
cov	2.15
results	NO CLEAR TREND

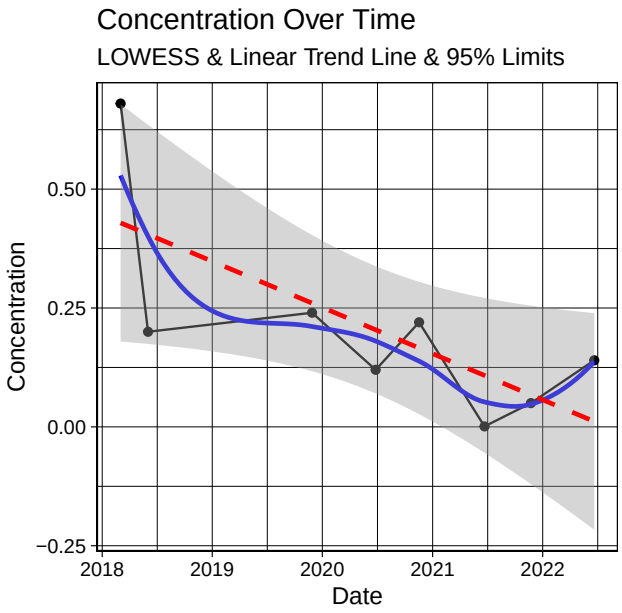
Report for ID : MW105 and Analyte : PFOA

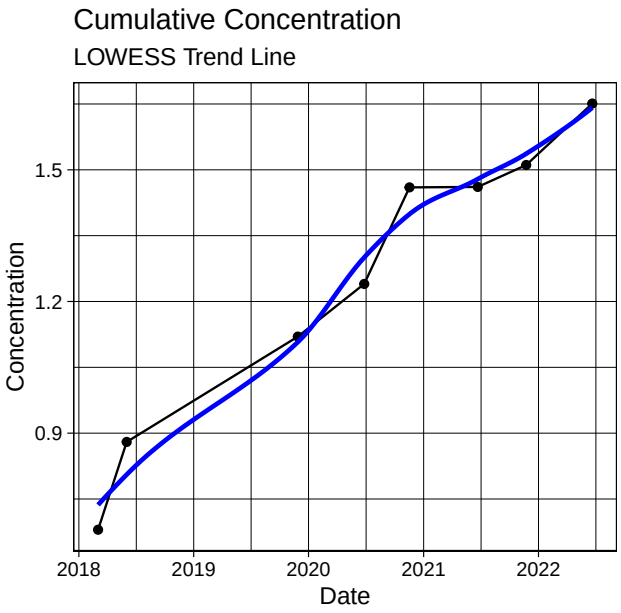




Kendall Trend Test Results Continuous	
n	8
z	-1.61
p	0.11
S	-14
varS	65.33
tau	-0.5
mean	0.21
sd	0.21
cov	1.01
results	NO CLEAR TREND

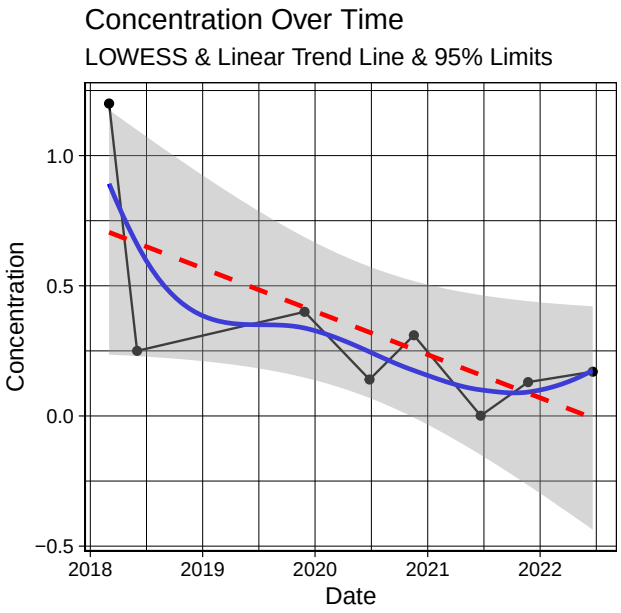
Report for ID : MW105 and Analyte : PFOS

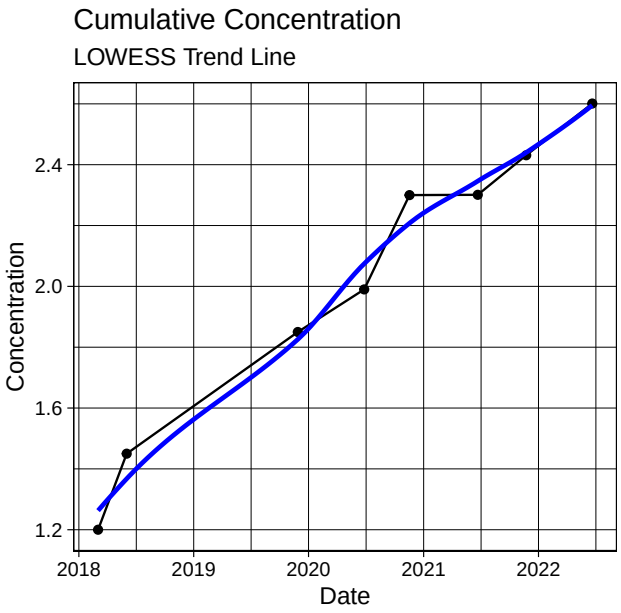




Kendall Trend Test Results Continuous	
n	8
z	-1.61
p	0.11
S	-14
varS	65.33
tau	-0.5
mean	0.33
sd	0.37
cov	1.15
results	NO CLEAR TREND

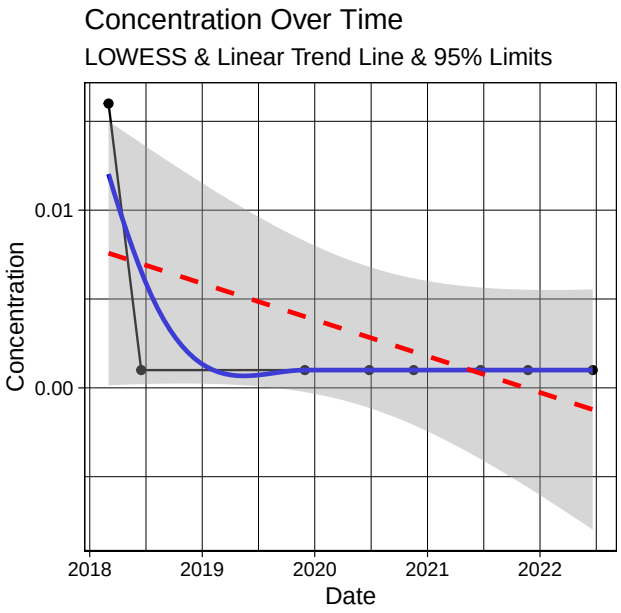
Report for ID : MW105 and Analyte : SumofPFOSandPFHxS

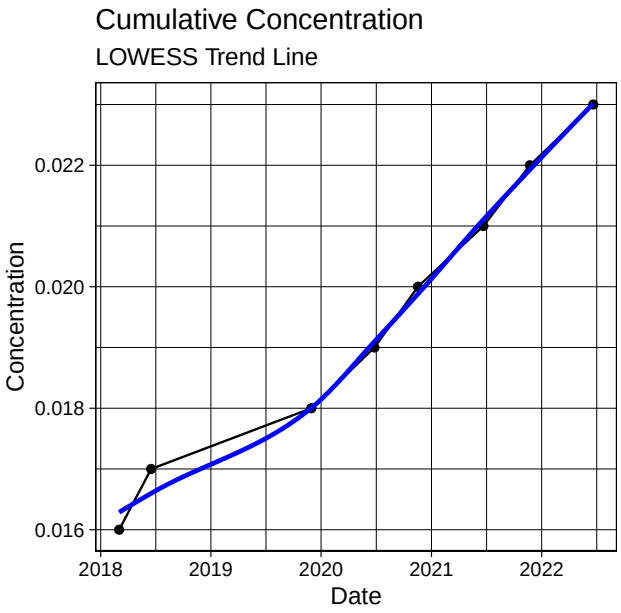




Kendall Trend Test Results Continuous	
n	8
z	-1.31
p	0.19
S	-7
varS	21
tau	-0.5
mean	0
sd	0.01
cov	1.84
results	NO CLEAR TREND

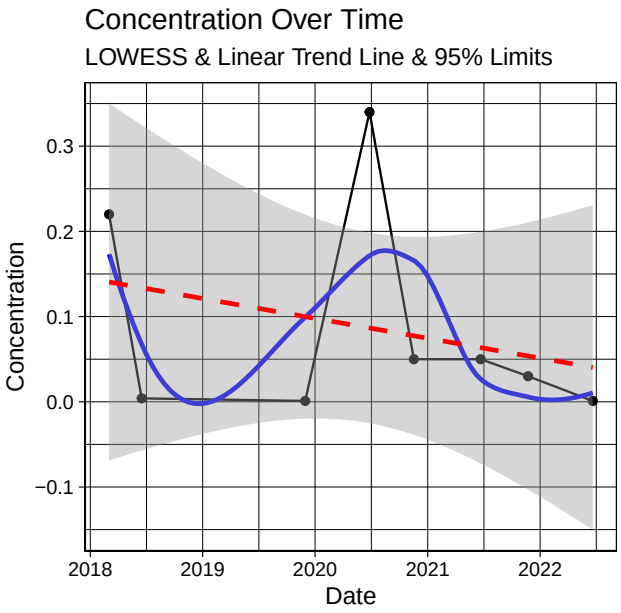
Report for ID : MW107 and Analyte : PFOA

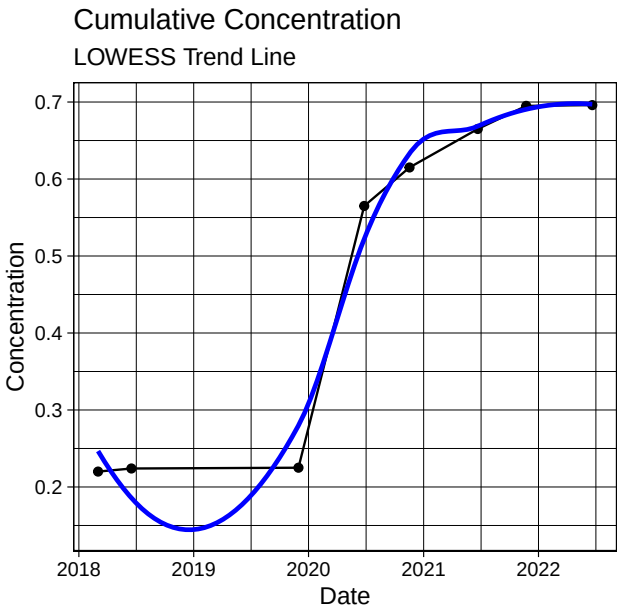




Kendall Trend Test Results Continuous	
n	8
z	-0.88
p	0.38
S	-8
varS	63.33
tau	-0.3
mean	0.09
sd	0.12
cov	1.44
results	NO CLEAR TREND

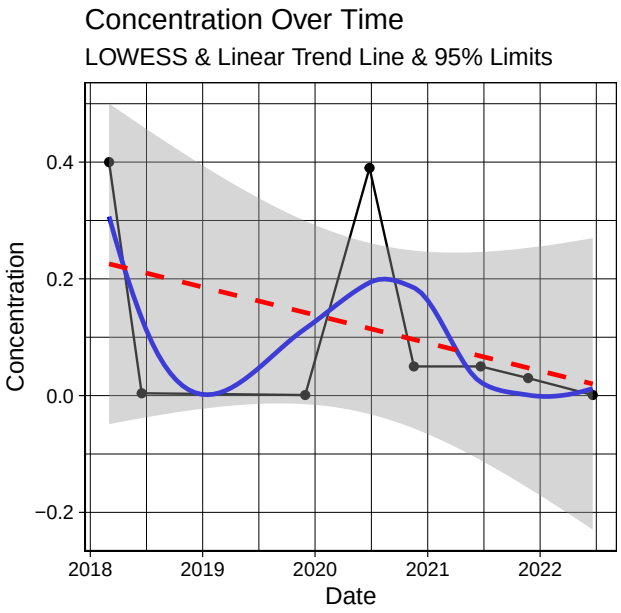
Report for ID : MW107 and Analyte : PFOS

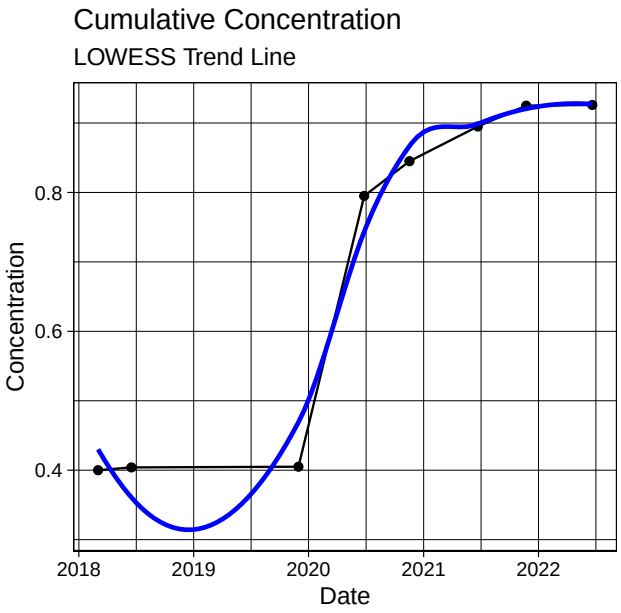




Kendall Trend Test Results Continuous	
n	8
z	-1.13
p	0.26
S	-10
varS	63.33
tau	-0.37
mean	0.12
sd	0.17
cov	1.5
results	NO CLEAR TREND

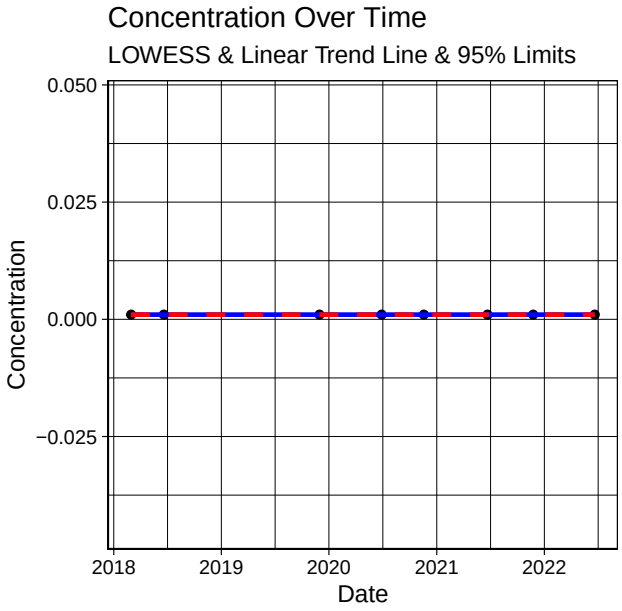
Report for ID : MW107 and Analyte : SumofPFOSandPFHxS

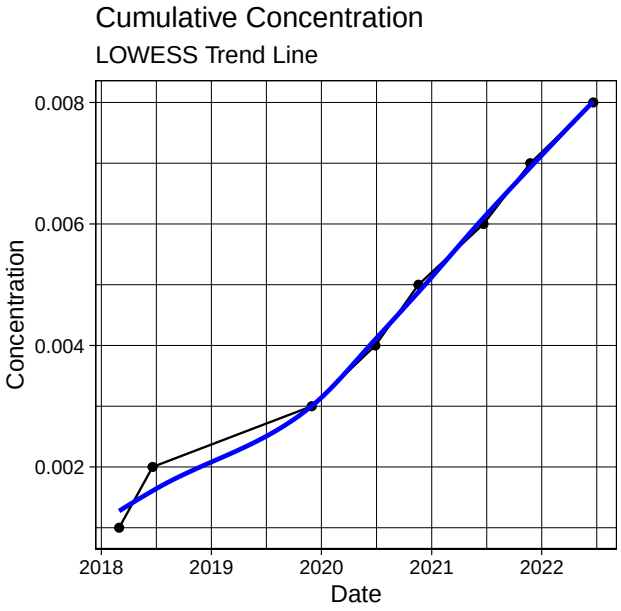




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

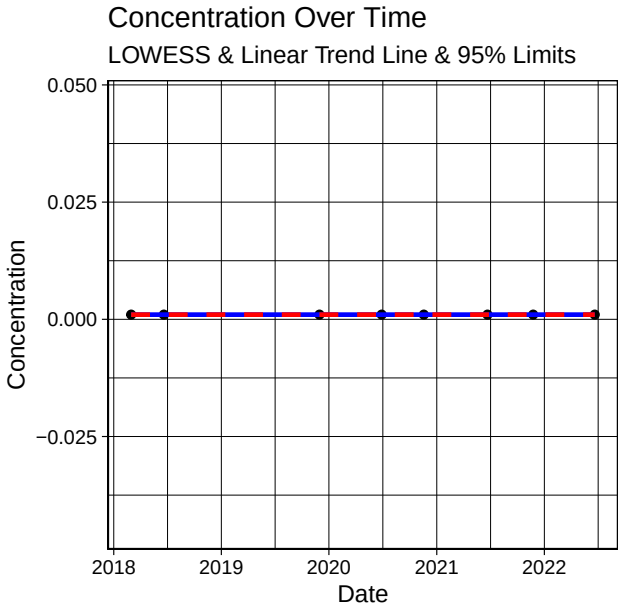
Report for ID : MW109 and Analyte : PFOA

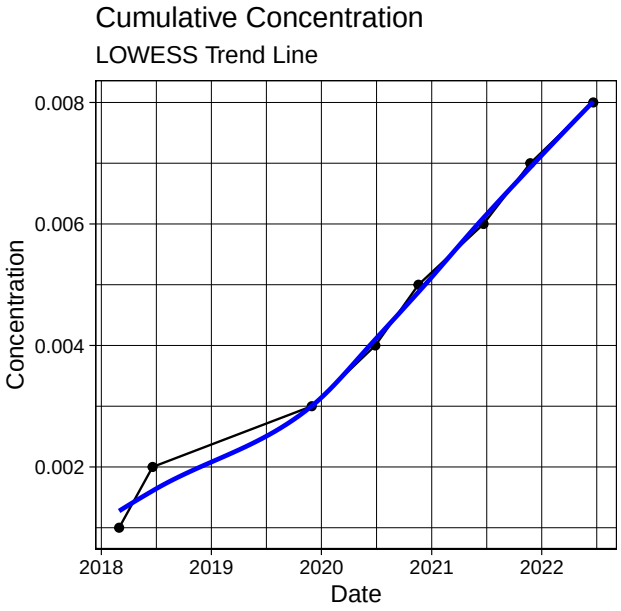




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

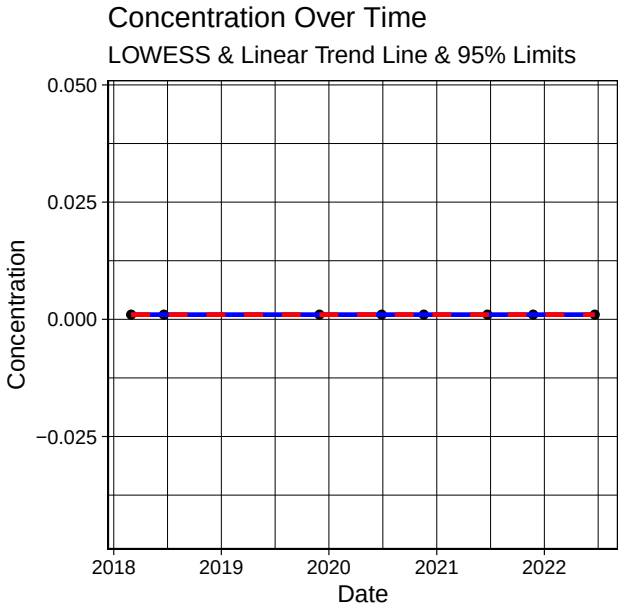
Report for ID : MW109 and Analyte : PFOS

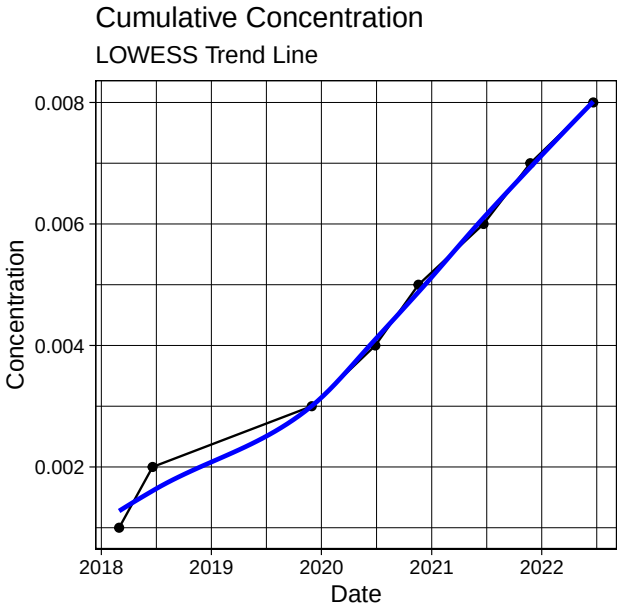




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

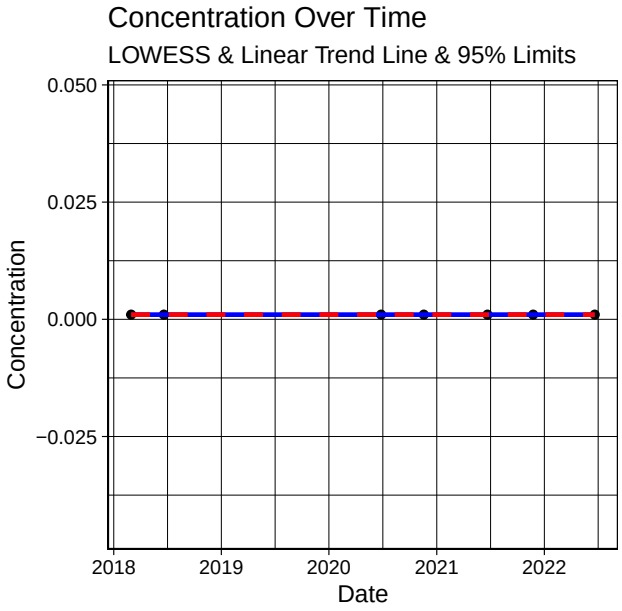
Report for ID : MW109 and Analyte : SumofPFOSandPFHxS

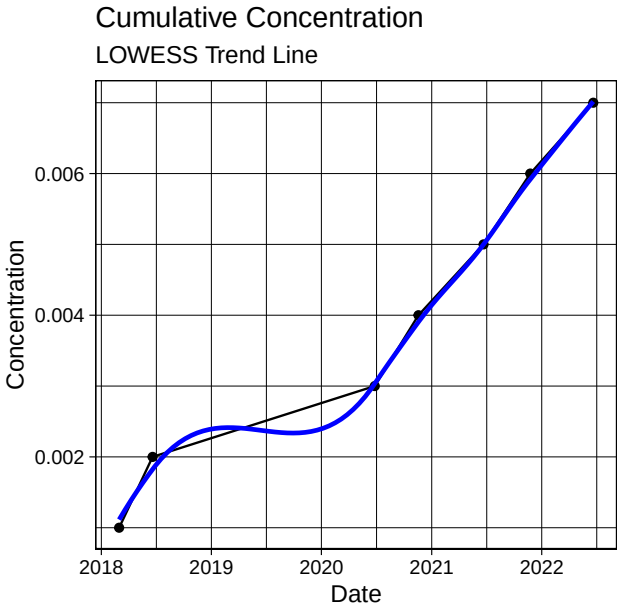




Kendall Trend Test Results Continuous	
n	7
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

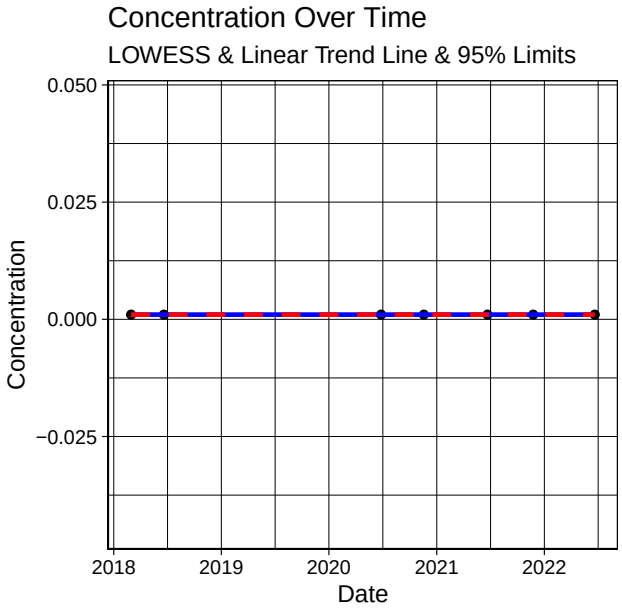
Report for ID : MW110 and Analyte : PFOA

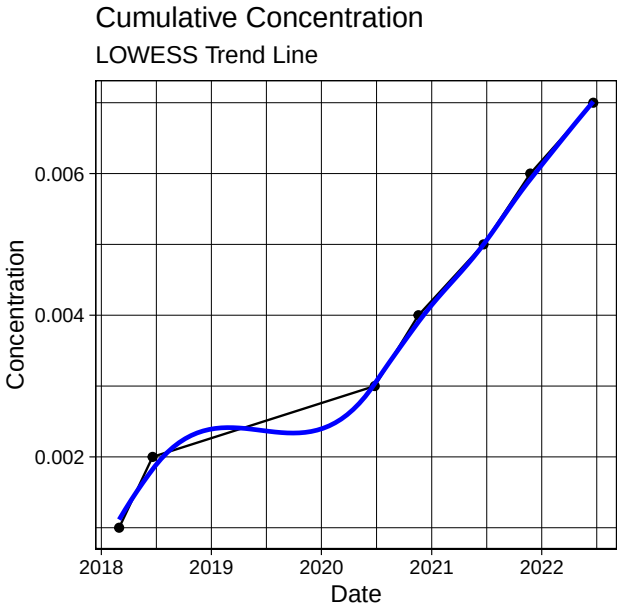




Kendall Trend Test Results Continuous	
n	7
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

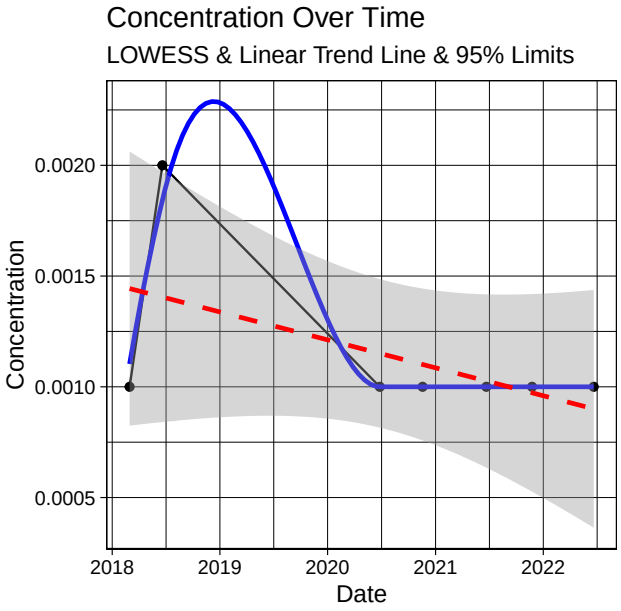
Report for ID : MW110 and Analyte : PFOS

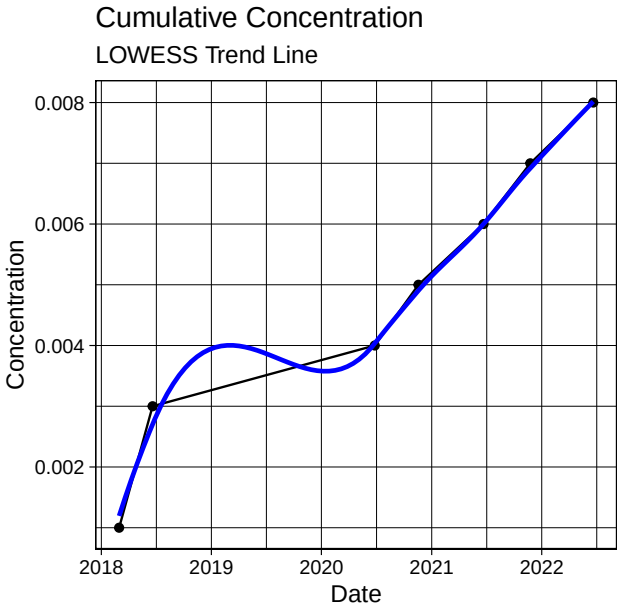




Kendall Trend Test Results Continuous	
n	7
z	-0.75
p	0.45
S	-4
varS	16
tau	-0.36
mean	0
sd	0
cov	0.33
results	STABLE

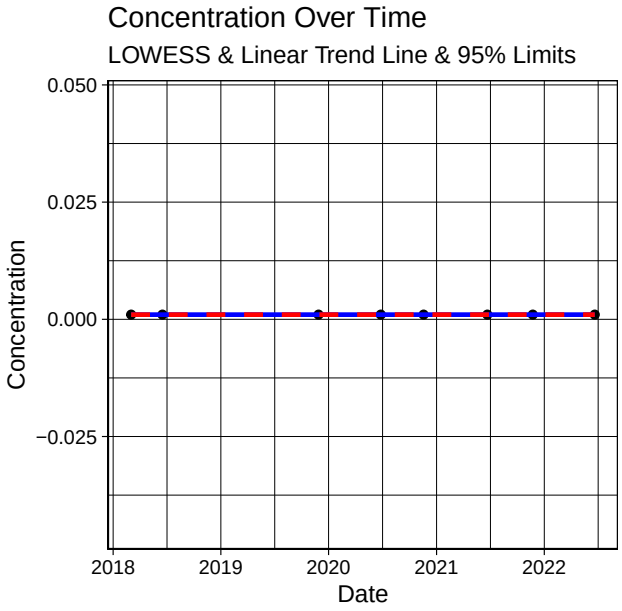
Report for ID : MW110 and Analyte : SumofPFOSandPFHxS

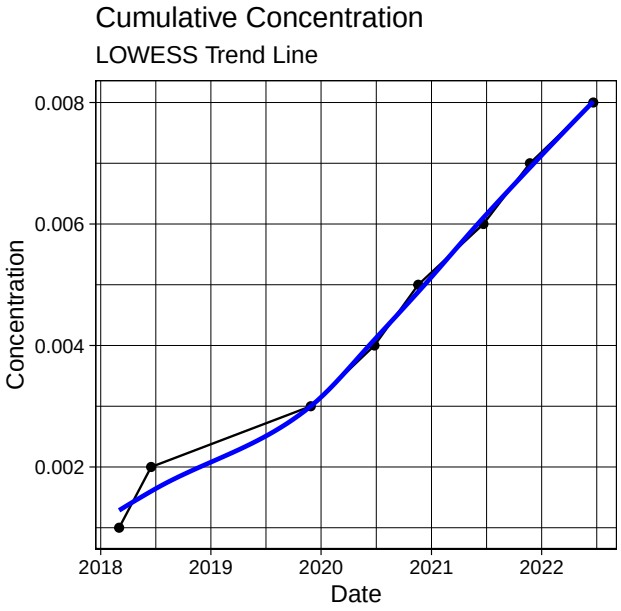




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

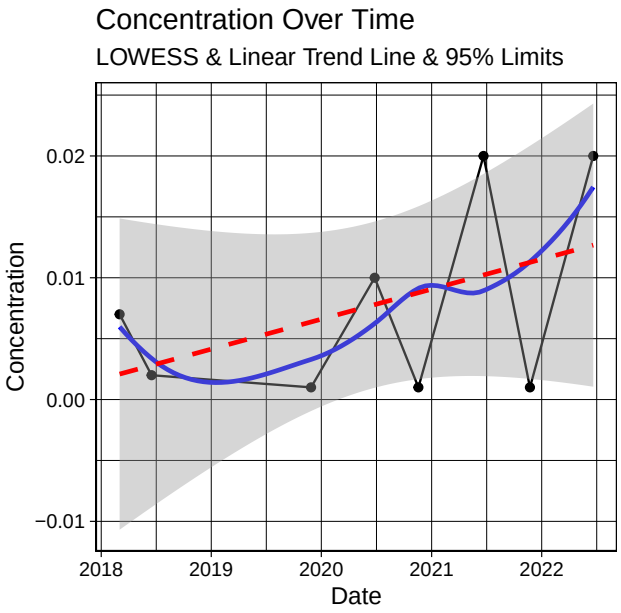
Report for ID : MW111 and Analyte : PFOA

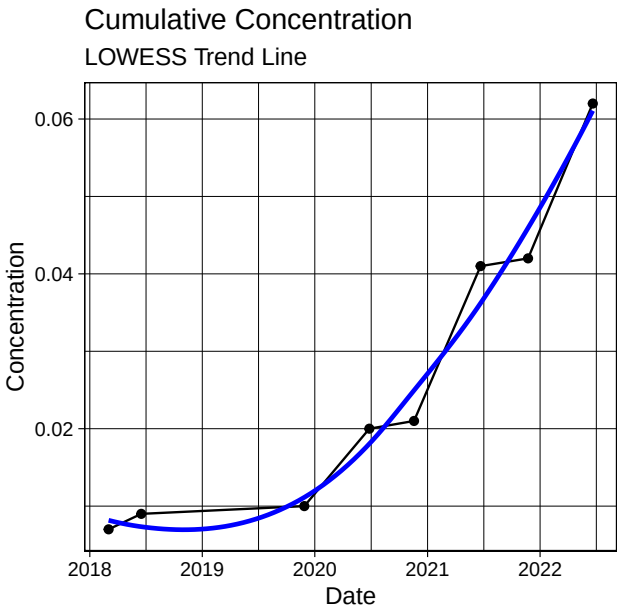




Kendall Trend Test Results Continuous	
n	8
z	0.39
p	0.7
S	4
varS	60.67
tau	0.15
mean	0.01
sd	0.01
cov	1.06
results	NO CLEAR TREND

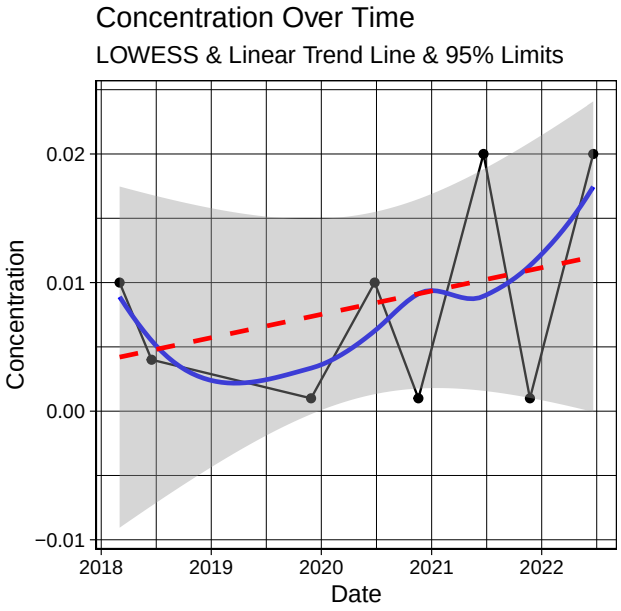
Report for ID : MW111 and Analyte : PFOS

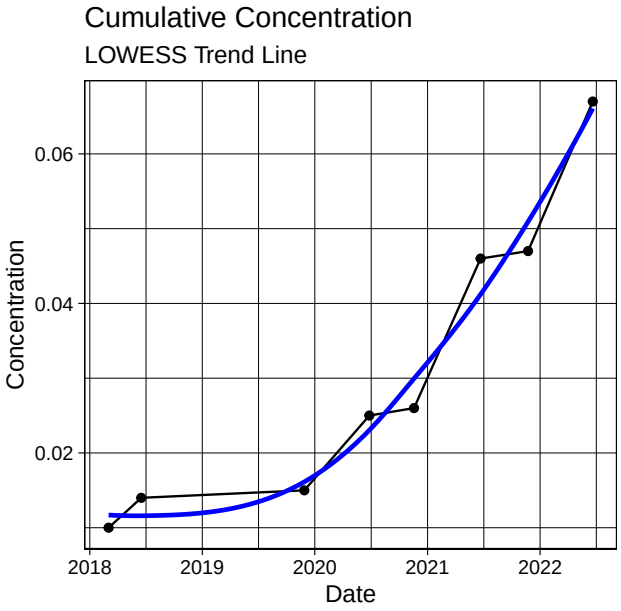




Kendall Trend Test Results Continuous	
n	8
z	0.26
p	0.8
S	3
varS	59.67
tau	0.12
mean	0.01
sd	0.01
cov	0.97
results	NO CLEAR TREND

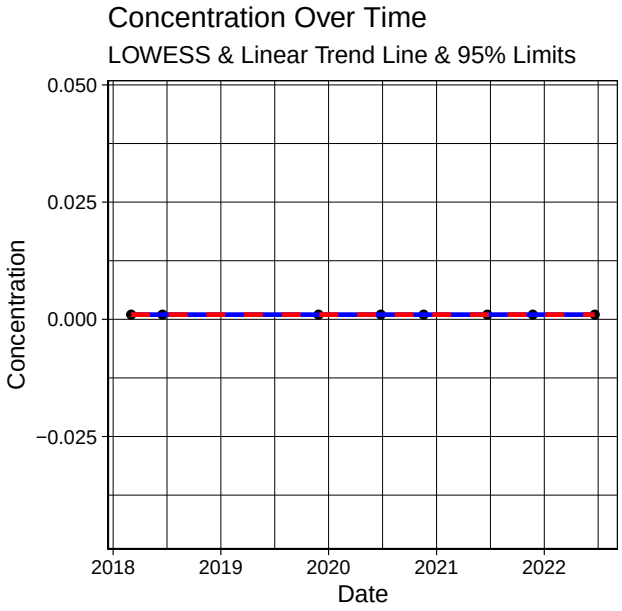
Report for ID : MW111 and Analyte : SumofPFOSandPFHxS

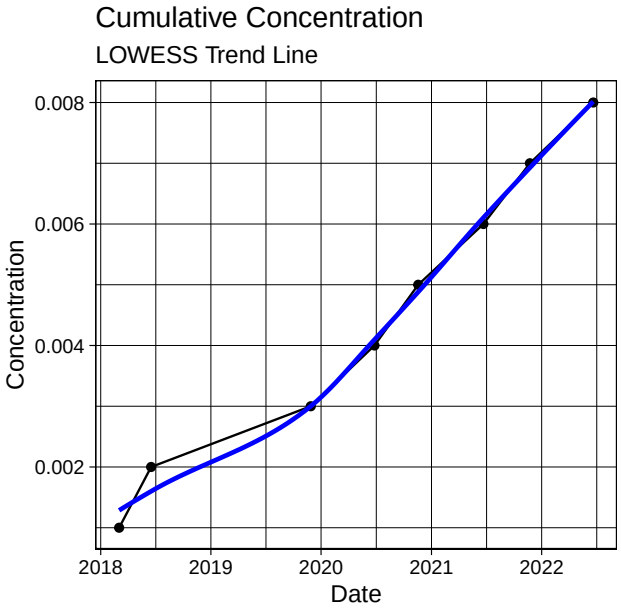




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

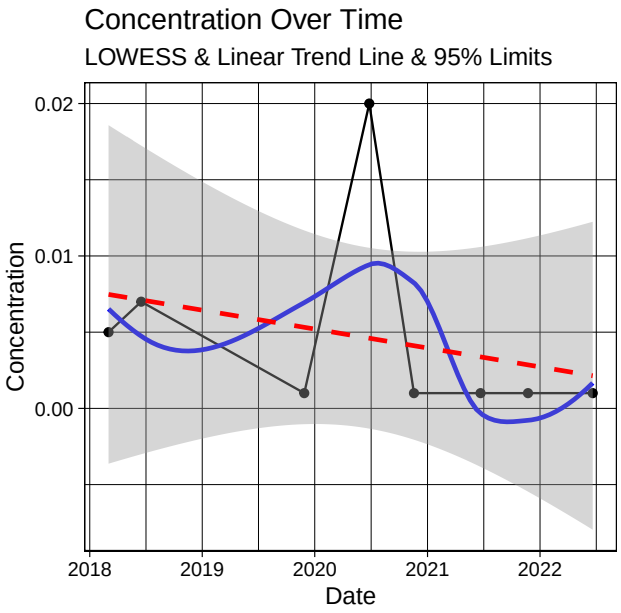
Report for ID : MW112 and Analyte : PFOA

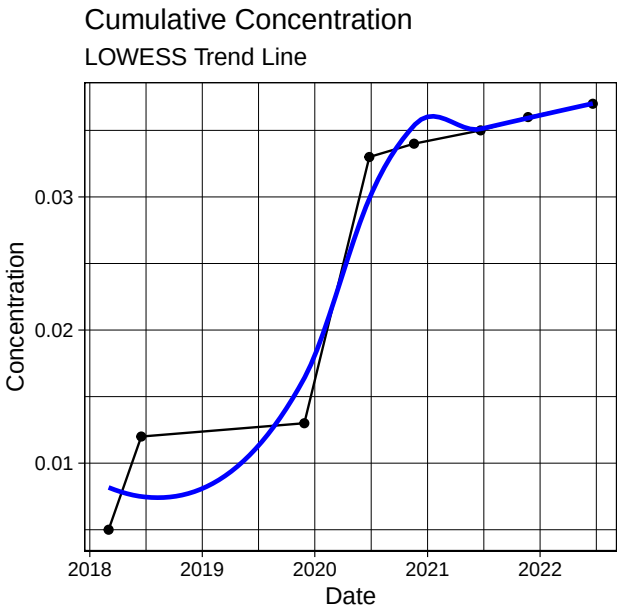




Kendall Trend Test Results Continuous	
n	8
z	-1.29
p	0.2
S	-10
varS	48.67
tau	-0.45
mean	0
sd	0.01
cov	1.43
results	NO CLEAR TREND

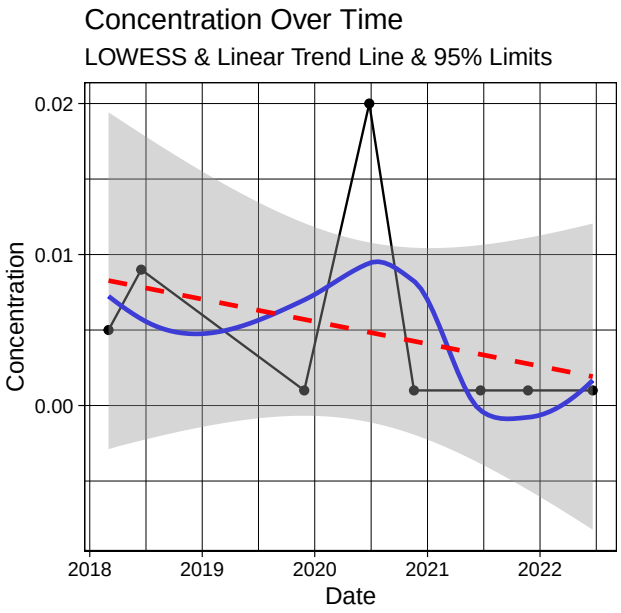
Report for ID : MW112 and Analyte : PFOS

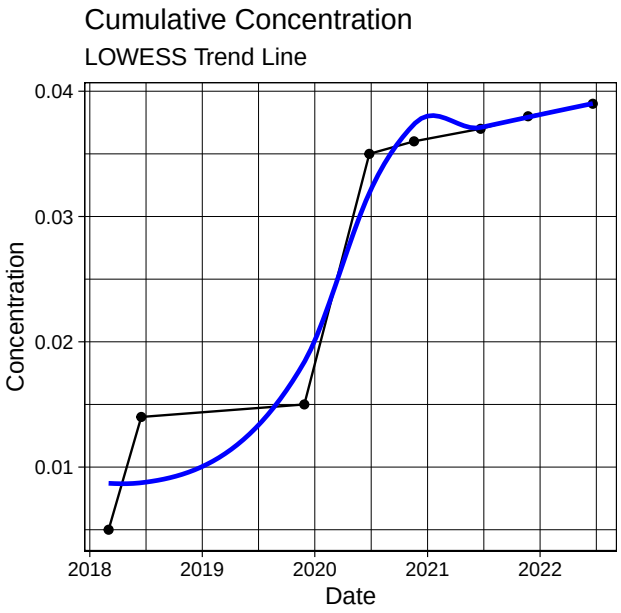




Kendall Trend Test Results Continuous	
n	8
z	-1.29
p	0.2
S	-10
varS	48.67
tau	-0.45
mean	0
sd	0.01
cov	1.39
results	NO CLEAR TREND

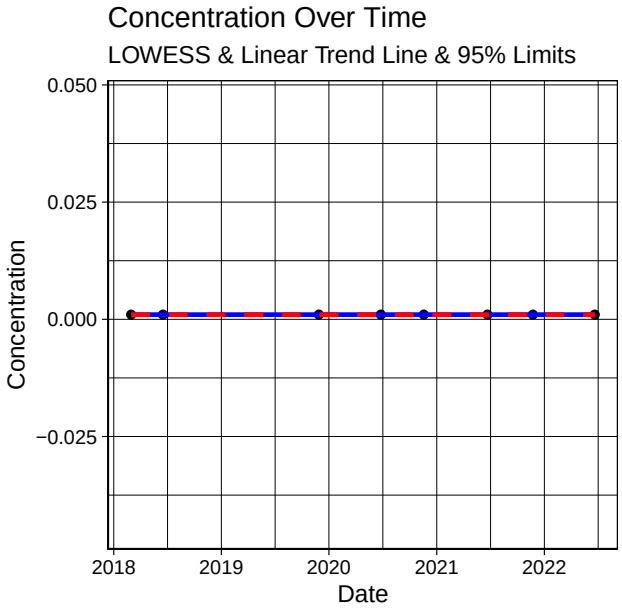
Report for ID : MW112 and Analyte : SumofPFOSandPFHxS

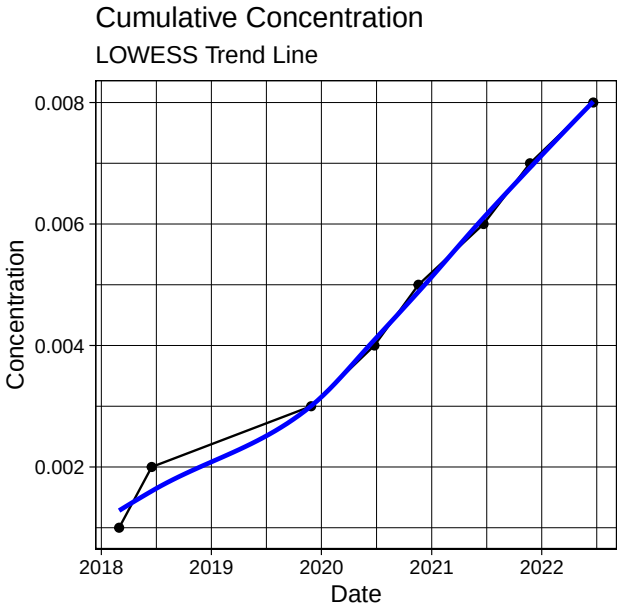




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

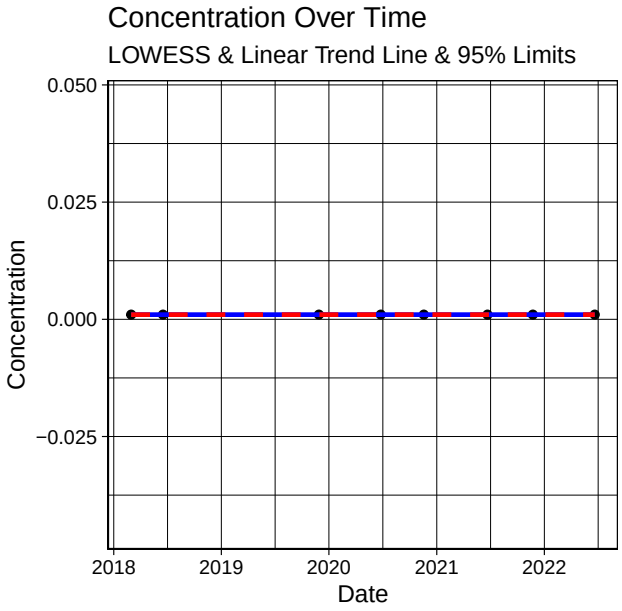
Report for ID : MW113 and Analyte : PFOA

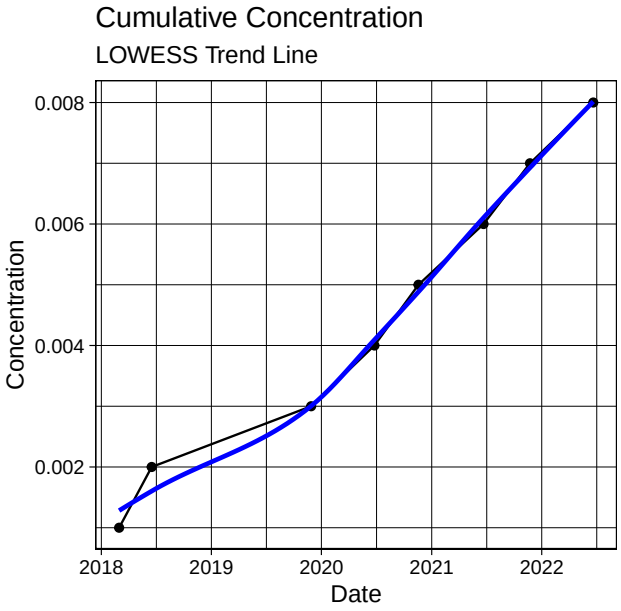




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

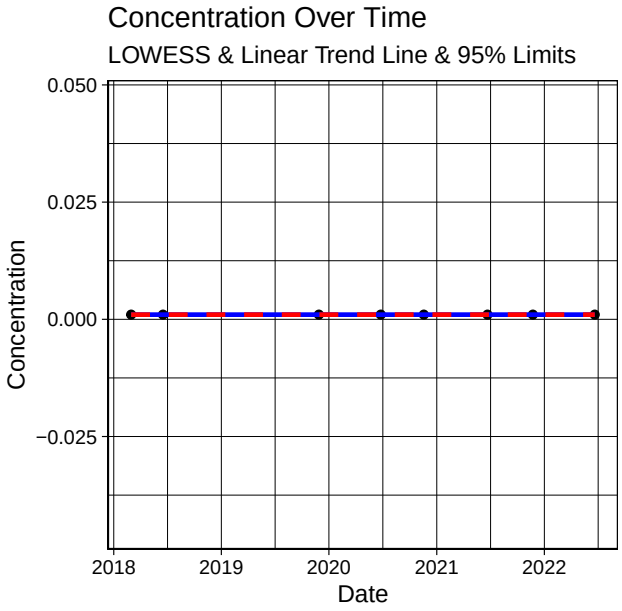
Report for ID : MW113 and Analyte : PFOS

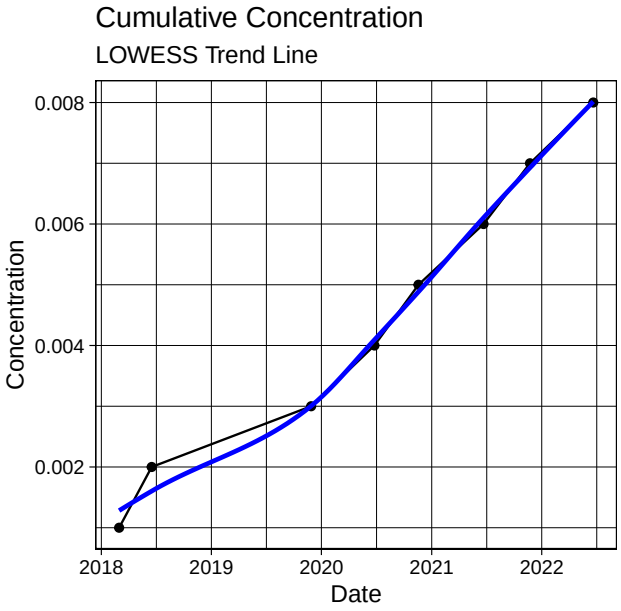




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

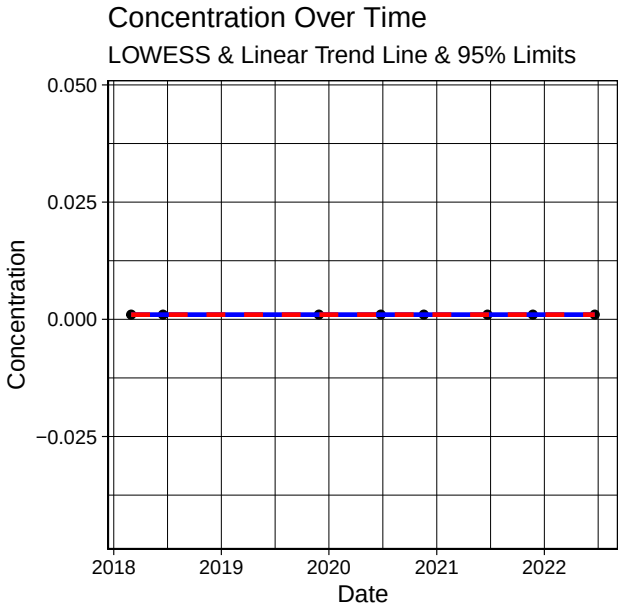
Report for ID : MW113 and Analyte : SumofPFOSandPFHxS

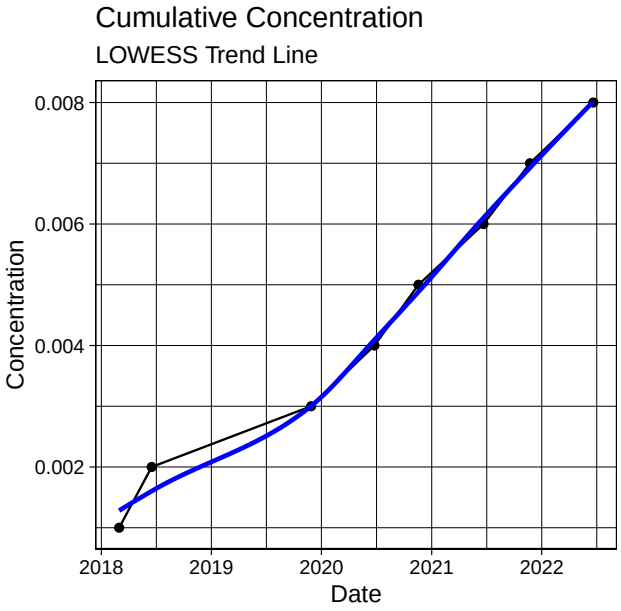




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

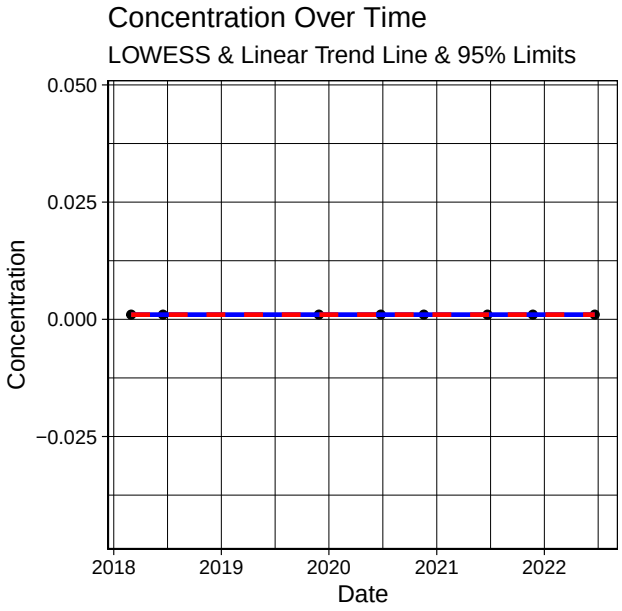
Report for ID : MW114 and Analyte : PFOA

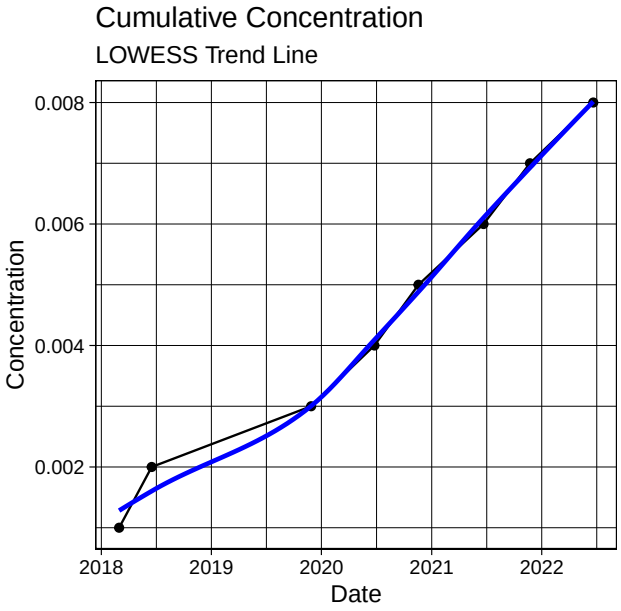




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

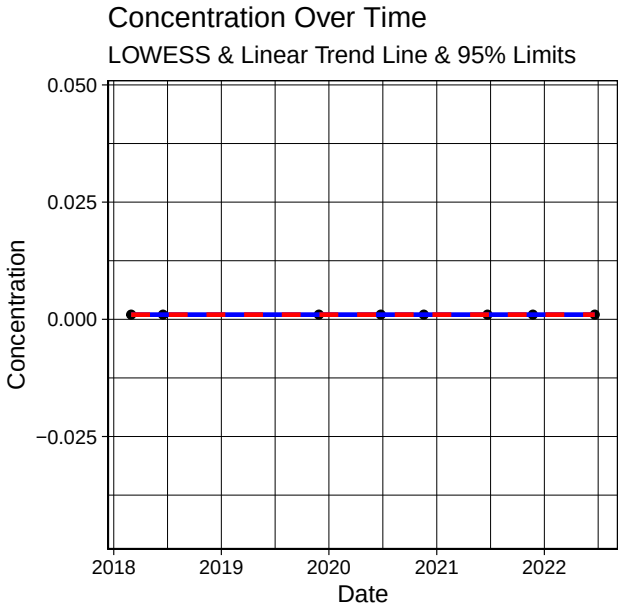
Report for ID : MW114 and Analyte : PFOS

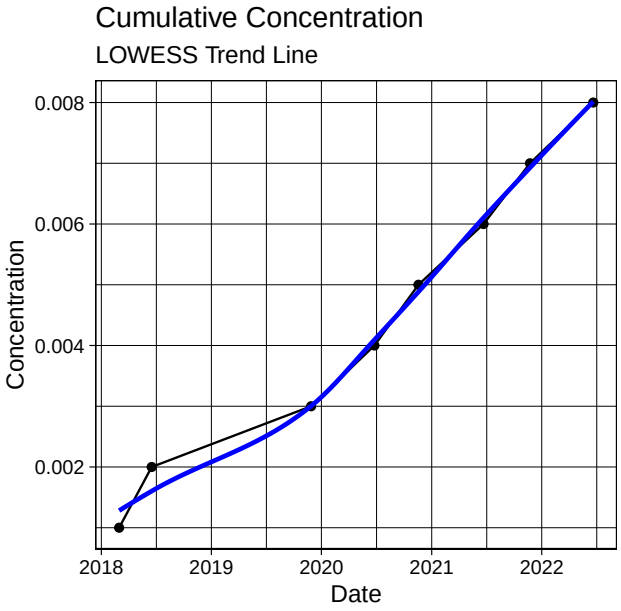




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

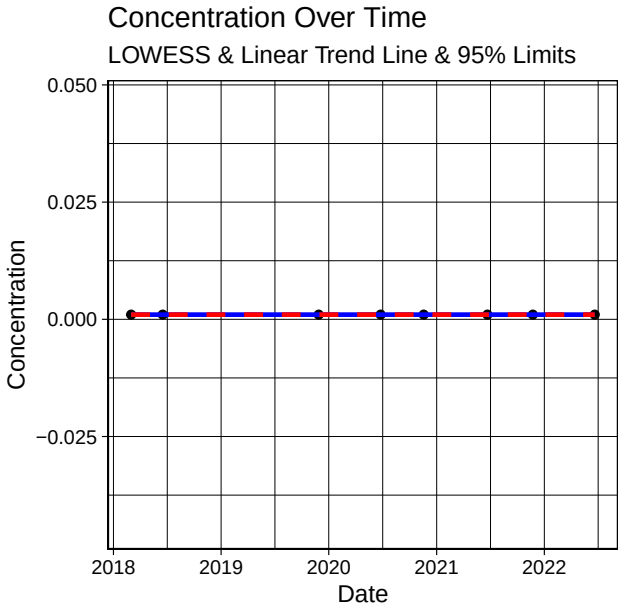
Report for ID : MW114 and Analyte : SumofPFOSandPFHxS

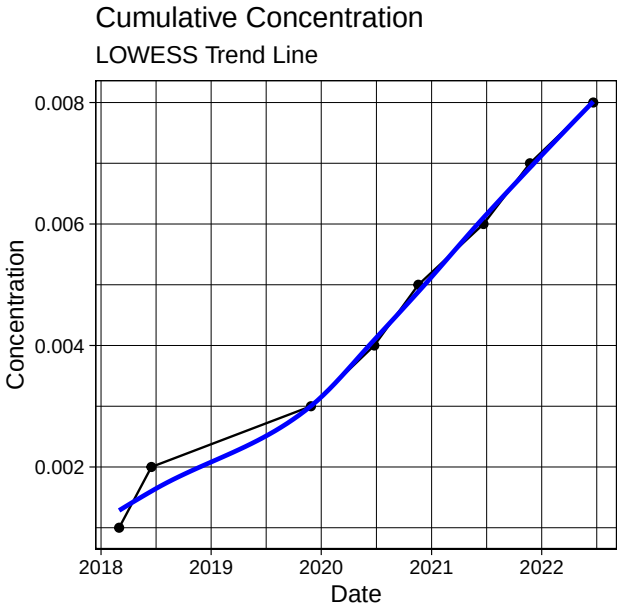




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

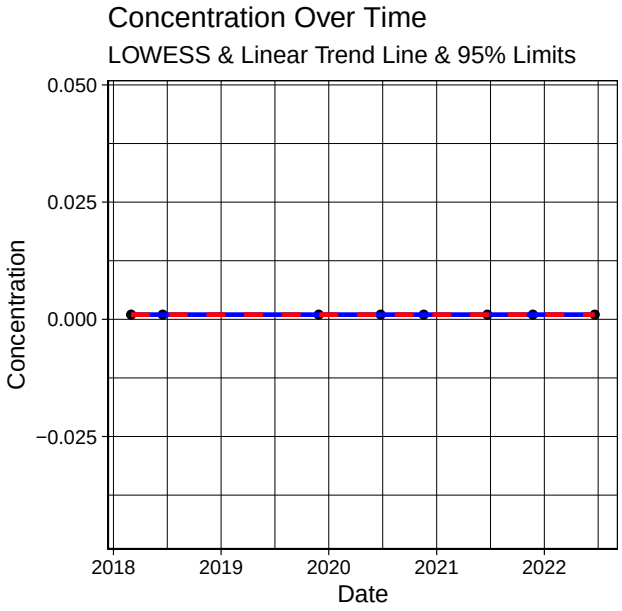
Report for ID : MW115 and Analyte : PFOA

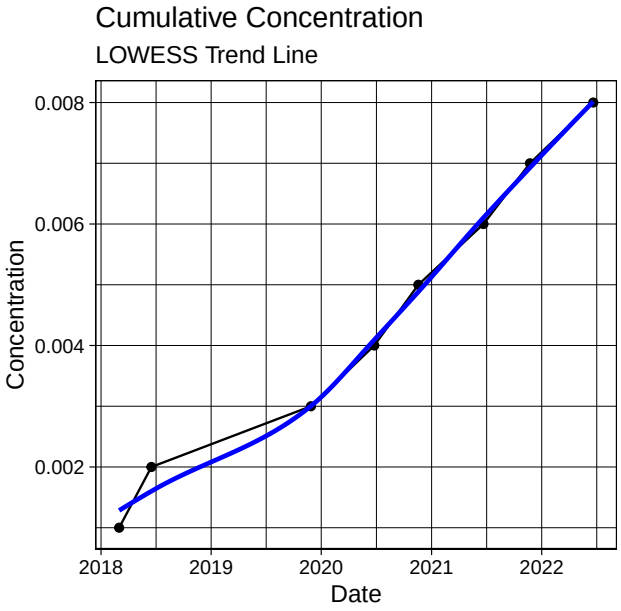




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

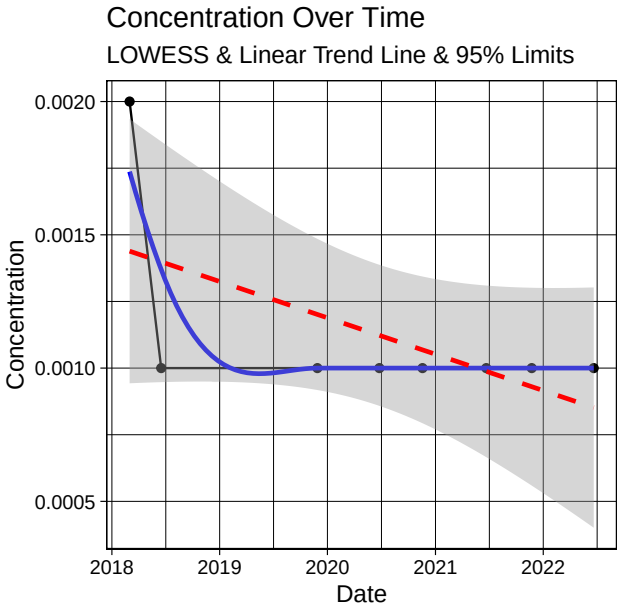
Report for ID : MW115 and Analyte : PFOS

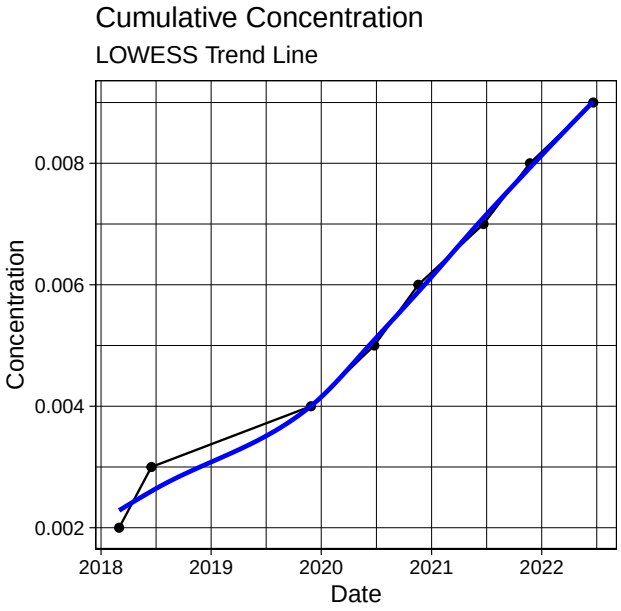




Kendall Trend Test Results Continuous	
n	8
z	-1.31
p	0.19
S	-7
varS	21
tau	-0.5
mean	0
sd	0
cov	0.31
results	STABLE

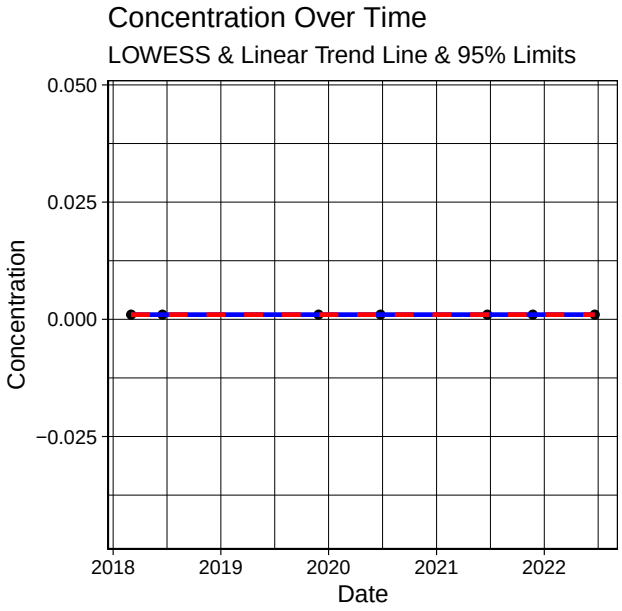
Report for ID : MW115 and Analyte : SumofPFOSandPFHxS

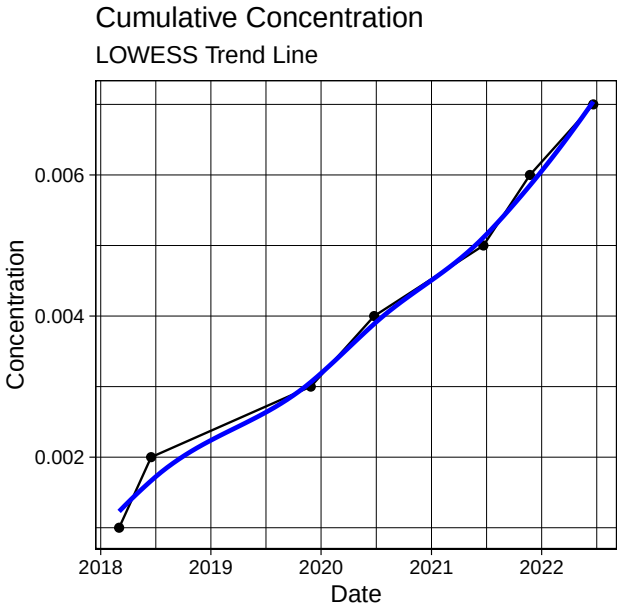




Kendall Trend Test Results Continuous	
n	7
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

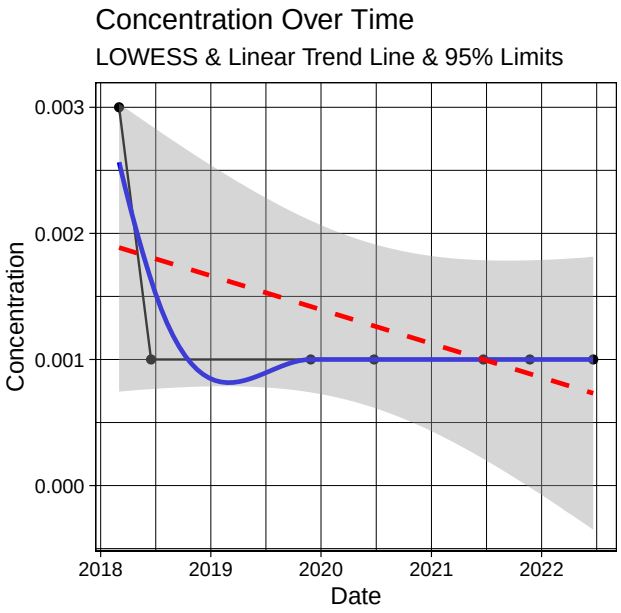
Report for ID : MW116 and Analyte : PFOA

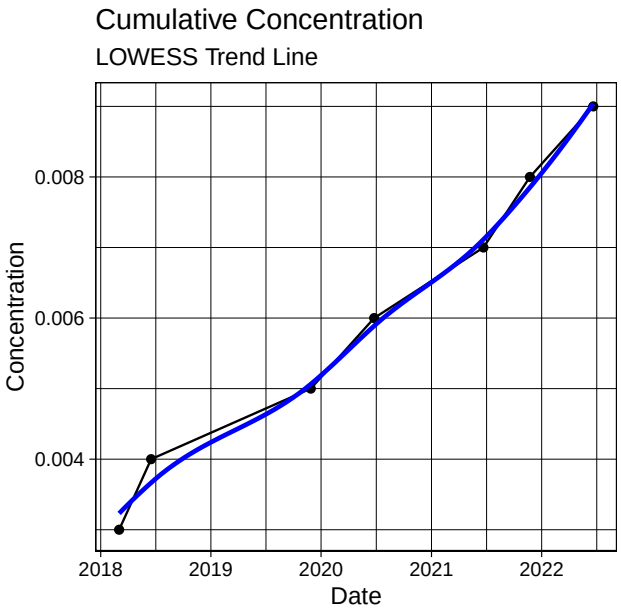




Kendall Trend Test Results Continuous	
n	7
z	-1.25
p	0.21
S	-6
varS	16
tau	-0.53
mean	0
sd	0
cov	0.59
results	STABLE

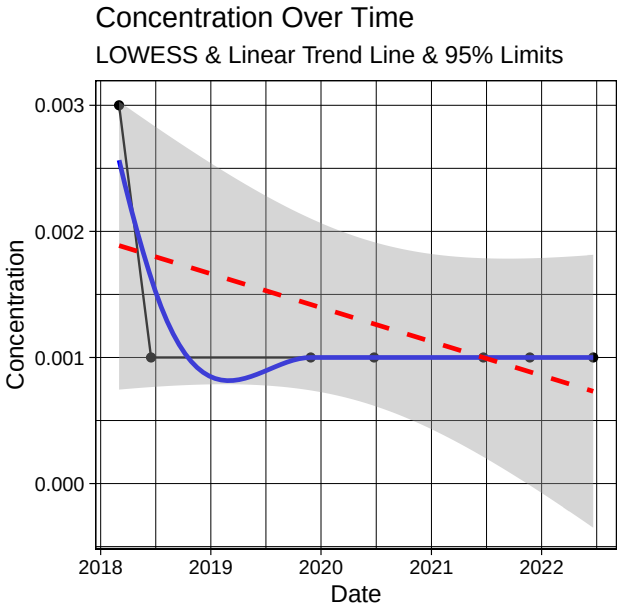
Report for ID : MW116 and Analyte : PFOS

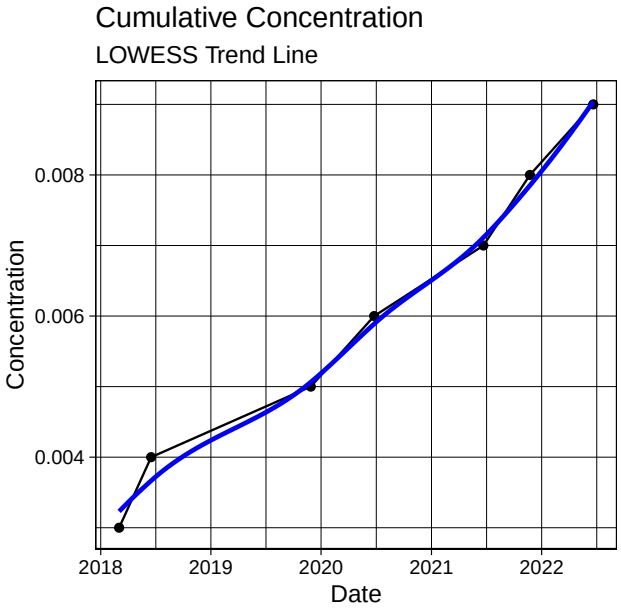




Kendall Trend Test Results Continuous	
n	7
z	-1.25
p	0.21
S	-6
varS	16
tau	-0.53
mean	0
sd	0
cov	0.59
results	STABLE

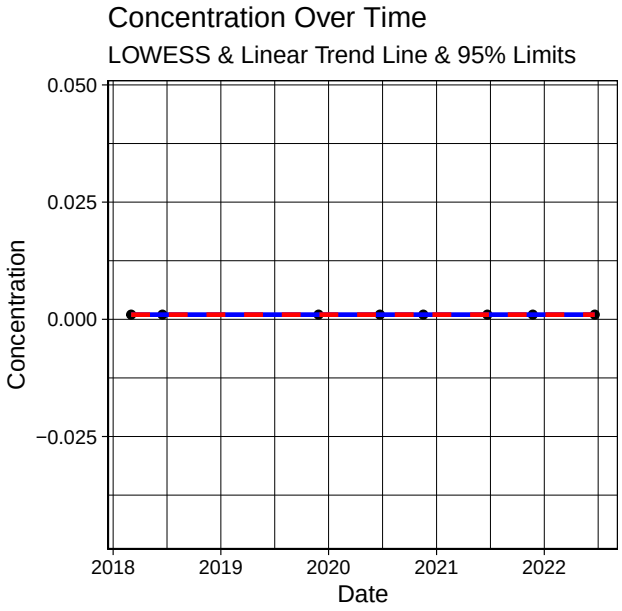
Report for ID : MW116 and Analyte : SumofPFOSandPFHxS

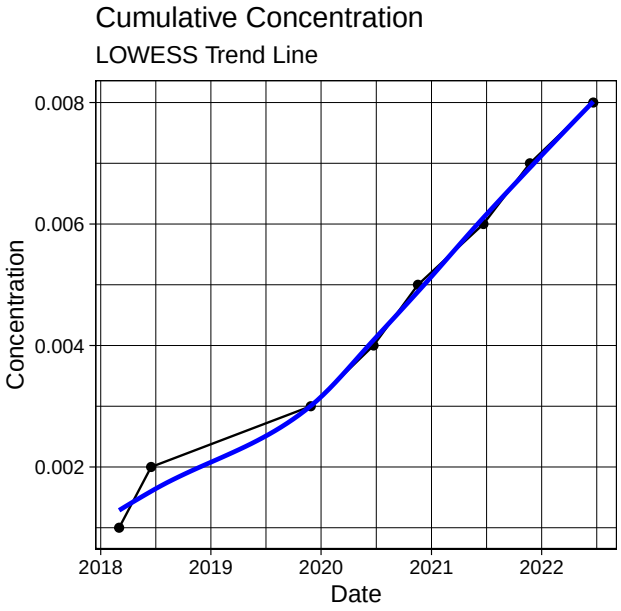




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

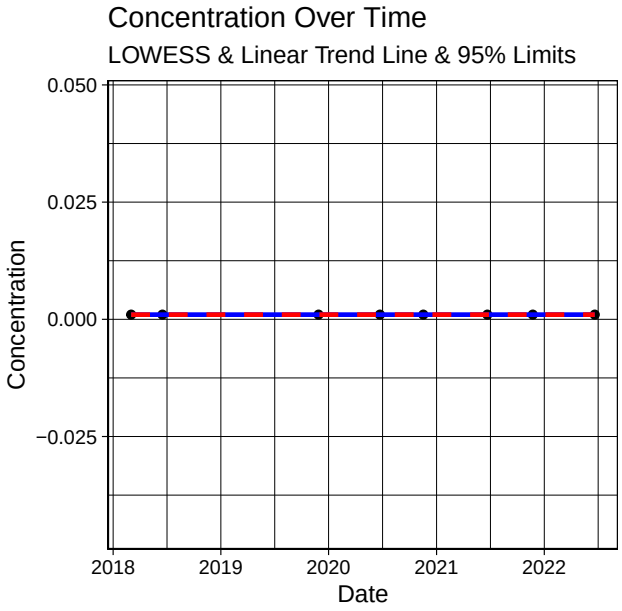
Report for ID : MW117 and Analyte : PFOA

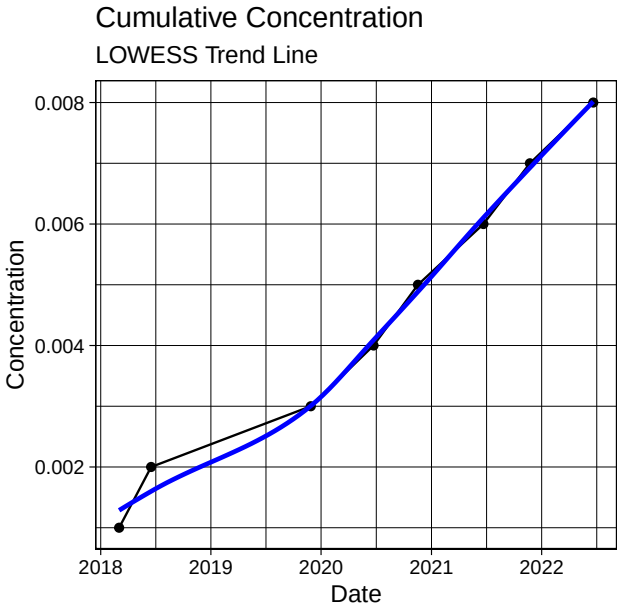




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

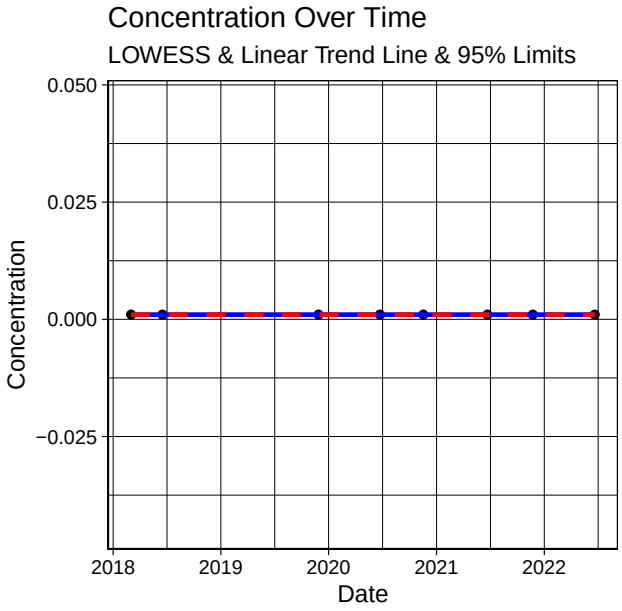
Report for ID : MW117 and Analyte : PFOS

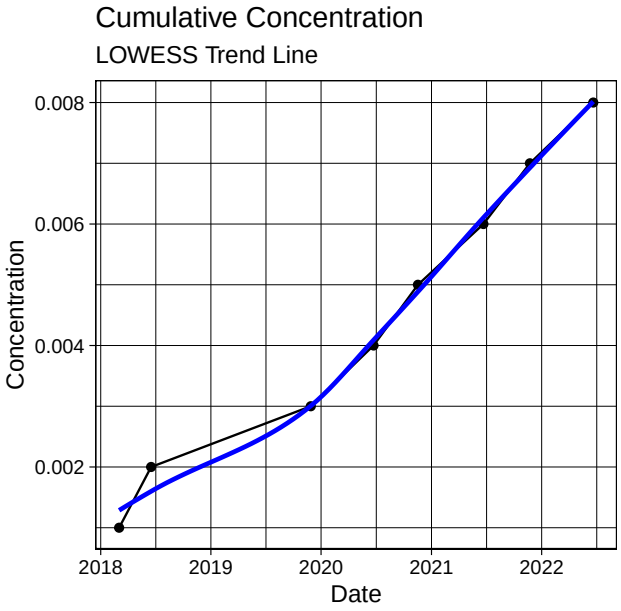




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

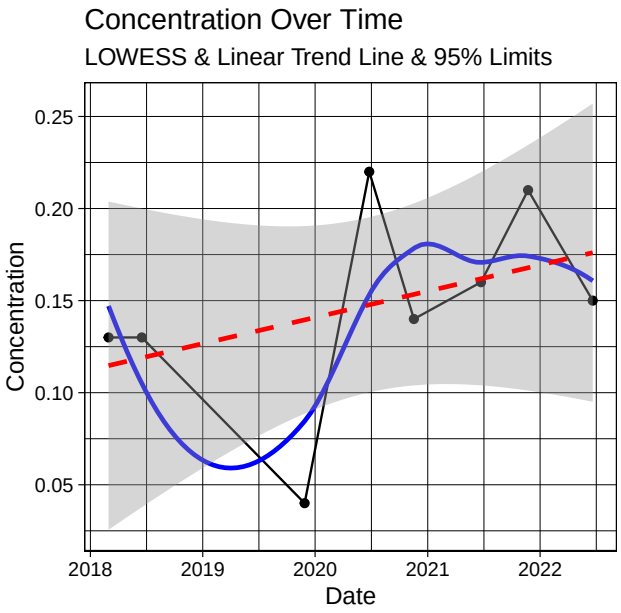
Report for ID : MW117 and Analyte : SumofPFOSandPFHxS

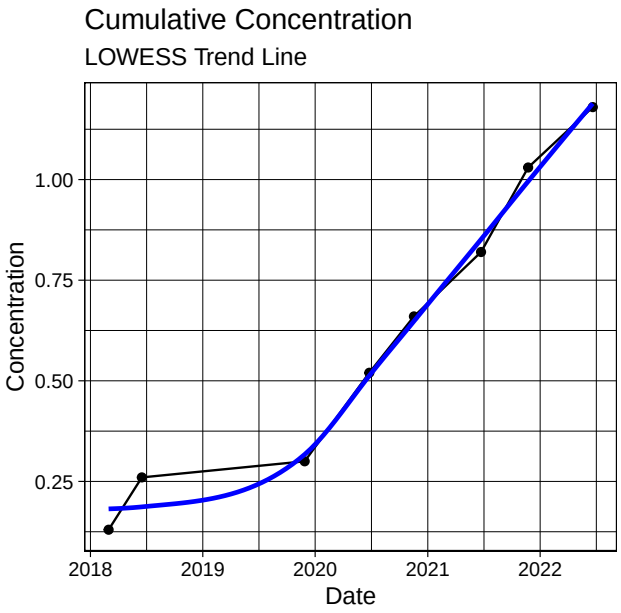




Kendall Trend Test Results Continuous	
n	8
z	1.25
p	0.21
S	11
varS	64.33
tau	0.4
mean	0.15
sd	0.06
cov	0.38
results	NO CLEAR TREND

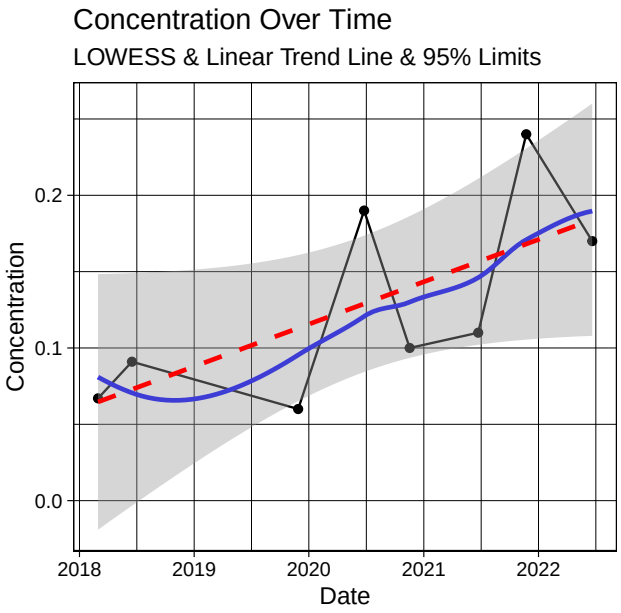
Report for ID : MW119 and Analyte : PFOA

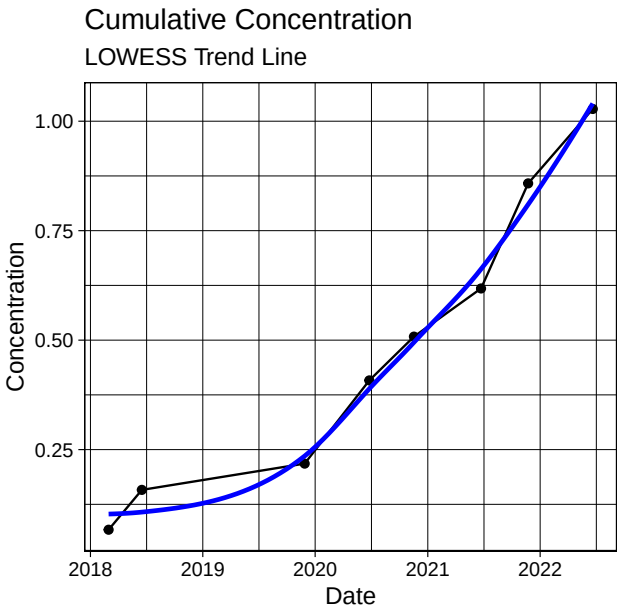




Kendall Trend Test Results Continuous	
n	8
z	1.86
p	0.06
S	16
varS	65.33
tau	0.57
mean	0.13
sd	0.06
cov	0.5
results	POSSIBLY INCREASING

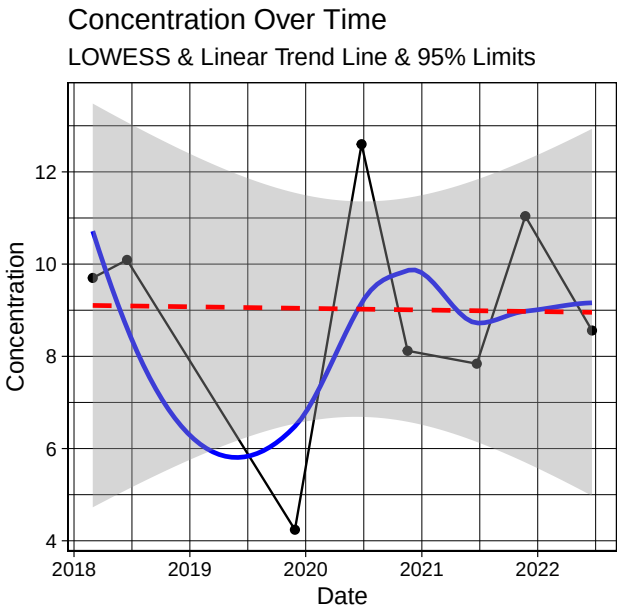
Report for ID : MW119 and Analyte : PFOS

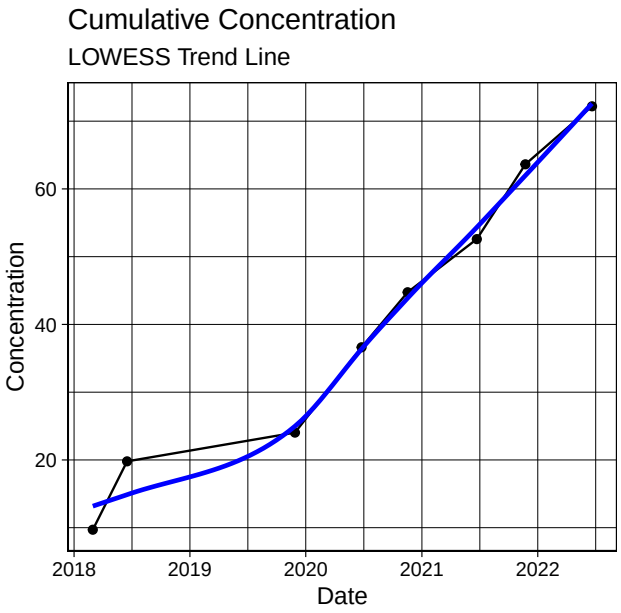




Kendall Trend Test Results Continuous	
n	8
z	0
p	1
S	0
varS	65.33
tau	0
mean	9.02
sd	2.5
cov	0.28
results	STABLE

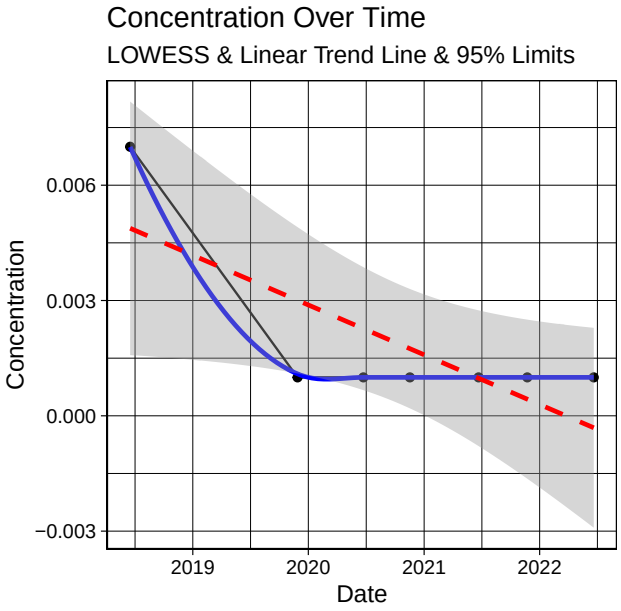
Report for ID : MW119 and Analyte : SumofPFOSandPFHxS

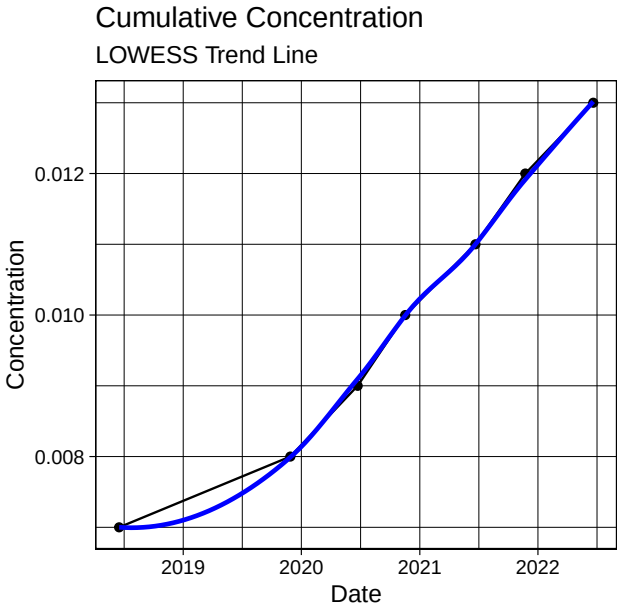




Kendall Trend Test Results Continuous	
n	7
z	-1.25
p	0.21
S	-6
varS	16
tau	-0.53
mean	0
sd	0
cov	1.22
results	NO CLEAR TREND

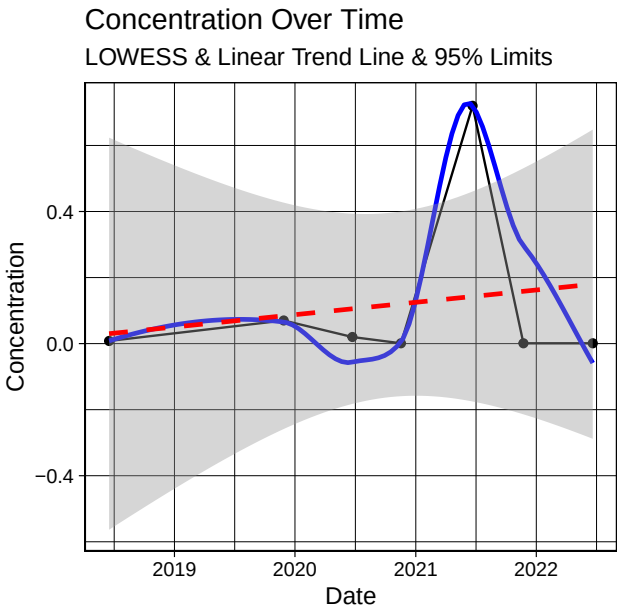
Report for ID : MW129 and Analyte : PFOA

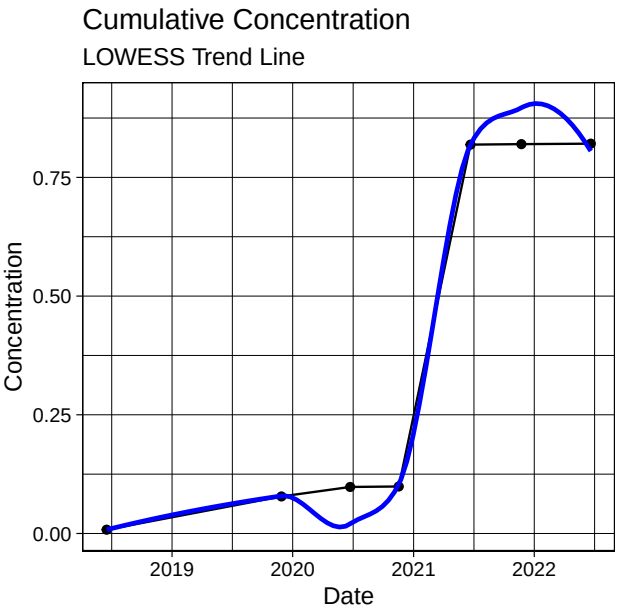




Kendall Trend Test Results Continuous	
n	7
z	-0.78
p	0.43
S	-6
varS	40.67
tau	-0.31
mean	0.12
sd	0.27
cov	2.28
results	NO CLEAR TREND

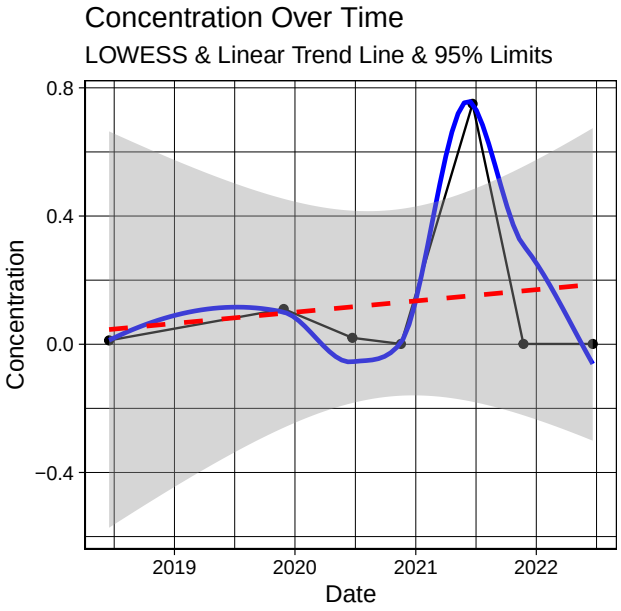
Report for ID : MW129 and Analyte : PFOS

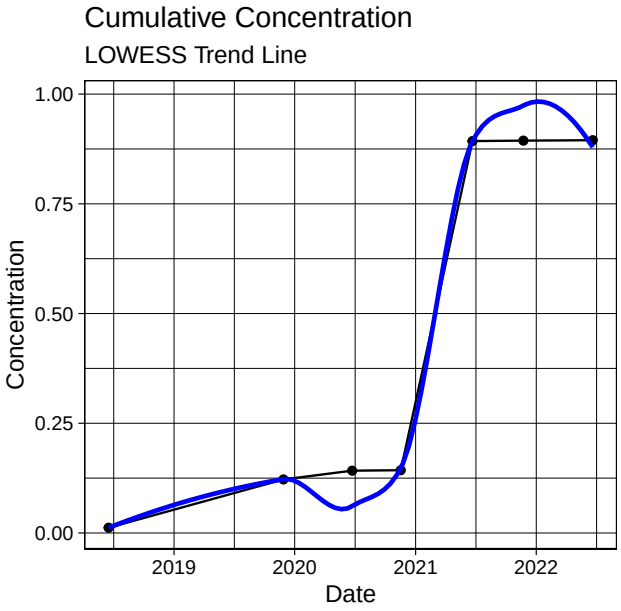




Kendall Trend Test Results Continuous	
n	7
z	-0.78
p	0.43
S	-6
varS	40.67
tau	-0.31
mean	0.13
sd	0.28
cov	2.17
results	NO CLEAR TREND

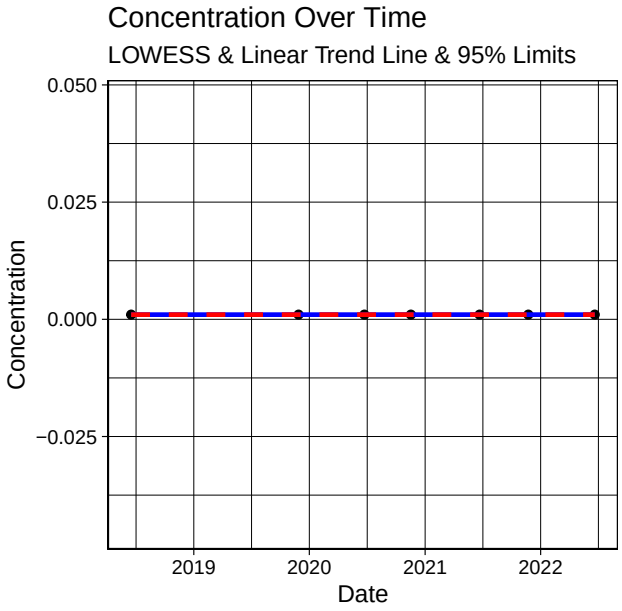
Report for ID : MW129 and Analyte : SumofPFOSandPFHxS

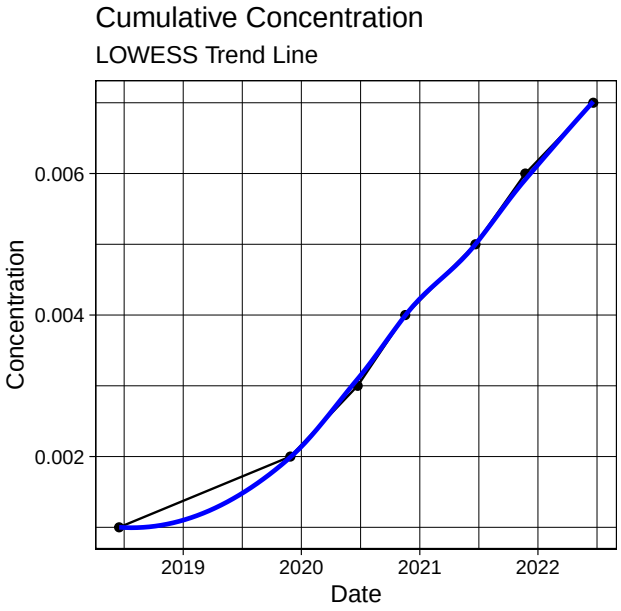




Kendall Trend Test Results Continuous	
n	7
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

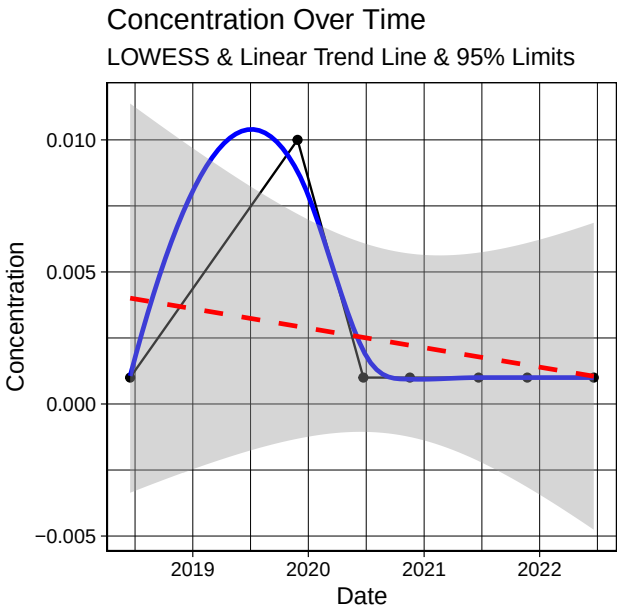
Report for ID : MW130 and Analyte : PFOA

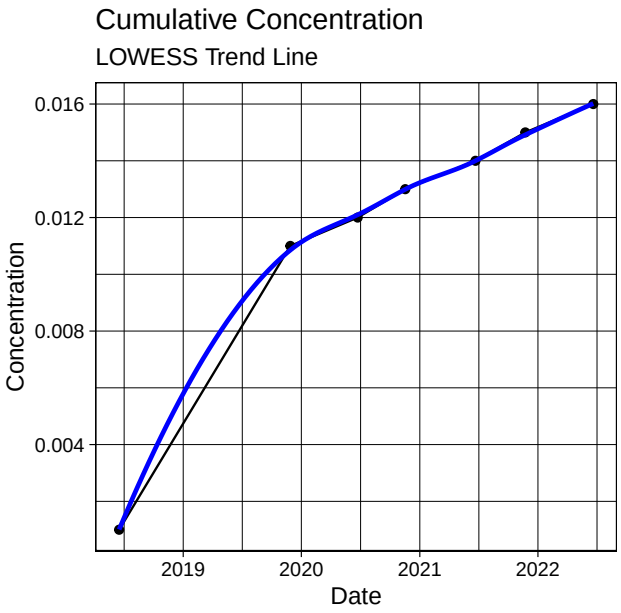




Kendall Trend Test Results Continuous	
n	7
z	-0.75
p	0.45
S	-4
varS	16
tau	-0.36
mean	0
sd	0
cov	1.49
results	NO CLEAR TREND

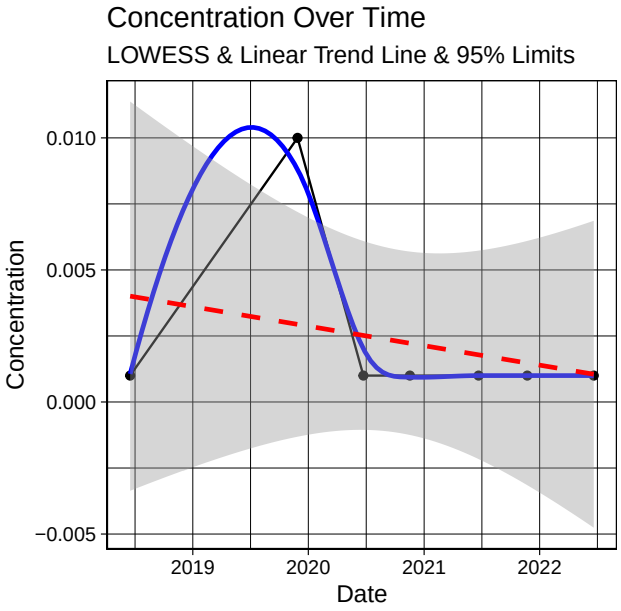
Report for ID : MW130 and Analyte : PFOS

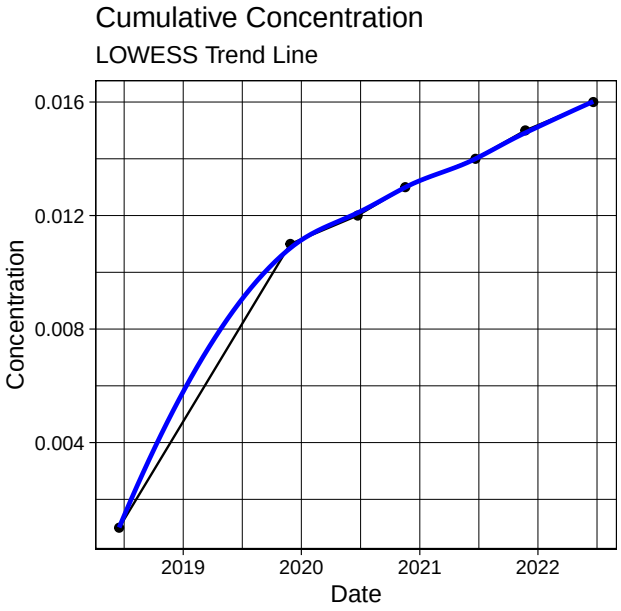




Kendall Trend Test Results Continuous	
n	7
z	-0.75
p	0.45
S	-4
varS	16
tau	-0.36
mean	0
sd	0
cov	1.49
results	NO CLEAR TREND

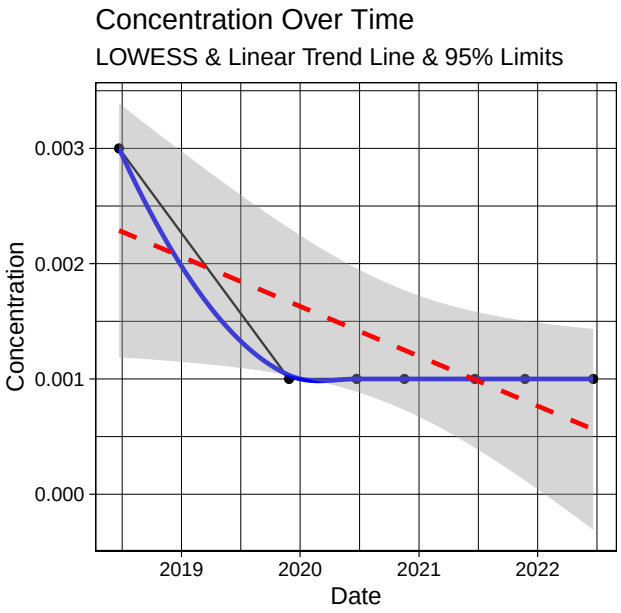
Report for ID : MW130 and Analyte : SumofPFOSandPFHxS

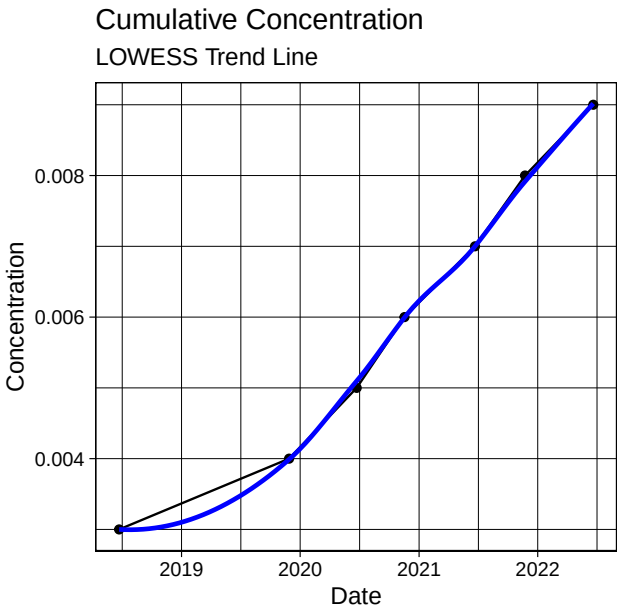




Kendall Trend Test Results Continuous	
n	7
z	-1.25
p	0.21
S	-6
varS	16
tau	-0.53
mean	0
sd	0
cov	0.59
results	STABLE

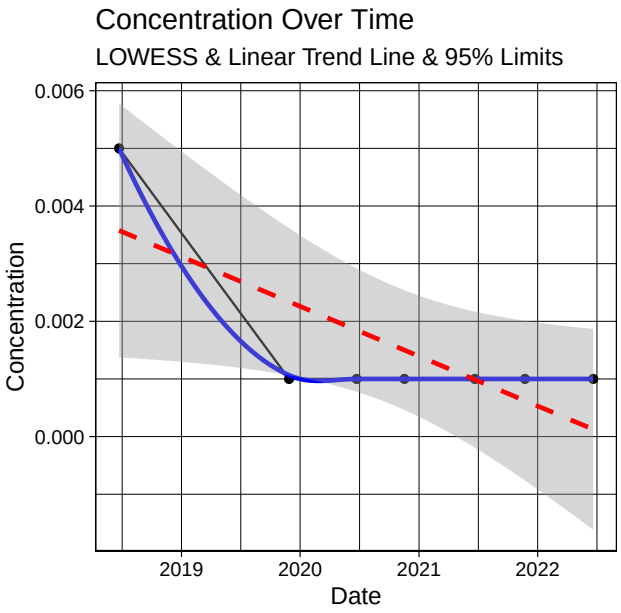
Report for ID : MW134 and Analyte : PFOA

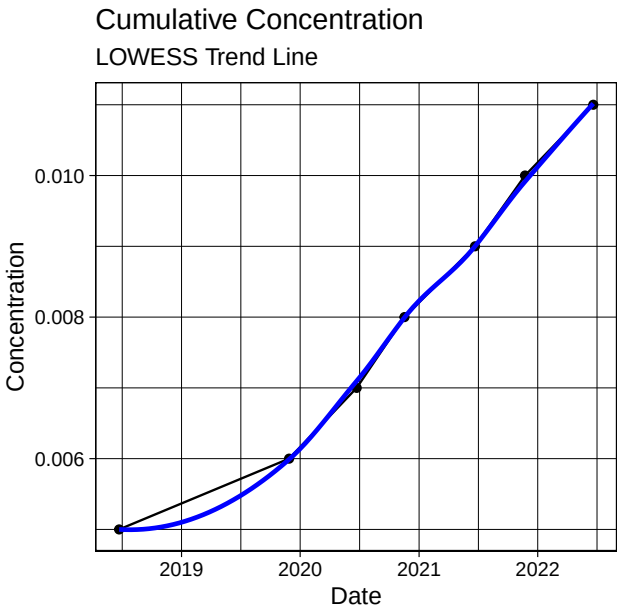




Kendall Trend Test Results Continuous	
n	7
z	-1.25
p	0.21
S	-6
varS	16
tau	-0.53
mean	0
sd	0
cov	0.96
results	STABLE

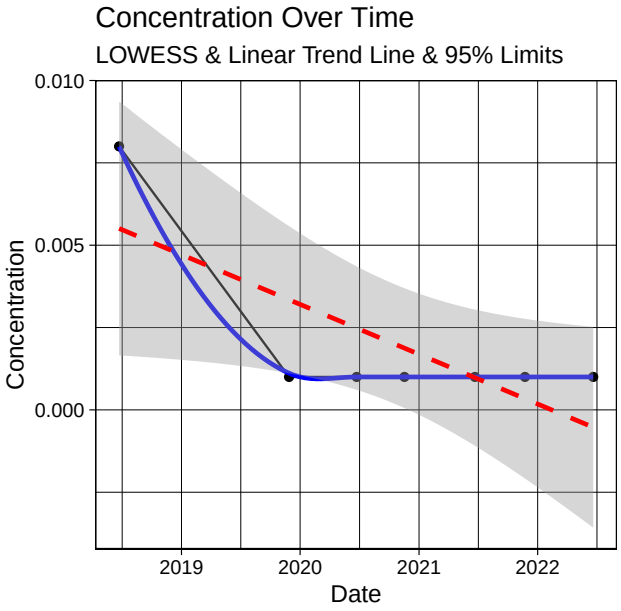
Report for ID : MW134 and Analyte : PFOS

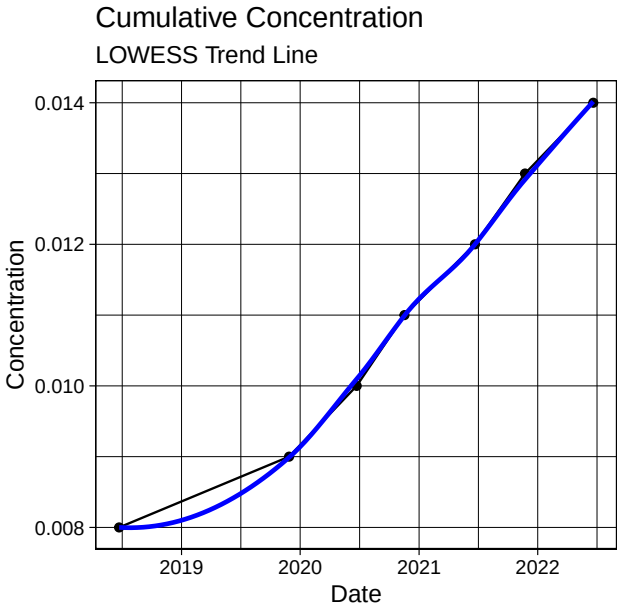




Kendall Trend Test Results Continuous	
n	7
z	-1.25
p	0.21
S	-6
varS	16
tau	-0.53
mean	0
sd	0
cov	1.32
results	NO CLEAR TREND

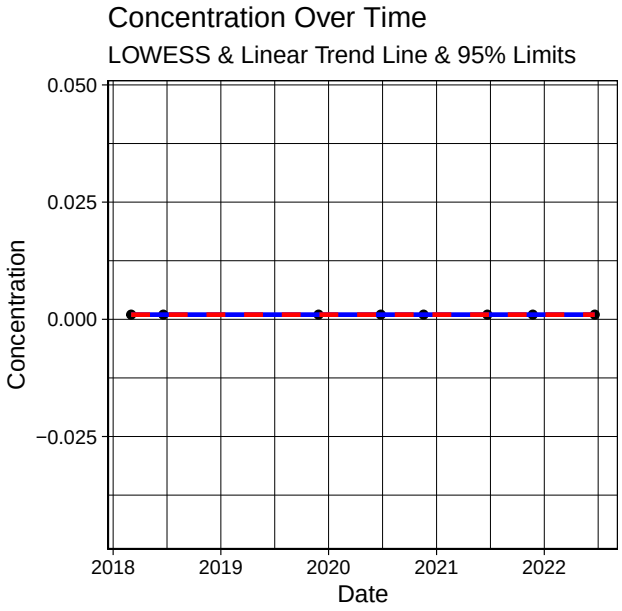
Report for ID : MW134 and Analyte : SumofPFOSandPFHxS

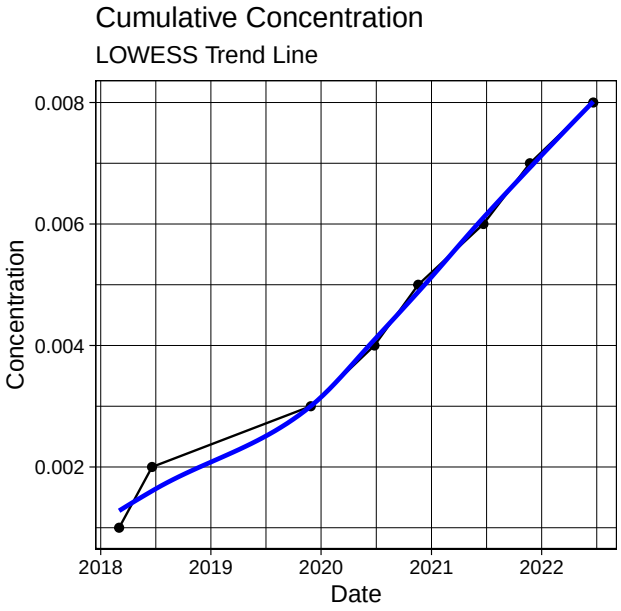




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

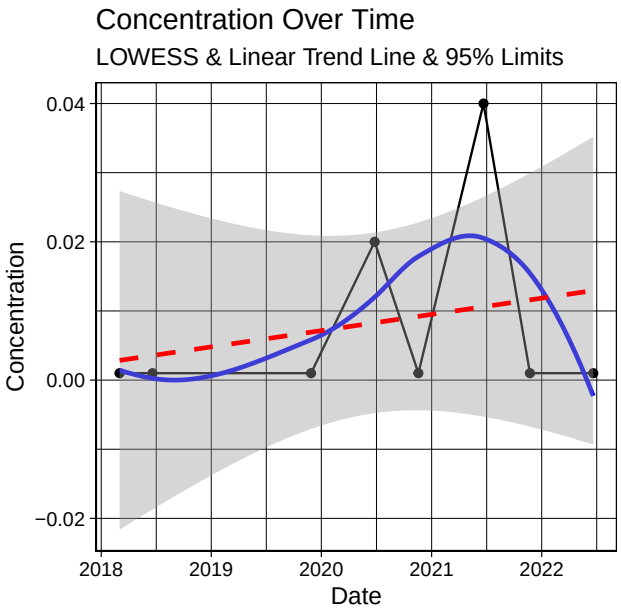
Report for ID : MW202 and Analyte : PFOA

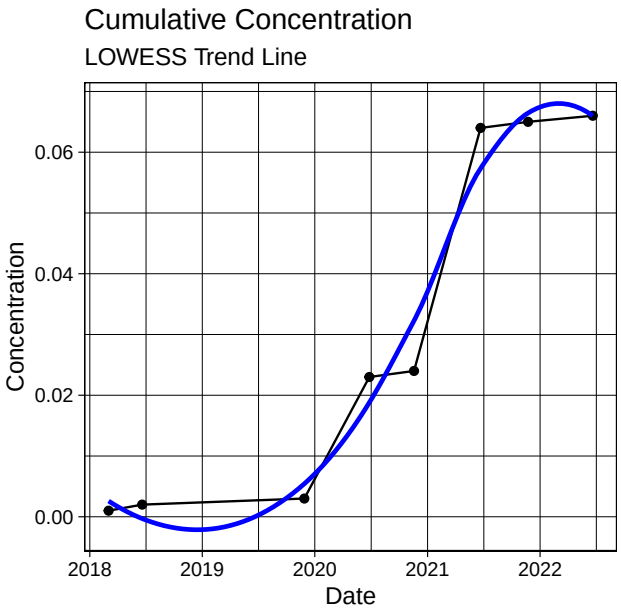




Kendall Trend Test Results Continuous	
n	8
z	0.33
p	0.74
S	3
varS	37
tau	0.16
mean	0.01
sd	0.01
cov	1.75
results	NO CLEAR TREND

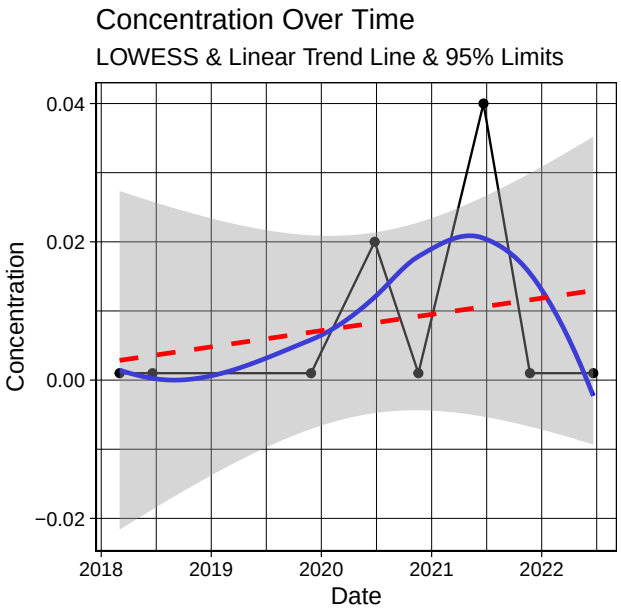
Report for ID : MW202 and Analyte : PFOS

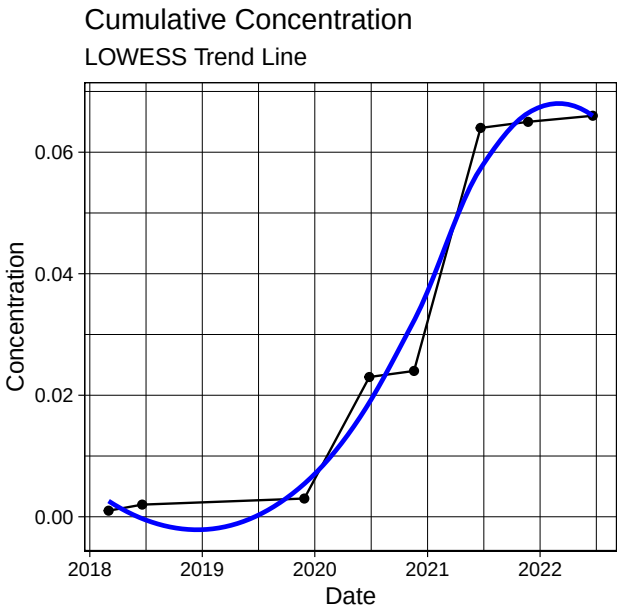




Kendall Trend Test Results Continuous	
n	8
z	0.33
p	0.74
S	3
varS	37
tau	0.16
mean	0.01
sd	0.01
cov	1.75
results	NO CLEAR TREND

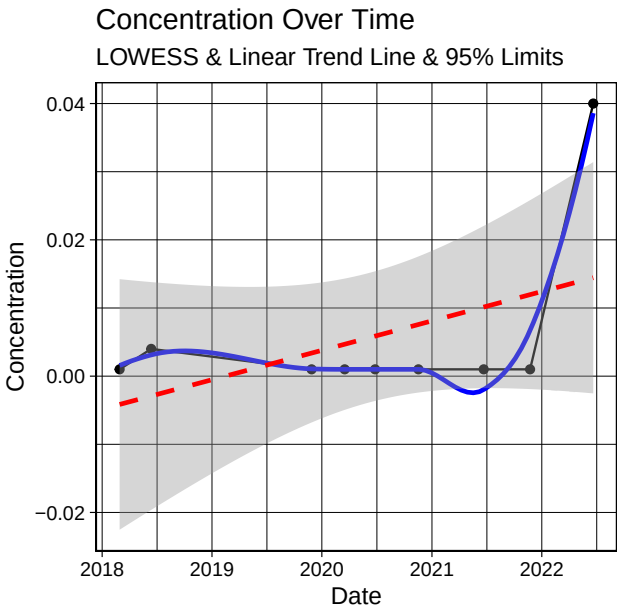
Report for ID : MW202 and Analyte : SumofPFOSandPFHxS

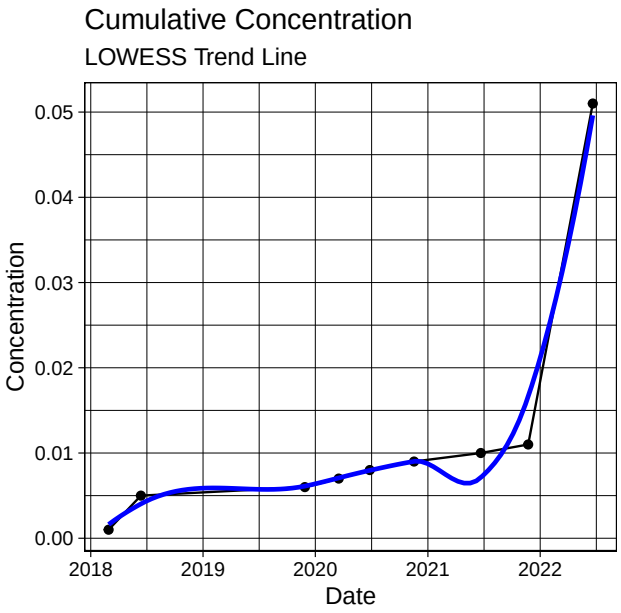




Kendall Trend Test Results Continuous	
n	9
z	0.29
p	0.77
S	3
varS	47.67
tau	0.13
mean	0.01
sd	0.01
cov	2.28
results	NO CLEAR TREND

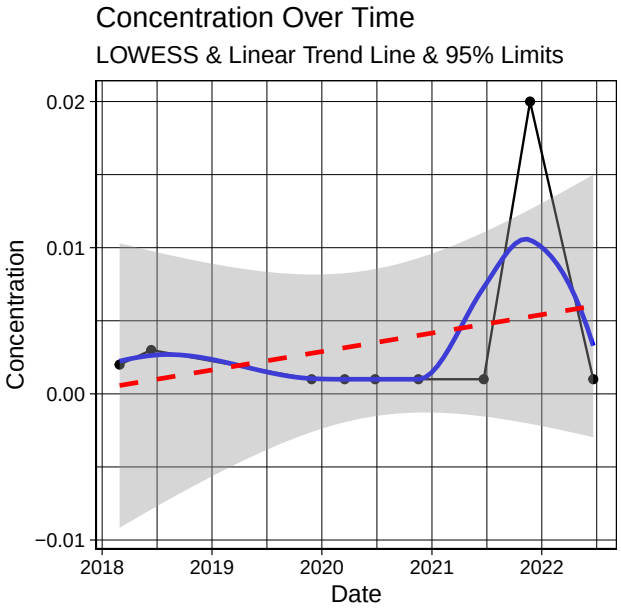
Report for ID : MW210 and Analyte : PFOA

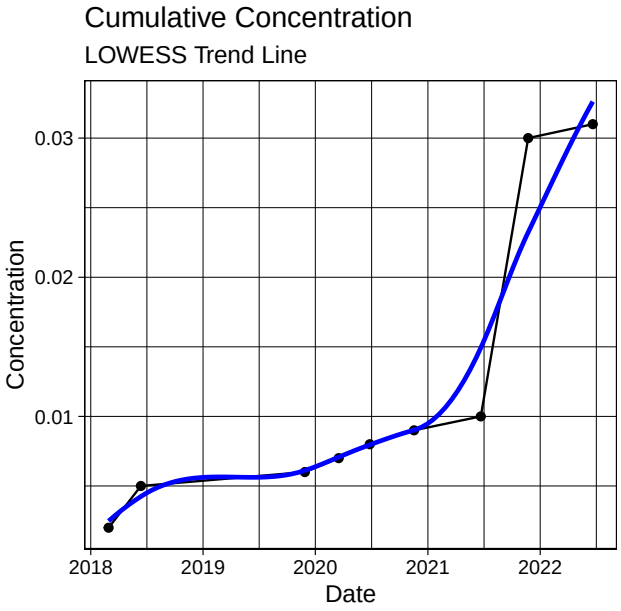




Kendall Trend Test Results Continuous	
n	9
z	-0.5
p	0.62
S	-5
varS	63.67
tau	-0.18
mean	0
sd	0.01
cov	1.81
results	NO CLEAR TREND

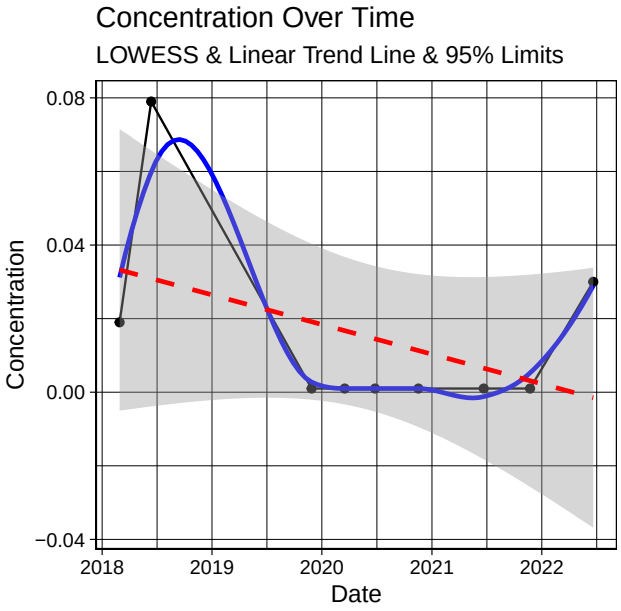
Report for ID : MW210 and Analyte : PFOS

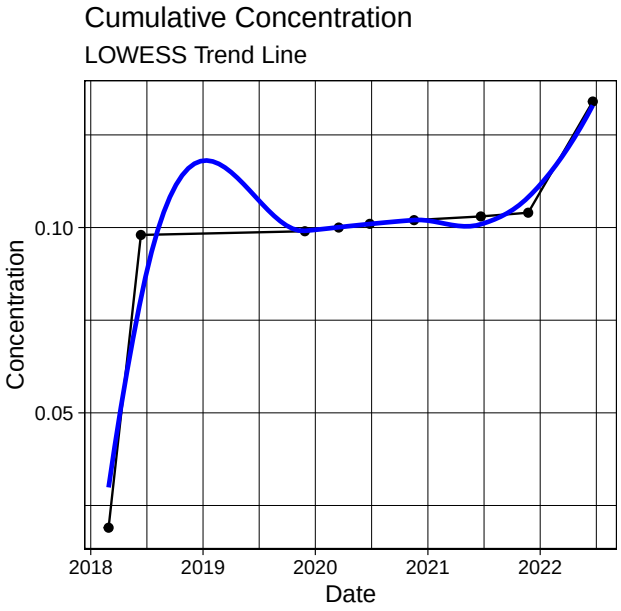




Kendall Trend Test Results Continuous	
n	9
z	-0.5
p	0.62
S	-5
varS	63.67
tau	-0.18
mean	0.01
sd	0.03
cov	1.76
results	NO CLEAR TREND

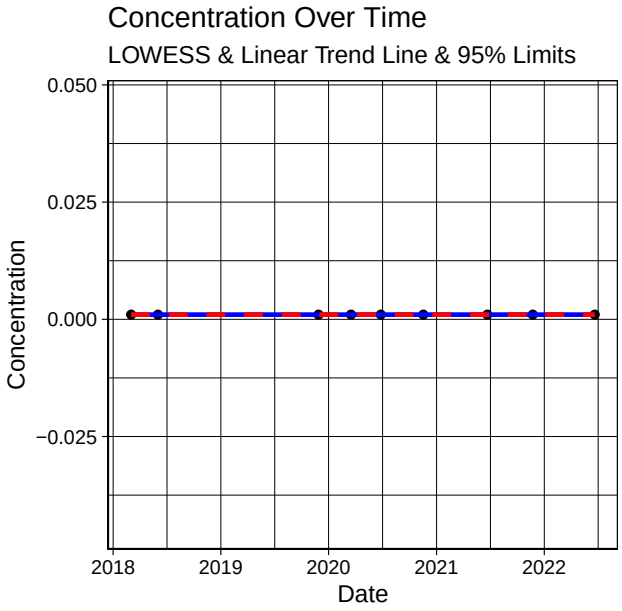
Report for ID : MW210 and Analyte : SumofPFOSandPFHxS

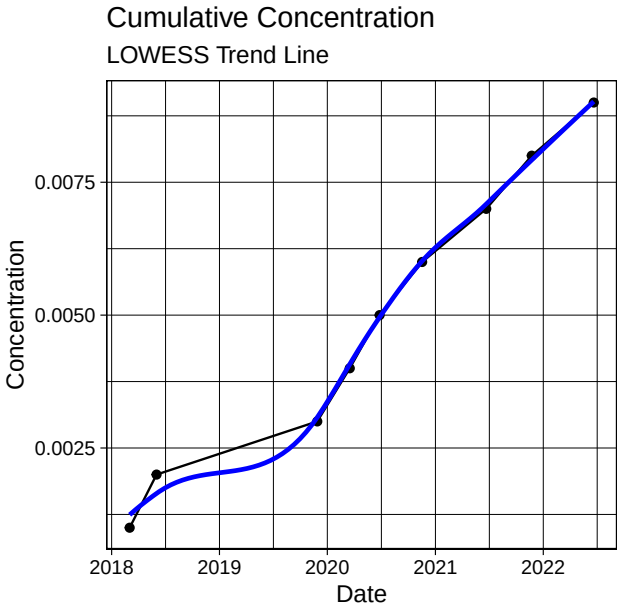




Kendall Trend Test Results Continuous	
n	9
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

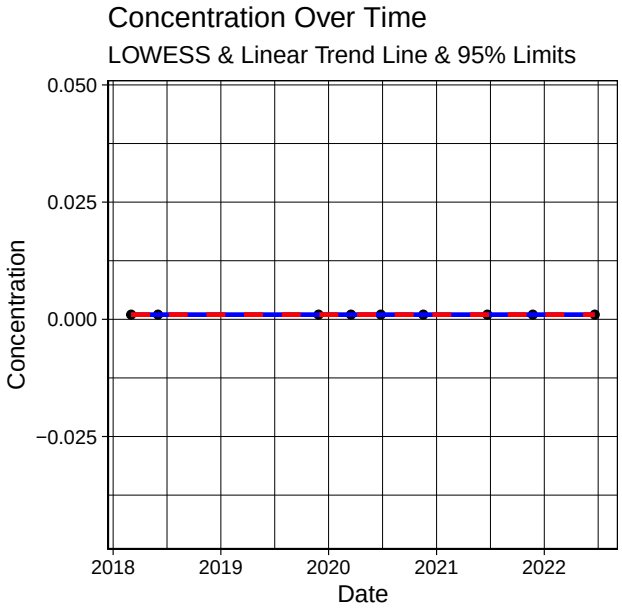
Report for ID : MW212 and Analyte : PFOA

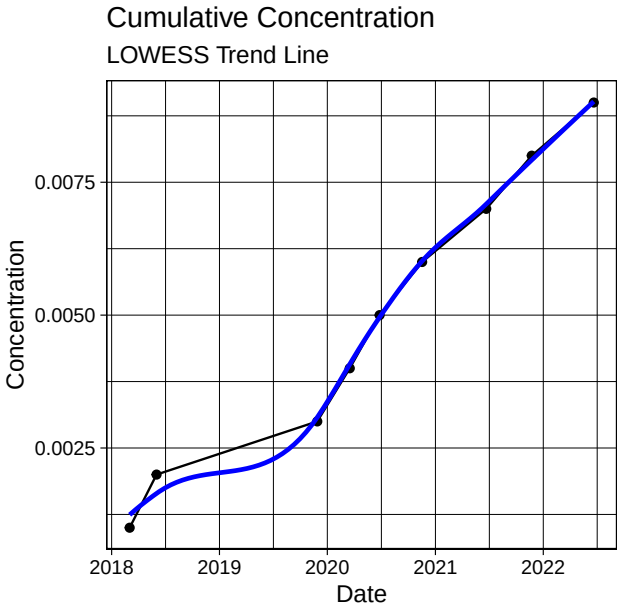




Kendall Trend Test Results Continuous	
n	9
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

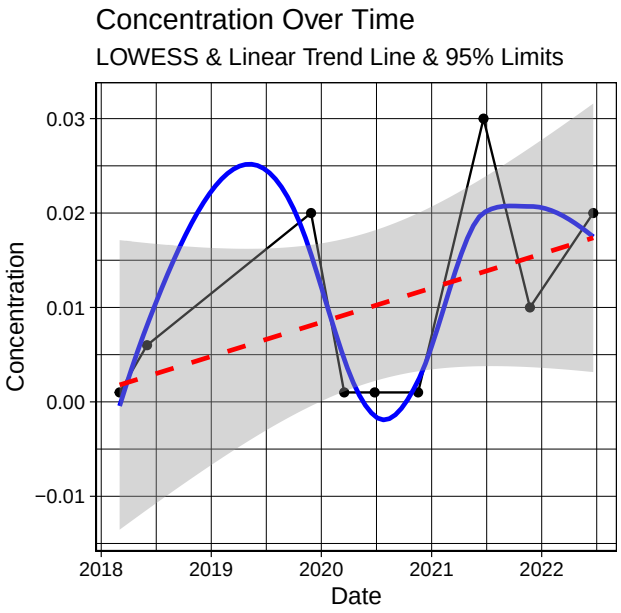
Report for ID : MW212 and Analyte : PFOS

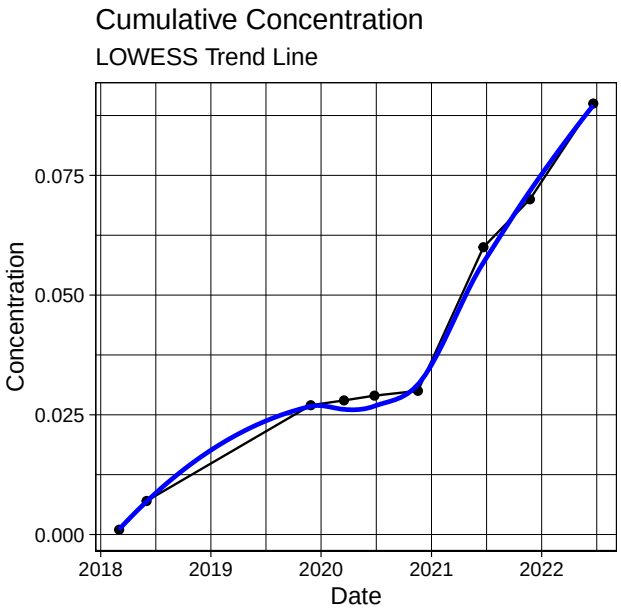




Kendall Trend Test Results Continuous	
n	9
z	1.1
p	0.27
S	11
varS	82.33
tau	0.34
mean	0.01
sd	0.01
cov	1.08
results	NO CLEAR TREND

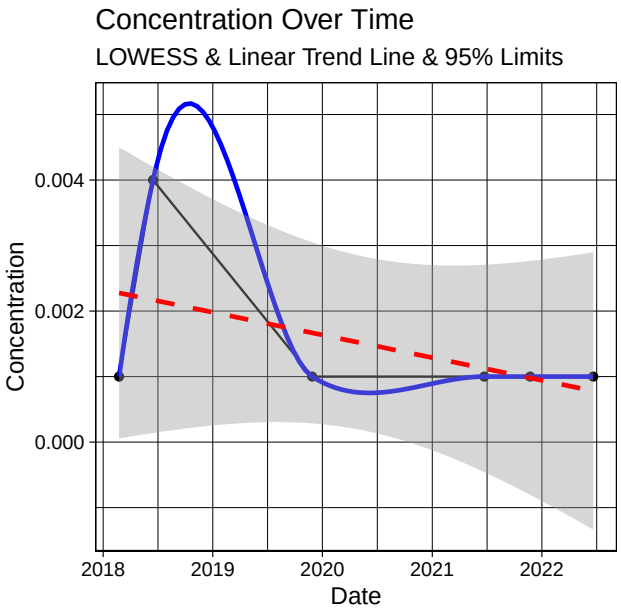
Report for ID : MW212 and Analyte : SumofPFOSandPFHxS

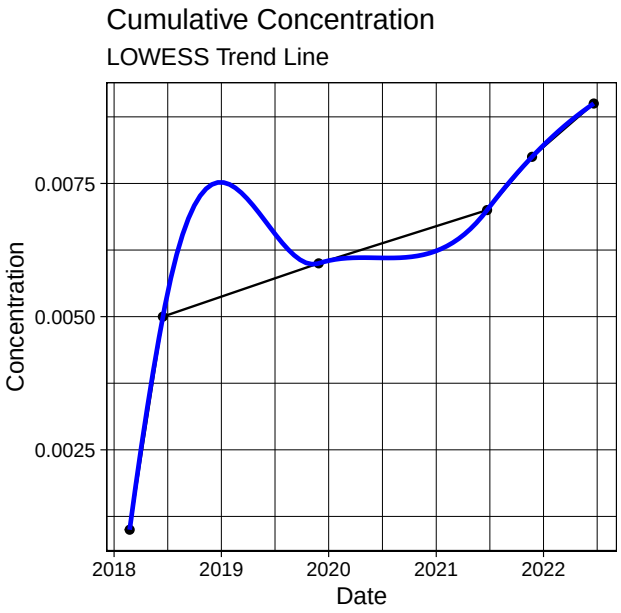




Kendall Trend Test Results Continuous	
n	6
z	-0.59
p	0.56
S	-3
varS	11.67
tau	-0.35
mean	0
sd	0
cov	0.82
results	STABLE

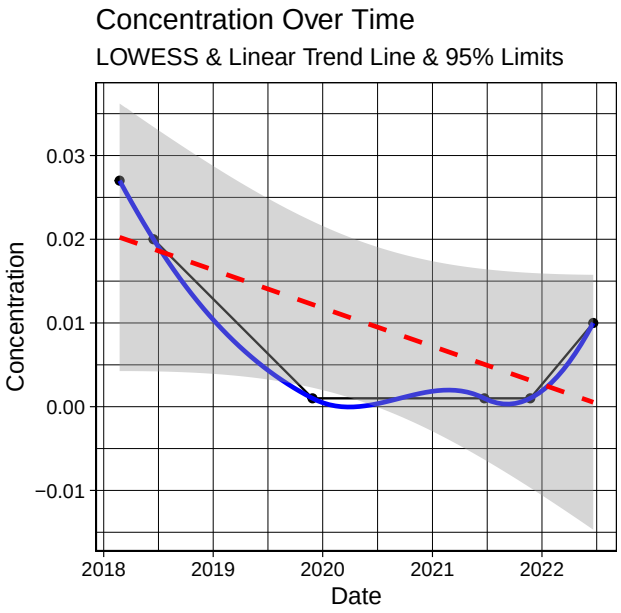
Report for ID : MW213 and Analyte : PFOA

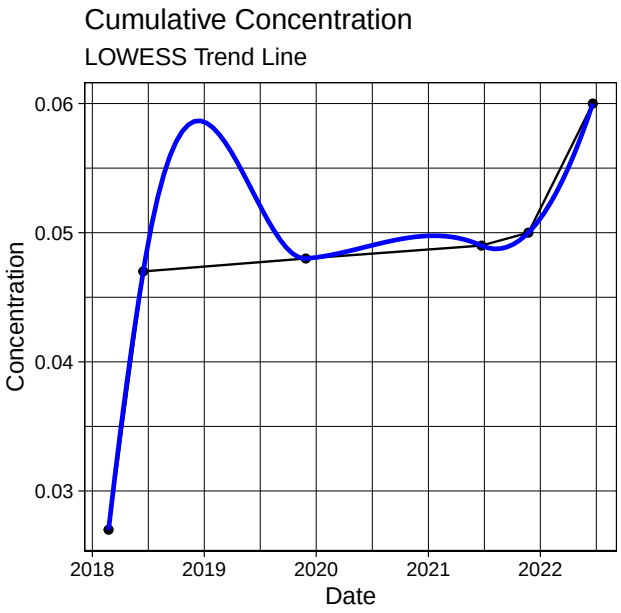




Kendall Trend Test Results Continuous	
n	6
z	-1.01
p	0.31
S	-6
varS	24.67
tau	-0.45
mean	0.01
sd	0.01
cov	1.12
results	NO CLEAR TREND

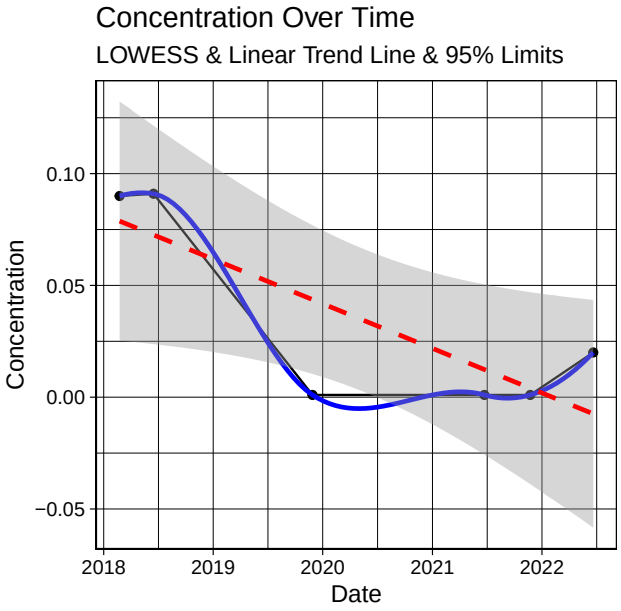
Report for ID : MW213 and Analyte : PFOS

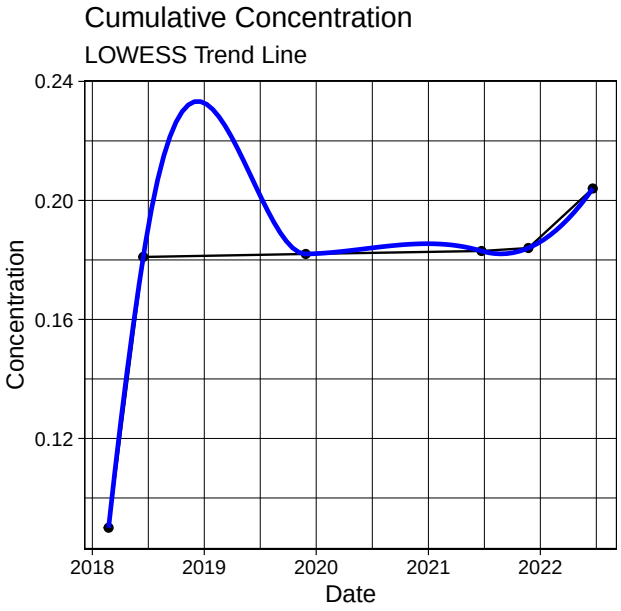




Kendall Trend Test Results Continuous	
n	6
z	-0.6
p	0.55
S	-4
varS	24.67
tau	-0.3
mean	0.03
sd	0.04
cov	1.31
results	NO CLEAR TREND

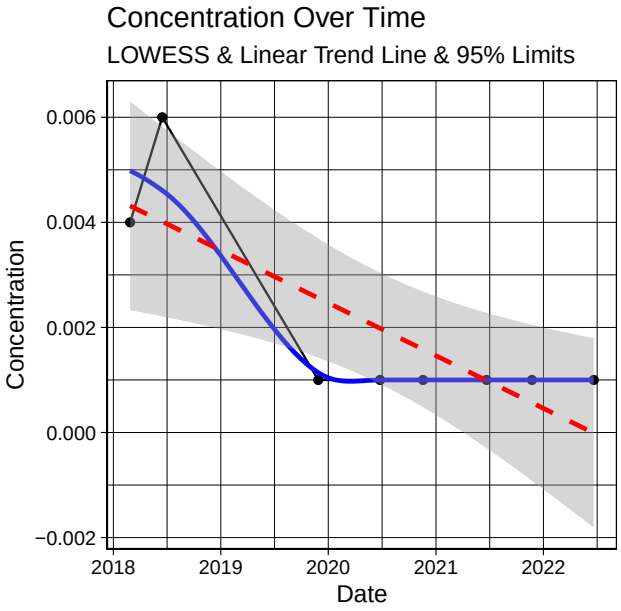
Report for ID : MW213 and Analyte : SumofPFOSandPFHxS

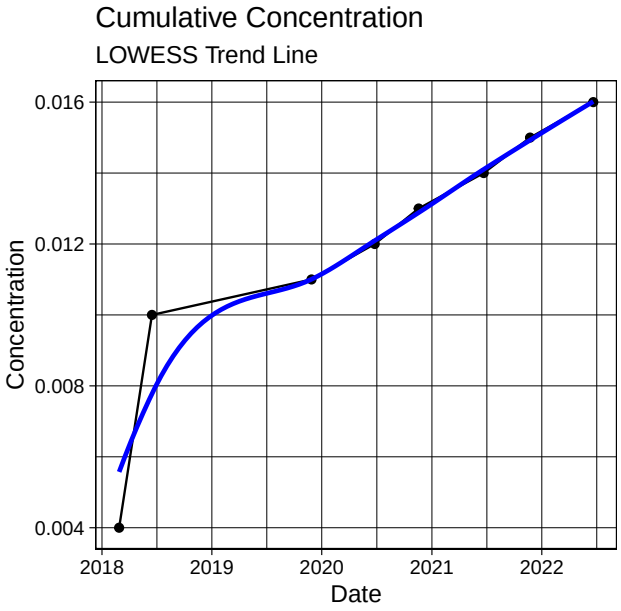




Kendall Trend Test Results Continuous	
n	8
z	-1.64
p	0.1
S	-11
varS	37
tau	-0.58
mean	0
sd	0
cov	0.96
results	STABLE

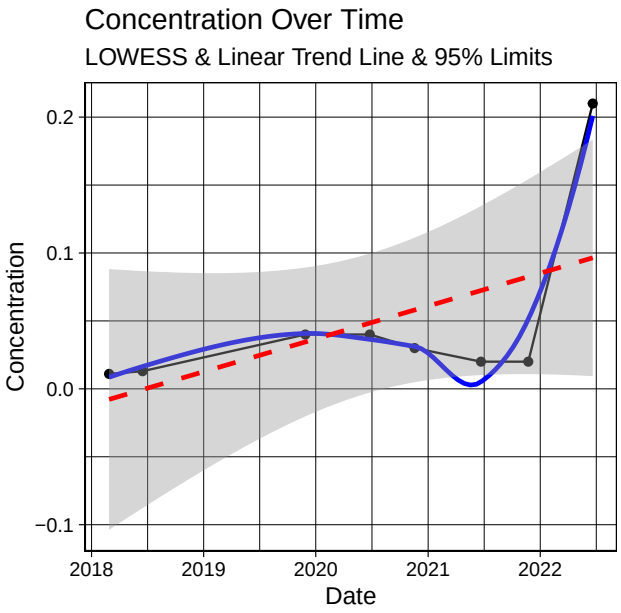
Report for ID : MW214 and Analyte : PFOA

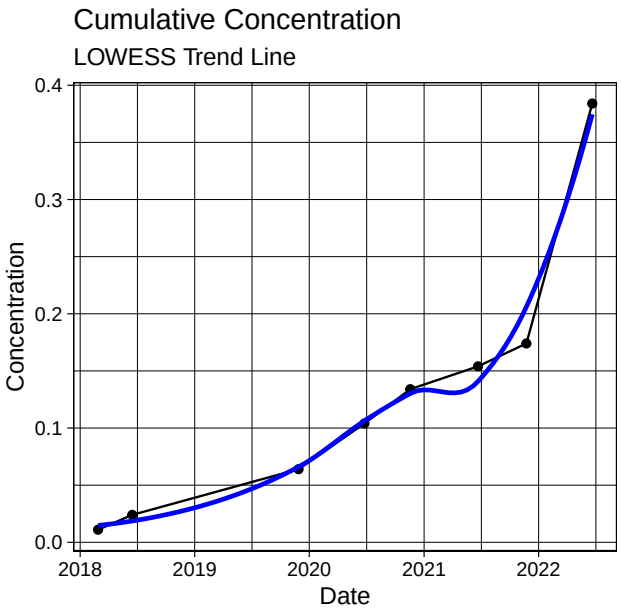




Kendall Trend Test Results Continuous	
n	8
z	1.13
p	0.26
S	10
varS	63.33
tau	0.37
mean	0.05
sd	0.07
cov	1.38
results	NO CLEAR TREND

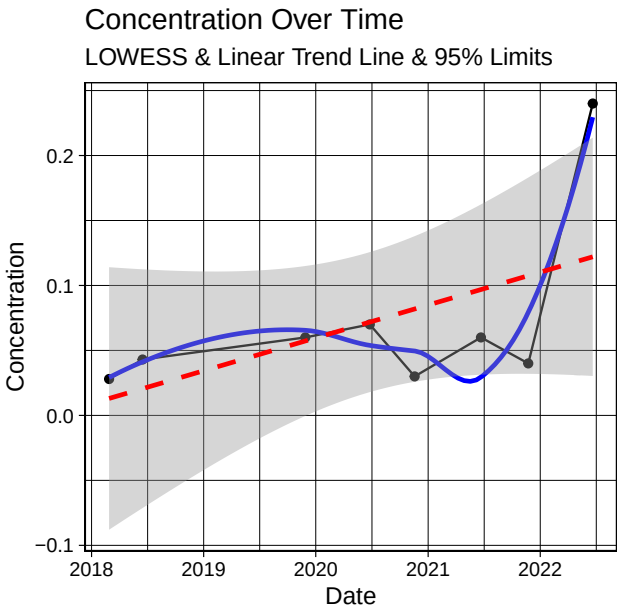
Report for ID : MW214 and Analyte : PFOS

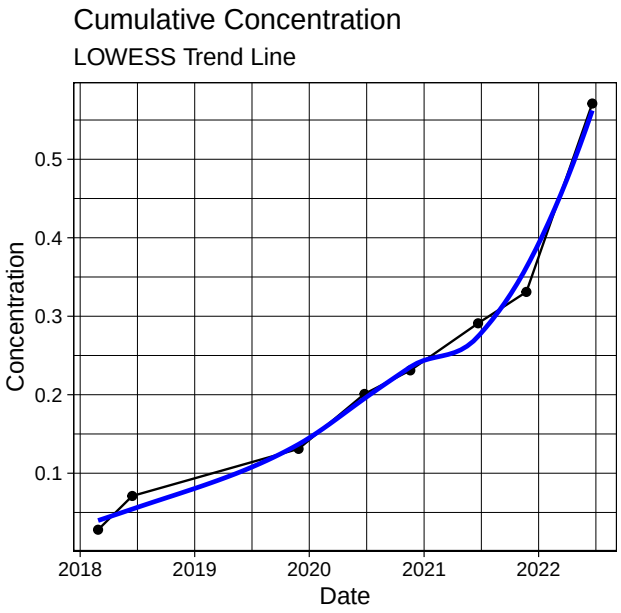




Kendall Trend Test Results Continuous	
n	8
z	1.25
p	0.21
S	11
varS	64.33
tau	0.4
mean	0.07
sd	0.07
cov	0.98
results	NO CLEAR TREND

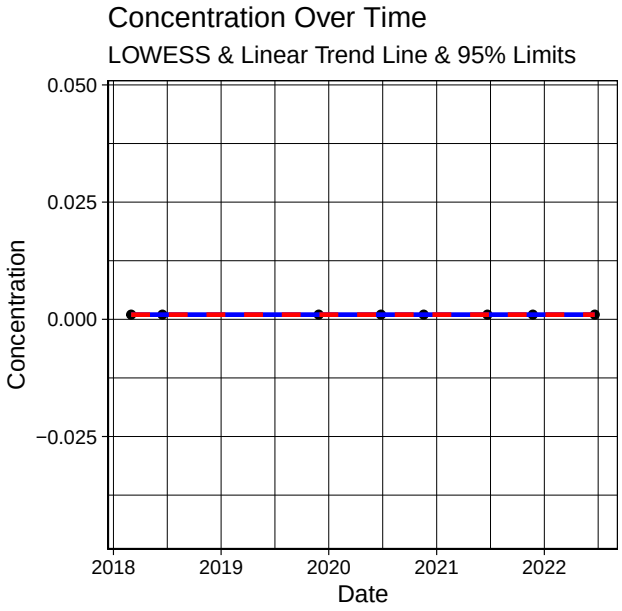
Report for ID : MW214 and Analyte : SumofPFOSandPFHxS

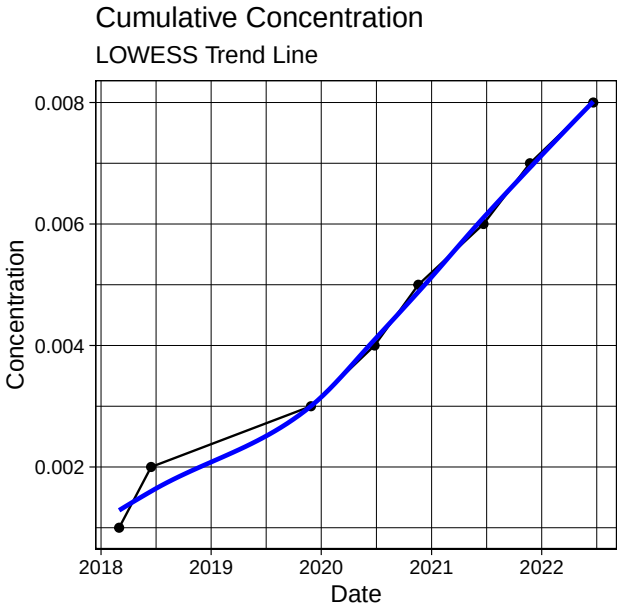




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

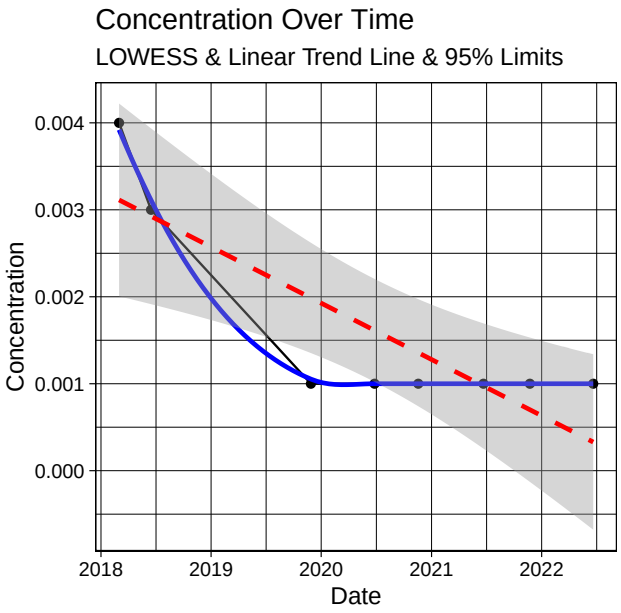
Report for ID : MW217 and Analyte : PFOA

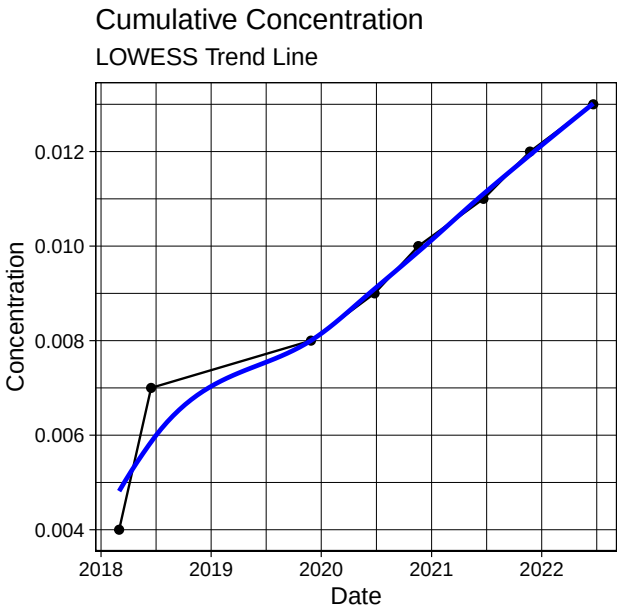




Kendall Trend Test Results Continuous	
n	8
z	-1.97
p	0.05
S	-13
varS	37
tau	-0.68
mean	0
sd	0
cov	0.73
results	DECREASING

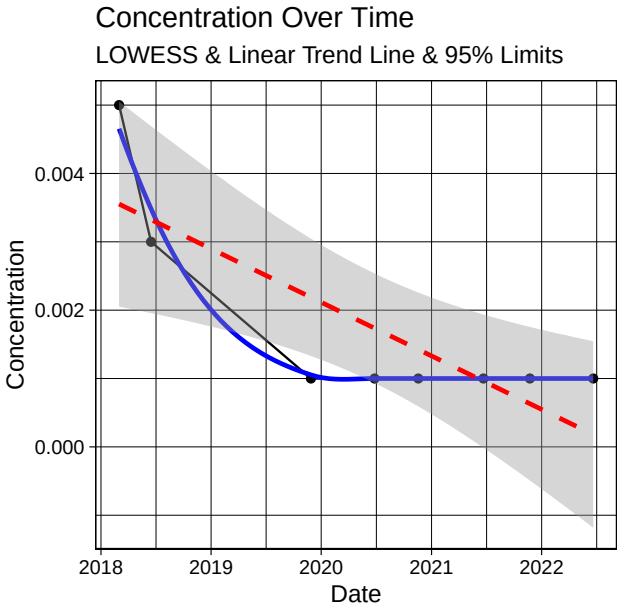
Report for ID : MW217 and Analyte : PFOS

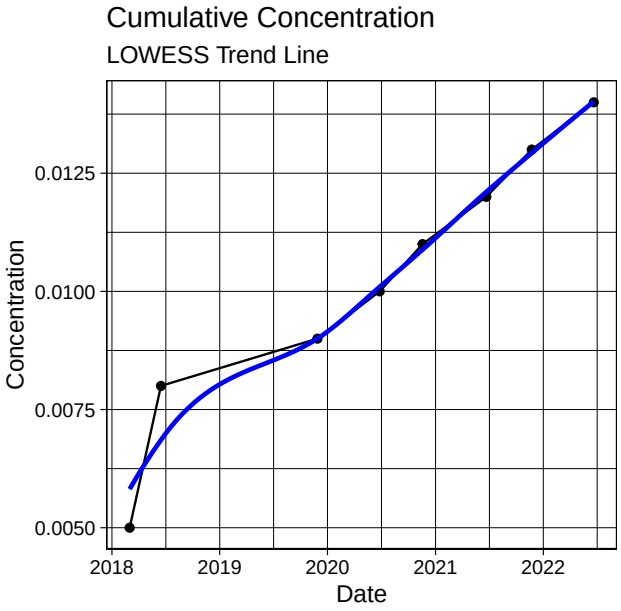




Kendall Trend Test Results Continuous	
n	8
z	-1.97
p	0.05
S	-13
varS	37
tau	-0.68
mean	0
sd	0
cov	0.85
results	DECREASING

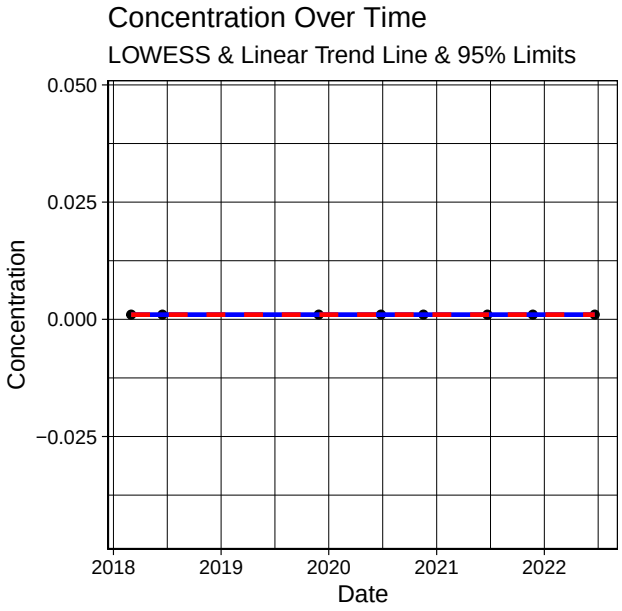
Report for ID : MW217 and Analyte : SumofPFOSandPFHxS

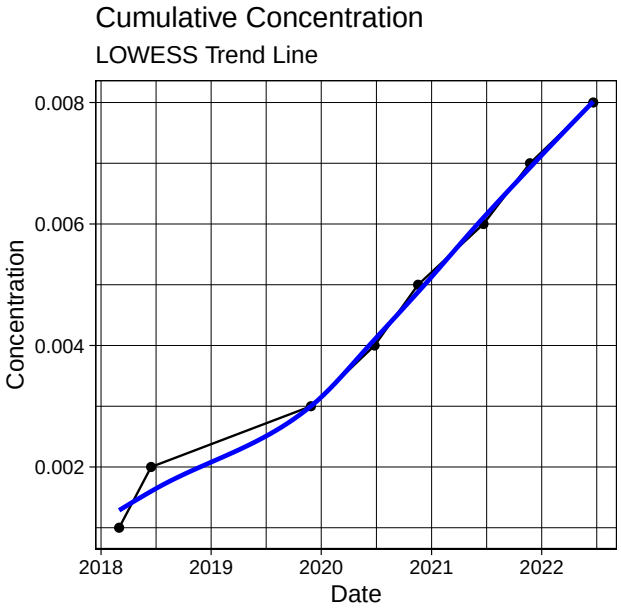




Kendall Trend Test Results Continuous	
n	8
z	NaN
p	NaN
S	0
varS	0
tau	NaN
mean	0
sd	0
cov	0
results	NA

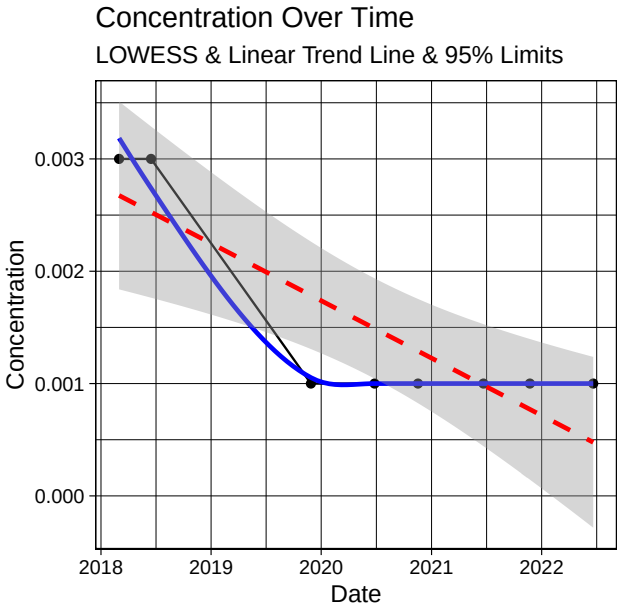
Report for ID : MW218 and Analyte : PFOA

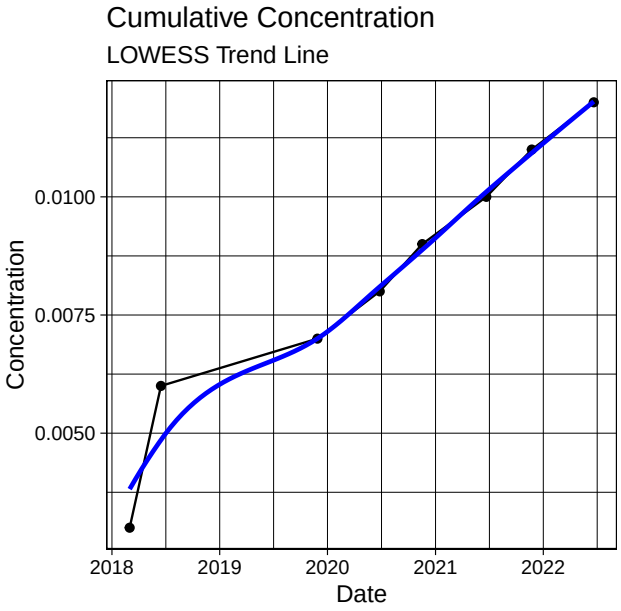




Kendall Trend Test Results Continuous	
n	8
z	-1.83
p	0.07
S	-12
varS	36
tau	-0.65
mean	0
sd	0
cov	0.62
results	POSSIBLY DECREASING

Report for ID : MW218 and Analyte : PFOS





Kendall Trend Test Results Continuous	
n	8
z	-1.83
p	0.07
S	-12
varS	36
tau	-0.65
mean	0
sd	0
cov	0.79
results	POSSIBLY DECREASING

Report for ID : MW218 and Analyte : SumofPFOSandPFHxS