

Appendix H - Data Statistics



ProUCL Summary Statistics

Surface Water – PFOA

Zone	PFOA (n, detects)	Value (µg/L)	Risk Assessment
Drain in Zone D – Combined	Average (49, 10)	0.021	Terrestrial
Drain in Zone B – Combined	95% UCL (23, 16)	Non-Discernible – 95% Chebyshev = 0.24	Terrestrial
Drain in Zone A - Combined	95% UCL (16, 9)	Normal, Student's-t UCL = 0.0591	Terrestrial
Drain in Zone C – Combined	Average (55, 8)	0.018	Terrestrial
All Freshwater Combined (Just Drains)	Average (143, 43)	0.055	Terrestrial
Ludmilla Creek Estuary – Combined	Average (42, 20)	0.072	Aquatic
Rapid Creek Estuary – Combined	Average (17, 3)	0.013	Aquatic
Reichardt and Sadgroves Creeks – Combined	Average (50, 6)	0.012	Aquatic
All Estuarine – Combined	Average (109, 29)	0.053	Aquatic
Rapid Creek Freshwater – Combined	95% UCL (73, 54)	Non-discernible – 95% Student's-t UCL = 0.0208	Aquatic



Surface Water – PFOS

Zone	PFOS (n, detects)	Value (µg/L)	Risk Assessment
Drain in Zone D – Combined	95% UCL (49, 35)	Gamma, 95% Adjusted Gamma UCL = 0.731	Terrestrial
Drain in Zone B – Combined	95% UCL (23, 22)	Normal, 95% Student's-t UCL = 1.427	Terrestrial
Drain in Zone A - Combined	95% UCL (16, 13)	Normal, 95% Student's-t UCL = 2.155	Terrestrial
Drain in Zone C – Combined	95% UCL (55, 50)	Lognormal, 95% H-UCL = 0.427	Terrestrial
All Freshwater Combined	95% UCL (143, 120)	Non-Discernible, 95% Chebyshev UCL = 0.953	Terrestrial
Ludmilla Creek Estuary – Combined	95% UCL (42, 33)	Gamma, 95% Adjusted Gamma UCL = 2.999	Aquatic
Rapid Creek Estuary – Combined	95% UCL (17, 14)	Lognormal, 95% H-UCL = 0.303	Aquatic
Reichardt and Sadgroves Creeks Estuary – Combined	95% UCL (50, 26)	Gamma, 95% Adjusted Gamma UCL = 0.106	Aquatic
All Estuarine – Combined	95% UCL (109, 73)	Non-discernible, 95% Chebyshev UCL = 1.701	Aquatic
Rapid Creek Freshwater – Combined	95% UCL (73, 73)	Non-discernible, 95% Chebyshev UCL = 0.711	Aquatic



Sediment

Zone	PFOA (n, detects)	Value (µg/kg)	PFOS (n, detects)	Value (µg/kg)
Ludmilla Creek Estuary	LOR (9, 0)	<5	Max (9, 2)	21
Rapid Creek Estuary	LOR (4, 0)	<5	Max (4, 2)	19
Reichardt and Sadgroves Creeks Estuary	LOR (11, 0)	<5	Average (11, 2)	43.6
All Estuarine/Marine	LOR (24, 0)	<5	Average (24, 6)	24.35
Rapid Creek Freshwater	LOR (20, 0)	<5	95% UCL (20, 10)	Gamma, 95% Adjusted Gamma UCL = 182.3



Soil

Zone	PFOA (n, detects)	Value (µg/kg)	PFOS (n, detects)	Value (µg/kg)
Zone A	LOR (29, 0)	<0.5	Average (29, 13)	18.8
Zone B	Average (137, 66)	29.2	95% UCL (137, 98)	Lognormal, 95% H-UCL = 2999
Zone C	Average (310, 26)	47.3	95% UCL (310, 165)	Non-Discernible, 95% Chebyshev UCL = 1590
Zone D	Average (348, 36)	25.8	95% UCL (348, 211)	Non-Discernible, 95% Chebyshev UCL = 3223
All Soil	Average (824, 128)	31.9	95% UCL (824, 487)	Non-Discernible, 95% Chebyshev UCL = 2385

Fish Tissue

Zone	PFOA (n, detects)	Value (µg/kg)	PFOS (n, detects)	Value (µg/kg)
Darwin Harbor (inc. Sadgroves and Reichardt Creeks)	LOR (68, 0)	<0.5	95% UCL (68, 50)	Lognormal, 95% H-UCL = 1.727
Drains in Zone C	Average (9, 1)	0.34	95% UCL (9, 9)	Normal, 95% Student's-t UCL = 94.46
Ludmilla Creek Estuary	Average (28, 3)	0.34	95% UCL (28, 26)	Gamma, 95% Adjusted Gamma UCL = 51.4
Rapid Creek Estuary	LOR (15, 0)	<0.5	95% UCL (15, 15)	Normal, 95% Student's-t UCL = 29.05
Rapid Creek Freshwater	LOR (27, 0)	<0.5	95% UCL (27, 27)	Gamma, 95% Adjusted Gamma UCL = 764.2
All Estuary/Marine	Average (111, 3)	0.34	95% UCL (111, 91)	Non-Discernible, 95% Chebyshev UCL = 25.81
All	Average (147, 4)	0.34	95% UCL (147, 120)	Non-Discernible, 95% Chebyshev UCL = 246.1



Aquatic Invertebrate Tissue

Zone	PFOA (n, detects)	Value (µg/kg)	PFOS (n, detects)	Value (µg/kg)
Darwin Harbor (inc. Sadgroves and Reichardt Creeks)	Average (25, 5)	1.74	Average (25, 18)	3.12
Drains in Zone C	NA	NA	NA	NA
Ludmilla Creek - Estuary	Average (71, 50)	4.41	Average (71, 71)	14.13
Rapid Creek Estuary	Average (44, 23)	2.17	Average (44, 43)	19.38
Rapid Creek Freshwater	Max (6, 6)	1.3	Max (6, 6)	78
All Estuary/Marine	Average (140, 78)	3.6	Average (140, 132)	14.4



Terrestrial Invertebrate

Zone	PFOA (n, detects)	Value (µg/kg)	PFOS (n, detects)	Value (µg/kg)
Zone A	LOR (8, 0)	<5	Max (8, 6)	250
Zone B	Max (9, 1)	0.9	95% UCL (9, 9)	Lognormal, 95% Chebyshev UCL = 99.87
Zone C	LOR (4, 0)	<1	Max (4, 4)	15
Zone D	LOR (4, 0)	<4.5	Max (4, 3)	3.8
All - Onsite	Max (25, 1)	0.9	95% UCL (25, 21)	Lognormal, 95% Chebyshev UCL = 88.76
Offsite	LOR (5, 0)	<1.5	Max (5, 5)	8.3

Terrestrial Plants

Zone	PFOA (n, detects)	Value (µg/kg)	PFOS (n, detects)	Value (µg/kg)
Zone A	LOR (11, 0)	<0.5	Average (11, 3)	7.13
Zone B	Average (11, 2)	1.2	Average (11, 7)	2.9
Zone C	LOR (8, 0)	<0.5	Average (8, 6)	5.03
Zone D	LOR (4, 0)	<0.5	LOR (4, 0)	<0.3
All	Average (34, 2)	1.2	Average (34, 16)	4.48

Freshwater Aquatic Plants

Zone	PFOA (n, detects)	Value (µg/kg)	PFOS (n, detects)	Value (µg/kg)
Rapid	LOR (3, 0)	<0.5	Max (3, 3)	13



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Estuarine/Marine Aquatic Plants

Zone	PFOA (n, detects)	Value (µg/kg)	PFOS (n, detects)	Value (µg/kg)
Ludmilla	LOR (4, 0)	<0.5	Max (4, 2)	4
Rapid	LOR (5, 0)	<0.5	Max (5, 4)	2.2
Reichardt & Sadgroves	LOR (6, 0)	<0.5	Max (6, 1)	0.7
All	LOR (15, 0)	<0.5	Average (15, 7)	1.3



Reptiles

Zone	PFOA (n, detects)	Value (µg/kg)	PFOS (n, detects)	Value (µg/kg)
Zone D	LOR (2, 0)	<0.5	Max (2, 2)	7.9
Zone B	LOR (5, 0)	<0.5	Max (5, 5)	17
Zone C	LOR (5, 0)	<0.5	Max (5, 5)	69
Zone A	LOR (5, 0)	<0.5	Max (5, 5)	7200
All – Estuary (Zone C, Zone D Zone B)	LOR (12, 0)	<0.5	95% UCL (12, 12)	Normal, 95% Student's-t UCL = 31.56

Amphibians

Zone	PFOA (n, detects)	Value (µg/kg)	PFOS (n, detects)	Value (µg/kg)
Zone D	LOR (3, 0)	<0.5	Max (3, 3)	24
Zone B	LOR (13, 0)	<0.5	95% UCL (13, 13)	Normal, 95% Student's-t UCL = 21.64
Zone C	LOR (14, 0)	<0.5	95% UCL (14, 14)	Normal, 95% Student's-t UCL = 3.094
Zone A	LOR (16, 0)	<0.5	95% UCL (16, 16)	Gamma, 95% Adjusted Gamma UCL = 116.6
All Onsite	LOR (46, 0)	<0.5	95% UCL (46, 46)	Lognormal, 95% Chebyshev UCL = 61.93
Offsite	LOR (6, 0)	<0.5	Max (6, 6)	16



Reptiles & Amphibians

Zone	PFOA (n, detects)	Value (µg/kg)	PFOS (n, detects)	Value (µg/kg)
Zone D	LOR (5, 0)	<0.5	Max (5, 5)	24
Zone B	LOR (19, 0)	<0.5	95% UCL (19, 19)	Gamma, 95% Adjusted Gamma UCL = 20.7
Zone C	LOR (21, 0)	<0.5	95% UCL (21, 21)	Non-Discernible, 95% Chebyshev UCL = 31.61
Zone A	LOR (18, 0)	<0.5	95% UCL (18, 18)	Non-Discernible, 95% Chebyshev UCL = 2262
All - Onsite	LOR (63, 0)	<0.5	95% UCL (63, 63)	Lognormal, 95% H-UCL = 194.2
All Freshwater (Zone A)	LOR (18, 0)	<0.5	95% UCL (18, 18)	Non-Discernible, 95% Chebyshev UCL = 2262
All Estuary (Zone C, Zone D & Zone B)	LOR (45, 0)	<0.5	95% UCL (45, 45)	Lognormal, 95% H-UCL = 22.1



Mammals

Zone	PFOA (n, detects)	Value (µg/kg)	PFOS (n, detects)	Value (µg/kg)
Zone D/Reichardt & Sadgroves	NA	NM	NA	NM
Zone B/Rapid Creek Estuary	LOR (3, 0)	<0.09	Max (3, 3)	4.98
Zone C/Ludmilla Creek Estuary	Max (3, 3)	0.52	Max (3, 3)	36.7
Zone A/Rapid Creek Freshwater	Max (10, 1)	0.09	95% UCL (10, 10)	Gamma, 95% Adjusted Gamma UCL = 183.2
Offsite	LOR (1, 0)	<0.5	Max (1, 1)	0.5
All (Onsite)	Max (16, 4)	0.52	95% UCL (16, 16)	Gamma, 95% Adjusted Gamma UCL = 85.17
All Freshwater (Onsite)	Max (10, 1)	0.09	95% UCL (10, 10)	Gamma, 95% Adjusted Gamma UCL = 183.2
All Estuary (Onsite)	Max (6, 3)	0.52	Max (6, 6)	36.7

	A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets											
2	All Soil											
3	User Selected Options											
4	Date/Time of Computation		ProUCL 5.16/5/2018 2:39:47 PM									
5	From File		Darwin_soil for ProUCL_20180605_b.xls									
6	Full Precision		OFF									
7	Confidence Coefficient		95%									
8	Number of Bootstrap Operations		2000									
9												
10												
11	Perfluoro-n-octane sulfonic acid (PFOS)											
12												
13	General Statistics											
14	Total Number of Observations				487		Number of Distinct Observations				283	
15							Number of Missing Observations				337	
16	Minimum				0.5		Mean				1320	
17	Maximum				70590		Median				73	
18	SD				5392		Std. Error of Mean				244.3	
19	Coefficient of Variation				4.086		Skewness				7.97	
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic				0.267		Shapiro Wilk GOF Test					
23	5% Shapiro Wilk P Value				0		Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic				0.403		Lilliefors GOF Test					
25	5% Lilliefors Critical Value				0.0405		Data Not Normal at 5% Significance Level					
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
30	95% Student's-t UCL				1722		95% Adjusted-CLT UCL (Chen-1995)				1816	
31							95% Modified-t UCL (Johnson-1978)				1737	
32												
33	Gamma GOF Test											
34	A-D Test Statistic				26.43		Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value				0.893		Data Not Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic				0.162		Kolmogorov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value				0.045		Data Not Gamma Distributed at 5% Significance Level					
38	Data Not Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)				0.257		k star (bias corrected MLE)				0.257	
42	Theta hat (MLE)				5130		Theta star (bias corrected MLE)				5134	
43	nu hat (MLE)				250.5		nu star (bias corrected)				250.3	
44	MLE Mean (bias corrected)				1320		MLE Sd (bias corrected)				2603	
45							Approximate Chi Square Value (0.05)				214.7	
46	Adjusted Level of Significance				0.0495		Adjusted Chi Square Value				214.6	
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50))				1539		95% Adjusted Gamma UCL (use when n<50)				1539	
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic				0.969		Shapiro Wilk Lognormal GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L	
53	5% Shapiro Wilk P Value				5.5935E-6	Data Not Lognormal at 5% Significance Level							
54	Lilliefors Test Statistic				0.0441	Lilliefors Lognormal GOF Test							
55	5% Lilliefors Critical Value				0.0405	Data Not Lognormal at 5% Significance Level							
56	Data Not Lognormal at 5% Significance Level												
57													
58	Lognormal Statistics												
59	Minimum of Logged Data				-0.693	Mean of logged Data				4.436			
60	Maximum of Logged Data				11.16	SD of logged Data				2.498			
61													
62	Assuming Lognormal Distribution												
63	95% H-UCL				2923	90% Chebyshev (MVUE) UCL				3099			
64	95% Chebyshev (MVUE) UCL				3659	97.5% Chebyshev (MVUE) UCL				4437			
65	99% Chebyshev (MVUE) UCL				5965								
66													
67	Nonparametric Distribution Free UCL Statistics												
68	Data do not follow a Discernible Distribution (0.05)												
69													
70	Nonparametric Distribution Free UCLs												
71	95% CLT UCL				1721	95% Jackknife UCL				1722			
72	95% Standard Bootstrap UCL				1733	95% Bootstrap-t UCL				1913			
73	95% Hall's Bootstrap UCL				1885	95% Percentile Bootstrap UCL				1748			
74	95% BCA Bootstrap UCL				1864								
75	90% Chebyshev(Mean, Sd) UCL				2053	95% Chebyshev(Mean, Sd) UCL				2385			
76	97.5% Chebyshev(Mean, Sd) UCL				2845	99% Chebyshev(Mean, Sd) UCL				3751			
77													
78	Suggested UCL to Use												
79	95% Chebyshev (Mean, Sd) UCL				2385								
80													
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
82	Recommendations are based upon data size, data distribution, and skewness.												
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
85													

A	B	C	D	E	F	G	H	I	J	K	L	
1	UCL Statistics for Uncensored Full Data Sets											
2	Soil by AEC											
3	User Selected Options											
4	Date/Time of Computation	ProUCL 5.16/6/2018 2:36:03 PM										
5	From File	Data_Darwin_soil for ProUCL_20180605_b.xls										
6	Full Precision	OFF										
7	Confidence Coefficient	95%										
8	Number of Bootstrap Operations	2000										
9												
10												
11	Perfluoro-n-octanoate acid (PFOA) (Zone D)											
12												
13	General Statistics											
14	Total Number of Observations	36						Number of Distinct Observations	34			
15								Number of Missing Observations	312			
16	Minimum	0.6						Mean	25.78			
17	Maximum	120						Median	10.75			
18	SD	31.08						Std. Error of Mean	5.181			
19	Coefficient of Variation	1.206						Skewness	1.708			
20												
21	Normal GOF Test											
22	Shapiro Wilk Test Statistic	0.75						Shapiro Wilk GOF Test				
23	5% Shapiro Wilk Critical Value	0.935						Data Not Normal at 5% Significance Level				
24	Lilliefors Test Statistic	0.256						Lilliefors GOF Test				
25	5% Lilliefors Critical Value	0.145						Data Not Normal at 5% Significance Level				
26	Data Not Normal at 5% Significance Level											
27												
28	Assuming Normal Distribution											
29	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
30	95% Student's-t UCL	34.53						95% Adjusted-CLT UCL (Chen-1995)	35.87			
31								95% Modified-t UCL (Johnson-1978)	34.78			
32												
33	Gamma GOF Test											
34	A-D Test Statistic	0.667						Anderson-Darling Gamma GOF Test				
35	5% A-D Critical Value	0.787						Detected data appear Gamma Distributed at 5% Significance Level				
36	K-S Test Statistic	0.139						Kolmogorov-Smirnov Gamma GOF Test				
37	5% K-S Critical Value	0.152						Detected data appear Gamma Distributed at 5% Significance Level				
38	Detected data appear Gamma Distributed at 5% Significance Level											
39												
40	Gamma Statistics											
41	k hat (MLE)	0.78						k star (bias corrected MLE)	0.734			
42	Theta hat (MLE)	33.03						Theta star (bias corrected MLE)	35.13			
43	nu hat (MLE)	56.18						nu star (bias corrected)	52.84			
44	MLE Mean (bias corrected)	25.78						MLE Sd (bias corrected)	30.09			
45								Approximate Chi Square Value (0.05)	37.14			
46	Adjusted Level of Significance	0.0428						Adjusted Chi Square Value	36.54			
47												
48	Assuming Gamma Distribution											
49	95% Approximate Gamma UCL (use when n>=50)	36.67						95% Adjusted Gamma UCL (use when n<50)	37.27			
50												
51	Lognormal GOF Test											
52	Shapiro Wilk Test Statistic	0.942						Shapiro Wilk Lognormal GOF Test				
53	5% Shapiro Wilk Critical Value	0.935						Data appear Lognormal at 5% Significance Level				
54	Lilliefors Test Statistic	0.144						Lilliefors Lognormal GOF Test				
55	5% Lilliefors Critical Value	0.145						Data appear Lognormal at 5% Significance Level				
56	Data appear Lognormal at 5% Significance Level											

A	B	C	D	E	F	G	H	I	J	K	L
57											
58	Lognormal Statistics										
59	Minimum of Logged Data			-0.511		Mean of logged Data			2.486		
60	Maximum of Logged Data			4.787		SD of logged Data			1.405		
61											
62	Assuming Lognormal Distribution										
63	95% H-UCL			63.94		90% Chebyshev (MVUE) UCL			57.89		
64	95% Chebyshev (MVUE) UCL			70.23		97.5% Chebyshev (MVUE) UCL			87.35		
65	99% Chebyshev (MVUE) UCL			121							
66											
67	Nonparametric Distribution Free UCL Statistics										
68	Data appear to follow a Discernible Distribution at 5% Significance Level										
69											
70	Nonparametric Distribution Free UCLs										
71	95% CLT UCL			34.3		95% Jackknife UCL			34.53		
72	95% Standard Bootstrap UCL			34.4		95% Bootstrap-t UCL			37.25		
73	95% Hall's Bootstrap UCL			34.91		95% Percentile Bootstrap UCL			34.59		
74	95% BCA Bootstrap UCL			36.14							
75	90% Chebyshev(Mean, Sd) UCL			41.32		95% Chebyshev(Mean, Sd) UCL			48.36		
76	97.5% Chebyshev(Mean, Sd) UCL			58.13		99% Chebyshev(Mean, Sd) UCL			77.32		
77											
78	Suggested UCL to Use										
79	95% Adjusted Gamma UCL			37.27							
80											
81	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
82	Recommendations are based upon data size, data distribution, and skewness.										
83	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
84	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
85											
86											
87	Perfluoro-n-octanoate acid (PFOA) (Zone B)										
88											
89	General Statistics										
90	Total Number of Observations			69		Number of Distinct Observations			57		
91						Number of Missing Observations			68		
92	Minimum			1		Mean			28.32		
93	Maximum			326.8		Median			11.3		
94	SD			55.7		Std. Error of Mean			6.705		
95	Coefficient of Variation			1.967		Skewness			4.627		
96											
97	Normal GOF Test										
98	Shapiro Wilk Test Statistic			0.452		Shapiro Wilk GOF Test					
99	5% Shapiro Wilk P Value			0		Data Not Normal at 5% Significance Level					
100	Lilliefors Test Statistic			0.312		Lilliefors GOF Test					
101	5% Lilliefors Critical Value			0.107		Data Not Normal at 5% Significance Level					
102	Data Not Normal at 5% Significance Level										
103											
104	Assuming Normal Distribution										
105	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
106	95% Student's-t UCL			39.5		95% Adjusted-CLT UCL (Chen-1995)			43.34		
107						95% Modified-t UCL (Johnson-1978)			40.12		
108											
109	Gamma GOF Test										
110	A-D Test Statistic			1.665		Anderson-Darling Gamma GOF Test					
111	5% A-D Critical Value			0.799		Data Not Gamma Distributed at 5% Significance Level					
112	K-S Test Statistic			0.109		Kolmogorov-Smirnov Gamma GOF Test					
113	5% K-S Critical Value			0.112		Detected data appear Gamma Distributed at 5% Significance Level					
114	Detected data follow Appr. Gamma Distribution at 5% Significance Level										
115											

	A	B	C	D	E	F	G	H	I	J	K	L
116	Gamma Statistics											
117	k hat (MLE)		0.683		k star (bias corrected MLE)		0.663					
118	Theta hat (MLE)		41.44		Theta star (bias corrected MLE)		42.69					
119	nu hat (MLE)		94.31		nu star (bias corrected)		91.54					
120	MLE Mean (bias corrected)		28.32		MLE Sd (bias corrected)		34.77					
121					Approximate Chi Square Value (0.05)		70.48					
122	Adjusted Level of Significance		0.0465		Adjusted Chi Square Value		70.09					
123												
124	Assuming Gamma Distribution											
125	95% Approximate Gamma UCL (use when n>=50)		36.78		95% Adjusted Gamma UCL (use when n<50)		36.99					
126												
127	Lognormal GOF Test											
128	Shapiro Wilk Test Statistic		0.968		Shapiro Wilk Lognormal GOF Test							
129	5% Shapiro Wilk P Value		0.206		Data appear Lognormal at 5% Significance Level							
130	Lilliefors Test Statistic		0.0634		Lilliefors Lognormal GOF Test							
131	5% Lilliefors Critical Value		0.107		Data appear Lognormal at 5% Significance Level							
132	Data appear Lognormal at 5% Significance Level											
133												
134	Lognormal Statistics											
135	Minimum of Logged Data		0		Mean of logged Data		2.456					
136	Maximum of Logged Data		5.789		SD of logged Data		1.329					
137												
138	Assuming Lognormal Distribution											
139	95% H-UCL		39.71		90% Chebyshev (MVUE) UCL		44.74					
140	95% Chebyshev (MVUE) UCL		52.53		97.5% Chebyshev (MVUE) UCL		63.33					
141	99% Chebyshev (MVUE) UCL		84.56									
142												
143	Nonparametric Distribution Free UCL Statistics											
144	Data appear to follow a Discernible Distribution at 5% Significance Level											
145												
146	Nonparametric Distribution Free UCLs											
147	95% CLT UCL		39.35		95% Jackknife UCL		39.5					
148	95% Standard Bootstrap UCL		39.6		95% Bootstrap-t UCL		55.53					
149	95% Hall's Bootstrap UCL		94.75		95% Percentile Bootstrap UCL		40					
150	95% BCA Bootstrap UCL		44.59									
151	90% Chebyshev(Mean, Sd) UCL		48.43		95% Chebyshev(Mean, Sd) UCL		57.55					
152	97.5% Chebyshev(Mean, Sd) UCL		70.19		99% Chebyshev(Mean, Sd) UCL		95.03					
153												
154	Suggested UCL to Use											
155	95% Approximate Gamma UCL		36.78									
156												
157	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
158	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
159												
160	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
161	Recommendations are based upon data size, data distribution, and skewness.											
162	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
163	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
164												
165												
166	Perfluoro-n-octanoate acid (PFOA) (Zone A)											
167												
168	General Statistics											
169	Total Number of Observations		0		Number of Distinct Observations		0					
170					Number of Missing Observations		29					
171	Minimum		N/A		Mean		N/A					
172	Maximum		N/A		Median		N/A					
173												
174	Warning: This data set only has 0 observations!											
175	Data set is too small to compute reliable and meaningful statistics and estimates!											
176	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone A) was not processed!											
177												
178	It is suggested to collect at least 8 to 10 observations before using these statistical methods!											
179	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.											
180												

A	B	C	D	E	F	G	H	I	J	K	L	
242	Nonparametric Distribution Free UCLs											
243	95% CLT UCL			82.28	95% Jackknife UCL			83.63				
244	95% Standard Bootstrap UCL			82.26	95% Bootstrap-t UCL			257.5				
245	95% Hall's Bootstrap UCL			240.9	95% Percentile Bootstrap UCL			85.82				
246	95% BCA Bootstrap UCL			102								
247	90% Chebyshev(Mean, Sd) UCL			111.1	95% Chebyshev(Mean, Sd) UCL			140.1				
248	97.5% Chebyshev(Mean, Sd) UCL			180.2	99% Chebyshev(Mean, Sd) UCL			259.1				
249												
250	Suggested UCL to Use											
251	95% H-UCL			100.6								
252												
253	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
254	Recommendations are based upon data size, data distribution, and skewness.											
255	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
256	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
257												
258	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
259	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.											
260	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
261	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											
262												
263												
264	Perfluoro-n-octane sulfonic acid (PFOS) (Zone D)											
265												
266	General Statistics											
267	Total Number of Observations			238	Number of Distinct Observations			168				
268					Number of Missing Observations			110				
269	Minimum			0.5	Mean			1145				
270	Maximum			70590	Median			28.5				
271	SD			6085	Std. Error of Mean			394.4				
272	Coefficient of Variation			5.316	Skewness			8.565				
273												
274	Normal GOF Test											
275	Shapiro Wilk Test Statistic			0.212	Shapiro Wilk GOF Test							
276	5% Shapiro Wilk P Value			0	Data Not Normal at 5% Significance Level							
277	Lilliefors Test Statistic			0.425	Lilliefors GOF Test							
278	5% Lilliefors Critical Value			0.0578	Data Not Normal at 5% Significance Level							
279	Data Not Normal at 5% Significance Level											
280												
281	Assuming Normal Distribution											
282	95% Normal UCL				95% UCLs (Adjusted for Skewness)							
283	95% Student's-t UCL			1796	95% Adjusted-CLT UCL (Chen-1995)			2027				
284					95% Modified-t UCL (Johnson-1978)			1832				
285												
286	Gamma GOF Test											
287	A-D Test Statistic			26.39	Anderson-Darling Gamma GOF Test							
288	5% A-D Critical Value			0.919	Data Not Gamma Distributed at 5% Significance Level							
289	K-S Test Statistic			0.261	Kolmogorov-Smirnov Gamma GOF Test							
290	5% K-S Critical Value			0.0658	Data Not Gamma Distributed at 5% Significance Level							
291	Data Not Gamma Distributed at 5% Significance Level											
292												
293	Gamma Statistics											
294	k hat (MLE)			0.204	k star (bias corrected MLE)			0.204				
295	Theta hat (MLE)			5622	Theta star (bias corrected MLE)			5615				
296	nu hat (MLE)			96.91	nu star (bias corrected)			97.02				
297	MLE Mean (bias corrected)			1145	MLE Sd (bias corrected)			2535				
298					Approximate Chi Square Value (0.05)			75.3				
299	Adjusted Level of Significance			0.049	Adjusted Chi Square Value			75.19				
300												
301	Assuming Gamma Distribution											
302	95% Approximate Gamma UCL (use when n>=50))			1475	95% Adjusted Gamma UCL (use when n<50)			1477				
303												
304	Lognormal GOF Test											
305	Shapiro Wilk Test Statistic			0.949	Shapiro Wilk Lognormal GOF Test							
306	5% Shapiro Wilk P Value			1.9123E-8	Data Not Lognormal at 5% Significance Level							
307	Lilliefors Test Statistic			0.0735	Lilliefors Lognormal GOF Test							
308	5% Lilliefors Critical Value			0.0578	Data Not Lognormal at 5% Significance Level							
309	Data Not Lognormal at 5% Significance Level											

A	B	C	D	E	F	G	H	I	J	K	L
310	Lognormal Statistics										
311											
312	Minimum of Logged Data			-0.693		Mean of logged Data			3.438		
313	Maximum of Logged Data			11.16		SD of logged Data			2.517		
314	Assuming Lognormal Distribution										
315											
316	95% H-UCL			1371		90% Chebyshev (MVUE) UCL			1350		
317	95% Chebyshev (MVUE) UCL			1645		97.5% Chebyshev (MVUE) UCL			2053		
318	99% Chebyshev (MVUE) UCL			2856							
319	Nonparametric Distribution Free UCL Statistics										
320	Data do not follow a Discernible Distribution (0.05)										
321											
322	Nonparametric Distribution Free UCLs										
323											
324	95% CLT UCL			1793		95% Jackknife UCL			1796		
325	95% Standard Bootstrap UCL			1819		95% Bootstrap-t UCL			2433		
326	95% Hall's Bootstrap UCL			2664		95% Percentile Bootstrap UCL			1849		
327	95% BCA Bootstrap UCL			2139							
328	90% Chebyshev(Mean, Sd) UCL			2328		95% Chebyshev(Mean, Sd) UCL			2864		
329	97.5% Chebyshev(Mean, Sd) UCL			3608		99% Chebyshev(Mean, Sd) UCL			5069		
330	Suggested UCL to Use										
331	95% Chebyshev (Mean, Sd) UCL			2864							
332											
333											
334	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
335	Recommendations are based upon data size, data distribution, and skewness.										
336	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
337	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
338											
339											
340	Perfluoro-n-octane sulfonic acid (PFOS) (Zone B)										
341											
342	General Statistics										
343	Total Number of Observations			109		Number of Distinct Observations			89		
344						Number of Missing Observations			28		
345	Minimum			1.4		Mean			1873		
346	Maximum			39000		Median			130		
347	SD			6715		Std. Error of Mean			643.2		
348	Coefficient of Variation			3.586		Skewness			4.552		
349	Normal GOF Test										
350											
351	Shapiro Wilk Test Statistic			0.304		Shapiro Wilk GOF Test					
352	5% Shapiro Wilk P Value			0		Data Not Normal at 5% Significance Level					
353	Lilliefors Test Statistic			0.418		Lilliefors GOF Test					
354	5% Lilliefors Critical Value			0.0852		Data Not Normal at 5% Significance Level					
355	Data Not Normal at 5% Significance Level										
356											
357	Assuming Normal Distribution										
358	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
359	95% Student's-t UCL			2940		95% Adjusted-CLT UCL (Chen-1995)			3230		
360						95% Modified-t UCL (Johnson-1978)			2987		
361											
362	Gamma GOF Test										
363	A-D Test Statistic			11.38		Anderson-Darling Gamma GOF Test					
364	5% A-D Critical Value			0.882		Data Not Gamma Distributed at 5% Significance Level					
365	K-S Test Statistic			0.256		Kolmogorov-Smirnov Gamma GOF Test					
366	5% K-S Critical Value			0.0952		Data Not Gamma Distributed at 5% Significance Level					
367	Data Not Gamma Distributed at 5% Significance Level										
368											
369	Gamma Statistics										
370	k hat (MLE)			0.272		k star (bias corrected MLE)			0.27		
371	Theta hat (MLE)			6891		Theta star (bias corrected MLE)			6926		
372	nu hat (MLE)			59.25		nu star (bias corrected)			58.95		
373	MLE Mean (bias corrected)			1873		MLE Sd (bias corrected)			3601		
374						Approximate Chi Square Value (0.05)			42.3		
375	Adjusted Level of Significance			0.0478		Adjusted Chi Square Value			42.11		
376											
377	Assuming Gamma Distribution										
378	95% Approximate Gamma UCL (use when n>=50)			2610		95% Adjusted Gamma UCL (use when n<50)			2622		

A	B	C	D	E	F	G	H	I	J	K	L
379											
380	Lognormal GOF Test										
381	Shapiro Wilk Test Statistic	0.955	Shapiro Wilk Lognormal GOF Test								
382	5% Shapiro Wilk P Value	0.00469	Data Not Lognormal at 5% Significance Level								
383	Lilliefors Test Statistic	0.0675	Lilliefors Lognormal GOF Test								
384	5% Lilliefors Critical Value	0.0852	Data appear Lognormal at 5% Significance Level								
385	Data appear Approximate Lognormal at 5% Significance Level										
386											
387	Lognormal Statistics										
388	Minimum of Logged Data	0.336								Mean of logged Data	4.957
389	Maximum of Logged Data	10.57								SD of logged Data	2.064
390											
391	Assuming Lognormal Distribution										
392	95% H-UCL	2346								90% Chebyshev (MVUE) UCL	2207
393	95% Chebyshev (MVUE) UCL	2695								97.5% Chebyshev (MVUE) UCL	3373
394	99% Chebyshev (MVUE) UCL	4704									
395											
396	Nonparametric Distribution Free UCL Statistics										
397	Data appear to follow a Discernible Distribution at 5% Significance Level										
398											
399	Nonparametric Distribution Free UCLs										
400	95% CLT UCL	2931								95% Jackknife UCL	2940
401	95% Standard Bootstrap UCL	2932								95% Bootstrap-t UCL	3620
402	95% Hall's Bootstrap UCL	2888								95% Percentile Bootstrap UCL	3023
403	95% BCA Bootstrap UCL	3223									
404	90% Chebyshev(Mean, Sd) UCL	3802								95% Chebyshev(Mean, Sd) UCL	4676
405	97.5% Chebyshev(Mean, Sd) UCL	5890								99% Chebyshev(Mean, Sd) UCL	8273
406											
407	Suggested UCL to Use										
408	95% H-UCL	2346									
409											
410	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
411	Recommendations are based upon data size, data distribution, and skewness.										
412	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
413	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
414											
415	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.										
416	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.										
417	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.										
418	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.										
419											
420											
421	Perfluoro-n-octane sulfonic acid (PFOS) (Zone A)										
422											
423	General Statistics										
424	Total Number of Observations	13								Number of Distinct Observations	9
425										Number of Missing Observations	16
426	Minimum	9.6								Mean	18.82
427	Maximum	35								Median	16
428	SD	8.636								Std. Error of Mean	2.395
429	Coefficient of Variation	0.459								Skewness	0.873
430											
431	Normal GOF Test										
432	Shapiro Wilk Test Statistic	0.864	Shapiro Wilk GOF Test								
433	5% Shapiro Wilk Critical Value	0.866	Data Not Normal at 5% Significance Level								
434	Lilliefors Test Statistic	0.243	Lilliefors GOF Test								
435	5% Lilliefors Critical Value	0.234	Data Not Normal at 5% Significance Level								
436	Data Not Normal at 5% Significance Level										
437											
438	Assuming Normal Distribution										
439	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
440	95% Student's-t UCL	23.08								95% Adjusted-CLT UCL (Chen-1995)	23.37
441										95% Modified-t UCL (Johnson-1978)	23.18
442											
443	Gamma GOF Test										
444	A-D Test Statistic	0.56	Anderson-Darling Gamma GOF Test								
445	5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level								
446	K-S Test Statistic	0.208	Kolmogorov-Smimov Gamma GOF Test								
447	5% K-S Critical Value	0.237	Detected data appear Gamma Distributed at 5% Significance Level								
448	Detected data appear Gamma Distributed at 5% Significance Level										

A	B	C	D	E	F	G	H	I	J	K	L
449	Gamma Statistics										
450											
451	k hat (MLE)		5.695		k star (bias corrected MLE)		4.432				
452	Theta hat (MLE)		3.304		Theta star (bias corrected MLE)		4.246				
453	nu hat (MLE)		148.1		nu star (bias corrected)		115.2				
454	MLE Mean (bias corrected)		18.82		MLE Sd (bias corrected)		8.938				
455					Approximate Chi Square Value (0.05)		91.44				
456	Adjusted Level of Significance		0.0301		Adjusted Chi Square Value		88.43				
457	Assuming Gamma Distribution										
458											
459	95% Approximate Gamma UCL (use when n>=50)		23.71		95% Adjusted Gamma UCL (use when n<50)		24.52				
460	Lognormal GOF Test										
461											
462	Shapiro Wilk Test Statistic		0.92		Shapiro Wilk Lognormal GOF Test						
463	5% Shapiro Wilk Critical Value		0.866		Data appear Lognormal at 5% Significance Level						
464	Lilliefors Test Statistic		0.181		Lilliefors Lognormal GOF Test						
465	5% Lilliefors Critical Value		0.234		Data appear Lognormal at 5% Significance Level						
466	Data appear Lognormal at 5% Significance Level										
467											
468	Lognormal Statistics										
469	Minimum of Logged Data		2.262		Mean of logged Data		2.844				
470	Maximum of Logged Data		3.555		SD of logged Data		0.435				
471	Assuming Lognormal Distribution										
472											
473	95% H-UCL		24.41		90% Chebyshev (MVUE) UCL		25.67				
474	95% Chebyshev (MVUE) UCL		28.8		97.5% Chebyshev (MVUE) UCL		33.16				
475	99% Chebyshev (MVUE) UCL		41.7								
476											
477	Nonparametric Distribution Free UCL Statistics										
478	Data appear to follow a Discernible Distribution at 5% Significance Level										
479											
480	Nonparametric Distribution Free UCLs										
481	95% CLT UCL		22.76		95% Jackknife UCL		23.08				
482	95% Standard Bootstrap UCL		22.53		95% Bootstrap-t UCL		24.01				
483	95% Hall's Bootstrap UCL		22.69		95% Percentile Bootstrap UCL		22.77				
484	95% BCA Bootstrap UCL		22.86								
485	90% Chebyshev(Mean, Sd) UCL		26		95% Chebyshev(Mean, Sd) UCL		29.26				
486	97.5% Chebyshev(Mean, Sd) UCL		33.77		99% Chebyshev(Mean, Sd) UCL		42.65				
487											
488	Suggested UCL to Use										
489	95% Adjusted Gamma UCL		24.52								
490											
491	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
492	Recommendations are based upon data size, data distribution, and skewness.										
493	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
494	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
495											
496											
497	Perfluoro-n-octane sulfonic acid (PFOS) (Zone C)										
498											
499	General Statistics										
500	Total Number of Observations		179		Number of Distinct Observations		128				
501					Number of Missing Observations		131				
502	Minimum		2.3		Mean		938.2				
503	Maximum		9100		Median		231				
504	SD		1648		Std. Error of Mean		123.2				
505	Coefficient of Variation		1.756		Skewness		2.792				
506											
507	Normal GOF Test										
508	Shapiro Wilk Test Statistic		0.612		Shapiro Wilk GOF Test						
509	5% Shapiro Wilk P Value		0		Data Not Normal at 5% Significance Level						
510	Lilliefors Test Statistic		0.285		Lilliefors GOF Test						
511	5% Lilliefors Critical Value		0.0666		Data Not Normal at 5% Significance Level						
512	Data Not Normal at 5% Significance Level										
513											
514	Assuming Normal Distribution										
515	95% Normal UCL				95% UCLs (Adjusted for Skewness)						
516	95% Student's-t UCL		1142		95% Adjusted-CLT UCL (Chen-1995)		1168				
517					95% Modified-t UCL (Johnson-1978)		1146				
518											

	A	B	C	D	E	F	G	H	I	J	K	L
519	Gamma GOF Test											
520	A-D Test Statistic		3.698		Anderson-Darling Gamma GOF Test							
521	5% A-D Critical Value		0.845		Data Not Gamma Distributed at 5% Significance Level							
522	K-S Test Statistic		0.126		Kolmogorov-Smirnov Gamma GOF Test							
523	5% K-S Critical Value		0.074		Data Not Gamma Distributed at 5% Significance Level							
524	Data Not Gamma Distributed at 5% Significance Level											
525												
526	Gamma Statistics											
527	k hat (MLE)		0.4		k star (bias corrected MLE)		0.397					
528	Theta hat (MLE)		2345		Theta star (bias corrected MLE)		2362					
529	nu hat (MLE)		143.2		nu star (bias corrected)		142.2					
530	MLE Mean (bias corrected)		938.2		MLE Sd (bias corrected)		1489					
531					Approximate Chi Square Value (0.05)				115.6			
532	Adjusted Level of Significance		0.0487		Adjusted Chi Square Value		115.4					
533												
534	Assuming Gamma Distribution											
535	95% Approximate Gamma UCL (use when n>=50))		1154		95% Adjusted Gamma UCL (use when n<50)		1156					
536												
537	Lognormal GOF Test											
538	Shapiro Wilk Test Statistic		0.935		Shapiro Wilk Lognormal GOF Test							
539	5% Shapiro Wilk P Value		1.6070E-9		Data Not Lognormal at 5% Significance Level							
540	Lilliefors Test Statistic		0.093		Lilliefors Lognormal GOF Test							
541	5% Lilliefors Critical Value		0.0666		Data Not Lognormal at 5% Significance Level							
542	Data Not Lognormal at 5% Significance Level											
543												
544	Lognormal Statistics											
545	Minimum of Logged Data		0.833		Mean of logged Data		5.2					
546	Maximum of Logged Data		9.116		SD of logged Data		2.111					
547												
548	Assuming Lognormal Distribution											
549	95% H-UCL		2852		90% Chebyshev (MVUE) UCL		2911					
550	95% Chebyshev (MVUE) UCL		3496		97.5% Chebyshev (MVUE) UCL		4309					
551	99% Chebyshev (MVUE) UCL		5905									
552												
553	Nonparametric Distribution Free UCL Statistics											
554	Data do not follow a Discernible Distribution (0.05)											
555												
556	Nonparametric Distribution Free UCLs											
557	95% CLT UCL		1141		95% Jackknife UCL		1142					
558	95% Standard Bootstrap UCL		1137		95% Bootstrap-t UCL		1184					
559	95% Hall's Bootstrap UCL		1170		95% Percentile Bootstrap UCL		1160					
560	95% BCA Bootstrap UCL		1183									
561	90% Chebyshev(Mean, Sd) UCL		1308		95% Chebyshev(Mean, Sd) UCL		1475					
562	97.5% Chebyshev(Mean, Sd) UCL		1707		99% Chebyshev(Mean, Sd) UCL		2164					
563												
564	Suggested UCL to Use											
565	95% Chebyshev (Mean, Sd) UCL		1475									
566												
567	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
568	Recommendations are based upon data size, data distribution, and skewness.											
569	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
570	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
571												

A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets										
2	All Surface Water by AEC										
3	User Selected Options										
4	Date/Time of Computation		ProUCL 5.17/3/2018 10:05:10 AM								
5	From File		Data_Darwin_surface water for ProUCL_20180703_c.xls								
6	Full Precision		OFF								
7	Confidence Coefficient		95%								
8	Number of Bootstrap Operations		2000								
9											
10											
11	Perfluoro-n-octanoate acid (PFOA) (Zone D drain)										
12											
13	General Statistics										
14	Total Number of Observations			10		Number of Distinct Observations			4		
15							Number of Missing Observations			39	
16	Minimum			0.01		Mean			0.021		
17	Maximum			0.05		Median			0.02		
18	SD			0.0129		Std. Error of Mean			0.00407		
19	Coefficient of Variation			0.613		Skewness			1.338		
20											
21	Normal GOF Test										
22	Shapiro Wilk Test Statistic			0.824		Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value			0.842		Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic			0.231		Lilliefors GOF Test					
25	5% Lilliefors Critical Value			0.262		Data appear Normal at 5% Significance Level					
26	Data appear Approximate Normal at 5% Significance Level										
27											
28	Assuming Normal Distribution										
29	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
30	95% Student's-t UCL			0.0285		95% Adjusted-CLT UCL (Chen-1995)			0.0295		
31						95% Modified-t UCL (Johnson-1978)			0.0287		
32											
33	Gamma GOF Test										
34	A-D Test Statistic			0.633		Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value			0.731		Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic			0.249		Kolmogorov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value			0.268		Detected data appear Gamma Distributed at 5% Significance Level					
38	Detected data appear Gamma Distributed at 5% Significance Level										
39											
40	Gamma Statistics										
41	k hat (MLE)			3.419		k star (bias corrected MLE)			2.46		
42	Theta hat (MLE)			0.00614		Theta star (bias corrected MLE)			0.00854		
43	nu hat (MLE)			68.37		nu star (bias corrected)			49.19		
44	MLE Mean (bias corrected)			0.021		MLE Sd (bias corrected)			0.0134		
45						Approximate Chi Square Value (0.05)			34.09		
46	Adjusted Level of Significance			0.0267		Adjusted Chi Square Value			31.92		
47											
48	Assuming Gamma Distribution										
49	95% Approximate Gamma UCL (use when n>=50))			0.0303		95% Adjusted Gamma UCL (use when n<50)			0.0324		
50											
51	Lognormal GOF Test										
52	Shapiro Wilk Test Statistic			0.864		Shapiro Wilk Lognormal GOF Test					
53	5% Shapiro Wilk Critical Value			0.842		Data appear Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic			0.247		Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value			0.262		Data appear Lognormal at 5% Significance Level					

	A	B	C	D	E	F	G	H	I	J	K	L
56	Data appear Lognormal at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
57												
58	Lognormal Statistics											
59	Minimum of Logged Data				-4.605		Mean of logged Data				-4.017	
60	Maximum of Logged Data				-2.996		SD of logged Data				0.576	
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL				0.0332		90% Chebyshev (MVUE) UCL				0.0325	
64	95% Chebyshev (MVUE) UCL				0.0378		97.5% Chebyshev (MVUE) UCL				0.0451	
65	99% Chebyshev (MVUE) UCL				0.0595							
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution at 5% Significance Level											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL				0.0277		95% Jackknife UCL				0.0285	
72	95% Standard Bootstrap UCL				N/A		95% Bootstrap-t UCL				N/A	
73	95% Hall's Bootstrap UCL				N/A		95% Percentile Bootstrap UCL				N/A	
74	95% BCA Bootstrap UCL				N/A							
75	90% Chebyshev(Mean, Sd) UCL				0.0332		95% Chebyshev(Mean, Sd) UCL				0.0387	
76	97.5% Chebyshev(Mean, Sd) UCL				0.0464		99% Chebyshev(Mean, Sd) UCL				0.0615	
77												
78	Suggested UCL to Use											
79	95% Student's-t UCL				0.0285							
80												
81	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
82	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
83												
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
85	Recommendations are based upon data size, data distribution, and skewness.											
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
88												
89												
90	Perfluoro-n-octanoate acid (PFOA) (Zone B drain)											
91												
92	General Statistics											
93	Total Number of Observations				16		Number of Distinct Observations				10	
94							Number of Missing Observations				7	
95	Minimum				0.01		Mean				0.102	
96	Maximum				0.49		Median				0.05	
97	SD				0.126		Std. Error of Mean				0.0316	
98	Coefficient of Variation				1.241		Skewness				2.567	
99												
100	Normal GOF Test											
101	Shapiro Wilk Test Statistic				0.593		Shapiro Wilk GOF Test					
102	5% Shapiro Wilk Critical Value				0.887		Data Not Normal at 5% Significance Level					
103	Lilliefors Test Statistic				0.319		Lilliefors GOF Test					
104	5% Lilliefors Critical Value				0.213		Data Not Normal at 5% Significance Level					
105	Data Not Normal at 5% Significance Level											
106												
107	Assuming Normal Distribution											
108	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
109	95% Student's-t UCL				0.157		95% Adjusted-CLT UCL (Chen-1995)				0.176	
110							95% Modified-t UCL (Johnson-1978)				0.161	
111												

	A	B	C	D	E	F	G	H	I	J	K	L
112	Gamma GOF Test											
113	A-D Test Statistic				1.535		Anderson-Darling Gamma GOF Test					
114	5% A-D Critical Value				0.758		Data Not Gamma Distributed at 5% Significance Level					
115	K-S Test Statistic				0.235		Kolmogorov-Smirnov Gamma GOF Test					
116	5% K-S Critical Value				0.22		Data Not Gamma Distributed at 5% Significance Level					
117	Data Not Gamma Distributed at 5% Significance Level											
118												
119	Gamma Statistics											
120	k hat (MLE)				1.294		k star (bias corrected MLE)				1.093	
121	Theta hat (MLE)				0.0787		Theta star (bias corrected MLE)				0.0932	
122	nu hat (MLE)				41.41		nu star (bias corrected)				34.98	
123	MLE Mean (bias corrected)				0.102		MLE Sd (bias corrected)				0.0974	
124							Approximate Chi Square Value (0.05)				22.45	
125	Adjusted Level of Significance				0.0335		Adjusted Chi Square Value				21.31	
126												
127	Assuming Gamma Distribution											
128	95% Approximate Gamma UCL (use when n>=50))				0.159		95% Adjusted Gamma UCL (use when n<50)				0.167	
129												
130	Lognormal GOF Test											
131	Shapiro Wilk Test Statistic				0.877		Shapiro Wilk Lognormal GOF Test					
132	5% Shapiro Wilk Critical Value				0.887		Data Not Lognormal at 5% Significance Level					
133	Lilliefors Test Statistic				0.224		Lilliefors Lognormal GOF Test					
134	5% Lilliefors Critical Value				0.213		Data Not Lognormal at 5% Significance Level					
135	Data Not Lognormal at 5% Significance Level											
136												
137	Lognormal Statistics											
138	Minimum of Logged Data				-4.605		Mean of logged Data				-2.718	
139	Maximum of Logged Data				-0.713		SD of logged Data				0.89	
140												
141	Assuming Lognormal Distribution											
142	95% H-UCL				0.176		90% Chebyshev (MVUE) UCL				0.164	
143	95% Chebyshev (MVUE) UCL				0.195		97.5% Chebyshev (MVUE) UCL				0.238	
144	99% Chebyshev (MVUE) UCL				0.323							
145												
146	Nonparametric Distribution Free UCL Statistics											
147	Data do not follow a Discernible Distribution (0.05)											
148												
149	Nonparametric Distribution Free UCLs											
150	95% CLT UCL				0.154		95% Jackknife UCL				0.157	
151	95% Standard Bootstrap UCL				0.153		95% Bootstrap-t UCL				0.313	
152	95% Hall's Bootstrap UCL				0.427		95% Percentile Bootstrap UCL				0.156	
153	95% BCA Bootstrap UCL				0.173							
154	90% Chebyshev(Mean, Sd) UCL				0.197		95% Chebyshev(Mean, Sd) UCL				0.24	
155	97.5% Chebyshev(Mean, Sd) UCL				0.299		99% Chebyshev(Mean, Sd) UCL				0.416	
156												
157	Suggested UCL to Use											
158	95% Chebyshev (Mean, Sd) UCL				0.24							
159												
160	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
161	Recommendations are based upon data size, data distribution, and skewness.											
162	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
163	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
164												
165												

A	B	C	D	E	F	G	H	I	J	K	L
166	Perfluoro-n-octanoate acid (PFOA) (Iudmilla creek)										
167											
168	General Statistics										
169	Total Number of Observations			20		Number of Distinct Observations			14		
170						Number of Missing Observations			22		
171	Minimum			0.002		Mean			0.0716		
172	Maximum			0.19		Median			0.065		
173	SD			0.0533		Std. Error of Mean			0.0119		
174	Coefficient of Variation			0.744		Skewness			0.522		
175											
176	Normal GOF Test										
177	Shapiro Wilk Test Statistic			0.92		Shapiro Wilk GOF Test					
178	5% Shapiro Wilk Critical Value			0.905		Data appear Normal at 5% Significance Level					
179	Lilliefors Test Statistic			0.182		Lilliefors GOF Test					
180	5% Lilliefors Critical Value			0.192		Data appear Normal at 5% Significance Level					
181	Data appear Normal at 5% Significance Level										
182											
183	Assuming Normal Distribution										
184	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
185	95% Student's-t UCL			0.0922		95% Adjusted-CLT UCL (Chen-1995)			0.0927		
186						95% Modified-t UCL (Johnson-1978)			0.0924		
187											
188	Gamma GOF Test										
189	A-D Test Statistic			0.472		Anderson-Darling Gamma GOF Test					
190	5% A-D Critical Value			0.761		Detected data appear Gamma Distributed at 5% Significance Level					
191	K-S Test Statistic			0.143		Kolmogorov-Smirnov Gamma GOF Test					
192	5% K-S Critical Value			0.198		Detected data appear Gamma Distributed at 5% Significance Level					
193	Detected data appear Gamma Distributed at 5% Significance Level										
194											
195	Gamma Statistics										
196	k hat (MLE)			1.362		k star (bias corrected MLE)			1.191		
197	Theta hat (MLE)			0.0526		Theta star (bias corrected MLE)			0.0601		
198	nu hat (MLE)			54.47		nu star (bias corrected)			47.63		
199	MLE Mean (bias corrected)			0.0716		MLE Sd (bias corrected)			0.0656		
200						Approximate Chi Square Value (0.05)			32.79		
201	Adjusted Level of Significance			0.038		Adjusted Chi Square Value			31.82		
202											
203	Assuming Gamma Distribution										
204	95% Approximate Gamma UCL (use when n>=50))			0.104		95% Adjusted Gamma UCL (use when n<50)			0.107		
205											
206	Lognormal GOF Test										
207	Shapiro Wilk Test Statistic			0.889		Shapiro Wilk Lognormal GOF Test					
208	5% Shapiro Wilk Critical Value			0.905		Data Not Lognormal at 5% Significance Level					
209	Lilliefors Test Statistic			0.136		Lilliefors Lognormal GOF Test					
210	5% Lilliefors Critical Value			0.192		Data appear Lognormal at 5% Significance Level					
211	Data appear Approximate Lognormal at 5% Significance Level										
212											
213	Lognormal Statistics										
214	Minimum of Logged Data			-6.215		Mean of logged Data			-3.047		
215	Maximum of Logged Data			-1.661		SD of logged Data			1.115		
216											
217	Assuming Lognormal Distribution										
218	95% H-UCL			0.181		90% Chebyshev (MVUE) UCL			0.156		
219	95% Chebyshev (MVUE) UCL			0.189		97.5% Chebyshev (MVUE) UCL			0.234		
220	99% Chebyshev (MVUE) UCL			0.323							

A	B	C	D	E	F	G	H	I	J	K	L	
221												
222	Nonparametric Distribution Free UCL Statistics											
223	Data appear to follow a Discernible Distribution at 5% Significance Level											
224												
225	Nonparametric Distribution Free UCLs											
226	95% CLT UCL			0.0912	95% Jackknife UCL			0.0922				
227	95% Standard Bootstrap UCL			0.091	95% Bootstrap-t UCL			0.0931				
228	95% Hall's Bootstrap UCL			0.0926	95% Percentile Bootstrap UCL			0.091				
229	95% BCA Bootstrap UCL			0.0921								
230	90% Chebyshev(Mean, Sd) UCL			0.107	95% Chebyshev(Mean, Sd) UCL			0.124				
231	97.5% Chebyshev(Mean, Sd) UCL			0.146	99% Chebyshev(Mean, Sd) UCL			0.19				
232												
233	Suggested UCL to Use											
234	95% Student's-t UCL			0.0922								
235												
236	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
237	Recommendations are based upon data size, data distribution, and skewness.											
238	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
239	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
240												
241												
242	Perfluoro-n-octanoate acid (PFOA) (Zone A drain)											
243												
244	General Statistics											
245	Total Number of Observations			9	Number of Distinct Observations			6				
246					Number of Missing Observations			7				
247	Minimum			0.01	Mean			0.0433				
248	Maximum			0.09	Median			0.05				
249	SD			0.0255	Std. Error of Mean			0.0085				
250	Coefficient of Variation			0.588	Skewness			0.453				
251												
252	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
253	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
254	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
255	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
256												
257	Normal GOF Test											
258	Shapiro Wilk Test Statistic			0.939	Shapiro Wilk GOF Test							
259	5% Shapiro Wilk Critical Value			0.829	Data appear Normal at 5% Significance Level							
260	Lilliefors Test Statistic			0.159	Lilliefors GOF Test							
261	5% Lilliefors Critical Value			0.274	Data appear Normal at 5% Significance Level							
262	Data appear Normal at 5% Significance Level											
263												
264	Assuming Normal Distribution											
265	95% Normal UCL				95% UCLs (Adjusted for Skewness)							
266	95% Student's-t UCL			0.0591	95% Adjusted-CLT UCL (Chen-1995)			0.0587				
267					95% Modified-t UCL (Johnson-1978)			0.0594				
268												
269	Gamma GOF Test											
270	A-D Test Statistic			0.335	Anderson-Darling Gamma GOF Test							
271	5% A-D Critical Value			0.727	Detected data appear Gamma Distributed at 5% Significance Level							
272	K-S Test Statistic			0.227	Kolmogorov-Smirnov Gamma GOF Test							
273	5% K-S Critical Value			0.282	Detected data appear Gamma Distributed at 5% Significance Level							
274	Detected data appear Gamma Distributed at 5% Significance Level											
275												

	A	B	C	D	E	F	G	H	I	J	K	L
276	Gamma Statistics											
277	k hat (MLE)				2.783		k star (bias corrected MLE)				1.93	
278	Theta hat (MLE)				0.0156		Theta star (bias corrected MLE)				0.0225	
279	nu hat (MLE)				50.1		nu star (bias corrected)				34.73	
280	MLE Mean (bias corrected)				0.0433		MLE Sd (bias corrected)				0.0312	
281							Approximate Chi Square Value (0.05)				22.25	
282	Adjusted Level of Significance				0.0231		Adjusted Chi Square Value				20.17	
283												
284	Assuming Gamma Distribution											
285	95% Approximate Gamma UCL (use when n>=50))				0.0676		95% Adjusted Gamma UCL (use when n<50)				0.0746	
286												
287	Lognormal GOF Test											
288	Shapiro Wilk Test Statistic				0.931		Shapiro Wilk Lognormal GOF Test					
289	5% Shapiro Wilk Critical Value				0.829		Data appear Lognormal at 5% Significance Level					
290	Lilliefors Test Statistic				0.238		Lilliefors Lognormal GOF Test					
291	5% Lilliefors Critical Value				0.274		Data appear Lognormal at 5% Significance Level					
292	Data appear Lognormal at 5% Significance Level											
293												
294	Lognormal Statistics											
295	Minimum of Logged Data				-4.605		Mean of logged Data				-3.329	
296	Maximum of Logged Data				-2.408		SD of logged Data				0.702	
297												
298	Assuming Lognormal Distribution											
299	95% H-UCL				0.0879		90% Chebyshev (MVUE) UCL				0.0763	
300	95% Chebyshev (MVUE) UCL				0.0908		97.5% Chebyshev (MVUE) UCL				0.111	
301	99% Chebyshev (MVUE) UCL				0.15							
302												
303	Nonparametric Distribution Free UCL Statistics											
304	Data appear to follow a Discernible Distribution at 5% Significance Level											
305												
306	Nonparametric Distribution Free UCLs											
307	95% CLT UCL				0.0573		95% Jackknife UCL				0.0591	
308	95% Standard Bootstrap UCL				0.0565		95% Bootstrap-t UCL				0.0615	
309	95% Hall's Bootstrap UCL				0.0585		95% Percentile Bootstrap UCL				0.0567	
310	95% BCA Bootstrap UCL				0.0567							
311	90% Chebyshev(Mean, Sd) UCL				0.0688		95% Chebyshev(Mean, Sd) UCL				0.0804	
312	97.5% Chebyshev(Mean, Sd) UCL				0.0964		99% Chebyshev(Mean, Sd) UCL				0.128	
313												
314	Suggested UCL to Use											
315	95% Student's-t UCL				0.0591							
316												
317	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
318	Recommendations are based upon data size, data distribution, and skewness.											
319	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
320	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
321												
322												

A	B	C	D	E	F	G	H	I	J	K	L	
323	Perfluoro-n-octanoate acid (PFOA) (rapid creek estuary)											
324												
325	General Statistics											
326	Total Number of Observations			3	Number of Distinct Observations			2				
327					Number of Missing Observations			14				
328	Minimum			0.01	Mean			0.0133				
329	Maximum			0.02	Median			0.01				
330	SD			0.00577	Std. Error of Mean			0.00333				
331	Coefficient of Variation			0.433	Skewness			1.732				
332												
333	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
334	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
335	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
336	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
337												
338	Normal GOF Test											
339	Shapiro Wilk Test Statistic			0.75	Shapiro Wilk GOF Test							
340	5% Shapiro Wilk Critical Value			0.767	Data Not Normal at 5% Significance Level							
341	Lilliefors Test Statistic			0.385	Lilliefors GOF Test							
342	5% Lilliefors Critical Value			0.425	Data appear Normal at 5% Significance Level							
343	Data appear Approximate Normal at 5% Significance Level											
344												
345	Assuming Normal Distribution											
346	95% Normal UCL				95% UCLs (Adjusted for Skewness)							
347	95% Student's-t UCL			0.0231	95% Adjusted-CLT UCL (Chen-1995)			0.0224				
348					95% Modified-t UCL (Johnson-1978)			0.0236				
349												
350	Gamma GOF Test											
351	Not Enough Data to Perform GOF Test											
352												
353	Gamma Statistics											
354	k hat (MLE)			8.992	k star (bias corrected MLE)			N/A				
355	Theta hat (MLE)			0.00148	Theta star (bias corrected MLE)			N/A				
356	nu hat (MLE)			53.95	nu star (bias corrected)			N/A				
357	MLE Mean (bias corrected)			N/A	MLE Sd (bias corrected)			N/A				
358					Approximate Chi Square Value (0.05)			N/A				
359	Adjusted Level of Significance			N/A	Adjusted Chi Square Value			N/A				
360												
361	Assuming Gamma Distribution											
362	95% Approximate Gamma UCL (use when n>=50))			N/A	95% Adjusted Gamma UCL (use when n<50)			N/A				
363												
364	Lognormal GOF Test											
365	Shapiro Wilk Test Statistic			0.75	Shapiro Wilk Lognormal GOF Test							
366	5% Shapiro Wilk Critical Value			0.767	Data Not Lognormal at 5% Significance Level							
367	Lilliefors Test Statistic			0.385	Lilliefors Lognormal GOF Test							
368	5% Lilliefors Critical Value			0.425	Data appear Lognormal at 5% Significance Level							
369	Data appear Approximate Lognormal at 5% Significance Level											
370												
371	Lognormal Statistics											
372	Minimum of Logged Data			-4.605	Mean of logged Data			-4.374				
373	Maximum of Logged Data			-3.912	SD of logged Data			0.4				
374												
375	Assuming Lognormal Distribution											
376	95% H-UCL			0.0598	90% Chebyshev (MVUE) UCL			0.0223				
377	95% Chebyshev (MVUE) UCL			0.0264	97.5% Chebyshev (MVUE) UCL			0.0321				

A	B	C	D	E	F	G	H	I	J	K	L
378	99% Chebyshev (MVUE) UCL				0.0432						
379											
380	Nonparametric Distribution Free UCL Statistics										
381	Data appear to follow a Discernible Distribution at 5% Significance Level										
382											
383	Nonparametric Distribution Free UCLs										
384	95% CLT UCL				0.0188	95% Jackknife UCL				N/A	
385	95% Standard Bootstrap UCL				N/A	95% Bootstrap-t UCL				N/A	
386	95% Hall's Bootstrap UCL				N/A	95% Percentile Bootstrap UCL				N/A	
387	95% BCA Bootstrap UCL				N/A						
388	90% Chebyshev(Mean, Sd) UCL				0.0233	95% Chebyshev(Mean, Sd) UCL				0.0279	
389	97.5% Chebyshev(Mean, Sd) UCL				0.0341	99% Chebyshev(Mean, Sd) UCL				0.0465	
390											
391	Suggested UCL to Use										
392	95% Student's-t UCL				0.0231						
393											
394	Recommended UCL exceeds the maximum observation										
395											
396	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test										
397	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL										
398											
399	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
400	Recommendations are based upon data size, data distribution, and skewness.										
401	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
402	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
403											
404											
405	Perfluoro-n-octanoate acid (PFOA) (rapid creek freshwater)										
406											
407	General Statistics										
408	Total Number of Observations				54	Number of Distinct Observations				8	
409						Number of Missing Observations				19	
410	Minimum				0.01	Mean				0.0186	
411	Maximum				0.06	Median				0.02	
412	SD				0.00974	Std. Error of Mean				0.00133	
413	Coefficient of Variation				0.523	Skewness				1.825	
414											
415	Normal GOF Test										
416	Shapiro Wilk Test Statistic				0.77	Shapiro Wilk GOF Test					
417	5% Shapiro Wilk P Value				7.946E-11	Data Not Normal at 5% Significance Level					
418	Lilliefors Test Statistic				0.277	Lilliefors GOF Test					
419	5% Lilliefors Critical Value				0.12	Data Not Normal at 5% Significance Level					
420	Data Not Normal at 5% Significance Level										
421											
422	Assuming Normal Distribution										
423	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
424	95% Student's-t UCL				0.0208	95% Adjusted-CLT UCL (Chen-1995)				0.0212	
425						95% Modified-t UCL (Johnson-1978)				0.0209	
426											
427	Gamma GOF Test										
428	A-D Test Statistic				3.805	Anderson-Darling Gamma GOF Test					
429	5% A-D Critical Value				0.754	Data Not Gamma Distributed at 5% Significance Level					
430	K-S Test Statistic				0.242	Kolmogorov-Smirnov Gamma GOF Test					
431	5% K-S Critical Value				0.121	Data Not Gamma Distributed at 5% Significance Level					
432	Data Not Gamma Distributed at 5% Significance Level										

	A	B	C	D	E	F	G	H	I	J	K	L
434	Gamma Statistics											
435	k hat (MLE)				4.632		k star (bias corrected MLE)				4.387	
436	Theta hat (MLE)				0.00402		Theta star (bias corrected MLE)				0.00425	
437	nu hat (MLE)				500.3		nu star (bias corrected)				473.8	
438	MLE Mean (bias corrected)				0.0186		MLE Sd (bias corrected)				0.00889	
439							Approximate Chi Square Value (0.05)				424.3	
440	Adjusted Level of Significance				0.0456		Adjusted Chi Square Value				423	
441												
442	Assuming Gamma Distribution											
443	95% Approximate Gamma UCL (use when n>=50))				0.0208		95% Adjusted Gamma UCL (use when n<50)				0.0209	
444												
445	Lognormal GOF Test											
446	Shapiro Wilk Test Statistic				0.823		Shapiro Wilk Lognormal GOF Test					
447	5% Shapiro Wilk P Value				2.0494E-8		Data Not Lognormal at 5% Significance Level					
448	Lilliefors Test Statistic				0.252		Lilliefors Lognormal GOF Test					
449	5% Lilliefors Critical Value				0.12		Data Not Lognormal at 5% Significance Level					
450	Data Not Lognormal at 5% Significance Level											
451												
452	Lognormal Statistics											
453	Minimum of Logged Data				-4.605		Mean of logged Data				-4.095	
454	Maximum of Logged Data				-2.813		SD of logged Data				0.466	
455												
456	Assuming Lognormal Distribution											
457	95% H-UCL				0.0209		90% Chebyshev (MVUE) UCL				0.0222	
458	95% Chebyshev (MVUE) UCL				0.0239		97.5% Chebyshev (MVUE) UCL				0.0262	
459	99% Chebyshev (MVUE) UCL				0.0307							
460												
461	Nonparametric Distribution Free UCL Statistics											
462	Data do not follow a Discernible Distribution (0.05)											
463												
464	Nonparametric Distribution Free UCLs											
465	95% CLT UCL				0.0208		95% Jackknife UCL				0.0208	
466	95% Standard Bootstrap UCL				0.0207		95% Bootstrap-t UCL				0.0213	
467	95% Hall's Bootstrap UCL				0.0216		95% Percentile Bootstrap UCL				0.021	
468	95% BCA Bootstrap UCL				0.0211							
469	90% Chebyshev(Mean, Sd) UCL				0.0226		95% Chebyshev(Mean, Sd) UCL				0.0244	
470	97.5% Chebyshev(Mean, Sd) UCL				0.0269		99% Chebyshev(Mean, Sd) UCL				0.0318	
471												
472	Suggested UCL to Use											
473	95% Student's-t UCL				0.0208		or 95% Modified-t UCL				0.0209	
474												
475	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
476	Recommendations are based upon data size, data distribution, and skewness.											
477	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
478	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
479												
480												

	A	B	C	D	E	F	G	H	I	J	K	L
481	Perfluoro-n-octanoate acid (PFOA) (reichardt and sadgrove creeks)											
482												
483	General Statistics											
484	Total Number of Observations			6			Number of Distinct Observations			2		
485							Number of Missing Observations			44		
486	Minimum			0.01			Mean			0.0117		
487	Maximum			0.02			Median			0.01		
488	SD			0.00408			Std. Error of Mean			0.00167		
489	Coefficient of Variation			0.35			Skewness			2.449		
490												
491	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
492	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
493	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
494	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
495												
496	Normal GOF Test											
497	Shapiro Wilk Test Statistic			0.496			Shapiro Wilk GOF Test					
498	5% Shapiro Wilk Critical Value			0.788			Data Not Normal at 5% Significance Level					
499	Lilliefors Test Statistic			0.492			Lilliefors GOF Test					
500	5% Lilliefors Critical Value			0.325			Data Not Normal at 5% Significance Level					
501	Data Not Normal at 5% Significance Level											
502												
503	Assuming Normal Distribution											
504	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
505	95% Student's-t UCL			0.015			95% Adjusted-CLT UCL (Chen-1995)			0.0162		
506							95% Modified-t UCL (Johnson-1978)			0.0153		
507												
508	Gamma GOF Test											
509	A-D Test Statistic			1.721			Anderson-Darling Gamma GOF Test					
510	5% A-D Critical Value			0.698			Data Not Gamma Distributed at 5% Significance Level					
511	K-S Test Statistic			0.507			Kolmogorov-Smirnov Gamma GOF Test					
512	5% K-S Critical Value			0.332			Data Not Gamma Distributed at 5% Significance Level					
513	Data Not Gamma Distributed at 5% Significance Level											
514												
515	Gamma Statistics											
516	k hat (MLE)			13.11			k star (bias corrected MLE)			6.666		
517	Theta hat (MLE)			8.8997E-4			Theta star (bias corrected MLE)			0.00175		
518	nu hat (MLE)			157.3			nu star (bias corrected)			79.99		
519	MLE Mean (bias corrected)			0.0117			MLE Sd (bias corrected)			0.00452		
520							Approximate Chi Square Value (0.05)			60.38		
521	Adjusted Level of Significance			0.0122			Adjusted Chi Square Value			54.27		
522												
523	Assuming Gamma Distribution											
524	95% Approximate Gamma UCL (use when n>=50))			0.0155			95% Adjusted Gamma UCL (use when n<50)			0.0172		
525												
526	Lognormal GOF Test											
527	Shapiro Wilk Test Statistic			0.496			Shapiro Wilk Lognormal GOF Test					
528	5% Shapiro Wilk Critical Value			0.788			Data Not Lognormal at 5% Significance Level					
529	Lilliefors Test Statistic			0.492			Lilliefors Lognormal GOF Test					
530	5% Lilliefors Critical Value			0.325			Data Not Lognormal at 5% Significance Level					
531	Data Not Lognormal at 5% Significance Level											
532												
533	Lognormal Statistics											
534	Minimum of Logged Data			-4.605			Mean of logged Data			-4.49		
535	Maximum of Logged Data			-3.912			SD of logged Data			0.283		

	A	B	C	D	E	F	G	H	I	J	K	L
536												
537	Assuming Lognormal Distribution											
538	95% H-UCL				0.0154		90% Chebyshev (MVUE) UCL				0.0156	
539	95% Chebyshev (MVUE) UCL				0.0174		97.5% Chebyshev (MVUE) UCL				0.02	
540	99% Chebyshev (MVUE) UCL				0.0249							

A	B	C	D	E	F	G	H	I	J	K	L
541											
542	Nonparametric Distribution Free UCL Statistics										
543	Data do not follow a Discernible Distribution (0.05)										
544											
545	Nonparametric Distribution Free UCLs										
546	95% CLT UCL			0.0144		95% Jackknife UCL			N/A		
547	95% Standard Bootstrap UCL			N/A		95% Bootstrap-t UCL			N/A		
548	95% Hall's Bootstrap UCL			N/A		95% Percentile Bootstrap UCL			N/A		
549	95% BCA Bootstrap UCL			N/A							
550	90% Chebyshev(Mean, Sd) UCL			0.0167		95% Chebyshev(Mean, Sd) UCL			0.0189		
551	97.5% Chebyshev(Mean, Sd) UCL			0.0221		99% Chebyshev(Mean, Sd) UCL			0.0282		
552											
553	Suggested UCL to Use										
554	95% Student's-t UCL			0.015		or 95% Modified-t UCL			0.0153		
555											
556	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
557	Recommendations are based upon data size, data distribution, and skewness.										
558	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
559	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
560											
561											
562	Perfluoro-n-octanoate acid (PFOA) (Zone C drain)										
563											
564	General Statistics										
565	Total Number of Observations			8		Number of Distinct Observations			6		
566						Number of Missing Observations			47		
567	Minimum			0.004		Mean			0.0175		
568	Maximum			0.05		Median			0.01		
569	SD			0.0156		Std. Error of Mean			0.00551		
570	Coefficient of Variation			0.891		Skewness			1.56		
571											
572	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use										
573	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.										
574	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).										
575	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1										
576											
577	Normal GOF Test										
578	Shapiro Wilk Test Statistic			0.812		Shapiro Wilk GOF Test					
579	5% Shapiro Wilk Critical Value			0.818		Data Not Normal at 5% Significance Level					
580	Lilliefors Test Statistic			0.31		Lilliefors GOF Test					
581	5% Lilliefors Critical Value			0.283		Data Not Normal at 5% Significance Level					
582	Data Not Normal at 5% Significance Level										
583											
584	Assuming Normal Distribution										
585	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
586	95% Student's-t UCL			0.0279		95% Adjusted-CLT UCL (Chen-1995)			0.0298		
587						95% Modified-t UCL (Johnson-1978)			0.0285		
588											
589	Gamma GOF Test										
590	A-D Test Statistic			0.402		Anderson-Darling Gamma GOF Test					
591	5% A-D Critical Value			0.726		Detected data appear Gamma Distributed at 5% Significance Level					
592	K-S Test Statistic			0.285		Kolmogorov-Smirnov Gamma GOF Test					
593	5% K-S Critical Value			0.298		Detected data appear Gamma Distributed at 5% Significance Level					
594	Detected data appear Gamma Distributed at 5% Significance Level										
595											

	A	B	C	D	E	F	G	H	I	J	K	L
596	Gamma Statistics											
597	k hat (MLE)				1.746		k star (bias corrected MLE)				1.175	
598	Theta hat (MLE)				0.01		Theta star (bias corrected MLE)				0.0149	
599	nu hat (MLE)				27.94		nu star (bias corrected)				18.8	
600	MLE Mean (bias corrected)				0.0175		MLE Sd (bias corrected)				0.0161	
601							Approximate Chi Square Value (0.05)				9.969	
602	Adjusted Level of Significance				0.0195		Adjusted Chi Square Value				8.393	
603												

A	B	C	D	E	F	G	H	I	J	K	L
604	Assuming Gamma Distribution										
605	95% Approximate Gamma UCL (use when n>=50)			0.033	95% Adjusted Gamma UCL (use when n<50)			0.0392			
606											
607	Lognormal GOF Test										
608	Shapiro Wilk Test Statistic			0.953	Shapiro Wilk Lognormal GOF Test						
609	5% Shapiro Wilk Critical Value			0.818	Data appear Lognormal at 5% Significance Level						
610	Lilliefors Test Statistic			0.241	Lilliefors Lognormal GOF Test						
611	5% Lilliefors Critical Value			0.283	Data appear Lognormal at 5% Significance Level						
612	Data appear Lognormal at 5% Significance Level										
613											
614	Lognormal Statistics										
615	Minimum of Logged Data			-5.521	Mean of logged Data			-4.358			
616	Maximum of Logged Data			-2.996	SD of logged Data			0.836			
617											
618	Assuming Lognormal Distribution										
619	95% H-UCL			0.0473	90% Chebyshev (MVUE) UCL			0.0328			
620	95% Chebyshev (MVUE) UCL			0.0398	97.5% Chebyshev (MVUE) UCL			0.0496			
621	99% Chebyshev (MVUE) UCL			0.0688							
622											
623	Nonparametric Distribution Free UCL Statistics										
624	Data appear to follow a Discernible Distribution at 5% Significance Level										
625											
626	Nonparametric Distribution Free UCLs										
627	95% CLT UCL			0.0266	95% Jackknife UCL			0.0279			
628	95% Standard Bootstrap UCL			0.0259	95% Bootstrap-t UCL			0.0426			
629	95% Hall's Bootstrap UCL			0.0649	95% Percentile Bootstrap UCL			0.0263			
630	95% BCA Bootstrap UCL			0.028							
631	90% Chebyshev(Mean, Sd) UCL			0.034	95% Chebyshev(Mean, Sd) UCL			0.0415			
632	97.5% Chebyshev(Mean, Sd) UCL			0.0519	99% Chebyshev(Mean, Sd) UCL			0.0724			
633											
634	Suggested UCL to Use										
635	95% Adjusted Gamma UCL			0.0392							
636											
637	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
638	Recommendations are based upon data size, data distribution, and skewness.										
639	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
640	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
641											
642											
643	Perfluoro-n-octane sulfonic acid (PFOS) (Zone D drain)										
644											
645	General Statistics										
646	Total Number of Observations			35	Number of Distinct Observations			26			
647					Number of Missing Observations			14			
648	Minimum			0.01	Mean			0.477			
649	Maximum			3.6	Median			0.21			
650	SD			0.69	Std. Error of Mean			0.117			
651	Coefficient of Variation			1.445	Skewness			3.043			
652											
653	Normal GOF Test										
654	Shapiro Wilk Test Statistic			0.67	Shapiro Wilk GOF Test						
655	5% Shapiro Wilk Critical Value			0.934	Data Not Normal at 5% Significance Level						
656	Lilliefors Test Statistic			0.249	Lilliefors GOF Test						
657	5% Lilliefors Critical Value			0.148	Data Not Normal at 5% Significance Level						
658	Data Not Normal at 5% Significance Level										

	A	B	C	D	E	F	G	H	I	J	K	L
659												
660	Assuming Normal Distribution											
661	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
662	95% Student's-t UCL				0.675		95% Adjusted-CLT UCL (Chen-1995)				0.733	
663							95% Modified-t UCL (Johnson-1978)				0.685	
664												

A	B	C	D	E	F	G	H	I	J	K	L
665	Gamma GOF Test										
666	A-D Test Statistic			0.425		Anderson-Darling Gamma GOF Test					
667	5% A-D Critical Value			0.801		Detected data appear Gamma Distributed at 5% Significance Level					
668	K-S Test Statistic			0.12		Kolmogorov-Smirnov Gamma GOF Test					
669	5% K-S Critical Value			0.156		Detected data appear Gamma Distributed at 5% Significance Level					
670	Detected data appear Gamma Distributed at 5% Significance Level										
671											
672	Gamma Statistics										
673	k hat (MLE)			0.619		k star (bias corrected MLE)			0.585		
674	Theta hat (MLE)			0.772		Theta star (bias corrected MLE)			0.817		
675	nu hat (MLE)			43.31		nu star (bias corrected)			40.93		
676	MLE Mean (bias corrected)			0.477		MLE Sd (bias corrected)			0.624		
677						Approximate Chi Square Value (0.05)			27.27		
678	Adjusted Level of Significance			0.0425		Adjusted Chi Square Value			26.74		
679											
680	Assuming Gamma Distribution										
681	95% Approximate Gamma UCL (use when n>=50)			0.717		95% Adjusted Gamma UCL (use when n<50)			0.731		
682											
683	Lognormal GOF Test										
684	Shapiro Wilk Test Statistic			0.943		Shapiro Wilk Lognormal GOF Test					
685	5% Shapiro Wilk Critical Value			0.934		Data appear Lognormal at 5% Significance Level					
686	Lilliefors Test Statistic			0.12		Lilliefors Lognormal GOF Test					
687	5% Lilliefors Critical Value			0.148		Data appear Lognormal at 5% Significance Level					
688	Data appear Lognormal at 5% Significance Level										
689											
690	Lognormal Statistics										
691	Minimum of Logged Data			-4.605		Mean of logged Data			-1.734		
692	Maximum of Logged Data			1.281		SD of logged Data			1.634		
693											
694	Assuming Lognormal Distribution										
695	95% H-UCL			1.705		90% Chebyshev (MVUE) UCL			1.292		
696	95% Chebyshev (MVUE) UCL			1.598		97.5% Chebyshev (MVUE) UCL			2.021		
697	99% Chebyshev (MVUE) UCL			2.853							
698											
699	Nonparametric Distribution Free UCL Statistics										
700	Data appear to follow a Discernible Distribution at 5% Significance Level										
701											
702	Nonparametric Distribution Free UCLs										
703	95% CLT UCL			0.669		95% Jackknife UCL			0.675		
704	95% Standard Bootstrap UCL			0.671		95% Bootstrap-t UCL			0.79		
705	95% Hall's Bootstrap UCL			1.472		95% Percentile Bootstrap UCL			0.691		
706	95% BCA Bootstrap UCL			0.739							
707	90% Chebyshev(Mean, Sd) UCL			0.827		95% Chebyshev(Mean, Sd) UCL			0.986		
708	97.5% Chebyshev(Mean, Sd) UCL			1.206		99% Chebyshev(Mean, Sd) UCL			1.638		
709											
710	Suggested UCL to Use										
711	95% Adjusted Gamma UCL			0.731							
712											
713	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
714	Recommendations are based upon data size, data distribution, and skewness.										
715	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
716	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
717											
718											
719	Perfluoro-n-octane sulfonic acid (PFOS) (Zone B drain)										

	A	B	C	D	E	F	G	H	I	J	K	L
720												
721	General Statistics											
722	Total Number of Observations				22		Number of Distinct Observations				16	
723							Number of Missing Observations				1	
724	Minimum				0.01		Mean				1.112	
725	Maximum				3.3		Median				1.15	
726	SD				0.858		Std. Error of Mean				0.183	
727	Coefficient of Variation				0.772		Skewness				0.699	

A	B	C	D	E	F	G	H	I	J	K	L
728											
729	Normal GOF Test										
730	Shapiro Wilk Test Statistic				0.911		Shapiro Wilk GOF Test				
731	5% Shapiro Wilk Critical Value				0.911		Data Not Normal at 5% Significance Level				
732	Lilliefors Test Statistic				0.156		Lilliefors GOF Test				
733	5% Lilliefors Critical Value				0.184		Data appear Normal at 5% Significance Level				
734	Data appear Approximate Normal at 5% Significance Level										
735											
736	Assuming Normal Distribution										
737	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
738	95% Student's-t UCL				1.427		95% Adjusted-CLT UCL (Chen-1995)				1.442
739							95% Modified-t UCL (Johnson-1978)				1.431
740											
741	Gamma GOF Test										
742	A-D Test Statistic				1.576		Anderson-Darling Gamma GOF Test				
743	5% A-D Critical Value				0.781		Data Not Gamma Distributed at 5% Significance Level				
744	K-S Test Statistic				0.232		Kolmogorov-Smirnov Gamma GOF Test				
745	5% K-S Critical Value				0.192		Data Not Gamma Distributed at 5% Significance Level				
746	Data Not Gamma Distributed at 5% Significance Level										
747											
748	Gamma Statistics										
749	k hat (MLE)				0.796		k star (bias corrected MLE)				0.718
750	Theta hat (MLE)				1.397		Theta star (bias corrected MLE)				1.549
751	nu hat (MLE)				35.03		nu star (bias corrected)				31.58
752	MLE Mean (bias corrected)				1.112		MLE Sd (bias corrected)				1.312
753							Approximate Chi Square Value (0.05)				19.74
754	Adjusted Level of Significance				0.0386		Adjusted Chi Square Value				19.04
755											
756	Assuming Gamma Distribution										
757	95% Approximate Gamma UCL (use when n>=50))				1.779		95% Adjusted Gamma UCL (use when n<50)				1.844
758											
759	Lognormal GOF Test										
760	Shapiro Wilk Test Statistic				0.766		Shapiro Wilk Lognormal GOF Test				
761	5% Shapiro Wilk Critical Value				0.911		Data Not Lognormal at 5% Significance Level				
762	Lilliefors Test Statistic				0.291		Lilliefors Lognormal GOF Test				
763	5% Lilliefors Critical Value				0.184		Data Not Lognormal at 5% Significance Level				
764	Data Not Lognormal at 5% Significance Level										
765											
766	Lognormal Statistics										
767	Minimum of Logged Data				-4.605		Mean of logged Data				-0.64
768	Maximum of Logged Data				1.194		SD of logged Data				1.774
769											
770	Assuming Lognormal Distribution										
771	95% H-UCL				11.07		90% Chebyshev (MVUE) UCL				5.247
772	95% Chebyshev (MVUE) UCL				6.638		97.5% Chebyshev (MVUE) UCL				8.569
773	99% Chebyshev (MVUE) UCL				12.36						
774											
775	Nonparametric Distribution Free UCL Statistics										
776	Data appear to follow a Discernible Distribution at 5% Significance Level										
777											
778	Nonparametric Distribution Free UCLs										
779	95% CLT UCL				1.413		95% Jackknife UCL				1.427
780	95% Standard Bootstrap UCL				1.408		95% Bootstrap-t UCL				1.453
781	95% Hall's Bootstrap UCL				1.491		95% Percentile Bootstrap UCL				1.401
782	95% BCA Bootstrap UCL				1.474						

	A	B	C	D	E	F	G	H	I	J	K	L
783			90% Chebyshev(Mean, Sd) UCL			1.661					95% Chebyshev(Mean, Sd) UCL	1.909
784			97.5% Chebyshev(Mean, Sd) UCL			2.254					99% Chebyshev(Mean, Sd) UCL	2.932
785												
786	Suggested UCL to Use											
787			95% Student's-t UCL			1.427						
788												
789	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
790	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
791												
792	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
793	Recommendations are based upon data size, data distribution, and skewness.											
794	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
795	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
796												

A	B	C	D	E	F	G	H	I	J	K	L
797											
798	Perfluoro-n-octane sulfonic acid (PFOS) (Iudmilla creek)										
799											
800	General Statistics										
801	Total Number of Observations			33		Number of Distinct Observations			27		
802						Number of Missing Observations			9		
803	Minimum			0.003		Mean			1.812		
804	Maximum			6.6		Median			0.7		
805	SD			2.059		Std. Error of Mean			0.358		
806	Coefficient of Variation			1.137		Skewness			0.867		
807											
808	Normal GOF Test										
809	Shapiro Wilk Test Statistic			0.809		Shapiro Wilk GOF Test					
810	5% Shapiro Wilk Critical Value			0.931		Data Not Normal at 5% Significance Level					
811	Lilliefors Test Statistic			0.221		Lilliefors GOF Test					
812	5% Lilliefors Critical Value			0.152		Data Not Normal at 5% Significance Level					
813	Data Not Normal at 5% Significance Level										
814											
815	Assuming Normal Distribution										
816	95% Normal UCL				95% UCLs (Adjusted for Skewness)						
817	95% Student's-t UCL			2.419		95% Adjusted-CLT UCL (Chen-1995)			2.459		
818						95% Modified-t UCL (Johnson-1978)			2.428		
819											
820	Gamma GOF Test										
821	A-D Test Statistic			0.76		Anderson-Darling Gamma GOF Test					
822	5% A-D Critical Value			0.814		Detected data appear Gamma Distributed at 5% Significance Level					
823	K-S Test Statistic			0.155		Kolmogorov-Smirnov Gamma GOF Test					
824	5% K-S Critical Value			0.162		Detected data appear Gamma Distributed at 5% Significance Level					
825	Detected data appear Gamma Distributed at 5% Significance Level										
826											
827	Gamma Statistics										
828	k hat (MLE)			0.487		k star (bias corrected MLE)			0.463		
829	Theta hat (MLE)			3.721		Theta star (bias corrected MLE)			3.914		
830	nu hat (MLE)			32.14		nu star (bias corrected)			30.55		
831	MLE Mean (bias corrected)			1.812		MLE Sd (bias corrected)			2.663		
832						Approximate Chi Square Value (0.05)			18.92		
833	Adjusted Level of Significance			0.0419		Adjusted Chi Square Value			18.45		
834											
835	Assuming Gamma Distribution										
836	95% Approximate Gamma UCL (use when n>=50)			2.924		95% Adjusted Gamma UCL (use when n<50)			2.999		
837											
838	Lognormal GOF Test										
839	Shapiro Wilk Test Statistic			0.907		Shapiro Wilk Lognormal GOF Test					
840	5% Shapiro Wilk Critical Value			0.931		Data Not Lognormal at 5% Significance Level					
841	Lilliefors Test Statistic			0.133		Lilliefors Lognormal GOF Test					
842	5% Lilliefors Critical Value			0.152		Data appear Lognormal at 5% Significance Level					
843	Data appear Approximate Lognormal at 5% Significance Level										
844											
845	Lognormal Statistics										
846	Minimum of Logged Data			-5.809		Mean of logged Data			-0.716		
847	Maximum of Logged Data			1.887		SD of logged Data			2.146		
848											
849	Assuming Lognormal Distribution										
850	95% H-UCL			22.93		90% Chebyshev (MVUE) UCL			10.24		
851	95% Chebyshev (MVUE) UCL			13.07		97.5% Chebyshev (MVUE) UCL			16.98		

	A	B	C	D	E	F	G	H	I	J	K	L
852	99% Chebyshev (MVUE) UCL					24.68						
853												
854	Nonparametric Distribution Free UCL Statistics											
855	Data appear to follow a Discernible Distribution at 5% Significance Level											
856												
857	Nonparametric Distribution Free UCLs											
858	95% CLT UCL					2.401	95% Jackknife UCL					2.419
859	95% Standard Bootstrap UCL					2.39	95% Bootstrap-t UCL					2.51
860	95% Hall's Bootstrap UCL					2.452	95% Percentile Bootstrap UCL					2.412
861	95% BCA Bootstrap UCL					2.447						
862	90% Chebyshev(Mean, Sd) UCL					2.887	95% Chebyshev(Mean, Sd) UCL					3.374
863	97.5% Chebyshev(Mean, Sd) UCL					4.05	99% Chebyshev(Mean, Sd) UCL					5.378
864												
865	Suggested UCL to Use											
866	95% Adjusted Gamma UCL					2.999						
867												
868	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
869	Recommendations are based upon data size, data distribution, and skewness.											
870	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
871	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
872												

A	B	C	D	E	F	G	H	I	J	K	L
873											
874	Perfluoro-n-octane sulfonic acid (PFOS) (Zone A drain)										
875											
876	General Statistics										
877	Total Number of Observations				13		Number of Distinct Observations				12
878							Number of Missing Observations				3
879	Minimum				0.04		Mean				1.48
880	Maximum				4.3		Median				1.1
881	SD				1.366		Std. Error of Mean				0.379
882	Coefficient of Variation				0.923		Skewness				0.766
883											
884	Normal GOF Test										
885	Shapiro Wilk Test Statistic				0.906		Shapiro Wilk GOF Test				
886	5% Shapiro Wilk Critical Value				0.866		Data appear Normal at 5% Significance Level				
887	Lilliefors Test Statistic				0.168		Lilliefors GOF Test				
888	5% Lilliefors Critical Value				0.234		Data appear Normal at 5% Significance Level				
889	Data appear Normal at 5% Significance Level										
890											
891	Assuming Normal Distribution										
892	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
893	95% Student's-t UCL				2.155		95% Adjusted-CLT UCL (Chen-1995)				2.189
894							95% Modified-t UCL (Johnson-1978)				2.169
895											
896	Gamma GOF Test										
897	A-D Test Statistic				0.435		Anderson-Darling Gamma GOF Test				
898	5% A-D Critical Value				0.768		Detected data appear Gamma Distributed at 5% Significance Level				
899	K-S Test Statistic				0.157		Kolmogorov-Smirnov Gamma GOF Test				
900	5% K-S Critical Value				0.245		Detected data appear Gamma Distributed at 5% Significance Level				
901	Detected data appear Gamma Distributed at 5% Significance Level										
902											
903	Gamma Statistics										
904	k hat (MLE)				0.793		k star (bias corrected MLE)				0.661
905	Theta hat (MLE)				1.866		Theta star (bias corrected MLE)				2.238
906	nu hat (MLE)				20.62		nu star (bias corrected)				17.19
907	MLE Mean (bias corrected)				1.48		MLE Sd (bias corrected)				1.82
908							Approximate Chi Square Value (0.05)				8.811
909	Adjusted Level of Significance				0.0301		Adjusted Chi Square Value				7.969
910											
911	Assuming Gamma Distribution										
912	95% Approximate Gamma UCL (use when n>=50))				2.888		95% Adjusted Gamma UCL (use when n<50)				3.193
913											
914	Lognormal GOF Test										
915	Shapiro Wilk Test Statistic				0.88		Shapiro Wilk Lognormal GOF Test				
916	5% Shapiro Wilk Critical Value				0.866		Data appear Lognormal at 5% Significance Level				
917	Lilliefors Test Statistic				0.216		Lilliefors Lognormal GOF Test				
918	5% Lilliefors Critical Value				0.234		Data appear Lognormal at 5% Significance Level				
919	Data appear Lognormal at 5% Significance Level										
920											
921	Lognormal Statistics										
922	Minimum of Logged Data				-3.219		Mean of logged Data				-0.357
923	Maximum of Logged Data				1.459		SD of logged Data				1.585
924											
925	Assuming Lognormal Distribution										
926	95% H-UCL				14.9		90% Chebyshev (MVUE) UCL				5.079
927	95% Chebyshev (MVUE) UCL				6.447		97.5% Chebyshev (MVUE) UCL				8.347

	A	B	C	D	E	F	G	H	I	J	K	L
928	99% Chebyshev (MVUE) UCL					12.08						
929												
930	Nonparametric Distribution Free UCL Statistics											
931	Data appear to follow a Discernible Distribution at 5% Significance Level											
932												
933	Nonparametric Distribution Free UCLs											
934	95% CLT UCL					2.103	95% Jackknife UCL					2.155
935	95% Standard Bootstrap UCL					2.083	95% Bootstrap-t UCL					2.276
936	95% Hall's Bootstrap UCL					2.214	95% Percentile Bootstrap UCL					2.088
937	95% BCA Bootstrap UCL					2.111						
938	90% Chebyshev(Mean, Sd) UCL					2.617	95% Chebyshev(Mean, Sd) UCL					3.131
939	97.5% Chebyshev(Mean, Sd) UCL					3.846	99% Chebyshev(Mean, Sd) UCL					5.25
940												
941	Suggested UCL to Use											
942	95% Student's-t UCL					2.155						
943												
944	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
945	Recommendations are based upon data size, data distribution, and skewness.											
946	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
947	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
948												

A	B	C	D	E	F	G	H	I	J	K	L	
949												
950	Perfluoro-n-octane sulfonic acid (PFOS) (rapid creek estuary)											
951												
952	General Statistics											
953	Total Number of Observations			14		Number of Distinct Observations			10			
954						Number of Missing Observations			3			
955	Minimum			0.027		Mean			0.146			
956	Maximum			0.66		Median			0.075			
957	SD			0.18		Std. Error of Mean			0.048			
958	Coefficient of Variation			1.234		Skewness			2.203			
959												
960	Normal GOF Test											
961	Shapiro Wilk Test Statistic			0.683		Shapiro Wilk GOF Test						
962	5% Shapiro Wilk Critical Value			0.874		Data Not Normal at 5% Significance Level						
963	Lilliefors Test Statistic			0.357		Lilliefors GOF Test						
964	5% Lilliefors Critical Value			0.226		Data Not Normal at 5% Significance Level						
965	Data Not Normal at 5% Significance Level											
966												
967	Assuming Normal Distribution											
968	95% Normal UCL				95% UCLs (Adjusted for Skewness)							
969	95% Student's-t UCL			0.23		95% Adjusted-CLT UCL (Chen-1995)			0.255			
970						95% Modified-t UCL (Johnson-1978)			0.235			
971												
972	Gamma GOF Test											
973	A-D Test Statistic			0.914		Anderson-Darling Gamma GOF Test						
974	5% A-D Critical Value			0.758		Data Not Gamma Distributed at 5% Significance Level						
975	K-S Test Statistic			0.31		Kolmogorov-Smirnov Gamma GOF Test						
976	5% K-S Critical Value			0.235		Data Not Gamma Distributed at 5% Significance Level						
977	Data Not Gamma Distributed at 5% Significance Level											
978												
979	Gamma Statistics											
980	k hat (MLE)			1.11		k star (bias corrected MLE)			0.92			
981	Theta hat (MLE)			0.131		Theta star (bias corrected MLE)			0.158			
982	nu hat (MLE)			31.08		nu star (bias corrected)			25.75			
983	MLE Mean (bias corrected)			0.146		MLE Sd (bias corrected)			0.152			
984						Approximate Chi Square Value (0.05)			15.19			
985	Adjusted Level of Significance			0.0312		Adjusted Chi Square Value			14.12			
986												
987	Assuming Gamma Distribution											
988	95% Approximate Gamma UCL (use when n>=50))			0.247		95% Adjusted Gamma UCL (use when n<50)			0.265			
989												
990	Lognormal GOF Test											
991	Shapiro Wilk Test Statistic			0.909		Shapiro Wilk Lognormal GOF Test						
992	5% Shapiro Wilk Critical Value			0.874		Data appear Lognormal at 5% Significance Level						
993	Lilliefors Test Statistic			0.248		Lilliefors Lognormal GOF Test						
994	5% Lilliefors Critical Value			0.226		Data Not Lognormal at 5% Significance Level						
995	Data appear Approximate Lognormal at 5% Significance Level											
996												
997	Lognormal Statistics											
998	Minimum of Logged Data			-3.612		Mean of logged Data			-2.441			
999	Maximum of Logged Data			-0.416		SD of logged Data			0.987			
1000												
1001	Assuming Lognormal Distribution											
1002	95% H-UCL			0.303		90% Chebyshev (MVUE) UCL			0.251			
1003	95% Chebyshev (MVUE) UCL			0.304		97.5% Chebyshev (MVUE) UCL			0.376			

	A	B	C	D	E	F	G	H	I	J	K	L
1004	99% Chebyshev (MVUE) UCL					0.52						
1005												
1006	Nonparametric Distribution Free UCL Statistics											
1007	Data appear to follow a Discernible Distribution at 5% Significance Level											
1008												
1009	Nonparametric Distribution Free UCLs											
1010	95% CLT UCL					0.224	95% Jackknife UCL					0.23
1011	95% Standard Bootstrap UCL					0.219	95% Bootstrap-t UCL					0.328
1012	95% Hall's Bootstrap UCL					0.518	95% Percentile Bootstrap UCL					0.231
1013	95% BCA Bootstrap UCL					0.26						
1014	90% Chebyshev(Mean, Sd) UCL					0.289	95% Chebyshev(Mean, Sd) UCL					0.355
1015	97.5% Chebyshev(Mean, Sd) UCL					0.445	99% Chebyshev(Mean, Sd) UCL					0.623
1016												
1017	Suggested UCL to Use											
1018	95% H-UCL					0.303						
1019												
1020	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1021	Recommendations are based upon data size, data distribution, and skewness.											
1022	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1023	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1024												
1025	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
1026	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.											
1027	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
1028	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											
1029												

A	B	C	D	E	F	G	H	I	J	K	L	
1030												
1031	Perfluoro-n-octane sulfonic acid (PFOS) (rapid creek freshwater)											
1032												
1033	General Statistics											
1034	Total Number of Observations			73		Number of Distinct Observations			51			
1035						Number of Missing Observations			0			
1036	Minimum			0.05		Mean			0.563			
1037	Maximum			1.6		Median			0.58			
1038	SD			0.29		Std. Error of Mean			0.034			
1039	Coefficient of Variation			0.516		Skewness			0.688			
1040												
1041	Normal GOF Test											
1042	Shapiro Wilk Test Statistic			0.94		Shapiro Wilk GOF Test						
1043	5% Shapiro Wilk P Value			0.00294		Data Not Normal at 5% Significance Level						
1044	Lilliefors Test Statistic			0.114		Lilliefors GOF Test						
1045	5% Lilliefors Critical Value			0.104		Data Not Normal at 5% Significance Level						
1046	Data Not Normal at 5% Significance Level											
1047												
1048	Assuming Normal Distribution											
1049	95% Normal UCL				95% UCLs (Adjusted for Skewness)							
1050	95% Student's-t UCL			0.619		95% Adjusted-CLT UCL (Chen-1995)			0.621			
1051						95% Modified-t UCL (Johnson-1978)			0.62			
1052												
1053	Gamma GOF Test											
1054	A-D Test Statistic			2.63		Anderson-Darling Gamma GOF Test						
1055	5% A-D Critical Value			0.758		Data Not Gamma Distributed at 5% Significance Level						
1056	K-S Test Statistic			0.17		Kolmogorov-Smirnov Gamma GOF Test						
1057	5% K-S Critical Value			0.105		Data Not Gamma Distributed at 5% Significance Level						
1058	Data Not Gamma Distributed at 5% Significance Level											
1059												
1060	Gamma Statistics											
1061	k hat (MLE)			2.887		k star (bias corrected MLE)			2.778			
1062	Theta hat (MLE)			0.195		Theta star (bias corrected MLE)			0.203			
1063	nu hat (MLE)			421.5		nu star (bias corrected)			405.5			
1064	MLE Mean (bias corrected)			0.563		MLE Sd (bias corrected)			0.338			
1065						Approximate Chi Square Value (0.05)			359.9			
1066	Adjusted Level of Significance			0.0467		Adjusted Chi Square Value			359			
1067												
1068	Assuming Gamma Distribution											
1069	95% Approximate Gamma UCL (use when n>=50))			0.634		95% Adjusted Gamma UCL (use when n<50)			0.636			
1070												
1071	Lognormal GOF Test											
1072	Shapiro Wilk Test Statistic			0.858		Shapiro Wilk Lognormal GOF Test						
1073	5% Shapiro Wilk P Value			1.9711E-9		Data Not Lognormal at 5% Significance Level						
1074	Lilliefors Test Statistic			0.203		Lilliefors Lognormal GOF Test						
1075	5% Lilliefors Critical Value			0.104		Data Not Lognormal at 5% Significance Level						
1076	Data Not Lognormal at 5% Significance Level											
1077												
1078	Lognormal Statistics											
1079	Minimum of Logged Data			-2.996		Mean of logged Data			-0.758			
1080	Maximum of Logged Data			0.47		SD of logged Data			0.7			
1081												
1082	Assuming Lognormal Distribution											
1083	95% H-UCL			0.705		90% Chebyshev (MVUE) UCL			0.757			
1084	95% Chebyshev (MVUE) UCL			0.83		97.5% Chebyshev (MVUE) UCL			0.931			

	A	B	C	D	E	F	G	H	I	J	K	L
1085	99% Chebyshev (MVUE) UCL					1.13						
1086												
1087	Nonparametric Distribution Free UCL Statistics											
1088	Data do not follow a Discernible Distribution (0.05)											
1089												
1090	Nonparametric Distribution Free UCLs											
1091	95% CLT UCL					0.618	95% Jackknife UCL					0.619
1092	95% Standard Bootstrap UCL					0.618	95% Bootstrap-t UCL					0.624
1093	95% Hall's Bootstrap UCL					0.622	95% Percentile Bootstrap UCL					0.618
1094	95% BCA Bootstrap UCL					0.621						
1095	90% Chebyshev(Mean, Sd) UCL					0.664	95% Chebyshev(Mean, Sd) UCL					0.711
1096	97.5% Chebyshev(Mean, Sd) UCL					0.775	99% Chebyshev(Mean, Sd) UCL					0.9
1097												
1098	Suggested UCL to Use											
1099	95% Chebyshev (Mean, Sd) UCL					0.711						
1100												
1101	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1102	Recommendations are based upon data size, data distribution, and skewness.											
1103	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1104	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1105												
1106												

A	B	C	D	E	F	G	H	I	J	K	L
1107	Perfluoro-n-octane sulfonic acid (PFOS) (reichardt and sadgrove creeks)										
1108											
1109	General Statistics										
1110	Total Number of Observations			26		Number of Distinct Observations			14		
1111						Number of Missing Observations			24		
1112	Minimum			0.01		Mean			0.0758		
1113	Maximum			0.25		Median			0.06		
1114	SD			0.066		Std. Error of Mean			0.013		
1115	Coefficient of Variation			0.872		Skewness			1.317		
1116											
1117	Normal GOF Test										
1118	Shapiro Wilk Test Statistic			0.85		Shapiro Wilk GOF Test					
1119	5% Shapiro Wilk Critical Value			0.92		Data Not Normal at 5% Significance Level					
1120	Lilliefors Test Statistic			0.189		Lilliefors GOF Test					
1121	5% Lilliefors Critical Value			0.17		Data Not Normal at 5% Significance Level					
1122	Data Not Normal at 5% Significance Level										
1123											
1124	Assuming Normal Distribution										
1125	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
1126	95% Student's-t UCL			0.0979		95% Adjusted-CLT UCL (Chen-1995)			0.101		
1127						95% Modified-t UCL (Johnson-1978)			0.0985		
1128											
1129	Gamma GOF Test										
1130	A-D Test Statistic			0.375		Anderson-Darling Gamma GOF Test					
1131	5% A-D Critical Value			0.764		Detected data appear Gamma Distributed at 5% Significance Level					
1132	K-S Test Statistic			0.105		Kolmogorov-Smirnov Gamma GOF Test					
1133	5% K-S Critical Value			0.175		Detected data appear Gamma Distributed at 5% Significance Level					
1134	Detected data appear Gamma Distributed at 5% Significance Level										
1135											
1136	Gamma Statistics										
1137	k hat (MLE)			1.381		k star (bias corrected MLE)			1.247		
1138	Theta hat (MLE)			0.0549		Theta star (bias corrected MLE)			0.0608		
1139	nu hat (MLE)			71.79		nu star (bias corrected)			64.84		
1140	MLE Mean (bias corrected)			0.0758		MLE Sd (bias corrected)			0.0679		
1141						Approximate Chi Square Value (0.05)			47.31		
1142	Adjusted Level of Significance			0.0398		Adjusted Chi Square Value			46.33		
1143											
1144	Assuming Gamma Distribution										
1145	95% Approximate Gamma UCL (use when n>=50)			0.104		95% Adjusted Gamma UCL (use when n<50)			0.106		
1146											
1147	Lognormal GOF Test										
1148	Shapiro Wilk Test Statistic			0.935		Shapiro Wilk Lognormal GOF Test					
1149	5% Shapiro Wilk Critical Value			0.92		Data appear Lognormal at 5% Significance Level					
1150	Lilliefors Test Statistic			0.149		Lilliefors Lognormal GOF Test					
1151	5% Lilliefors Critical Value			0.17		Data appear Lognormal at 5% Significance Level					
1152	Data appear Lognormal at 5% Significance Level										
1153											
1154	Lognormal Statistics										
1155	Minimum of Logged Data			-4.605		Mean of logged Data			-2.984		
1156	Maximum of Logged Data			-1.386		SD of logged Data			0.985		
1157											
1158	Assuming Lognormal Distribution										
1159	95% H-UCL			0.134		90% Chebyshev (MVUE) UCL			0.133		
1160	95% Chebyshev (MVUE) UCL			0.157		97.5% Chebyshev (MVUE) UCL			0.19		
1161	99% Chebyshev (MVUE) UCL			0.255							

	A	B	C	D	E	F	G	H	I	J	K	L
1162												
1163	Nonparametric Distribution Free UCL Statistics											
1164	Data appear to follow a Discernible Distribution at 5% Significance Level											
1165												
1166	Nonparametric Distribution Free UCLs											
1167	95% CLT UCL				0.0971		95% Jackknife UCL				0.0979	
1168	95% Standard Bootstrap UCL				0.0966		95% Bootstrap-t UCL				0.104	
1169	95% Hall's Bootstrap UCL				0.102		95% Percentile Bootstrap UCL				0.0981	
1170	95% BCA Bootstrap UCL				0.1							
1171	90% Chebyshev(Mean, Sd) UCL				0.115		95% Chebyshev(Mean, Sd) UCL				0.132	
1172	97.5% Chebyshev(Mean, Sd) UCL				0.157		99% Chebyshev(Mean, Sd) UCL				0.205	
1173												
1174	Suggested UCL to Use											
1175	95% Adjusted Gamma UCL				0.106							
1176												
1177	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1178	Recommendations are based upon data size, data distribution, and skewness.											
1179	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1180	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1181												
1182												

	A	B	C	D	E	F	G	H	I	J	K	L
1183	Perfluoro-n-octane sulfonic acid (PFOS) (Zone C drain)											
1184												
1185	General Statistics											
1186	Total Number of Observations			50		Number of Distinct Observations			29			
1187						Number of Missing Observations			5			
1188	Minimum			0.01		Mean			0.271			
1189	Maximum			2.6		Median			0.14			
1190	SD			0.432		Std. Error of Mean			0.0611			
1191	Coefficient of Variation			1.592		Skewness			3.793			
1192												
1193	Normal GOF Test											
1194	Shapiro Wilk Test Statistic			0.573		Shapiro Wilk GOF Test						
1195	5% Shapiro Wilk Critical Value			0.947		Data Not Normal at 5% Significance Level						
1196	Lilliefors Test Statistic			0.307		Lilliefors GOF Test						
1197	5% Lilliefors Critical Value			0.125		Data Not Normal at 5% Significance Level						
1198	Data Not Normal at 5% Significance Level											
1199												
1200	Assuming Normal Distribution											
1201	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
1202	95% Student's-t UCL			0.374		95% Adjusted-CLT UCL (Chen-1995)			0.407			
1203						95% Modified-t UCL (Johnson-1978)			0.379			
1204												
1205	Gamma GOF Test											
1206	A-D Test Statistic			1.373		Anderson-Darling Gamma GOF Test						
1207	5% A-D Critical Value			0.79		Data Not Gamma Distributed at 5% Significance Level						
1208	K-S Test Statistic			0.192		Kolmogorov-Smirnov Gamma GOF Test						
1209	5% K-S Critical Value			0.13		Data Not Gamma Distributed at 5% Significance Level						
1210	Data Not Gamma Distributed at 5% Significance Level											
1211												
1212	Gamma Statistics											
1213	k hat (MLE)			0.812		k star (bias corrected MLE)			0.776			
1214	Theta hat (MLE)			0.334		Theta star (bias corrected MLE)			0.349			
1215	nu hat (MLE)			81.16		nu star (bias corrected)			77.62			
1216	MLE Mean (bias corrected)			0.271		MLE Sd (bias corrected)			0.308			
1217						Approximate Chi Square Value (0.05)			58.33			
1218	Adjusted Level of Significance			0.0452		Adjusted Chi Square Value			57.83			
1219												
1220	Assuming Gamma Distribution											
1221	95% Approximate Gamma UCL (use when n>=50))			0.361		95% Adjusted Gamma UCL (use when n<50)			0.364			
1222												
1223	Lognormal GOF Test											
1224	Shapiro Wilk Test Statistic			0.975		Shapiro Wilk Lognormal GOF Test						
1225	5% Shapiro Wilk Critical Value			0.947		Data appear Lognormal at 5% Significance Level						
1226	Lilliefors Test Statistic			0.103		Lilliefors Lognormal GOF Test						
1227	5% Lilliefors Critical Value			0.125		Data appear Lognormal at 5% Significance Level						
1228	Data appear Lognormal at 5% Significance Level											
1229												
1230	Lognormal Statistics											
1231	Minimum of Logged Data			-4.605		Mean of logged Data			-2.035			
1232	Maximum of Logged Data			0.956		SD of logged Data			1.213			
1233												
1234	Assuming Lognormal Distribution											
1235	95% H-UCL			0.427		90% Chebyshev (MVUE) UCL			0.436			
1236	95% Chebyshev (MVUE) UCL			0.513		97.5% Chebyshev (MVUE) UCL			0.62			
1237	99% Chebyshev (MVUE) UCL			0.83								

	A	B	C	D	E	F	G	H	I	J	K	L
1238												
1239	Nonparametric Distribution Free UCL Statistics											
1240	Data appear to follow a Discernible Distribution at 5% Significance Level											
1241												
1242	Nonparametric Distribution Free UCLs											
1243	95% CLT UCL				0.372		95% Jackknife UCL				0.374	
1244	95% Standard Bootstrap UCL				0.371		95% Bootstrap-t UCL				0.451	
1245	95% Hall's Bootstrap UCL				0.735		95% Percentile Bootstrap UCL				0.381	
1246	95% BCA Bootstrap UCL				0.408							
1247	90% Chebyshev(Mean, Sd) UCL				0.454		95% Chebyshev(Mean, Sd) UCL				0.537	
1248	97.5% Chebyshev(Mean, Sd) UCL				0.653		99% Chebyshev(Mean, Sd) UCL				0.879	
1249												
1250	Suggested UCL to Use											
1251	95% H-UCL				0.427							
1252												
1253	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
1254	Recommendations are based upon data size, data distribution, and skewness.											
1255	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
1256	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
1257												
1258	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
1259	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.											
1260	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
1261	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											
1262												

A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets										
2	All Surface Water by Type										
3	User Selected Options										
4	Date/Time of Computation		ProUCL 5.17/3/2018 10:12:28 AM								
5	From File		Data_Darwin_surface water for ProUCL_20180703_c.xls								
6	Full Precision		OFF								
7	Confidence Coefficient		95%								
8	Number of Bootstrap Operations		2000								
9											
10											
11	Perfluoro-n-octanoate acid (PFOA) (Zone D drain)										
12											
13	General Statistics										
14	Total Number of Observations			10		Number of Distinct Observations			4		
15							Number of Missing Observations			39	
16	Minimum			0.01		Mean			0.021		
17	Maximum			0.05		Median			0.02		
18	SD			0.0129		Std. Error of Mean			0.00407		
19	Coefficient of Variation			0.613		Skewness			1.338		
20											
21	Normal GOF Test										
22	Shapiro Wilk Test Statistic			0.824		Shapiro Wilk GOF Test					
23	5% Shapiro Wilk Critical Value			0.842		Data Not Normal at 5% Significance Level					
24	Lilliefors Test Statistic			0.231		Lilliefors GOF Test					
25	5% Lilliefors Critical Value			0.262		Data appear Normal at 5% Significance Level					
26	Data appear Approximate Normal at 5% Significance Level										
27											
28	Assuming Normal Distribution										
29	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
30	95% Student's-t UCL			0.0285		95% Adjusted-CLT UCL (Chen-1995)			0.0295		
31						95% Modified-t UCL (Johnson-1978)			0.0287		
32											
33	Gamma GOF Test										
34	A-D Test Statistic			0.633		Anderson-Darling Gamma GOF Test					
35	5% A-D Critical Value			0.731		Detected data appear Gamma Distributed at 5% Significance Level					
36	K-S Test Statistic			0.249		Kolmogorov-Smirnov Gamma GOF Test					
37	5% K-S Critical Value			0.268		Detected data appear Gamma Distributed at 5% Significance Level					
38	Detected data appear Gamma Distributed at 5% Significance Level										
39											
40	Gamma Statistics										
41	k hat (MLE)			3.419		k star (bias corrected MLE)			2.46		
42	Theta hat (MLE)			0.00614		Theta star (bias corrected MLE)			0.00854		
43	nu hat (MLE)			68.37		nu star (bias corrected)			49.19		
44	MLE Mean (bias corrected)			0.021		MLE Sd (bias corrected)			0.0134		
45						Approximate Chi Square Value (0.05)			34.09		
46	Adjusted Level of Significance			0.0267		Adjusted Chi Square Value			31.92		
47											
48	Assuming Gamma Distribution										
49	95% Approximate Gamma UCL (use when n>=50))			0.0303		95% Adjusted Gamma UCL (use when n<50)			0.0324		
50											
51	Lognormal GOF Test										
52	Shapiro Wilk Test Statistic			0.864		Shapiro Wilk Lognormal GOF Test					
53	5% Shapiro Wilk Critical Value			0.842		Data appear Lognormal at 5% Significance Level					
54	Lilliefors Test Statistic			0.247		Lilliefors Lognormal GOF Test					
55	5% Lilliefors Critical Value			0.262		Data appear Lognormal at 5% Significance Level					
56	Data appear Lognormal at 5% Significance Level										

A	B	C	D	E	F	G	H	I	J	K	L
57											
58	Lognormal Statistics										
59	Minimum of Logged Data			-4.605		Mean of logged Data			-4.017		
60	Maximum of Logged Data			-2.996		SD of logged Data			0.576		
61											
62	Assuming Lognormal Distribution										
63	95% H-UCL			0.0332		90% Chebyshev (MVUE) UCL			0.0325		
64	95% Chebyshev (MVUE) UCL			0.0378		97.5% Chebyshev (MVUE) UCL			0.0451		
65	99% Chebyshev (MVUE) UCL			0.0595							
66											
67	Nonparametric Distribution Free UCL Statistics										
68	Data appear to follow a Discernible Distribution at 5% Significance Level										
69											
70	Nonparametric Distribution Free UCLs										
71	95% CLT UCL			0.0277		95% Jackknife UCL			0.0285		
72	95% Standard Bootstrap UCL			N/A		95% Bootstrap-t UCL			N/A		
73	95% Hall's Bootstrap UCL			N/A		95% Percentile Bootstrap UCL			N/A		
74	95% BCA Bootstrap UCL			N/A							
75	90% Chebyshev(Mean, Sd) UCL			0.0332		95% Chebyshev(Mean, Sd) UCL			0.0387		
76	97.5% Chebyshev(Mean, Sd) UCL			0.0464		99% Chebyshev(Mean, Sd) UCL			0.0615		
77											
78	Suggested UCL to Use										
79	95% Student's-t UCL			0.0285							
80											
81	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test										
82	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL										
83											
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
85	Recommendations are based upon data size, data distribution, and skewness.										
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
88											
89											
90	Perfluoro-n-octanoate acid (PFOA) (estuary)										
91											
92	General Statistics										
93	Total Number of Observations			29		Number of Distinct Observations			14		
94						Number of Missing Observations			80		
95	Minimum			0.002		Mean			0.0532		
96	Maximum			0.19		Median			0.03		
97	SD			0.0521		Std. Error of Mean			0.00968		
98	Coefficient of Variation			0.98		Skewness			1.037		
99											
100	Normal GOF Test										
101	Shapiro Wilk Test Statistic			0.821		Shapiro Wilk GOF Test					
102	5% Shapiro Wilk Critical Value			0.926		Data Not Normal at 5% Significance Level					
103	Lilliefors Test Statistic			0.258		Lilliefors GOF Test					
104	5% Lilliefors Critical Value			0.161		Data Not Normal at 5% Significance Level					
105	Data Not Normal at 5% Significance Level										
106											
107	Assuming Normal Distribution										
108	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
109	95% Student's-t UCL			0.0696		95% Adjusted-CLT UCL (Chen-1995)			0.0711		
110						95% Modified-t UCL (Johnson-1978)			0.0699		
111											

A	B	C	D	E	F	G	H	I	J	K	L
112	Gamma GOF Test										
113	A-D Test Statistic		1.121		Anderson-Darling Gamma GOF Test						
114	5% A-D Critical Value		0.773		Data Not Gamma Distributed at 5% Significance Level						
115	K-S Test Statistic		0.179		Kolmogorov-Smirnov Gamma GOF Test						
116	5% K-S Critical Value		0.167		Data Not Gamma Distributed at 5% Significance Level						
117	Data Not Gamma Distributed at 5% Significance Level										
118											
119	Gamma Statistics										
120	k hat (MLE)		1.047		k star (bias corrected MLE)		0.962				
121	Theta hat (MLE)		0.0508		Theta star (bias corrected MLE)		0.0553				
122	nu hat (MLE)		60.72		nu star (bias corrected)		55.77				
123	MLE Mean (bias corrected)		0.0532		MLE Sd (bias corrected)		0.0542				
124					Approximate Chi Square Value (0.05)		39.61				
125	Adjusted Level of Significance		0.0407		Adjusted Chi Square Value		38.8				
126											
127	Assuming Gamma Distribution										
128	95% Approximate Gamma UCL (use when n>=50))		0.0749		95% Adjusted Gamma UCL (use when n<50)		0.0764				
129											
130	Lognormal GOF Test										
131	Shapiro Wilk Test Statistic		0.921		Shapiro Wilk Lognormal GOF Test						
132	5% Shapiro Wilk Critical Value		0.926		Data Not Lognormal at 5% Significance Level						
133	Lilliefors Test Statistic		0.147		Lilliefors Lognormal GOF Test						
134	5% Lilliefors Critical Value		0.161		Data appear Lognormal at 5% Significance Level						
135	Data appear Approximate Lognormal at 5% Significance Level										
136											
137	Lognormal Statistics										
138	Minimum of Logged Data		-6.215		Mean of logged Data		-3.483				
139	Maximum of Logged Data		-1.661		SD of logged Data		1.144				
140											
141	Assuming Lognormal Distribution										
142	95% H-UCL		0.105		90% Chebyshev (MVUE) UCL		0.0999				
143	95% Chebyshev (MVUE) UCL		0.119		97.5% Chebyshev (MVUE) UCL		0.146				
144	99% Chebyshev (MVUE) UCL		0.199								
145											
146	Nonparametric Distribution Free UCL Statistics										
147	Data appear to follow a Discernible Distribution at 5% Significance Level										
148											
149	Nonparametric Distribution Free UCLs										
150	95% CLT UCL		0.0691		95% Jackknife UCL		0.0696				
151	95% Standard Bootstrap UCL		0.0691		95% Bootstrap-t UCL		0.0714				
152	95% Hall's Bootstrap UCL		0.0708		95% Percentile Bootstrap UCL		0.0694				
153	95% BCA Bootstrap UCL		0.0712								
154	90% Chebyshev(Mean, Sd) UCL		0.0822		95% Chebyshev(Mean, Sd) UCL		0.0953				
155	97.5% Chebyshev(Mean, Sd) UCL		0.114		99% Chebyshev(Mean, Sd) UCL		0.149				
156											
157	Suggested UCL to Use										
158	95% H-UCL		0.105								
159											
160	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
161	Recommendations are based upon data size, data distribution, and skewness.										
162	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
163	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
164											
165	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.										
166	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.										
167	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.										
168	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.										

A	B	C	D	E	F	G	H	I	J	K	L
169											
170											
171	Perfluoro-n-octanoate acid (PFOA) (freshwater)										
172											
173	General Statistics										
174	Total Number of Observations				54		Number of Distinct Observations				8
175							Number of Missing Observations				19
176	Minimum				0.01		Mean				0.0186
177	Maximum				0.06		Median				0.02
178	SD				0.00974		Std. Error of Mean				0.00133
179	Coefficient of Variation				0.523		Skewness				1.825
180											
181	Normal GOF Test										
182	Shapiro Wilk Test Statistic				0.77		Shapiro Wilk GOF Test				
183	5% Shapiro Wilk P Value				7.946E-11		Data Not Normal at 5% Significance Level				
184	Lilliefors Test Statistic				0.277		Lilliefors GOF Test				
185	5% Lilliefors Critical Value				0.12		Data Not Normal at 5% Significance Level				
186	Data Not Normal at 5% Significance Level										
187											
188	Assuming Normal Distribution										
189	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
190	95% Student's-t UCL				0.0208		95% Adjusted-CLT UCL (Chen-1995)				0.0212
191							95% Modified-t UCL (Johnson-1978)				0.0209
192											
193	Gamma GOF Test										
194	A-D Test Statistic				3.805		Anderson-Darling Gamma GOF Test				
195	5% A-D Critical Value				0.754		Data Not Gamma Distributed at 5% Significance Level				
196	K-S Test Statistic				0.242		Kolmogorov-Smirnov Gamma GOF Test				
197	5% K-S Critical Value				0.121		Data Not Gamma Distributed at 5% Significance Level				
198	Data Not Gamma Distributed at 5% Significance Level										
199											
200	Gamma Statistics										
201	k hat (MLE)				4.632		k star (bias corrected MLE)				4.387
202	Theta hat (MLE)				0.00402		Theta star (bias corrected MLE)				0.00425
203	nu hat (MLE)				500.3		nu star (bias corrected)				473.8
204	MLE Mean (bias corrected)				0.0186		MLE Sd (bias corrected)				0.00889
205							Approximate Chi Square Value (0.05)				424.3
206	Adjusted Level of Significance				0.0456		Adjusted Chi Square Value				423
207											
208	Assuming Gamma Distribution										
209	95% Approximate Gamma UCL (use when n>=50))				0.0208		95% Adjusted Gamma UCL (use when n<50)				0.0209
210											
211	Lognormal GOF Test										
212	Shapiro Wilk Test Statistic				0.823		Shapiro Wilk Lognormal GOF Test				
213	5% Shapiro Wilk P Value				2.0494E-8		Data Not Lognormal at 5% Significance Level				
214	Lilliefors Test Statistic				0.252		Lilliefors Lognormal GOF Test				
215	5% Lilliefors Critical Value				0.12		Data Not Lognormal at 5% Significance Level				
216	Data Not Lognormal at 5% Significance Level										
217											
218	Lognormal Statistics										
219	Minimum of Logged Data				-4.605		Mean of logged Data				-4.095
220	Maximum of Logged Data				-2.813		SD of logged Data				0.466
221											
222	Assuming Lognormal Distribution										
223	95% H-UCL				0.0209		90% Chebyshev (MVUE) UCL				0.0222
224	95% Chebyshev (MVUE) UCL				0.0239		97.5% Chebyshev (MVUE) UCL				0.0262
225	99% Chebyshev (MVUE) UCL				0.0307						

A	B	C	D	E	F	G	H	I	J	K	L	
226												
227	Nonparametric Distribution Free UCL Statistics											
228	Data do not follow a Discernible Distribution (0.05)											
229												
230	Nonparametric Distribution Free UCLs											
231	95% CLT UCL			0.0208	95% Jackknife UCL			0.0208				
232	95% Standard Bootstrap UCL			0.0207	95% Bootstrap-t UCL			0.0213				
233	95% Hall's Bootstrap UCL			0.0216	95% Percentile Bootstrap UCL			0.0209				
234	95% BCA Bootstrap UCL			0.0211								
235	90% Chebyshev(Mean, Sd) UCL			0.0226	95% Chebyshev(Mean, Sd) UCL			0.0244				
236	97.5% Chebyshev(Mean, Sd) UCL			0.0269	99% Chebyshev(Mean, Sd) UCL			0.0318				
237												
238	Suggested UCL to Use											
239	95% Student's-t UCL			0.0208	or 95% Modified-t UCL			0.0209				
240												
241	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
242	Recommendations are based upon data size, data distribution, and skewness.											
243	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
244	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
245												
246												
247	Perfluoro-n-octanoate acid (PFOA) (Zone B drain)											
248												
249	General Statistics											
250	Total Number of Observations			16	Number of Distinct Observations			10				
251					Number of Missing Observations			7				
252	Minimum			0.01	Mean			0.102				
253	Maximum			0.49	Median			0.05				
254	SD			0.126	Std. Error of Mean			0.0316				
255	Coefficient of Variation			1.241	Skewness			2.567				
256												
257	Normal GOF Test											
258	Shapiro Wilk Test Statistic			0.593	Shapiro Wilk GOF Test							
259	5% Shapiro Wilk Critical Value			0.887	Data Not Normal at 5% Significance Level							
260	Lilliefors Test Statistic			0.319	Lilliefors GOF Test							
261	5% Lilliefors Critical Value			0.213	Data Not Normal at 5% Significance Level							
262	Data Not Normal at 5% Significance Level											
263												
264	Assuming Normal Distribution											
265	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
266	95% Student's-t UCL			0.157	95% Adjusted-CLT UCL (Chen-1995)			0.176				
267					95% Modified-t UCL (Johnson-1978)			0.161				
268												
269	Gamma GOF Test											
270	A-D Test Statistic			1.535	Anderson-Darling Gamma GOF Test							
271	5% A-D Critical Value			0.758	Data Not Gamma Distributed at 5% Significance Level							
272	K-S Test Statistic			0.235	Kolmogorov-Smirnov Gamma GOF Test							
273	5% K-S Critical Value			0.22	Data Not Gamma Distributed at 5% Significance Level							
274	Data Not Gamma Distributed at 5% Significance Level											
275												
276	Gamma Statistics											
277	k hat (MLE)			1.294	k star (bias corrected MLE)			1.093				
278	Theta hat (MLE)			0.0787	Theta star (bias corrected MLE)			0.0932				
279	nu hat (MLE)			41.41	nu star (bias corrected)			34.98				
280	MLE Mean (bias corrected)			0.102	MLE Sd (bias corrected)			0.0974				
281					Approximate Chi Square Value (0.05)			22.45				
282	Adjusted Level of Significance			0.0335	Adjusted Chi Square Value			21.31				

A	B	C	D	E	F	G	H	I	J	K	L
283											
284	Assuming Gamma Distribution										
285	95% Approximate Gamma UCL (use when n>=50))				0.159		95% Adjusted Gamma UCL (use when n<50)				0.167
286											
287	Lognormal GOF Test										
288	Shapiro Wilk Test Statistic				0.877		Shapiro Wilk Lognormal GOF Test				
289	5% Shapiro Wilk Critical Value				0.887		Data Not Lognormal at 5% Significance Level				
290	Lilliefors Test Statistic				0.224		Lilliefors Lognormal GOF Test				
291	5% Lilliefors Critical Value				0.213		Data Not Lognormal at 5% Significance Level				
292	Data Not Lognormal at 5% Significance Level										
293											
294	Lognormal Statistics										
295	Minimum of Logged Data				-4.605		Mean of logged Data				-2.718
296	Maximum of Logged Data				-0.713		SD of logged Data				0.89
297											
298	Assuming Lognormal Distribution										
299	95% H-UCL		0.176		90% Chebyshev (MVUE) UCL				0.164		
300	95% Chebyshev (MVUE) UCL		0.195		97.5% Chebyshev (MVUE) UCL				0.238		
301	99% Chebyshev (MVUE) UCL		0.323								
302											
303	Nonparametric Distribution Free UCL Statistics										
304	Data do not follow a Discernible Distribution (0.05)										
305											
306	Nonparametric Distribution Free UCLs										
307	95% CLT UCL		0.154		95% Jackknife UCL				0.157		
308	95% Standard Bootstrap UCL		0.151		95% Bootstrap-t UCL				0.32		
309	95% Hall's Bootstrap UCL		0.429		95% Percentile Bootstrap UCL				0.158		
310	95% BCA Bootstrap UCL		0.176								
311	90% Chebyshev(Mean, Sd) UCL		0.197		95% Chebyshev(Mean, Sd) UCL				0.24		
312	97.5% Chebyshev(Mean, Sd) UCL		0.299		99% Chebyshev(Mean, Sd) UCL				0.416		
313											
314	Suggested UCL to Use										
315	95% Chebyshev (Mean, Sd) UCL		0.24								
316											
317	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
318	Recommendations are based upon data size, data distribution, and skewness.										
319	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
320	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
321											
322											
323	Perfluoro-n-octanoate acid (PFOA) (Zone A drain)										
324											
325	General Statistics										
326	Total Number of Observations				9		Number of Distinct Observations				6
327							Number of Missing Observations				7
328	Minimum				0.01		Mean				0.0433
329	Maximum				0.09		Median				0.05
330	SD				0.0255		Std. Error of Mean				0.0085
331	Coefficient of Variation				0.588		Skewness				0.453
332											
333	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use										
334	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.										
335	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).										
336	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1										
337											

A	B	C	D	E	F	G	H	I	J	K	L
338	Normal GOF Test										
339	Shapiro Wilk Test Statistic			0.939	Shapiro Wilk GOF Test						
340	5% Shapiro Wilk Critical Value			0.829	Data appear Normal at 5% Significance Level						
341	Lilliefors Test Statistic			0.159	Lilliefors GOF Test						
342	5% Lilliefors Critical Value			0.274	Data appear Normal at 5% Significance Level						
343	Data appear Normal at 5% Significance Level										
344											
345	Assuming Normal Distribution										
346	95% Normal UCL				95% UCLs (Adjusted for Skewness)						
347	95% Student's-t UCL			0.0591	95% Adjusted-CLT UCL (Chen-1995)					0.0587	
348					95% Modified-t UCL (Johnson-1978)					0.0594	
349											
350	Gamma GOF Test										
351	A-D Test Statistic			0.335	Anderson-Darling Gamma GOF Test						
352	5% A-D Critical Value			0.727	Detected data appear Gamma Distributed at 5% Significance Level						
353	K-S Test Statistic			0.227	Kolmogorov-Smirnov Gamma GOF Test						
354	5% K-S Critical Value			0.282	Detected data appear Gamma Distributed at 5% Significance Level						
355	Detected data appear Gamma Distributed at 5% Significance Level										
356											
357	Gamma Statistics										
358	k hat (MLE)			2.783	k star (bias corrected MLE)					1.93	
359	Theta hat (MLE)			0.0156	Theta star (bias corrected MLE)					0.0225	
360	nu hat (MLE)			50.1	nu star (bias corrected)					34.73	
361	MLE Mean (bias corrected)			0.0433	MLE Sd (bias corrected)					0.0312	
362					Approximate Chi Square Value (0.05)					22.25	
363	Adjusted Level of Significance			0.0231	Adjusted Chi Square Value					20.17	
364											
365	Assuming Gamma Distribution										
366	95% Approximate Gamma UCL (use when n>=50))			0.0676	95% Adjusted Gamma UCL (use when n<50)					0.0746	
367											
368	Lognormal GOF Test										
369	Shapiro Wilk Test Statistic			0.931	Shapiro Wilk Lognormal GOF Test						
370	5% Shapiro Wilk Critical Value			0.829	Data appear Lognormal at 5% Significance Level						
371	Lilliefors Test Statistic			0.238	Lilliefors Lognormal GOF Test						
372	5% Lilliefors Critical Value			0.274	Data appear Lognormal at 5% Significance Level						
373	Data appear Lognormal at 5% Significance Level										
374											
375	Lognormal Statistics										
376	Minimum of Logged Data			-4.605	Mean of logged Data					-3.329	
377	Maximum of Logged Data			-2.408	SD of logged Data					0.702	
378											
379	Assuming Lognormal Distribution										
380	95% H-UCL			0.0879	90% Chebyshev (MVUE) UCL					0.0763	
381	95% Chebyshev (MVUE) UCL			0.0908	97.5% Chebyshev (MVUE) UCL					0.111	
382	99% Chebyshev (MVUE) UCL			0.15							
383											
384	Nonparametric Distribution Free UCL Statistics										
385	Data appear to follow a Discernible Distribution at 5% Significance Level										
386											
387	Nonparametric Distribution Free UCLs										
388	95% CLT UCL			0.0573	95% Jackknife UCL					0.0591	
389	95% Standard Bootstrap UCL			0.0568	95% Bootstrap-t UCL					0.0603	
390	95% Hall's Bootstrap UCL			0.0592	95% Percentile Bootstrap UCL					0.0567	
391	95% BCA Bootstrap UCL			0.0567							
392	90% Chebyshev(Mean, Sd) UCL			0.0688	95% Chebyshev(Mean, Sd) UCL					0.0804	
393	97.5% Chebyshev(Mean, Sd) UCL			0.0964	99% Chebyshev(Mean, Sd) UCL					0.128	
394											

	A	B	C	D	E	F	G	H	I	J	K	L
395	Suggested UCL to Use											
396	95% Student's-t UCL				0.0591							
397												
398	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
399	Recommendations are based upon data size, data distribution, and skewness.											
400	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
401	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											

A	B	C	D	E	F	G	H	I	J	K	L	
402												
403												
404	Perfluoro-n-octanoate acid (PFOA) (Zone C drain)											
405												
406	General Statistics											
407	Total Number of Observations				8		Number of Distinct Observations				6	
408							Number of Missing Observations				47	
409	Minimum				0.004		Mean				0.0175	
410	Maximum				0.05		Median				0.01	
411	SD				0.0156		Std. Error of Mean				0.00551	
412	Coefficient of Variation				0.891		Skewness				1.56	
413												
414	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
415	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
416	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
417	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
418												
419	Normal GOF Test											
420	Shapiro Wilk Test Statistic				0.812		Shapiro Wilk GOF Test					
421	5% Shapiro Wilk Critical Value				0.818		Data Not Normal at 5% Significance Level					
422	Lilliefors Test Statistic				0.31		Lilliefors GOF Test					
423	5% Lilliefors Critical Value				0.283		Data Not Normal at 5% Significance Level					
424	Data Not Normal at 5% Significance Level											
425												
426	Assuming Normal Distribution											
427	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
428	95% Student's-t UCL				0.0279		95% Adjusted-CLT UCL (Chen-1995)				0.0298	
429							95% Modified-t UCL (Johnson-1978)				0.0285	
430												
431	Gamma GOF Test											
432	A-D Test Statistic				0.402		Anderson-Darling Gamma GOF Test					
433	5% A-D Critical Value				0.726		Detected data appear Gamma Distributed at 5% Significance Level					
434	K-S Test Statistic				0.285		Kolmogorov-Smirnov Gamma GOF Test					
435	5% K-S Critical Value				0.298		Detected data appear Gamma Distributed at 5% Significance Level					
436	Detected data appear Gamma Distributed at 5% Significance Level											
437												
438	Gamma Statistics											
439	k hat (MLE)				1.746		k star (bias corrected MLE)				1.175	
440	Theta hat (MLE)				0.01		Theta star (bias corrected MLE)				0.0149	
441	nu hat (MLE)				27.94		nu star (bias corrected)				18.8	
442	MLE Mean (bias corrected)				0.0175		MLE Sd (bias corrected)				0.0161	
443							Approximate Chi Square Value (0.05)				9.969	
444	Adjusted Level of Significance				0.0195		Adjusted Chi Square Value				8.393	
445												
446	Assuming Gamma Distribution											
447	95% Approximate Gamma UCL (use when n>=50)				0.033		95% Adjusted Gamma UCL (use when n<50)				0.0392	
448												
449	Lognormal GOF Test											
450	Shapiro Wilk Test Statistic				0.953		Shapiro Wilk Lognormal GOF Test					
451	5% Shapiro Wilk Critical Value				0.818		Data appear Lognormal at 5% Significance Level					
452	Lilliefors Test Statistic				0.241		Lilliefors Lognormal GOF Test					
453	5% Lilliefors Critical Value				0.283		Data appear Lognormal at 5% Significance Level					
454	Data appear Lognormal at 5% Significance Level											
455												
456	Lognormal Statistics											
457	Minimum of Logged Data				-5.521		Mean of logged Data				-4.358	
458	Maximum of Logged Data				-2.996		SD of logged Data				0.836	

	A	B	C	D	E	F	G	H	I	J	K	L
459												
460	Assuming Lognormal Distribution											
461	95% H-UCL				0.0473		90% Chebyshev (MVUE) UCL				0.0328	
462	95% Chebyshev (MVUE) UCL				0.0398		97.5% Chebyshev (MVUE) UCL				0.0496	
463	99% Chebyshev (MVUE) UCL				0.0688							
464												

A	B	C	D	E	F	G	H	I	J	K	L
465	Nonparametric Distribution Free UCL Statistics										
466	Data appear to follow a Discernible Distribution at 5% Significance Level										
467											
468	Nonparametric Distribution Free UCLs										
469	95% CLT UCL			0.0266		95% Jackknife UCL			0.0279		
470	95% Standard Bootstrap UCL			0.0257		95% Bootstrap-t UCL			0.0426		
471	95% Hall's Bootstrap UCL			0.0647		95% Percentile Bootstrap UCL			0.0268		
472	95% BCA Bootstrap UCL			0.0293							
473	90% Chebyshev(Mean, Sd) UCL			0.034		95% Chebyshev(Mean, Sd) UCL			0.0415		
474	97.5% Chebyshev(Mean, Sd) UCL			0.0519		99% Chebyshev(Mean, Sd) UCL			0.0724		
475											
476	Suggested UCL to Use										
477	95% Adjusted Gamma UCL			0.0392							
478											
479	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
480	Recommendations are based upon data size, data distribution, and skewness.										
481	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
482	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
483											
484											
485	Perfluoro-n-octane sulfonic acid (PFOS) (Zone D drain)										
486											
487	General Statistics										
488	Total Number of Observations			35		Number of Distinct Observations			26		
489						Number of Missing Observations			14		
490	Minimum			0.01		Mean			0.477		
491	Maximum			3.6		Median			0.21		
492	SD			0.69		Std. Error of Mean			0.117		
493	Coefficient of Variation			1.445		Skewness			3.043		
494											
495	Normal GOF Test										
496	Shapiro Wilk Test Statistic			0.67		Shapiro Wilk GOF Test					
497	5% Shapiro Wilk Critical Value			0.934		Data Not Normal at 5% Significance Level					
498	Lilliefors Test Statistic			0.249		Lilliefors GOF Test					
499	5% Lilliefors Critical Value			0.148		Data Not Normal at 5% Significance Level					
500	Data Not Normal at 5% Significance Level										
501											
502	Assuming Normal Distribution										
503	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
504	95% Student's-t UCL			0.675		95% Adjusted-CLT UCL (Chen-1995)			0.733		
505						95% Modified-t UCL (Johnson-1978)			0.685		
506											
507	Gamma GOF Test										
508	A-D Test Statistic			0.425		Anderson-Darling Gamma GOF Test					
509	5% A-D Critical Value			0.801		Detected data appear Gamma Distributed at 5% Significance Level					
510	K-S Test Statistic			0.12		Kolmogorov-Smirnov Gamma GOF Test					
511	5% K-S Critical Value			0.156		Detected data appear Gamma Distributed at 5% Significance Level					
512	Detected data appear Gamma Distributed at 5% Significance Level										
513											
514	Gamma Statistics										
515	k hat (MLE)			0.619		k star (bias corrected MLE)			0.585		
516	Theta hat (MLE)			0.772		Theta star (bias corrected MLE)			0.817		
517	nu hat (MLE)			43.31		nu star (bias corrected)			40.93		
518	MLE Mean (bias corrected)			0.477		MLE Sd (bias corrected)			0.624		
519						Approximate Chi Square Value (0.05)			27.27		
520	Adjusted Level of Significance			0.0425		Adjusted Chi Square Value			26.74		
521											

A	B	C	D	E	F	G	H	I	J	K	L	
522	Assuming Gamma Distribution											
523	95% Approximate Gamma UCL (use when n>=50)			0.717	95% Adjusted Gamma UCL (use when n<50)					0.731		
524												
525	Lognormal GOF Test											
526	Shapiro Wilk Test Statistic			0.943	Shapiro Wilk Lognormal GOF Test							
527	5% Shapiro Wilk Critical Value			0.934	Data appear Lognormal at 5% Significance Level							
528	Lilliefors Test Statistic			0.12	Lilliefors Lognormal GOF Test							
529	5% Lilliefors Critical Value			0.148	Data appear Lognormal at 5% Significance Level							
530	Data appear Lognormal at 5% Significance Level											
531												
532	Lognormal Statistics											
533	Minimum of Logged Data			-4.605	Mean of logged Data					-1.734		
534	Maximum of Logged Data			1.281	SD of logged Data					1.634		
535												
536	Assuming Lognormal Distribution											
537	95% H-UCL			1.705	90% Chebyshev (MVUE) UCL					1.292		
538	95% Chebyshev (MVUE) UCL			1.598	97.5% Chebyshev (MVUE) UCL					2.021		
539	99% Chebyshev (MVUE) UCL			2.853								
540												
541	Nonparametric Distribution Free UCL Statistics											
542	Data appear to follow a Discernible Distribution at 5% Significance Level											
543												
544	Nonparametric Distribution Free UCLs											
545	95% CLT UCL			0.669	95% Jackknife UCL					0.675		
546	95% Standard Bootstrap UCL			0.662	95% Bootstrap-t UCL					0.802		
547	95% Hall's Bootstrap UCL			1.457	95% Percentile Bootstrap UCL					0.684		
548	95% BCA Bootstrap UCL			0.735								
549	90% Chebyshev(Mean, Sd) UCL			0.827	95% Chebyshev(Mean, Sd) UCL					0.986		
550	97.5% Chebyshev(Mean, Sd) UCL			1.206	99% Chebyshev(Mean, Sd) UCL					1.638		
551												
552	Suggested UCL to Use											
553	95% Adjusted Gamma UCL			0.731								
554												
555	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
556	Recommendations are based upon data size, data distribution, and skewness.											
557	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
558	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
559												
560												
561	Perfluoro-n-octane sulfonic acid (PFOS) (estuary)											
562												
563	General Statistics											
564	Total Number of Observations			73	Number of Distinct Observations					41		
565					Number of Missing Observations					36		
566	Minimum			0.003	Mean					0.874		
567	Maximum			6.6	Median					0.09		
568	SD			1.621	Std. Error of Mean					0.19		
569	Coefficient of Variation			1.855	Skewness					2.068		
570												
571	Normal GOF Test											
572	Shapiro Wilk Test Statistic			0.584	Shapiro Wilk GOF Test							
573	5% Shapiro Wilk P Value			0	Data Not Normal at 5% Significance Level							
574	Lilliefors Test Statistic			0.346	Lilliefors GOF Test							
575	5% Lilliefors Critical Value			0.104	Data Not Normal at 5% Significance Level							
576	Data Not Normal at 5% Significance Level											
577												
578	Assuming Normal Distribution											

	A	B	C	D	E	F	G	H	I	J	K	L
579	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
580	95% Student's-t UCL				1.19	95% Adjusted-CLT UCL (Chen-1995)						1.235
581						95% Modified-t UCL (Johnson-1978)						1.198
582												
583	Gamma GOF Test											
584	A-D Test Statistic			4.904	Anderson-Darling Gamma GOF Test							
585	5% A-D Critical Value			0.845	Data Not Gamma Distributed at 5% Significance Level							
586	K-S Test Statistic			0.225	Kolmogorov-Smimov Gamma GOF Test							
587	5% K-S Critical Value			0.112	Data Not Gamma Distributed at 5% Significance Level							
588	Data Not Gamma Distributed at 5% Significance Level											
589												
590	Gamma Statistics											
591	k hat (MLE)			0.385	k star (bias corrected MLE)						0.378	
592	Theta hat (MLE)			2.27	Theta star (bias corrected MLE)						2.31	
593	nu hat (MLE)			56.21	nu star (bias corrected)						55.23	
594	MLE Mean (bias corrected)			0.874	MLE Sd (bias corrected)						1.421	
595					Approximate Chi Square Value (0.05)						39.16	
596	Adjusted Level of Significance			0.0467	Adjusted Chi Square Value						38.88	

A	B	C	D	E	F	G	H	I	J	K	L		
597													
598	Assuming Gamma Distribution												
599	95% Approximate Gamma UCL (use when n>=50))				1.233	95% Adjusted Gamma UCL (use when n<50)				1.241			
600													
601	Lognormal GOF Test												
602	Shapiro Wilk Test Statistic				0.929	Shapiro Wilk Lognormal GOF Test							
603	5% Shapiro Wilk P Value				4.2158E-4	Data Not Lognormal at 5% Significance Level							
604	Lilliefors Test Statistic				0.12	Lilliefors Lognormal GOF Test							
605	5% Lilliefors Critical Value				0.104	Data Not Lognormal at 5% Significance Level							
606	Data Not Lognormal at 5% Significance Level												
607													
608	Lognormal Statistics												
609	Minimum of Logged Data				-5.809	Mean of logged Data				-1.855			
610	Maximum of Logged Data				1.887	SD of logged Data				1.919			
611													
612	Assuming Lognormal Distribution												
613	95% H-UCL				2.083	90% Chebyshev (MVUE) UCL				1.856			
614	95% Chebyshev (MVUE) UCL				2.28	97.5% Chebyshev (MVUE) UCL				2.867			
615	99% Chebyshev (MVUE) UCL				4.021								
616													
617	Nonparametric Distribution Free UCL Statistics												
618	Data do not follow a Discernible Distribution (0.05)												
619													
620	Nonparametric Distribution Free UCLs												
621	95% CLT UCL				1.186	95% Jackknife UCL				1.19			
622	95% Standard Bootstrap UCL				1.176	95% Bootstrap-t UCL				1.248			
623	95% Hall's Bootstrap UCL				1.215	95% Percentile Bootstrap UCL				1.193			
624	95% BCA Bootstrap UCL				1.226								
625	90% Chebyshev(Mean, Sd) UCL				1.443	95% Chebyshev(Mean, Sd) UCL				1.701			
626	97.5% Chebyshev(Mean, Sd) UCL				2.059	99% Chebyshev(Mean, Sd) UCL				2.762			
627													
628	Suggested UCL to Use												
629	95% Chebyshev (Mean, Sd) UCL				1.701								
630													
631	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
632	Recommendations are based upon data size, data distribution, and skewness.												
633	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
634	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
635													
636													
637	Perfluoro-n-octane sulfonic acid (PFOS) (freshwater)												
638													
639	General Statistics												
640	Total Number of Observations				73	Number of Distinct Observations				51			
641						Number of Missing Observations				0			
642	Minimum				0.05	Mean				0.563			
643	Maximum				1.6	Median				0.58			
644	SD				0.29	Std. Error of Mean				0.034			
645	Coefficient of Variation				0.516	Skewness				0.688			
646													
647	Normal GOF Test												
648	Shapiro Wilk Test Statistic				0.94	Shapiro Wilk GOF Test							
649	5% Shapiro Wilk P Value				0.00294	Data Not Normal at 5% Significance Level							
650	Lilliefors Test Statistic				0.114	Lilliefors GOF Test							
651	5% Lilliefors Critical Value				0.104	Data Not Normal at 5% Significance Level							
652	Data Not Normal at 5% Significance Level												
653													

	A	B	C	D	E	F	G	H	I	J	K	L	
654	Assuming Normal Distribution												
655	95% Normal UCL					95% UCLs (Adjusted for Skewness)							
656	95% Student's-t UCL				0.619		95% Adjusted-CLT UCL (Chen-1995)					0.621	
657							95% Modified-t UCL (Johnson-1978)					0.62	
658													
659	Gamma GOF Test												
660	A-D Test Statistic			2.63			Anderson-Darling Gamma GOF Test						
661	5% A-D Critical Value			0.758			Data Not Gamma Distributed at 5% Significance Level						
662	K-S Test Statistic			0.17			Kolmogorov-Smirnov Gamma GOF Test						
663	5% K-S Critical Value			0.105			Data Not Gamma Distributed at 5% Significance Level						
664	Data Not Gamma Distributed at 5% Significance Level												

A	B	C	D	E	F	G	H	I	J	K	L
665											
666	Gamma Statistics										
667	k hat (MLE)		2.887		k star (bias corrected MLE)		2.778				
668	Theta hat (MLE)		0.195		Theta star (bias corrected MLE)		0.203				
669	nu hat (MLE)		421.5		nu star (bias corrected)		405.5				
670	MLE Mean (bias corrected)		0.563		MLE Sd (bias corrected)		0.338				
671					Approximate Chi Square Value (0.05)		359.9				
672	Adjusted Level of Significance		0.0467		Adjusted Chi Square Value		359				
673											
674	Assuming Gamma Distribution										
675	95% Approximate Gamma UCL (use when n>=50))			0.634		95% Adjusted Gamma UCL (use when n<50)			0.636		
676											
677	Lognormal GOF Test										
678	Shapiro Wilk Test Statistic		0.858		Shapiro Wilk Lognormal GOF Test						
679	5% Shapiro Wilk P Value		1.9711E-9		Data Not Lognormal at 5% Significance Level						
680	Lilliefors Test Statistic		0.203		Lilliefors Lognormal GOF Test						
681	5% Lilliefors Critical Value		0.104		Data Not Lognormal at 5% Significance Level						
682	Data Not Lognormal at 5% Significance Level										
683											
684	Lognormal Statistics										
685	Minimum of Logged Data		-2.996		Mean of logged Data		-0.758				
686	Maximum of Logged Data		0.47		SD of logged Data		0.7				
687											
688	Assuming Lognormal Distribution										
689	95% H-UCL		0.705		90% Chebyshev (MVUE) UCL		0.757				
690	95% Chebyshev (MVUE) UCL		0.83		97.5% Chebyshev (MVUE) UCL		0.931				
691	99% Chebyshev (MVUE) UCL		1.13								
692											
693	Nonparametric Distribution Free UCL Statistics										
694	Data do not follow a Discernible Distribution (0.05)										
695											
696	Nonparametric Distribution Free UCLs										
697	95% CLT UCL		0.618		95% Jackknife UCL		0.619				
698	95% Standard Bootstrap UCL		0.619		95% Bootstrap-t UCL		0.621				
699	95% Hall's Bootstrap UCL		0.623		95% Percentile Bootstrap UCL		0.617				
700	95% BCA Bootstrap UCL		0.62								
701	90% Chebyshev(Mean, Sd) UCL		0.664		95% Chebyshev(Mean, Sd) UCL		0.711				
702	97.5% Chebyshev(Mean, Sd) UCL		0.775		99% Chebyshev(Mean, Sd) UCL		0.9				
703											
704	Suggested UCL to Use										
705	95% Chebyshev (Mean, Sd) UCL		0.711								
706											
707	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
708	Recommendations are based upon data size, data distribution, and skewness.										
709	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
710	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
711											
712											
713	Perfluoro-n-octane sulfonic acid (PFOS) (Zone B drain)										
714											
715	General Statistics										
716	Total Number of Observations		22		Number of Distinct Observations		16				
717					Number of Missing Observations		1				
718	Minimum		0.01		Mean		1.112				
719	Maximum		3.3		Median		1.15				
720	SD		0.858		Std. Error of Mean		0.183				
721	Coefficient of Variation		0.772		Skewness		0.699				

	A	B	C	D	E	F	G	H	I	J	K	L
722												
723	Normal GOF Test											
724	Shapiro Wilk Test Statistic				0.911		Shapiro Wilk GOF Test					
725	5% Shapiro Wilk Critical Value				0.911		Data Not Normal at 5% Significance Level					
726	Lilliefors Test Statistic				0.156		Lilliefors GOF Test					
727	5% Lilliefors Critical Value				0.184		Data appear Normal at 5% Significance Level					
728	Data appear Approximate Normal at 5% Significance Level											
729												
730	Assuming Normal Distribution											
731	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
732	95% Student's-t UCL				1.427		95% Adjusted-CLT UCL (Chen-1995)				1.442	
733							95% Modified-t UCL (Johnson-1978)				1.431	

A	B	C	D	E	F	G	H	I	J	K	L
734											
735	Gamma GOF Test										
736	A-D Test Statistic			1.576		Anderson-Darling Gamma GOF Test					
737	5% A-D Critical Value			0.781		Data Not Gamma Distributed at 5% Significance Level					
738	K-S Test Statistic			0.232		Kolmogorov-Smirnov Gamma GOF Test					
739	5% K-S Critical Value			0.192		Data Not Gamma Distributed at 5% Significance Level					
740	Data Not Gamma Distributed at 5% Significance Level										
741											
742	Gamma Statistics										
743	k hat (MLE)			0.796		k star (bias corrected MLE)			0.718		
744	Theta hat (MLE)			1.397		Theta star (bias corrected MLE)			1.549		
745	nu hat (MLE)			35.03		nu star (bias corrected)			31.58		
746	MLE Mean (bias corrected)			1.112		MLE Sd (bias corrected)			1.312		
747						Approximate Chi Square Value (0.05)			19.74		
748	Adjusted Level of Significance			0.0386		Adjusted Chi Square Value			19.04		
749											
750	Assuming Gamma Distribution										
751	95% Approximate Gamma UCL (use when n>=50))			1.779		95% Adjusted Gamma UCL (use when n<50)			1.844		
752											
753	Lognormal GOF Test										
754	Shapiro Wilk Test Statistic			0.766		Shapiro Wilk Lognormal GOF Test					
755	5% Shapiro Wilk Critical Value			0.911		Data Not Lognormal at 5% Significance Level					
756	Lilliefors Test Statistic			0.291		Lilliefors Lognormal GOF Test					
757	5% Lilliefors Critical Value			0.184		Data Not Lognormal at 5% Significance Level					
758	Data Not Lognormal at 5% Significance Level										
759											
760	Lognormal Statistics										
761	Minimum of Logged Data			-4.605		Mean of logged Data			-0.64		
762	Maximum of Logged Data			1.194		SD of logged Data			1.774		
763											
764	Assuming Lognormal Distribution										
765	95% H-UCL		11.07		90% Chebyshev (MVUE) UCL			5.247			
766	95% Chebyshev (MVUE) UCL		6.638		97.5% Chebyshev (MVUE) UCL			8.569			
767	99% Chebyshev (MVUE) UCL		12.36								
768											
769	Nonparametric Distribution Free UCL Statistics										
770	Data appear to follow a Discernible Distribution at 5% Significance Level										
771											
772	Nonparametric Distribution Free UCLs										
773	95% CLT UCL		1.413		95% Jackknife UCL			1.427			
774	95% Standard Bootstrap UCL		1.412		95% Bootstrap-t UCL			1.453			
775	95% Hall's Bootstrap UCL		1.467		95% Percentile Bootstrap UCL			1.406			
776	95% BCA Bootstrap UCL		1.44								
777	90% Chebyshev(Mean, Sd) UCL		1.661		95% Chebyshev(Mean, Sd) UCL			1.909			
778	97.5% Chebyshev(Mean, Sd) UCL		2.254		99% Chebyshev(Mean, Sd) UCL			2.932			
779											
780	Suggested UCL to Use										
781	95% Student's-t UCL		1.427								
782											
783	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test										
784	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL										
785											
786	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
787	Recommendations are based upon data size, data distribution, and skewness.										
788	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
789	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
790											

	A	B	C	D	E	F	G	H	I	J	K	L
791												
792	Perfluoro-n-octane sulfonic acid (PFOS) (Zone A drain)											
793												
794	General Statistics											
795	Total Number of Observations				13		Number of Distinct Observations				12	
796							Number of Missing Observations				3	
797	Minimum				0.04		Mean				1.48	
798	Maximum				4.3		Median				1.1	
799	SD				1.366		Std. Error of Mean				0.379	
800	Coefficient of Variation				0.923		Skewness				0.766	
801												

A	B	C	D	E	F	G	H	I	J	K	L
802	Normal GOF Test										
803	Shapiro Wilk Test Statistic			0.906	Shapiro Wilk GOF Test						
804	5% Shapiro Wilk Critical Value			0.866	Data appear Normal at 5% Significance Level						
805	Lilliefors Test Statistic			0.168	Lilliefors GOF Test						
806	5% Lilliefors Critical Value			0.234	Data appear Normal at 5% Significance Level						
807	Data appear Normal at 5% Significance Level										
808											
809	Assuming Normal Distribution										
810	95% Normal UCL				95% UCLs (Adjusted for Skewness)						
811	95% Student's-t UCL			2.155	95% Adjusted-CLT UCL (Chen-1995)					2.189	
812					95% Modified-t UCL (Johnson-1978)					2.169	
813											
814	Gamma GOF Test										
815	A-D Test Statistic			0.435	Anderson-Darling Gamma GOF Test						
816	5% A-D Critical Value			0.768	Detected data appear Gamma Distributed at 5% Significance Level						
817	K-S Test Statistic			0.157	Kolmogorov-Smirnov Gamma GOF Test						
818	5% K-S Critical Value			0.245	Detected data appear Gamma Distributed at 5% Significance Level						
819	Detected data appear Gamma Distributed at 5% Significance Level										
820											
821	Gamma Statistics										
822	k hat (MLE)			0.793	k star (bias corrected MLE)					0.661	
823	Theta hat (MLE)			1.866	Theta star (bias corrected MLE)					2.238	
824	nu hat (MLE)			20.62	nu star (bias corrected)					17.19	
825	MLE Mean (bias corrected)			1.48	MLE Sd (bias corrected)					1.82	
826					Approximate Chi Square Value (0.05)					8.811	
827	Adjusted Level of Significance			0.0301	Adjusted Chi Square Value					7.969	
828											
829	Assuming Gamma Distribution										
830	95% Approximate Gamma UCL (use when n>=50))			2.888	95% Adjusted Gamma UCL (use when n<50)					3.193	
831											
832	Lognormal GOF Test										
833	Shapiro Wilk Test Statistic			0.88	Shapiro Wilk Lognormal GOF Test						
834	5% Shapiro Wilk Critical Value			0.866	Data appear Lognormal at 5% Significance Level						
835	Lilliefors Test Statistic			0.216	Lilliefors Lognormal GOF Test						
836	5% Lilliefors Critical Value			0.234	Data appear Lognormal at 5% Significance Level						
837	Data appear Lognormal at 5% Significance Level										
838											
839	Lognormal Statistics										
840	Minimum of Logged Data			-3.219	Mean of logged Data					-0.357	
841	Maximum of Logged Data			1.459	SD of logged Data					1.585	
842											
843	Assuming Lognormal Distribution										
844	95% H-UCL			14.9	90% Chebyshev (MVUE) UCL					5.079	
845	95% Chebyshev (MVUE) UCL			6.447	97.5% Chebyshev (MVUE) UCL					8.347	
846	99% Chebyshev (MVUE) UCL			12.08							
847											
848	Nonparametric Distribution Free UCL Statistics										
849	Data appear to follow a Discernible Distribution at 5% Significance Level										
850											
851	Nonparametric Distribution Free UCLs										
852	95% CLT UCL			2.103	95% Jackknife UCL					2.155	
853	95% Standard Bootstrap UCL			2.076	95% Bootstrap-t UCL					2.305	
854	95% Hall's Bootstrap UCL			2.207	95% Percentile Bootstrap UCL					2.087	
855	95% BCA Bootstrap UCL			2.117							
856	90% Chebyshev(Mean, Sd) UCL			2.617	95% Chebyshev(Mean, Sd) UCL					3.131	
857	97.5% Chebyshev(Mean, Sd) UCL			3.846	99% Chebyshev(Mean, Sd) UCL					5.25	
858											

	A	B	C	D	E	F	G	H	I	J	K	L
859	Suggested UCL to Use											
860	95% Student's-t UCL				2.155							
861												
862	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
863	Recommendations are based upon data size, data distribution, and skewness.											
864	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
865	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
866												
867												

A	B	C	D	E	F	G	H	I	J	K	L
868	Perfluoro-n-octane sulfonic acid (PFOS) (Zone C drain)										
869											
870	General Statistics										
871	Total Number of Observations			50		Number of Distinct Observations			29		
872							Number of Missing Observations			5	
873	Minimum			0.01		Mean			0.271		
874	Maximum			2.6		Median			0.14		
875	SD			0.432		Std. Error of Mean			0.0611		
876	Coefficient of Variation			1.592		Skewness			3.793		
877											
878	Normal GOF Test										
879	Shapiro Wilk Test Statistic			0.573		Shapiro Wilk GOF Test					
880	5% Shapiro Wilk Critical Value			0.947		Data Not Normal at 5% Significance Level					
881	Lilliefors Test Statistic			0.307		Lilliefors GOF Test					
882	5% Lilliefors Critical Value			0.125		Data Not Normal at 5% Significance Level					
883	Data Not Normal at 5% Significance Level										
884											
885	Assuming Normal Distribution										
886	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
887	95% Student's-t UCL			0.374		95% Adjusted-CLT UCL (Chen-1995)			0.407		
888						95% Modified-t UCL (Johnson-1978)			0.379		
889											
890	Gamma GOF Test										
891	A-D Test Statistic			1.373		Anderson-Darling Gamma GOF Test					
892	5% A-D Critical Value			0.79		Data Not Gamma Distributed at 5% Significance Level					
893	K-S Test Statistic			0.192		Kolmogorov-Smirnov Gamma GOF Test					
894	5% K-S Critical Value			0.13		Data Not Gamma Distributed at 5% Significance Level					
895	Data Not Gamma Distributed at 5% Significance Level										
896											
897	Gamma Statistics										
898	k hat (MLE)			0.812		k star (bias corrected MLE)			0.776		
899	Theta hat (MLE)			0.334		Theta star (bias corrected MLE)			0.349		
900	nu hat (MLE)			81.16		nu star (bias corrected)			77.62		
901	MLE Mean (bias corrected)			0.271		MLE Sd (bias corrected)			0.308		
902						Approximate Chi Square Value (0.05)			58.33		
903	Adjusted Level of Significance			0.0452		Adjusted Chi Square Value			57.83		
904											
905	Assuming Gamma Distribution										
906	95% Approximate Gamma UCL (use when n>=50))			0.361		95% Adjusted Gamma UCL (use when n<50)			0.364		
907											
908	Lognormal GOF Test										
909	Shapiro Wilk Test Statistic			0.975		Shapiro Wilk Lognormal GOF Test					
910	5% Shapiro Wilk Critical Value			0.947		Data appear Lognormal at 5% Significance Level					
911	Lilliefors Test Statistic			0.103		Lilliefors Lognormal GOF Test					
912	5% Lilliefors Critical Value			0.125		Data appear Lognormal at 5% Significance Level					
913	Data appear Lognormal at 5% Significance Level										
914											
915	Lognormal Statistics										
916	Minimum of Logged Data			-4.605		Mean of logged Data			-2.035		
917	Maximum of Logged Data			0.956		SD of logged Data			1.213		
918											
919	Assuming Lognormal Distribution										
920	95% H-UCL			0.427		90% Chebyshev (MVUE) UCL			0.436		
921	95% Chebyshev (MVUE) UCL			0.513		97.5% Chebyshev (MVUE) UCL			0.62		
922	99% Chebyshev (MVUE) UCL			0.83							
923											
924	Nonparametric Distribution Free UCL Statistics										

	A	B	C	D	E	F	G	H	I	J	K	L
925	Data appear to follow a Discernible Distribution at 5% Significance Level											
926												
927	Nonparametric Distribution Free UCLs											
928	95% CLT UCL			0.372			95% Jackknife UCL			0.374		
929	95% Standard Bootstrap UCL			0.374			95% Bootstrap-t UCL			0.453		
930	95% Hall's Bootstrap UCL			0.712			95% Percentile Bootstrap UCL			0.374		
931	95% BCA Bootstrap UCL			0.431								
932	90% Chebyshev(Mean, Sd) UCL			0.454			95% Chebyshev(Mean, Sd) UCL			0.537		
933	97.5% Chebyshev(Mean, Sd) UCL			0.653			99% Chebyshev(Mean, Sd) UCL			0.879		
934												
935	Suggested UCL to Use											
936	95% H-UCL			0.427								
937												
938	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
939	Recommendations are based upon data size, data distribution, and skewness.											
940	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
941	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
942												
943	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.											
944	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.											
945	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.											
946	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.											

A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets										
2	Sediment										
3	User Selected Options										
4	Date/Time of Computation		ProUCL 5.16/7/2018 2:31:34 PM								
5	From File		Data_Darwin_sediment for ProUCL_20180607_b.xls								
6	Full Precision		OFF								
7	Confidence Coefficient		95%								
8	Number of Bootstrap Operations		2000								
9											
10											
11	Perfluoro-n-octanoate acid (PFOA) (Iudmilla creek)										
12											
13	General Statistics										
14	Total Number of Observations			0		Number of Distinct Observations			0		
15							Number of Missing Observations			9	
16	Minimum			N/A		Mean			N/A		
17	Maximum			N/A		Median			N/A		
18											
19	Warning: This data set only has 0 observations!										
20	Data set is too small to compute reliable and meaningful statistics and estimates!										
21	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Iudmilla creek) was not processed!										
22											
23	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
24	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
25											
26											
27											
28	Perfluoro-n-octanoate acid (PFOA) (rapid creek estuary)										
29											
30	General Statistics										
31	Total Number of Observations			0		Number of Distinct Observations			0		
32							Number of Missing Observations			4	
33	Minimum			N/A		Mean			N/A		
34	Maximum			N/A		Median			N/A		
35											
36	Warning: This data set only has 0 observations!										
37	Data set is too small to compute reliable and meaningful statistics and estimates!										
38	The data set for variable Perfluoro-n-octanoate acid (PFOA) (rapid creek estuary) was not processed!										
39											
40	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
41	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
42											
43											
44											
45	Perfluoro-n-octanoate acid (PFOA) (rapid creek freshwater)										
46											
47	General Statistics										
48	Total Number of Observations			0		Number of Distinct Observations			0		
49							Number of Missing Observations			20	
50	Minimum			N/A		Mean			N/A		
51	Maximum			N/A		Median			N/A		
52											
53	Warning: This data set only has 0 observations!										
54	Data set is too small to compute reliable and meaningful statistics and estimates!										
55	The data set for variable Perfluoro-n-octanoate acid (PFOA) (rapid creek freshwater) was not processed!										
56											
57	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										

A	B	C	D	E	F	G	H	I	J	K	L
58	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
59											
60											
61											
62	Perfluoro-n-octanoate acid (PFOA) (sadgrove and reichardt)										
63											
64	General Statistics										
65	Total Number of Observations			0		Number of Distinct Observations			0		
66						Number of Missing Observations			11		
67	Minimum			N/A		Mean			N/A		
68	Maximum			N/A		Median			N/A		
69											
70	Warning: This data set only has 0 observations!										
71	Data set is too small to compute reliable and meaningful statistics and estimates!										
72	The data set for variable Perfluoro-n-octanoate acid (PFOA) (sadgrove and reichardt) was not processed!										
73											
74	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
75	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
76											
77											
78											
79	Perfluoro-n-octane sulfonic acid (PFOS) (ludmilla creek)										
80											
81	General Statistics										
82	Total Number of Observations			2		Number of Distinct Observations			2		
83						Number of Missing Observations			7		
84	Minimum			6		Mean			13.5		
85	Maximum			21		Median			13.5		
86											
87	Warning: This data set only has 2 observations!										
88	Data set is too small to compute reliable and meaningful statistics and estimates!										
89	The data set for variable Perfluoro-n-octane sulfonic acid (PFOS) (ludmilla creek) was not processed!										
90											
91	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
92	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
93											
94											
95											
96	Perfluoro-n-octane sulfonic acid (PFOS) (rapid creek estuary)										
97											
98	General Statistics										
99	Total Number of Observations			2		Number of Distinct Observations			2		
100						Number of Missing Observations			2		
101	Minimum			13		Mean			16		
102	Maximum			19		Median			16		
103											
104	Warning: This data set only has 2 observations!										
105	Data set is too small to compute reliable and meaningful statistics and estimates!										
106	The data set for variable Perfluoro-n-octane sulfonic acid (PFOS) (rapid creek estuary) was not processed!										
107											
108	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
109	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
110											

A	B	C	D	E	F	G	H	I	J	K	L		
111													
112													
113	Perfluoro-n-octane sulfonic acid (PFOS) (rapid creek freshwater)												
114													
115	General Statistics												
116	Total Number of Observations				10		Number of Distinct Observations				9		
117							Number of Missing Observations				10		
118	Minimum				9.4		Mean				71.39		
119	Maximum				390		Median				23.5		
120	SD				115		Std. Error of Mean				36.37		
121	Coefficient of Variation				1.611		Skewness				2.864		
122													
123	Normal GOF Test												
124	Shapiro Wilk Test Statistic				0.556		Shapiro Wilk GOF Test						
125	5% Shapiro Wilk Critical Value				0.842		Data Not Normal at 5% Significance Level						
126	Lilliefors Test Statistic				0.391		Lilliefors GOF Test						
127	5% Lilliefors Critical Value				0.262		Data Not Normal at 5% Significance Level						
128	Data Not Normal at 5% Significance Level												
129													
130	Assuming Normal Distribution												
131	95% Normal UCL					95% UCLs (Adjusted for Skewness)							
132	95% Student's-t UCL				138.1		95% Adjusted-CLT UCL (Chen-1995)				166.4		
133							95% Modified-t UCL (Johnson-1978)				143.6		
134													
135	Gamma GOF Test												
136	A-D Test Statistic				0.853		Anderson-Darling Gamma GOF Test						
137	5% A-D Critical Value				0.754		Data Not Gamma Distributed at 5% Significance Level						
138	K-S Test Statistic				0.266		Kolmogorov-Smirnov Gamma GOF Test						
139	5% K-S Critical Value				0.275		Detected data appear Gamma Distributed at 5% Significance Level						
140	Detected data follow Appr. Gamma Distribution at 5% Significance Level												
141													
142	Gamma Statistics												
143	k hat (MLE)				0.835		k star (bias corrected MLE)				0.651		
144	Theta hat (MLE)				85.49		Theta star (bias corrected MLE)				109.6		
145	nu hat (MLE)				16.7		nu star (bias corrected)				13.02		
146	MLE Mean (bias corrected)				71.39		MLE Sd (bias corrected)				88.46		
147							Approximate Chi Square Value (0.05)				5.909		
148	Adjusted Level of Significance				0.0267		Adjusted Chi Square Value				5.101		
149													
150	Assuming Gamma Distribution												
151	95% Approximate Gamma UCL (use when n>=50)				157.4		95% Adjusted Gamma UCL (use when n<50)				182.3		
152													
153	Lognormal GOF Test												
154	Shapiro Wilk Test Statistic				0.897		Shapiro Wilk Lognormal GOF Test						
155	5% Shapiro Wilk Critical Value				0.842		Data appear Lognormal at 5% Significance Level						
156	Lilliefors Test Statistic				0.218		Lilliefors Lognormal GOF Test						
157	5% Lilliefors Critical Value				0.262		Data appear Lognormal at 5% Significance Level						
158	Data appear Lognormal at 5% Significance Level												
159													
160	Lognormal Statistics												
161	Minimum of Logged Data				2.241		Mean of logged Data				3.561		
162	Maximum of Logged Data				5.966		SD of logged Data				1.145		
163													
164	Assuming Lognormal Distribution												
165	95% H-UCL				249.3		90% Chebyshev (MVUE) UCL				132.5		
166	95% Chebyshev (MVUE) UCL				164.6		97.5% Chebyshev (MVUE) UCL				209		
167	99% Chebyshev (MVUE) UCL				296.4								

A	B	C	D	E	F	G	H	I	J	K	L
168											
169	Nonparametric Distribution Free UCL Statistics										
170	Data appear to follow a Discernible Distribution at 5% Significance Level										
171											
172	Nonparametric Distribution Free UCLs										
173	95% CLT UCL			131.2				95% Jackknife UCL			138.1
174	95% Standard Bootstrap UCL			127.7				95% Bootstrap-t UCL			280.7
175	95% Hall's Bootstrap UCL			340.6				95% Percentile Bootstrap UCL			140
176	95% BCA Bootstrap UCL			165.4							
177	90% Chebyshev(Mean, Sd) UCL			180.5				95% Chebyshev(Mean, Sd) UCL			229.9
178	97.5% Chebyshev(Mean, Sd) UCL			298.5				99% Chebyshev(Mean, Sd) UCL			433.3
179											
180	Suggested UCL to Use										
181	95% Adjusted Gamma UCL			182.3							
182											
183	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test										
184	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL										
185											
186	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
187	Recommendations are based upon data size, data distribution, and skewness.										
188	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
189	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
190											
191											
192	Perfluoro-n-octane sulfonic acid (PFOS) (sadgrove and reichardt)										
193											
194	General Statistics										
195	Total Number of Observations			2				Number of Distinct Observations			2
196								Number of Missing Observations			9
197	Minimum			7.1				Mean			43.55
198	Maximum			80				Median			43.55
199											
200	Warning: This data set only has 2 observations!										
201	Data set is too small to compute reliable and meaningful statistics and estimates!										
202	The data set for variable Perfluoro-n-octane sulfonic acid (PFOS) (sadgrove and reichardt) was not processed!										
203											
204	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
205	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
206											
207											

A	B	C	D	E	F	G	H	I	J	K	L	
1	UCL Statistics for Uncensored Full Data Sets											
2	Terrestrial Invertebrate - All											
3	User Selected Options											
4	Date/Time of Computation		ProUCL 5.16/5/2018 3:09:47 PM									
5	From File		Darwin_Terrestrial Inverts for ProUCL_20180602_b.xls									
6	Full Precision		OFF									
7	Confidence Coefficient		95%									
8	Number of Bootstrap Operations		2000									
9												
10												
11	Perfluoro-n-octanoate acid (PFOA)											
12												
13	General Statistics											
14	Total Number of Observations			1	Number of Distinct Observations			1				
15					Number of Missing Observations			24				
16	Minimum			0.9	Mean			0.9				
17	Maximum			0.9	Median			0.9				
18												
19	Warning: This data set only has 1 observations!											
20	Data set is too small to compute reliable and meaningful statistics and estimates!											
21	The data set for variable Perfluoro-n-octanoate acid (PFOA) was not processed!											
22												
23	It is suggested to collect at least 8 to 10 observations before using these statistical methods!											
24	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.											
25												
26												
27												
28	Perfluoro-n-octane sulfonic acid (PFOS)											
29												
30	General Statistics											
31	Total Number of Observations			21	Number of Distinct Observations			21				
32					Number of Missing Observations			4				
33	Minimum			0.6	Mean			32.54				
34	Maximum			250	Median			12				
35	SD			59.1	Std. Error of Mean			12.9				
36	Coefficient of Variation			1.816	Skewness			3.052				
37												
38	Normal GOF Test											
39	Shapiro Wilk Test Statistic			0.53	Shapiro Wilk GOF Test							
40	5% Shapiro Wilk Critical Value			0.908	Data Not Normal at 5% Significance Level							
41	Lilliefors Test Statistic			0.368	Lilliefors GOF Test							
42	5% Lilliefors Critical Value			0.188	Data Not Normal at 5% Significance Level							
43	Data Not Normal at 5% Significance Level											
44												
45	Assuming Normal Distribution											
46	95% Normal UCL				95% UCLs (Adjusted for Skewness)							
47	95% Student's-t UCL			54.79	95% Adjusted-CLT UCL (Chen-1995)			62.93				
48					95% Modified-t UCL (Johnson-1978)			56.22				
49												
50	Gamma GOF Test											
51	A-D Test Statistic			1.379	Anderson-Darling Gamma GOF Test							
52	5% A-D Critical Value			0.79	Data Not Gamma Distributed at 5% Significance Level							
53	K-S Test Statistic			0.218	Kolmogorov-Smirnov Gamma GOF Test							
54	5% K-S Critical Value			0.198	Data Not Gamma Distributed at 5% Significance Level							
55	Data Not Gamma Distributed at 5% Significance Level											

	A	B	C	D	E	F	G	H	I	J	K	L
56												
57	Gamma Statistics											
58	k hat (MLE)				0.665		k star (bias corrected MLE)				0.602	
59	Theta hat (MLE)				48.92		Theta star (bias corrected MLE)				54.06	
60	nu hat (MLE)				27.94		nu star (bias corrected)				25.28	
61	MLE Mean (bias corrected)				32.54		MLE Sd (bias corrected)				41.94	
62							Approximate Chi Square Value (0.05)				14.83	
63	Adjusted Level of Significance				0.0383		Adjusted Chi Square Value				14.21	
64												
65	Assuming Gamma Distribution											
66	95% Approximate Gamma UCL (use when n>=50))				55.49		95% Adjusted Gamma UCL (use when n<50)				57.89	
67												
68	Lognormal GOF Test											
69	Shapiro Wilk Test Statistic				0.958		Shapiro Wilk Lognormal GOF Test					
70	5% Shapiro Wilk Critical Value				0.908		Data appear Lognormal at 5% Significance Level					
71	Lilliefors Test Statistic				0.125		Lilliefors Lognormal GOF Test					
72	5% Lilliefors Critical Value				0.188		Data appear Lognormal at 5% Significance Level					
73	Data appear Lognormal at 5% Significance Level											
74												
75	Lognormal Statistics											
76	Minimum of Logged Data				-0.511		Mean of logged Data				2.568	
77	Maximum of Logged Data				5.521		SD of logged Data				1.329	
78												
79	Assuming Lognormal Distribution											
80	95% H-UCL				77.77		90% Chebyshev (MVUE) UCL				59.42	
81	95% Chebyshev (MVUE) UCL				73.05		97.5% Chebyshev (MVUE) UCL				91.97	
82	99% Chebyshev (MVUE) UCL				129.1							
83												
84	Nonparametric Distribution Free UCL Statistics											
85	Data appear to follow a Discernible Distribution at 5% Significance Level											
86												
87	Nonparametric Distribution Free UCLs											
88	95% CLT UCL				53.76		95% Jackknife UCL				54.79	
89	95% Standard Bootstrap UCL				53.06		95% Bootstrap-t UCL				99.85	
90	95% Hall's Bootstrap UCL				121.8		95% Percentile Bootstrap UCL				54.12	
91	95% BCA Bootstrap UCL				65.02							
92	90% Chebyshev(Mean, Sd) UCL				71.23		95% Chebyshev(Mean, Sd) UCL				88.76	
93	97.5% Chebyshev(Mean, Sd) UCL				113.1		99% Chebyshev(Mean, Sd) UCL				160.9	
94												
95	Suggested UCL to Use											
96	95% Chebyshev (Mean, Sd) UCL				88.76							
97												
98	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
99	Recommendations are based upon data size, data distribution, and skewness.											
100	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
101	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
102												

A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets										
2	Terrestrial Invertebrate by AEC										
3	User Selected Options										
4	Date/Time of Computation		ProUCL 5.16/5/2018 3:01:23 PM								
5	From File		Darwin_Terrestrial Inverts for ProUCL_20180602_b.xls								
6	Full Precision		OFF								
7	Confidence Coefficient		95%								
8	Number of Bootstrap Operations		2000								
9											
10											
11	Perfluoro-n-octanoate acid (PFOA) (Zone D)										
12											
13	General Statistics										
14	Total Number of Observations			0		Number of Distinct Observations			0		
15							Number of Missing Observations			4	
16	Minimum			N/A		Mean			N/A		
17	Maximum			N/A		Median			N/A		
18											
19	Warning: This data set only has 0 observations!										
20	Data set is too small to compute reliable and meaningful statistics and estimates!										
21	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone D) was not processed!										
22											
23	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
24	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
25											
26											
27											
28	Perfluoro-n-octanoate acid (PFOA) (Zone B)										
29											
30	General Statistics										
31	Total Number of Observations			1		Number of Distinct Observations			1		
32							Number of Missing Observations			8	
33	Minimum			0.9		Mean			0.9		
34	Maximum			0.9		Median			0.9		
35											
36	Warning: This data set only has 1 observations!										
37	Data set is too small to compute reliable and meaningful statistics and estimates!										
38	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone B) was not processed!										
39											
40	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
41	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
42											
43											
44											
45	Perfluoro-n-octanoate acid (PFOA) (offsite)										
46											
47	General Statistics										
48	Total Number of Observations			0		Number of Distinct Observations			0		
49							Number of Missing Observations			5	
50	Minimum			N/A		Mean			N/A		
51	Maximum			N/A		Median			N/A		
52											
53	Warning: This data set only has 0 observations!										
54	Data set is too small to compute reliable and meaningful statistics and estimates!										
55	The data set for variable Perfluoro-n-octanoate acid (PFOA) (offsite) was not processed!										

A	B	C	D	E	F	G	H	I	J	K	L
56											
57	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
58	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
59											
60											
61											
62	Perfluoro-n-octanoate acid (PFOA) (Zone A)										
63											
64	General Statistics										
65	Total Number of Observations			0		Number of Distinct Observations			0		
66						Number of Missing Observations			8		
67	Minimum			N/A		Mean			N/A		
68	Maximum			N/A		Median			N/A		
69											
70	Warning: This data set only has 0 observations!										
71	Data set is too small to compute reliable and meaningful statistics and estimates!										
72	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone A) was not processed!										
73											
74	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
75	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
76											
77											
78											
79	Perfluoro-n-octanoate acid (PFOA) (Zone C)										
80											
81	General Statistics										
82	Total Number of Observations			0		Number of Distinct Observations			0		
83						Number of Missing Observations			4		
84	Minimum			N/A		Mean			N/A		
85	Maximum			N/A		Median			N/A		
86											
87	Warning: This data set only has 0 observations!										
88	Data set is too small to compute reliable and meaningful statistics and estimates!										
89	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone C) was not processed!										
90											
91	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
92	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
93											
94											
95											
96	Perfluoro-n-octane sulfonic acid (PFOS) (Zone D)										
97											
98	General Statistics										
99	Total Number of Observations			2		Number of Distinct Observations			2		
100						Number of Missing Observations			2		
101	Minimum			0.6		Mean			2.2		
102	Maximum			3.8		Median			2.2		
103											
104	Warning: This data set only has 2 observations!										
105	Data set is too small to compute reliable and meaningful statistics and estimates!										
106	The data set for variable Perfluoro-n-octane sulfonic acid (PFOS) (Zone D) was not processed!										
107											
108	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
109	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
110											

	A	B	C	D	E	F	G	H	I	J	K	L
111												
112												
113	Perfluoro-n-octane sulfonic acid (PFOS) (Zone B)											
114												
115	General Statistics											
116	Total Number of Observations				9		Number of Distinct Observations				9	
117							Number of Missing Observations				0	
118	Minimum				4.7		Mean				32.07	
119	Maximum				140		Median				10	
120	SD				46.67		Std. Error of Mean				15.56	
121	Coefficient of Variation				1.455		Skewness				2.018	
122												
123	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
124	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
125	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
126	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
127												
128	Normal GOF Test											
129	Shapiro Wilk Test Statistic				0.646		Shapiro Wilk GOF Test					
130	5% Shapiro Wilk Critical Value				0.829		Data Not Normal at 5% Significance Level					
131	Lilliefors Test Statistic				0.388		Lilliefors GOF Test					
132	5% Lilliefors Critical Value				0.274		Data Not Normal at 5% Significance Level					
133	Data Not Normal at 5% Significance Level											
134												
135	Assuming Normal Distribution											
136	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
137	95% Student's-t UCL				60.99		95% Adjusted-CLT UCL (Chen-1995)				68.83	
138							95% Modified-t UCL (Johnson-1978)				62.74	
139												
140	Gamma GOF Test											
141	A-D Test Statistic				0.976		Anderson-Darling Gamma GOF Test					
142	5% A-D Critical Value				0.749		Data Not Gamma Distributed at 5% Significance Level					
143	K-S Test Statistic				0.298		Kolmogorov-Smirnov Gamma GOF Test					
144	5% K-S Critical Value				0.289		Data Not Gamma Distributed at 5% Significance Level					
145	Data Not Gamma Distributed at 5% Significance Level											
146												
147	Gamma Statistics											
148	k hat (MLE)				0.817		k star (bias corrected MLE)				0.619	
149	Theta hat (MLE)				39.25		Theta star (bias corrected MLE)				51.82	
150	nu hat (MLE)				14.71		nu star (bias corrected)				11.14	
151	MLE Mean (bias corrected)				32.07		MLE Sd (bias corrected)				40.77	
152							Approximate Chi Square Value (0.05)				4.665	
153	Adjusted Level of Significance				0.0231		Adjusted Chi Square Value				3.821	
154												
155	Assuming Gamma Distribution											
156	95% Approximate Gamma UCL (use when n>=50))				76.56		95% Adjusted Gamma UCL (use when n<50)				93.47	
157												
158	Lognormal GOF Test											
159	Shapiro Wilk Test Statistic				0.859		Shapiro Wilk Lognormal GOF Test					
160	5% Shapiro Wilk Critical Value				0.829		Data appear Lognormal at 5% Significance Level					
161	Lilliefors Test Statistic				0.227		Lilliefors Lognormal GOF Test					
162	5% Lilliefors Critical Value				0.274		Data appear Lognormal at 5% Significance Level					
163	Data appear Lognormal at 5% Significance Level											
164												

A	B	C	D	E	F	G	H	I	J	K	L		
165	Lognormal Statistics												
166	Minimum of Logged Data				1.548	Mean of logged Data				2.743			
167	Maximum of Logged Data				4.942	SD of logged Data				1.17			
168													
169	Assuming Lognormal Distribution												
170	95% H-UCL			138.4	90% Chebyshev (MVUE) UCL				61.25				
171	95% Chebyshev (MVUE) UCL			76.47	97.5% Chebyshev (MVUE) UCL				97.59				
172	99% Chebyshev (MVUE) UCL			139.1									
173													
174	Nonparametric Distribution Free UCL Statistics												
175	Data appear to follow a Discernible Distribution at 5% Significance Level												
176													
177	Nonparametric Distribution Free UCLs												
178	95% CLT UCL			57.65	95% Jackknife UCL				60.99				
179	95% Standard Bootstrap UCL			56.59	95% Bootstrap-t UCL				268.3				
180	95% Hall's Bootstrap UCL			205.2	95% Percentile Bootstrap UCL				57.44				
181	95% BCA Bootstrap UCL			68.78									
182	90% Chebyshev(Mean, Sd) UCL			78.73	95% Chebyshev(Mean, Sd) UCL				99.87				
183	97.5% Chebyshev(Mean, Sd) UCL			129.2	99% Chebyshev(Mean, Sd) UCL				186.8				
184													
185	Suggested UCL to Use												
186	95% Chebyshev (Mean, Sd) UCL			99.87									
187													
188	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
189	Recommendations are based upon data size, data distribution, and skewness.												
190	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
191	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
192													
193													
194	Perfluoro-n-octane sulfonic acid (PFOS) (offsite)												
195													
196	General Statistics												
197	Total Number of Observations			5	Number of Distinct Observations				4				
198					Number of Missing Observations				0				
199	Minimum			0.6	Mean				3.8				
200	Maximum			8.3	Median				2.9				
201	SD			3.514	Std. Error of Mean				1.571				
202	Coefficient of Variation			0.925	Skewness				0.45				
203													
204	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use												
205	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.												
206	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).												
207	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1												
208													
209	Normal GOF Test												
210	Shapiro Wilk Test Statistic			0.873	Shapiro Wilk GOF Test								
211	5% Shapiro Wilk Critical Value			0.762	Data appear Normal at 5% Significance Level								
212	Lilliefors Test Statistic			0.219	Lilliefors GOF Test								
213	5% Lilliefors Critical Value			0.343	Data appear Normal at 5% Significance Level								
214	Data appear Normal at 5% Significance Level												
215													
216	Assuming Normal Distribution												
217	95% Normal UCL				95% UCLs (Adjusted for Skewness)								
218	95% Student's-t UCL			7.15	95% Adjusted-CLT UCL (Chen-1995)				6.722				
219					95% Modified-t UCL (Johnson-1978)				7.202				

A	B	C	D	E	F	G	H	I	J	K	L
220											
221	Gamma GOF Test										
222	A-D Test Statistic		0.437		Anderson-Darling Gamma GOF Test						
223	5% A-D Critical Value		0.69		Detected data appear Gamma Distributed at 5% Significance Level						
224	K-S Test Statistic		0.27		Kolmogorov-Smirnov Gamma GOF Test						
225	5% K-S Critical Value		0.364		Detected data appear Gamma Distributed at 5% Significance Level						
226	Detected data appear Gamma Distributed at 5% Significance Level										
227											
228	Gamma Statistics										
229	k hat (MLE)		1.087		k star (bias corrected MLE)		0.568				
230	Theta hat (MLE)		3.494		Theta star (bias corrected MLE)		6.686				
231	nu hat (MLE)		10.87		nu star (bias corrected)		5.683				
232	MLE Mean (bias corrected)		3.8		MLE Sd (bias corrected)		5.041				
233					Approximate Chi Square Value (0.05)		1.48				
234	Adjusted Level of Significance		0.0086		Adjusted Chi Square Value		0.734				
235											
236	Assuming Gamma Distribution										
237	95% Approximate Gamma UCL (use when n>=50))		14.59		95% Adjusted Gamma UCL (use when n<50)		29.41				
238											
239	Lognormal GOF Test										
240	Shapiro Wilk Test Statistic		0.842		Shapiro Wilk Lognormal GOF Test						
241	5% Shapiro Wilk Critical Value		0.762		Data appear Lognormal at 5% Significance Level						
242	Lilliefors Test Statistic		0.251		Lilliefors Lognormal GOF Test						
243	5% Lilliefors Critical Value		0.343		Data appear Lognormal at 5% Significance Level						
244	Data appear Lognormal at 5% Significance Level										
245											
246	Lognormal Statistics										
247	Minimum of Logged Data		-0.511		Mean of logged Data		0.809				
248	Maximum of Logged Data		2.116		SD of logged Data		1.267				
249											
250	Assuming Lognormal Distribution										
251	95% H-UCL		235.3		90% Chebyshev (MVUE) UCL		10.41				
252	95% Chebyshev (MVUE) UCL		13.3		97.5% Chebyshev (MVUE) UCL		17.31				
253	99% Chebyshev (MVUE) UCL		25.18								
254											
255	Nonparametric Distribution Free UCL Statistics										
256	Data appear to follow a Discernible Distribution at 5% Significance Level										
257											
258	Nonparametric Distribution Free UCLs										
259	95% CLT UCL		6.385		95% Jackknife UCL		7.15				
260	95% Standard Bootstrap UCL		N/A		95% Bootstrap-t UCL		N/A				
261	95% Hall's Bootstrap UCL		N/A		95% Percentile Bootstrap UCL		N/A				
262	95% BCA Bootstrap UCL		N/A								
263	90% Chebyshev(Mean, Sd) UCL		8.514		95% Chebyshev(Mean, Sd) UCL		10.65				
264	97.5% Chebyshev(Mean, Sd) UCL		13.61		99% Chebyshev(Mean, Sd) UCL		19.43				
265											
266	Suggested UCL to Use										
267	95% Student's-t UCL		7.15								
268											
269	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
270	Recommendations are based upon data size, data distribution, and skewness.										
271	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
272	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
273											
274											

A	B	C	D	E	F	G	H	I	J	K	L
275	Perfluoro-n-octane sulfonic acid (PFOS) (Zone A)										
276											
277	General Statistics										
278	Total Number of Observations			6		Number of Distinct Observations			6		
279						Number of Missing Observations			2		
280	Minimum			12		Mean			59.5		
281	Maximum			250		Median			25		
282	SD			93.61		Std. Error of Mean			38.21		
283	Coefficient of Variation			1.573		Skewness			2.416		
284											
285	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use										
286	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.										
287	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).										
288	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1										
289											
290	Normal GOF Test										
291	Shapiro Wilk Test Statistic			0.57		Shapiro Wilk GOF Test					
292	5% Shapiro Wilk Critical Value			0.788		Data Not Normal at 5% Significance Level					
293	Lilliefors Test Statistic			0.453		Lilliefors GOF Test					
294	5% Lilliefors Critical Value			0.325		Data Not Normal at 5% Significance Level					
295	Data Not Normal at 5% Significance Level										
296											
297	Assuming Normal Distribution										
298	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
299	95% Student's-t UCL			136.5		95% Adjusted-CLT UCL (Chen-1995)			162.6		
300						95% Modified-t UCL (Johnson-1978)			142.8		
301											
302	Gamma GOF Test										
303	A-D Test Statistic			0.964		Anderson-Darling Gamma GOF Test					
304	5% A-D Critical Value			0.718		Data Not Gamma Distributed at 5% Significance Level					
305	K-S Test Statistic			0.404		Kolmogorov-Smirnov Gamma GOF Test					
306	5% K-S Critical Value			0.342		Data Not Gamma Distributed at 5% Significance Level					
307	Data Not Gamma Distributed at 5% Significance Level										
308											
309	Gamma Statistics										
310	k hat (MLE)			0.879		k star (bias corrected MLE)			0.551		
311	Theta hat (MLE)			67.66		Theta star (bias corrected MLE)			108		
312	nu hat (MLE)			10.55		nu star (bias corrected)			6.61		
313	MLE Mean (bias corrected)			59.5		MLE Sd (bias corrected)			80.17		
314						Approximate Chi Square Value (0.05)			1.959		
315	Adjusted Level of Significance			0.0122		Adjusted Chi Square Value			1.177		
316											
317	Assuming Gamma Distribution										
318	95% Approximate Gamma UCL (use when n>=50))			200.8		95% Adjusted Gamma UCL (use when n<50)			334		
319											
320	Lognormal GOF Test										
321	Shapiro Wilk Test Statistic			0.796		Shapiro Wilk Lognormal GOF Test					
322	5% Shapiro Wilk Critical Value			0.788		Data appear Lognormal at 5% Significance Level					
323	Lilliefors Test Statistic			0.328		Lilliefors Lognormal GOF Test					
324	5% Lilliefors Critical Value			0.325		Data Not Lognormal at 5% Significance Level					
325	Data appear Approximate Lognormal at 5% Significance Level										
326											
327	Lognormal Statistics										
328	Minimum of Logged Data			2.485		Mean of logged Data			3.419		
329	Maximum of Logged Data			5.521		SD of logged Data			1.094		

A	B	C	D	E	F	G	H	I	J	K	L
330											
331	Assuming Lognormal Distribution										
332	95% H-UCL			492.1	90% Chebyshev (MVUE) UCL			112.6			
333	95% Chebyshev (MVUE) UCL			141.6	97.5% Chebyshev (MVUE) UCL			181.7			
334	99% Chebyshev (MVUE) UCL			260.6							
335											
336	Nonparametric Distribution Free UCL Statistics										
337	Data appear to follow a Discernible Distribution at 5% Significance Level										
338											
339	Nonparametric Distribution Free UCLs										
340	95% CLT UCL			122.4	95% Jackknife UCL			136.5			
341	95% Standard Bootstrap UCL			115.8	95% Bootstrap-t UCL			717.5			
342	95% Hall's Bootstrap UCL			673.1	95% Percentile Bootstrap UCL			133.7			
343	95% BCA Bootstrap UCL			138.2							
344	90% Chebyshev(Mean, Sd) UCL			174.1	95% Chebyshev(Mean, Sd) UCL			226.1			
345	97.5% Chebyshev(Mean, Sd) UCL			298.2	99% Chebyshev(Mean, Sd) UCL			439.7			
346											
347	Suggested UCL to Use										
348	95% Chebyshev (Mean, Sd) UCL			226.1							
349											
350	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
351	Recommendations are based upon data size, data distribution, and skewness.										
352	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
353	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
354											
355											
356	Perfluoro-n-octane sulfonic acid (PFOS) (Zone C)										
357											
358	General Statistics										
359	Total Number of Observations			4	Number of Distinct Observations			4			
360					Number of Missing Observations			0			
361	Minimum			3	Mean			8.35			
362	Maximum			15	Median			7.7			
363	SD			4.957	Std. Error of Mean			2.478			
364	Coefficient of Variation			0.594	Skewness			0.768			
365											
366	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use										
367	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.										
368	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).										
369	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1										
370											
371	Normal GOF Test										
372	Shapiro Wilk Test Statistic			0.93	Shapiro Wilk GOF Test						
373	5% Shapiro Wilk Critical Value			0.748	Data appear Normal at 5% Significance Level						
374	Lilliefors Test Statistic			0.294	Lilliefors GOF Test						
375	5% Lilliefors Critical Value			0.375	Data appear Normal at 5% Significance Level						
376	Data appear Normal at 5% Significance Level										
377											
378	Assuming Normal Distribution										
379	95% Normal UCL				95% UCLs (Adjusted for Skewness)						
380	95% Student's-t UCL			14.18	95% Adjusted-CLT UCL (Chen-1995)			13.44			
381					95% Modified-t UCL (Johnson-1978)			14.34			
382											

A	B	C	D	E	F	G	H	I	J	K	L
383	Gamma GOF Test										
384	A-D Test Statistic		0.314		Anderson-Darling Gamma GOF Test						
385	5% A-D Critical Value		0.659		Detected data appear Gamma Distributed at 5% Significance Level						
386	K-S Test Statistic		0.253		Kolmogorov-Smirnov Gamma GOF Test						
387	5% K-S Critical Value		0.396		Detected data appear Gamma Distributed at 5% Significance Level						
388	Detected data appear Gamma Distributed at 5% Significance Level										
389											
390	Gamma Statistics										
391	k hat (MLE)		3.491		k star (bias corrected MLE)		1.039				
392	Theta hat (MLE)		2.392		Theta star (bias corrected MLE)		8.034				
393	nu hat (MLE)		27.92		nu star (bias corrected)		8.314				
394	MLE Mean (bias corrected)		8.35		MLE Sd (bias corrected)		8.191				
395					Approximate Chi Square Value (0.05)		2.918				
396	Adjusted Level of Significance		N/A		Adjusted Chi Square Value		N/A				
397											
398	Assuming Gamma Distribution										
399	95% Approximate Gamma UCL (use when n>=50))		23.79		95% Adjusted Gamma UCL (use when n<50)		N/A				
400											
401	Lognormal GOF Test										
402	Shapiro Wilk Test Statistic		0.938		Shapiro Wilk Lognormal GOF Test						
403	5% Shapiro Wilk Critical Value		0.748		Data appear Lognormal at 5% Significance Level						
404	Lilliefors Test Statistic		0.284		Lilliefors Lognormal GOF Test						
405	5% Lilliefors Critical Value		0.375		Data appear Lognormal at 5% Significance Level						
406	Data appear Lognormal at 5% Significance Level										
407											
408	Lognormal Statistics										
409	Minimum of Logged Data		1.099		Mean of logged Data		1.972				
410	Maximum of Logged Data		2.708		SD of logged Data		0.662				
411											
412	Assuming Lognormal Distribution										
413	95% H-UCL		51.32		90% Chebyshev (MVUE) UCL		16.52				
414	95% Chebyshev (MVUE) UCL		20.19		97.5% Chebyshev (MVUE) UCL		25.28				
415	99% Chebyshev (MVUE) UCL		35.28								
416											
417	Nonparametric Distribution Free UCL Statistics										
418	Data appear to follow a Discernible Distribution at 5% Significance Level										
419											
420	Nonparametric Distribution Free UCLs										
421	95% CLT UCL		12.43		95% Jackknife UCL		14.18				
422	95% Standard Bootstrap UCL		N/A		95% Bootstrap-t UCL		N/A				
423	95% Hall's Bootstrap UCL		N/A		95% Percentile Bootstrap UCL		N/A				
424	95% BCA Bootstrap UCL		N/A								
425	90% Chebyshev(Mean, Sd) UCL		15.79		95% Chebyshev(Mean, Sd) UCL		19.15				
426	97.5% Chebyshev(Mean, Sd) UCL		23.83		99% Chebyshev(Mean, Sd) UCL		33.01				
427											
428	Suggested UCL to Use										
429	95% Student's-t UCL		14.18								
430											
431	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
432	Recommendations are based upon data size, data distribution, and skewness.										
433	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
434	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
435											

A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets										
2	Terrestrial Vertebrates - All										
3	User Selected Options										
4	Date/Time of Computation	ProUCL 5.16/11/2018 8:29:50 AM									
5	From File	Data_Darwin_Terrestrial Vertebrates Results Table_20180611_j.xls									
6	Full Precision	OFF									
7	Confidence Coefficient	95%									
8	Number of Bootstrap Operations	2000									
9											
10											
11	Perfluoro-n-octanoate acid (PFOA)										
12											
13	General Statistics										
14	Total Number of Observations	4			Number of Distinct Observations			2			
15					Number of Missing Observations			13			
16	Minimum	0.26			Mean			0.588			
17	Maximum	1.57			Median			0.26			
18	SD	0.655			Std. Error of Mean			0.328			
19	Coefficient of Variation	1.115			Skewness			2			
20											
21	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use										
22	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.										
23	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).										
24	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1										
25											
26	Normal GOF Test										
27	Shapiro Wilk Test Statistic	0.63			Shapiro Wilk GOF Test						
28	5% Shapiro Wilk Critical Value	0.748			Data Not Normal at 5% Significance Level						
29	Lilliefors Test Statistic	0.441			Lilliefors GOF Test						
30	5% Lilliefors Critical Value	0.375			Data Not Normal at 5% Significance Level						
31	Data Not Normal at 5% Significance Level										
32											
33	Assuming Normal Distribution										
34	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
35	95% Student's-t UCL	1.358			95% Adjusted-CLT UCL (Chen-1995)			1.476			
36					95% Modified-t UCL (Johnson-1978)			1.413			
37											
38	Gamma GOF Test										
39	A-D Test Statistic	0.963			Anderson-Darling Gamma GOF Test						
40	5% A-D Critical Value	0.662			Data Not Gamma Distributed at 5% Significance Level						
41	K-S Test Statistic	0.474			Kolmogorov-Smirnov Gamma GOF Test						
42	5% K-S Critical Value	0.399			Data Not Gamma Distributed at 5% Significance Level						
43	Data Not Gamma Distributed at 5% Significance Level										
44											
45	Gamma Statistics										
46	k hat (MLE)	1.512			k star (bias corrected MLE)			0.545			
47	Theta hat (MLE)	0.388			Theta star (bias corrected MLE)			1.078			
48	nu hat (MLE)	12.1			nu star (bias corrected)			4.358			
49	MLE Mean (bias corrected)	0.588			MLE Sd (bias corrected)			0.796			
50					Approximate Chi Square Value (0.05)			0.868			
51	Adjusted Level of Significance	N/A			Adjusted Chi Square Value			N/A			
52											
53	Assuming Gamma Distribution										
54	95% Approximate Gamma UCL (use when n>=50)	2.949			95% Adjusted Gamma UCL (use when n<50)			N/A			
55											
56	Lognormal GOF Test										
57	Shapiro Wilk Test Statistic	0.63			Shapiro Wilk Lognormal GOF Test						
58	5% Shapiro Wilk Critical Value	0.748			Data Not Lognormal at 5% Significance Level						
59	Lilliefors Test Statistic	0.441			Lilliefors Lognormal GOF Test						
60	5% Lilliefors Critical Value	0.375			Data Not Lognormal at 5% Significance Level						
61	Data Not Lognormal at 5% Significance Level										

A	B	C	D	E	F	G	H	I	J	K	L
62											
63	Lognormal Statistics										
64	Minimum of Logged Data			-1.347			Mean of logged Data			-0.898	
65	Maximum of Logged Data			0.451			SD of logged Data			0.899	
66											
67	Assuming Lognormal Distribution										
68	95% H-UCL			13.98			90% Chebyshev (MVUE) UCL			1.232	
69	95% Chebyshev (MVUE) UCL			1.545			97.5% Chebyshev (MVUE) UCL			1.978	
70	99% Chebyshev (MVUE) UCL			2.829							
71											
72	Nonparametric Distribution Free UCL Statistics										
73	Data do not follow a Discernible Distribution (0.05)										
74											
75	Nonparametric Distribution Free UCLs										
76	95% CLT UCL			1.126			95% Jackknife UCL			N/A	
77	95% Standard Bootstrap UCL			N/A			95% Bootstrap-t UCL			N/A	
78	95% Hall's Bootstrap UCL			N/A			95% Percentile Bootstrap UCL			N/A	
79	95% BCA Bootstrap UCL			N/A							
80	90% Chebyshev(Mean, Sd) UCL			1.57			95% Chebyshev(Mean, Sd) UCL			2.015	
81	97.5% Chebyshev(Mean, Sd) UCL			2.633			99% Chebyshev(Mean, Sd) UCL			3.846	
82											
83	Suggested UCL to Use										
84	95% Chebyshev (Mean, Sd) UCL			2.015							
85											
86	Recommended UCL exceeds the maximum observation										
87											
88	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
89	Recommendations are based upon data size, data distribution, and skewness.										
90	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
91	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
92											
93											
94	Perfluoro-n-octane sulfonic acid (PFOS)										
95											
96	General Statistics										
97	Total Number of Observations			17			Number of Distinct Observations			17	
98							Number of Missing Observations			0	
99	Minimum			0.5			Mean			36.76	
100	Maximum			225.2			Median			7.2	
101	SD			63.58			Std. Error of Mean			15.42	
102	Coefficient of Variation			1.73			Skewness			2.24	
103											
104	Normal GOF Test										
105	Shapiro Wilk Test Statistic			0.632			Shapiro Wilk GOF Test				
106	5% Shapiro Wilk Critical Value			0.892			Data Not Normal at 5% Significance Level				
107	Lilliefors Test Statistic			0.334			Lilliefors GOF Test				
108	5% Lilliefors Critical Value			0.207			Data Not Normal at 5% Significance Level				
109	Data Not Normal at 5% Significance Level										
110											

A	B	C	D	E	F	G	H	I	J	K	L
111	Assuming Normal Distribution										
112	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
113	95% Student's-t UCL			63.68		95% Adjusted-CLT UCL (Chen-1995)					71.08
114						95% Modified-t UCL (Johnson-1978)					65.08
115											
116	Gamma GOF Test										
117	A-D Test Statistic			0.815		Anderson-Darling Gamma GOF Test					
118	5% A-D Critical Value			0.808		Data Not Gamma Distributed at 5% Significance Level					
119	K-S Test Statistic			0.204		Kolmogorov-Smirnov Gamma GOF Test					
120	5% K-S Critical Value			0.222		Detected data appear Gamma Distributed at 5% Significance Level					
121	Detected data follow Appr. Gamma Distribution at 5% Significance Level										
122											
123	Gamma Statistics										
124	k hat (MLE)			0.452		k star (bias corrected MLE)			0.412		
125	Theta hat (MLE)			81.31		Theta star (bias corrected MLE)			89.32		
126	nu hat (MLE)			15.37		nu star (bias corrected)			13.99		
127	MLE Mean (bias corrected)			36.76		MLE Sd (bias corrected)			57.3		
128						Approximate Chi Square Value (0.05)			6.566		
129	Adjusted Level of Significance			0.0346		Adjusted Chi Square Value			6.039		
130											
131	Assuming Gamma Distribution										
132	95% Approximate Gamma UCL (use when n>=50)			78.34		95% Adjusted Gamma UCL (use when n<50)			85.17		
133											
134	Lognormal GOF Test										
135	Shapiro Wilk Test Statistic			0.959		Shapiro Wilk Lognormal GOF Test					
136	5% Shapiro Wilk Critical Value			0.892		Data appear Lognormal at 5% Significance Level					
137	Lilliefors Test Statistic			0.11		Lilliefors Lognormal GOF Test					
138	5% Lilliefors Critical Value			0.207		Data appear Lognormal at 5% Significance Level					
139	Data appear Lognormal at 5% Significance Level										
140											
141	Lognormal Statistics										
142	Minimum of Logged Data			-0.693		Mean of logged Data			2.177		
143	Maximum of Logged Data			5.417		SD of logged Data			1.826		
144											
145	Assuming Lognormal Distribution										
146	95% H-UCL			298.9		90% Chebyshev (MVUE) UCL			97.23		
147	95% Chebyshev (MVUE) UCL			124.2		97.5% Chebyshev (MVUE) UCL			161.5		
148	99% Chebyshev (MVUE) UCL			235							
149											
150	Nonparametric Distribution Free UCL Statistics										
151	Data appear to follow a Discernible Distribution at 5% Significance Level										
152											
153	Nonparametric Distribution Free UCLs										
154	95% CLT UCL			62.13		95% Jackknife UCL			63.68		
155	95% Standard Bootstrap UCL			61.79		95% Bootstrap-t UCL			97.5		
156	95% Hall's Bootstrap UCL			152.1		95% Percentile Bootstrap UCL			63.04		
157	95% BCA Bootstrap UCL			74.94							
158	90% Chebyshev(Mean, Sd) UCL			83.02		95% Chebyshev(Mean, Sd) UCL			104		
159	97.5% Chebyshev(Mean, Sd) UCL			133.1		99% Chebyshev(Mean, Sd) UCL			190.2		
160											
161	Suggested UCL to Use										
162	95% Adjusted Gamma UCL			85.17							
163											
164	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test										
165	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL										
166											
167	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
168	Recommendations are based upon data size, data distribution, and skewness.										
169	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
170	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
171											

A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets										
2	Terrestrial Vertebrates by AEC										
3	User Selected Options										
4	Date/Time of Computation		ProUCL 5.16/11/2018 8:26:21 AM								
5	From File		Data_Darwin_Terrestrial Vertebrates Results Table_20180611_j.xls								
6	Full Precision		OFF								
7	Confidence Coefficient		95%								
8	Number of Bootstrap Operations		2000								
9											
10											
11	Perfluoro-n-octanoate acid (PFOA) (Zone B)										
12											
13	General Statistics										
14	Total Number of Observations			0		Number of Distinct Observations			0		
15							Number of Missing Observations			3	
16	Minimum			N/A		Mean			N/A		
17	Maximum			N/A		Median			N/A		
18											
19	Warning: This data set only has 0 observations!										
20	Data set is too small to compute reliable and meaningful statistics and estimates!										
21	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone B) was not processed!										
22											
23	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
24	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
25											
26											
27											
28	Perfluoro-n-octanoate acid (PFOA) (offsite)										
29											
30	General Statistics										
31	Total Number of Observations			0		Number of Distinct Observations			0		
32							Number of Missing Observations			1	
33	Minimum			N/A		Mean			N/A		
34	Maximum			N/A		Median			N/A		
35											
36	Warning: This data set only has 0 observations!										
37	Data set is too small to compute reliable and meaningful statistics and estimates!										
38	The data set for variable Perfluoro-n-octanoate acid (PFOA) (offsite) was not processed!										
39											
40	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
41	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
42											
43											
44											
45	Perfluoro-n-octanoate acid (PFOA) (Zone A)										
46											
47	General Statistics										
48	Total Number of Observations			1		Number of Distinct Observations			1		
49							Number of Missing Observations			9	
50	Minimum			0.26		Mean			0.26		
51	Maximum			0.26		Median			0.26		
52											
53	Warning: This data set only has 1 observations!										
54	Data set is too small to compute reliable and meaningful statistics and estimates!										
55	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone A) was not processed!										
56											
57	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
58	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
59											
60											
61											
62	Perfluoro-n-octanoate acid (PFOA) (Zone C)										
63											

	A	B	C	D	E	F	G	H	I	J	K	L	
64	General Statistics												
65	Total Number of Observations				3	Number of Distinct Observations				2			
66						Number of Missing Observations				0			
67	Minimum				0.26	Mean				0.697			
68	Maximum				1.57	Median				0.26			
69	SD				0.756	Std. Error of Mean				0.437			
70	Coefficient of Variation				1.086	Skewness				1.732			
71													
72	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use												
73	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.												
74	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).												
75	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1												
76													
77	Normal GOF Test												
78	Shapiro Wilk Test Statistic				0.75	Shapiro Wilk GOF Test							
79	5% Shapiro Wilk Critical Value				0.767	Data Not Normal at 5% Significance Level							
80	Lilliefors Test Statistic				0.385	Lilliefors GOF Test							
81	5% Lilliefors Critical Value				0.425	Data appear Normal at 5% Significance Level							
82	Data appear Approximate Normal at 5% Significance Level												
83													
84	Assuming Normal Distribution												
85	95% Normal UCL						95% UCLs (Adjusted for Skewness)						
86	95% Student's-t UCL				1.972	95% Adjusted-CLT UCL (Chen-1995)				1.882			
87						95% Modified-t UCL (Johnson-1978)				2.045			
88													
89	Gamma GOF Test												
90	Not Enough Data to Perform GOF Test												
91													
92	Gamma Statistics												
93	k hat (MLE)				1.438	k star (bias corrected MLE)				N/A			
94	Theta hat (MLE)				0.484	Theta star (bias corrected MLE)				N/A			
95	nu hat (MLE)				8.631	nu star (bias corrected)				N/A			
96	MLE Mean (bias corrected)				N/A	MLE Sd (bias corrected)				N/A			
97						Approximate Chi Square Value (0.05)				N/A			
98	Adjusted Level of Significance				N/A	Adjusted Chi Square Value				N/A			
99													
100	Assuming Gamma Distribution												
101	95% Approximate Gamma UCL (use when n>=50))				N/A	95% Adjusted Gamma UCL (use when n<50)				N/A			
102													
103	Lognormal GOF Test												
104	Shapiro Wilk Test Statistic				0.75	Shapiro Wilk Lognormal GOF Test							
105	5% Shapiro Wilk Critical Value				0.767	Data Not Lognormal at 5% Significance Level							
106	Lilliefors Test Statistic				0.385	Lilliefors Lognormal GOF Test							
107	5% Lilliefors Critical Value				0.425	Data appear Lognormal at 5% Significance Level							
108	Data appear Approximate Lognormal at 5% Significance Level												
109													

A	B	C	D	E	F	G	H	I	J	K	L
110	Lognormal Statistics										
111	Minimum of Logged Data			-1.347		Mean of logged Data			-0.748		
112	Maximum of Logged Data			0.451		SD of logged Data			1.038		
113	Assuming Lognormal Distribution										
114	95% H-UCL			16955		90% Chebyshev (MVUE) UCL			1.71		
115	95% Chebyshev (MVUE) UCL			2.186		97.5% Chebyshev (MVUE) UCL			2.847		
116	99% Chebyshev (MVUE) UCL			4.144							
117	Nonparametric Distribution Free UCL Statistics										
118	Data appear to follow a Discernible Distribution at 5% Significance Level										
119	Nonparametric Distribution Free UCLs										
120	Data appear to follow a Discernible Distribution at 5% Significance Level										
121	Nonparametric Distribution Free UCLs										
122	95% CLT UCL			1.415		95% Jackknife UCL			N/A		
123	95% Standard Bootstrap UCL			N/A		95% Bootstrap-t UCL			N/A		
124	95% Hall's Bootstrap UCL			N/A		95% Percentile Bootstrap UCL			N/A		
125	95% BCA Bootstrap UCL			N/A							
126	90% Chebyshev(Mean, Sd) UCL			2.007		95% Chebyshev(Mean, Sd) UCL			2.6		
127	97.5% Chebyshev(Mean, Sd) UCL			3.424		99% Chebyshev(Mean, Sd) UCL			5.041		
128	Suggested UCL to Use										
129	95% Student's-t UCL			1.972							
130	Recommended UCL exceeds the maximum observation										
131	Recommended UCL exceeds the maximum observation										
132	Recommended UCL exceeds the maximum observation										
133	Recommended UCL exceeds the maximum observation										
134	Recommended UCL exceeds the maximum observation										
135	Recommended UCL exceeds the maximum observation										
136	Recommended UCL exceeds the maximum observation										
137	Recommended UCL exceeds the maximum observation										
138	Recommended UCL exceeds the maximum observation										
139	Recommended UCL exceeds the maximum observation										
140	Recommended UCL exceeds the maximum observation										
141	Recommended UCL exceeds the maximum observation										
142	Recommended UCL exceeds the maximum observation										
143	Recommended UCL exceeds the maximum observation										
144	Recommended UCL exceeds the maximum observation										
145	Recommended UCL exceeds the maximum observation										
146	Recommended UCL exceeds the maximum observation										
147	Recommended UCL exceeds the maximum observation										
148	Recommended UCL exceeds the maximum observation										
149	Recommended UCL exceeds the maximum observation										
150	Recommended UCL exceeds the maximum observation										
151	Recommended UCL exceeds the maximum observation										
152	Recommended UCL exceeds the maximum observation										
153	Recommended UCL exceeds the maximum observation										
154	Recommended UCL exceeds the maximum observation										
155	Recommended UCL exceeds the maximum observation										
156	Recommended UCL exceeds the maximum observation										
157	Recommended UCL exceeds the maximum observation										
158	Recommended UCL exceeds the maximum observation										
159	Recommended UCL exceeds the maximum observation										
160	Recommended UCL exceeds the maximum observation										
161	Recommended UCL exceeds the maximum observation										
162	Recommended UCL exceeds the maximum observation										
163	Recommended UCL exceeds the maximum observation										
164	Recommended UCL exceeds the maximum observation										

A	B	C	D	E	F	G	H	I	J	K	L	
165												
166	Assuming Normal Distribution											
167	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
168	95% Student's-t UCL				6.107		95% Adjusted-CLT UCL (Chen-1995)				4.596	
169							95% Modified-t UCL (Johnson-1978)				6.026	
170												
171	Gamma GOF Test											
172	Not Enough Data to Perform GOF Test											
173												
174	Gamma Statistics											
175	k hat (MLE)			10.69			k star (bias corrected MLE)			N/A		
176	Theta hat (MLE)			0.359			Theta star (bias corrected MLE)			N/A		
177	nu hat (MLE)			64.15			nu star (bias corrected)			N/A		
178	MLE Mean (bias corrected)			N/A			MLE Sd (bias corrected)			N/A		
179							Approximate Chi Square Value (0.05)			N/A		
180	Adjusted Level of Significance			N/A			Adjusted Chi Square Value			N/A		
181												
182	Assuming Gamma Distribution											
183	95% Approximate Gamma UCL (use when n>=50))				N/A		95% Adjusted Gamma UCL (use when n<50)				N/A	
184												
185	Lognormal GOF Test											
186	Shapiro Wilk Test Statistic			0.911			Shapiro Wilk Lognormal GOF Test					
187	5% Shapiro Wilk Critical Value			0.767			Data appear Lognormal at 5% Significance Level					
188	Lilliefors Test Statistic			0.301			Lilliefors Lognormal GOF Test					
189	5% Lilliefors Critical Value			0.425			Data appear Lognormal at 5% Significance Level					
190	Data appear Lognormal at 5% Significance Level											
191												
192	Lognormal Statistics											
193	Minimum of Logged Data			0.857			Mean of logged Data			1.298		
194	Maximum of Logged Data			1.605			SD of logged Data			0.391		
195												
196	Assuming Lognormal Distribution											
197	95% H-UCL			16.27			90% Chebyshev (MVUE) UCL			6.415		
198	95% Chebyshev (MVUE) UCL			7.576			97.5% Chebyshev (MVUE) UCL			9.187		
199	99% Chebyshev (MVUE) UCL			12.35								
200												
201	Nonparametric Distribution Free UCL Statistics											
202	Data appear to follow a Discernible Distribution at 5% Significance Level											
203												
204	Nonparametric Distribution Free UCLs											
205	95% CLT UCL			5.118			95% Jackknife UCL			6.107		
206	95% Standard Bootstrap UCL			N/A			95% Bootstrap-t UCL			N/A		
207	95% Hall's Bootstrap UCL			N/A			95% Percentile Bootstrap UCL			N/A		
208	95% BCA Bootstrap UCL			N/A								
209	90% Chebyshev(Mean, Sd) UCL			6.169			95% Chebyshev(Mean, Sd) UCL			7.223		
210	97.5% Chebyshev(Mean, Sd) UCL			8.687			99% Chebyshev(Mean, Sd) UCL			11.56		
211												
212	Suggested UCL to Use											
213	95% Student's-t UCL			6.107								
214												
215	Recommended UCL exceeds the maximum observation											
216												
217	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
218	Recommendations are based upon data size, data distribution, and skewness.											
219	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
220	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
221												
222	Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be											
223	reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.											

	A	B	C	D	E	F	G	H	I	J	K	L
224												
225												
226	Perfluoro-n-octane sulfonic acid (PFOS) (offsite)											
227												
228	General Statistics											
229	Total Number of Observations			1			Number of Distinct Observations			1		
230							Number of Missing Observations			0		
231	Minimum			0.5			Mean			0.5		
232	Maximum			0.5			Median			0.5		
233												
234	Warning: This data set only has 1 observations!											
235	Data set is too small to compute reliable and meaningful statistics and estimates!											
236	The data set for variable Perfluoro-n-octane sulfonic acid (PFOS) (offsite) was not processed!											
237												
238	It is suggested to collect at least 8 to 10 observations before using these statistical methods!											
239	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.											
240												
241												
242												
243	Perfluoro-n-octane sulfonic acid (PFOS) (Zone A)											
244												
245	General Statistics											
246	Total Number of Observations			10			Number of Distinct Observations			10		
247							Number of Missing Observations			0		
248	Minimum			1.1			Mean			57.34		
249	Maximum			225.2			Median			14.5		
250	SD			77.02			Std. Error of Mean			24.35		
251	Coefficient of Variation			1.343			Skewness			1.517		
252												
253	Normal GOF Test											
254	Shapiro Wilk Test Statistic			0.762			Shapiro Wilk GOF Test					
255	5% Shapiro Wilk Critical Value			0.842			Data Not Normal at 5% Significance Level					
256	Lilliefors Test Statistic			0.304			Lilliefors GOF Test					
257	5% Lilliefors Critical Value			0.262			Data Not Normal at 5% Significance Level					
258	Data Not Normal at 5% Significance Level											
259												
260	Assuming Normal Distribution											
261	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
262	95% Student's-t UCL			102			95% Adjusted-CLT UCL (Chen-1995)			109.9		
263							95% Modified-t UCL (Johnson-1978)			103.9		
264												
265	Gamma GOF Test											
266	A-D Test Statistic			0.372			Anderson-Darling Gamma GOF Test					
267	5% A-D Critical Value			0.772			Detected data appear Gamma Distributed at 5% Significance Level					
268	K-S Test Statistic			0.226			Kolmogorov-Smirnov Gamma GOF Test					
269	5% K-S Critical Value			0.28			Detected data appear Gamma Distributed at 5% Significance Level					
270	Detected data appear Gamma Distributed at 5% Significance Level											
271												
272	Gamma Statistics											
273	k hat (MLE)			0.566			k star (bias corrected MLE)			0.463		
274	Theta hat (MLE)			101.2			Theta star (bias corrected MLE)			123.8		
275	nu hat (MLE)			11.33			nu star (bias corrected)			9.263		
276	MLE Mean (bias corrected)			57.34			MLE Sd (bias corrected)			84.25		
277							Approximate Chi Square Value (0.05)			3.487		
278	Adjusted Level of Significance			0.0267			Adjusted Chi Square Value			2.899		
279												
280	Assuming Gamma Distribution											
281	95% Approximate Gamma UCL (use when n>=50)			152.3			95% Adjusted Gamma UCL (use when n<50)			183.2		
282												

A	B	C	D	E	F	G	H	I	J	K	L
283	Lognormal GOF Test										
284	Shapiro Wilk Test Statistic			0.957	Shapiro Wilk Lognormal GOF Test						
285	5% Shapiro Wilk Critical Value			0.842	Data appear Lognormal at 5% Significance Level						
286	Lilliefors Test Statistic			0.16	Lilliefors Lognormal GOF Test						
287	5% Lilliefors Critical Value			0.262	Data appear Lognormal at 5% Significance Level						
288	Data appear Lognormal at 5% Significance Level										
289											
290	Lognormal Statistics										
291	Minimum of Logged Data			0.0953	Mean of logged Data			2.949			
292	Maximum of Logged Data			5.417	SD of logged Data			1.76			
293											
294	Assuming Lognormal Distribution										
295	95% H-UCL			1516	90% Chebyshev (MVUE) UCL			183.7			
296	95% Chebyshev (MVUE) UCL			236.6	97.5% Chebyshev (MVUE) UCL			310			
297	99% Chebyshev (MVUE) UCL			454.3							
298											
299	Nonparametric Distribution Free UCL Statistics										
300	Data appear to follow a Discernible Distribution at 5% Significance Level										
301											
302	Nonparametric Distribution Free UCLs										
303	95% CLT UCL			97.4	95% Jackknife UCL			102			
304	95% Standard Bootstrap UCL			95.52	95% Bootstrap-t UCL			150.5			
305	95% Hall's Bootstrap UCL			170.9	95% Percentile Bootstrap UCL			97.85			
306	95% BCA Bootstrap UCL			108.1							
307	90% Chebyshev(Mean, Sd) UCL			130.4	95% Chebyshev(Mean, Sd) UCL			163.5			
308	97.5% Chebyshev(Mean, Sd) UCL			209.4	99% Chebyshev(Mean, Sd) UCL			299.7			
309											
310	Suggested UCL to Use										
311	95% Adjusted Gamma UCL			183.2							
312											
313	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
314	Recommendations are based upon data size, data distribution, and skewness.										
315	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
316	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
317											
318											
319	Perfluoro-n-octane sulfonic acid (PFOS) (Zone C)										
320											
321	General Statistics										
322	Total Number of Observations			3	Number of Distinct Observations			3			
323					Number of Missing Observations			0			
324	Minimum			1.31	Mean			13.18			
325	Maximum			36.67	Median			1.571			
326	SD			20.34	Std. Error of Mean			11.74			
327	Coefficient of Variation			1.543	Skewness			1.732			
328											
329	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use										
330	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.										
331	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).										
332	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1										
333											
334	Normal GOF Test										
335	Shapiro Wilk Test Statistic			0.756	Shapiro Wilk GOF Test						
336	5% Shapiro Wilk Critical Value			0.767	Data Not Normal at 5% Significance Level						
337	Lilliefors Test Statistic			0.383	Lilliefors GOF Test						
338	5% Lilliefors Critical Value			0.425	Data appear Normal at 5% Significance Level						
339	Data appear Approximate Normal at 5% Significance Level										
340											

A	B	C	D	E	F	G	H	I	J	K	L
341	Assuming Normal Distribution										
342	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
343	95% Student's-t UCL			47.47		95% Adjusted-CLT UCL (Chen-1995)				45.04	
344						95% Modified-t UCL (Johnson-1978)				49.43	
345											
346	Gamma GOF Test										
347	Not Enough Data to Perform GOF Test										
348											
349	Gamma Statistics										
350	k hat (MLE)			0.55		k star (bias corrected MLE)				N/A	
351	Theta hat (MLE)			23.96		Theta star (bias corrected MLE)				N/A	
352	nu hat (MLE)			3.301		nu star (bias corrected)				N/A	
353	MLE Mean (bias corrected)			N/A		MLE Sd (bias corrected)				N/A	
354						Approximate Chi Square Value (0.05)				N/A	
355	Adjusted Level of Significance			N/A		Adjusted Chi Square Value				N/A	
356											
357	Assuming Gamma Distribution										
358	95% Approximate Gamma UCL (use when n>=50)			N/A		95% Adjusted Gamma UCL (use when n<50)				N/A	
359											
360	Lognormal GOF Test										
361	Shapiro Wilk Test Statistic			0.791		Shapiro Wilk Lognormal GOF Test					
362	5% Shapiro Wilk Critical Value			0.767		Data appear Lognormal at 5% Significance Level					
363	Lilliefors Test Statistic			0.368		Lilliefors Lognormal GOF Test					
364	5% Lilliefors Critical Value			0.425		Data appear Lognormal at 5% Significance Level					
365	Data appear Lognormal at 5% Significance Level										
366											
367	Lognormal Statistics										
368	Minimum of Logged Data			0.27		Mean of logged Data				1.441	
369	Maximum of Logged Data			3.602		SD of logged Data				1.873	
370											
371	Assuming Lognormal Distribution										
372	95% H-UCL			2.982E+15		90% Chebyshev (MVUE) UCL				36.15	
373	95% Chebyshev (MVUE) UCL			47.63		97.5% Chebyshev (MVUE) UCL				63.55	
374	99% Chebyshev (MVUE) UCL			94.84							
375											
376	Nonparametric Distribution Free UCL Statistics										
377	Data appear to follow a Discernible Distribution at 5% Significance Level										
378											
379	Nonparametric Distribution Free UCLs										
380	95% CLT UCL			32.5		95% Jackknife UCL				47.47	
381	95% Standard Bootstrap UCL			N/A		95% Bootstrap-t UCL				N/A	
382	95% Hall's Bootstrap UCL			N/A		95% Percentile Bootstrap UCL				N/A	
383	95% BCA Bootstrap UCL			N/A							
384	90% Chebyshev(Mean, Sd) UCL			48.41		95% Chebyshev(Mean, Sd) UCL				64.36	
385	97.5% Chebyshev(Mean, Sd) UCL			86.51		99% Chebyshev(Mean, Sd) UCL				130	
386											
387	Suggested UCL to Use										
388	95% Student's-t UCL			47.47							
389											
390	Recommended UCL exceeds the maximum observation										
391											
392	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test										
393	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL										
394											
395	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
396	Recommendations are based upon data size, data distribution, and skewness.										
397	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
398	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
399											

A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets										
2	Terrestrial Vertebrates by Water Type										
3	User Selected Options										
4	Date/Time of Computation		ProUCL 5.16/11/2018 8:46:01 AM								
5	From File		Data_Darwin_Terrestrial Vertebrates Results Table_20180611_j.xls								
6	Full Precision		OFF								
7	Confidence Coefficient		95%								
8	Number of Bootstrap Operations		2000								
9											
10											
11	Perfluoro-n-octanoate acid (PFOA) (estuary)										
12											
13	General Statistics										
14	Total Number of Observations			0		Number of Distinct Observations			0		
15						Number of Missing Observations			3		
16	Minimum			N/A		Mean			N/A		
17	Maximum			N/A		Median			N/A		
18											
19	Warning: This data set only has 0 observations!										
20	Data set is too small to compute reliable and meaningful statistics and estimates!										
21	The data set for variable Perfluoro-n-octanoate acid (PFOA) (estuary) was not processed!										
22											
23	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
24	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
25											
26											
27											
28	Perfluoro-n-octanoate acid (PFOA) (freshwater)										
29											
30	General Statistics										
31	Total Number of Observations			4		Number of Distinct Observations			2		
32						Number of Missing Observations			9		
33	Minimum			0.26		Mean			0.588		
34	Maximum			1.57		Median			0.26		
35	SD			0.655		Std. Error of Mean			0.328		
36	Coefficient of Variation			1.115		Skewness			2		
37											
38	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use										
39	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.										
40	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).										
41	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1										
42											
43	Normal GOF Test										
44	Shapiro Wilk Test Statistic			0.63		Shapiro Wilk GOF Test					
45	5% Shapiro Wilk Critical Value			0.748		Data Not Normal at 5% Significance Level					
46	Lilliefors Test Statistic			0.441		Lilliefors GOF Test					
47	5% Lilliefors Critical Value			0.375		Data Not Normal at 5% Significance Level					
48	Data Not Normal at 5% Significance Level										
49											
50	Assuming Normal Distribution										
51	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
52	95% Student's-t UCL			1.358		95% Adjusted-CLT UCL (Chen-1995)			1.476		
53						95% Modified-t UCL (Johnson-1978)			1.413		
54											

A	B	C	D	E	F	G	H	I	J	K	L
55	Gamma GOF Test										
56	A-D Test Statistic			0.963		Anderson-Darling Gamma GOF Test					
57	5% A-D Critical Value			0.662		Data Not Gamma Distributed at 5% Significance Level					
58	K-S Test Statistic			0.474		Kolmogorov-Smirnov Gamma GOF Test					
59	5% K-S Critical Value			0.399		Data Not Gamma Distributed at 5% Significance Level					
60	Data Not Gamma Distributed at 5% Significance Level										
61											
62	Gamma Statistics										
63	k hat (MLE)			1.512		k star (bias corrected MLE)			0.545		
64	Theta hat (MLE)			0.388		Theta star (bias corrected MLE)			1.078		
65	nu hat (MLE)			12.1		nu star (bias corrected)			4.358		
66	MLE Mean (bias corrected)			0.588		MLE Sd (bias corrected)			0.796		
67							Approximate Chi Square Value (0.05)			0.868	
68	Adjusted Level of Significance			N/A		Adjusted Chi Square Value			N/A		
69											
70	Assuming Gamma Distribution										
71	95% Approximate Gamma UCL (use when n>=50))			2.949		95% Adjusted Gamma UCL (use when n<50)			N/A		
72											
73	Lognormal GOF Test										
74	Shapiro Wilk Test Statistic			0.63		Shapiro Wilk Lognormal GOF Test					
75	5% Shapiro Wilk Critical Value			0.748		Data Not Lognormal at 5% Significance Level					
76	Lilliefors Test Statistic			0.441		Lilliefors Lognormal GOF Test					
77	5% Lilliefors Critical Value			0.375		Data Not Lognormal at 5% Significance Level					
78	Data Not Lognormal at 5% Significance Level										
79											
80	Lognormal Statistics										
81	Minimum of Logged Data			-1.347		Mean of logged Data			-0.898		
82	Maximum of Logged Data			0.451		SD of logged Data			0.899		
83											
84	Assuming Lognormal Distribution										
85	95% H-UCL			13.98		90% Chebyshev (MVUE) UCL			1.232		
86	95% Chebyshev (MVUE) UCL			1.545		97.5% Chebyshev (MVUE) UCL			1.978		
87	99% Chebyshev (MVUE) UCL			2.829							
88											
89	Nonparametric Distribution Free UCL Statistics										
90	Data do not follow a Discernible Distribution (0.05)										
91											
92	Nonparametric Distribution Free UCLs										
93	95% CLT UCL			1.126		95% Jackknife UCL			N/A		
94	95% Standard Bootstrap UCL			N/A		95% Bootstrap-t UCL			N/A		
95	95% Hall's Bootstrap UCL			N/A		95% Percentile Bootstrap UCL			N/A		
96	95% BCA Bootstrap UCL			N/A							
97	90% Chebyshev(Mean, Sd) UCL			1.57		95% Chebyshev(Mean, Sd) UCL			2.015		
98	97.5% Chebyshev(Mean, Sd) UCL			2.633		99% Chebyshev(Mean, Sd) UCL			3.846		
99											
100	Suggested UCL to Use										
101	95% Chebyshev (Mean, Sd) UCL			2.015							
102											
103	Recommended UCL exceeds the maximum observation										
104											
105	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
106	Recommendations are based upon data size, data distribution, and skewness.										
107	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
108	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
109											

	A	B	C	D	E	F	G	H	I	J	K	L
110												
111	Perfluoro-n-octanoate acid (PFOA) (offsite)											
112												
113	General Statistics											
114	Total Number of Observations				0		Number of Distinct Observations				0	
115							Number of Missing Observations				1	
116	Minimum				N/A		Mean				N/A	
117	Maximum				N/A		Median				N/A	
118												
119	Warning: This data set only has 0 observations!											
120	Data set is too small to compute reliable and meaningful statistics and estimates!											
121	The data set for variable Perfluoro-n-octanoate acid (PFOA) (offsite) was not processed!											
122												
123	It is suggested to collect at least 8 to 10 observations before using these statistical methods!											
124	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.											
125												
126												
127												
128	Perfluoro-n-octane sulfonic acid (PFOS) (estuary)											
129												
130	General Statistics											
131	Total Number of Observations				3		Number of Distinct Observations				3	
132							Number of Missing Observations				0	
133	Minimum				2.357		Mean				3.841	
134	Maximum				4.976		Median				4.19	
135	SD				1.344		Std. Error of Mean				0.776	
136	Coefficient of Variation				0.35		Skewness				-1.09	
137												
138	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
139	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
140	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
141	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
142												
143	Normal GOF Test											
144	Shapiro Wilk Test Statistic				0.949		Shapiro Wilk GOF Test					
145	5% Shapiro Wilk Critical Value				0.767		Data appear Normal at 5% Significance Level					
146	Lilliefors Test Statistic				0.269		Lilliefors GOF Test					
147	5% Lilliefors Critical Value				0.425		Data appear Normal at 5% Significance Level					
148	Data appear Normal at 5% Significance Level											
149												
150	Assuming Normal Distribution											
151	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
152	95% Student's-t UCL				6.107		95% Adjusted-CLT UCL (Chen-1995)				4.596	
153							95% Modified-t UCL (Johnson-1978)				6.026	
154												
155	Gamma GOF Test											
156	Not Enough Data to Perform GOF Test											
157												
158	Gamma Statistics											
159	k hat (MLE)				10.69		k star (bias corrected MLE)				N/A	
160	Theta hat (MLE)				0.359		Theta star (bias corrected MLE)				N/A	
161	nu hat (MLE)				64.15		nu star (bias corrected)				N/A	
162	MLE Mean (bias corrected)				N/A		MLE Sd (bias corrected)				N/A	
163							Approximate Chi Square Value (0.05)				N/A	
164	Adjusted Level of Significance				N/A		Adjusted Chi Square Value				N/A	

A	B	C	D	E	F	G	H	I	J	K	L	
165												
166	Assuming Gamma Distribution											
167	95% Approximate Gamma UCL (use when n>=50))				N/A		95% Adjusted Gamma UCL (use when n<50)				N/A	
168												
169	Lognormal GOF Test											
170	Shapiro Wilk Test Statistic			0.911		Shapiro Wilk Lognormal GOF Test						
171	5% Shapiro Wilk Critical Value			0.767		Data appear Lognormal at 5% Significance Level						
172	Lilliefors Test Statistic			0.301		Lilliefors Lognormal GOF Test						
173	5% Lilliefors Critical Value			0.425		Data appear Lognormal at 5% Significance Level						
174	Data appear Lognormal at 5% Significance Level											
175												
176	Lognormal Statistics											
177	Minimum of Logged Data			0.857		Mean of logged Data				1.298		
178	Maximum of Logged Data			1.605		SD of logged Data				0.391		
179												
180	Assuming Lognormal Distribution											
181	95% H-UCL			16.27		90% Chebyshev (MVUE) UCL				6.415		
182	95% Chebyshev (MVUE) UCL			7.576		97.5% Chebyshev (MVUE) UCL				9.187		
183	99% Chebyshev (MVUE) UCL			12.35								
184												
185	Nonparametric Distribution Free UCL Statistics											
186	Data appear to follow a Discernible Distribution at 5% Significance Level											
187												
188	Nonparametric Distribution Free UCLs											
189	95% CLT UCL			5.118		95% Jackknife UCL				6.107		
190	95% Standard Bootstrap UCL			N/A		95% Bootstrap-t UCL				N/A		
191	95% Hall's Bootstrap UCL			N/A		95% Percentile Bootstrap UCL				N/A		
192	95% BCA Bootstrap UCL			N/A								
193	90% Chebyshev(Mean, Sd) UCL			6.169		95% Chebyshev(Mean, Sd) UCL				7.223		
194	97.5% Chebyshev(Mean, Sd) UCL			8.687		99% Chebyshev(Mean, Sd) UCL				11.56		
195												
196	Suggested UCL to Use											
197	95% Student's-t UCL			6.107								
198												
199	Recommended UCL exceeds the maximum observation											
200												
201	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
202	Recommendations are based upon data size, data distribution, and skewness.											
203	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
204	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
205												
206	Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be											
207	reliable. Chen's and Johnson's methods provide adjustments for positively skewed data sets.											
208												
209												
210	Perfluoro-n-octane sulfonic acid (PFOS) (freshwater)											
211												
212	General Statistics											
213	Total Number of Observations			13		Number of Distinct Observations				13		
214						Number of Missing Observations				0		
215	Minimum			1.1		Mean				47.15		
216	Maximum			225.2		Median				13		
217	SD			69.95		Std. Error of Mean				19.4		
218	Coefficient of Variation			1.484		Skewness				1.854		
219												

A	B	C	D	E	F	G	H	I	J	K	L
220	Normal GOF Test										
221	Shapiro Wilk Test Statistic			0.713		Shapiro Wilk GOF Test					
222	5% Shapiro Wilk Critical Value			0.866		Data Not Normal at 5% Significance Level					
223	Lilliefors Test Statistic			0.287		Lilliefors GOF Test					
224	5% Lilliefors Critical Value			0.234		Data Not Normal at 5% Significance Level					
225	Data Not Normal at 5% Significance Level										
226											
227	Assuming Normal Distribution										
228	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
229	95% Student's-t UCL			81.72		95% Adjusted-CLT UCL (Chen-1995)				89.71	
230						95% Modified-t UCL (Johnson-1978)				83.39	
231											
232	Gamma GOF Test										
233	A-D Test Statistic			0.431		Anderson-Darling Gamma GOF Test					
234	5% A-D Critical Value			0.789		Detected data appear Gamma Distributed at 5% Significance Level					
235	K-S Test Statistic			0.178		Kolmogorov-Smirnov Gamma GOF Test					
236	5% K-S Critical Value			0.25		Detected data appear Gamma Distributed at 5% Significance Level					
237	Detected data appear Gamma Distributed at 5% Significance Level										
238											
239	Gamma Statistics										
240	k hat (MLE)			0.506		k star (bias corrected MLE)				0.441	
241	Theta hat (MLE)			93.14		Theta star (bias corrected MLE)				107	
242	nu hat (MLE)			13.16		nu star (bias corrected)				11.46	
243	MLE Mean (bias corrected)			47.15		MLE Sd (bias corrected)				71.03	
244						Approximate Chi Square Value (0.05)				4.872	
245	Adjusted Level of Significance			0.0301		Adjusted Chi Square Value				4.276	
246											
247	Assuming Gamma Distribution										
248	95% Approximate Gamma UCL (use when n>=50)			110.9		95% Adjusted Gamma UCL (use when n<50)				126.3	
249											
250	Lognormal GOF Test										
251	Shapiro Wilk Test Statistic			0.941		Shapiro Wilk Lognormal GOF Test					
252	5% Shapiro Wilk Critical Value			0.866		Data appear Lognormal at 5% Significance Level					
253	Lilliefors Test Statistic			0.118		Lilliefors Lognormal GOF Test					
254	5% Lilliefors Critical Value			0.234		Data appear Lognormal at 5% Significance Level					
255	Data appear Lognormal at 5% Significance Level										
256											
257	Lognormal Statistics										
258	Minimum of Logged Data			0.0953		Mean of logged Data				2.601	
259	Maximum of Logged Data			5.417		SD of logged Data				1.829	
260											
261	Assuming Lognormal Distribution										
262	95% H-UCL			730.7		90% Chebyshev (MVUE) UCL				148.2	
263	95% Chebyshev (MVUE) UCL			190.4		97.5% Chebyshev (MVUE) UCL				249	
264	99% Chebyshev (MVUE) UCL			364.1							
265											
266	Nonparametric Distribution Free UCL Statistics										
267	Data appear to follow a Discernible Distribution at 5% Significance Level										
268											

	A	B	C	D	E	F	G	H	I	J	K	L
269	Nonparametric Distribution Free UCLs											
270	95% CLT UCL				79.06		95% Jackknife UCL				81.72	
271	95% Standard Bootstrap UCL				76.76		95% Bootstrap-t UCL				119.7	
272	95% Hall's Bootstrap UCL				203		95% Percentile Bootstrap UCL				79.32	
273	95% BCA Bootstrap UCL				86.9							
274	90% Chebyshev(Mean, Sd) UCL				105.3		95% Chebyshev(Mean, Sd) UCL				131.7	
275	97.5% Chebyshev(Mean, Sd) UCL				168.3		99% Chebyshev(Mean, Sd) UCL				240.2	
276												
277	Suggested UCL to Use											
278	95% Adjusted Gamma UCL				126.3							
279												
280	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
281	Recommendations are based upon data size, data distribution, and skewness.											
282	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
283	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
284												
285												
286	Perfluoro-n-octane sulfonic acid (PFOS) (offsite)											
287												
288	General Statistics											
289	Total Number of Observations				1		Number of Distinct Observations				1	
290							Number of Missing Observations				0	
291	Minimum				0.5		Mean				0.5	
292	Maximum				0.5		Median				0.5	
293												
294	Warning: This data set only has 1 observations!											
295	Data set is too small to compute reliable and meaningful statistics and estimates!											
296	The data set for variable Perfluoro-n-octane sulfonic acid (PFOS) (offsite) was not processed!											
297												
298	It is suggested to collect at least 8 to 10 observations before using these statistical methods!											
299	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.											
300												
301												

	A	B	C	D	E	F	G	H	I	J	K	L								
1	UCL Statistics for Uncensored Full Data Sets																			
2	Reptiles and Amphibians by AEC																			
3	User Selected Options																			
4	Date/Time of Computation			ProUCL 5.16/5/2018 3:44:31 PM																
5	From File			Darwin_Terrestrial Vertebrates Results Table_01.06.2018_h.xls																
6	Full Precision			OFF																
7	Confidence Coefficient			95%																
8	Number of Bootstrap Operations			2000																
9																				
10																				
11	Perfluoro-n-octanoate acid (PFOA) (Zone D)																			
12																				
13	General Statistics																			
14	Total Number of Observations				0				Number of Distinct Observations				0							
15									Number of Missing Observations				5							
16					Minimum				N/A				Mean				N/A			
17					Maximum				N/A				Median				N/A			
18																				
19	Warning: This data set only has 0 observations!																			
20	Data set is too small to compute reliable and meaningful statistics and estimates!																			
21	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone D) was not processed!																			
22																				
23	It is suggested to collect at least 8 to 10 observations before using these statistical methods!																			
24	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.																			
25																				
26																				
27																				
28	Perfluoro-n-octanoate acid (PFOA) (Zone B)																			
29																				
30	General Statistics																			
31	Total Number of Observations				0				Number of Distinct Observations				0							
32									Number of Missing Observations				18							
33					Minimum				N/A				Mean				N/A			
34					Maximum				N/A				Median				N/A			
35																				
36	Warning: This data set only has 0 observations!																			
37	Data set is too small to compute reliable and meaningful statistics and estimates!																			
38	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone B) was not processed!																			
39																				
40	It is suggested to collect at least 8 to 10 observations before using these statistical methods!																			
41	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.																			
42																				
43																				
44																				

	A	B	C	D	E	F	G	H	I	J	K	L				
45	Perfluoro-n-octanoate acid (PFOA) (offsite nth)															
46																
47	General Statistics															
48	Total Number of Observations					0		Number of Distinct Observations					0			
49								Number of Missing Observations					6			
50						Minimum		N/A		Mean					N/A	
51						Maximum		N/A		Median					N/A	
52																
53	Warning: This data set only has 0 observations!															
54	Data set is too small to compute reliable and meaningful statistics and estimates!															
55	The data set for variable Perfluoro-n-octanoate acid (PFOA) (offsite nth) was not processed!															
56																
57	It is suggested to collect at least 8 to 10 observations before using these statistical methods!															
58	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.															
59																
60																
61																
62	Perfluoro-n-octanoate acid (PFOA) (Zone A)															
63																
64	General Statistics															
65	Total Number of Observations					0		Number of Distinct Observations					0			
66								Number of Missing Observations					21			
67						Minimum		N/A		Mean					N/A	
68						Maximum		N/A		Median					N/A	
69																
70	Warning: This data set only has 0 observations!															
71	Data set is too small to compute reliable and meaningful statistics and estimates!															
72	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone A) was not processed!															
73																
74	It is suggested to collect at least 8 to 10 observations before using these statistical methods!															
75	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.															
76																
77																
78																
79	Perfluoro-n-octanoate acid (PFOA) (Zone C)															
80																
81	General Statistics															
82	Total Number of Observations					0		Number of Distinct Observations					0			
83								Number of Missing Observations					19			
84						Minimum		N/A		Mean					N/A	
85						Maximum		N/A		Median					N/A	
86																
87	Warning: This data set only has 0 observations!															
88	Data set is too small to compute reliable and meaningful statistics and estimates!															
89	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone C) was not processed!															
90																
91	It is suggested to collect at least 8 to 10 observations before using these statistical methods!															
92	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.															
93																
94																

	A	B	C	D	E	F	G	H	I	J	K	L
95												
96	Perfluoro-n-octane sulfonic acid (PFOS) (Zone D)											
97												
98	General Statistics											
99	Total Number of Observations				5		Number of Distinct Observations				5	
100							Number of Missing Observations				0	
101	Minimum				2.5		Mean				8.46	
102	Maximum				24		Median				4.5	
103	SD				8.925		Std. Error of Mean				3.991	
104	Coefficient of Variation				1.055		Skewness				1.963	
105												
106	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
107	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
108	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
109	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
110												
111	Normal GOF Test											
112	Shapiro Wilk Test Statistic				0.742		Shapiro Wilk GOF Test					
113	5% Shapiro Wilk Critical Value				0.762		Data Not Normal at 5% Significance Level					
114	Lilliefors Test Statistic				0.325		Lilliefors GOF Test					
115	5% Lilliefors Critical Value				0.343		Data appear Normal at 5% Significance Level					
116	Data appear Approximate Normal at 5% Significance Level											
117												
118	Assuming Normal Distribution											
119	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
120	95% Student's-t UCL				16.97		95% Adjusted-CLT UCL (Chen-1995)				18.77	
121							95% Modified-t UCL (Johnson-1978)				17.55	
122												
123	Gamma GOF Test											
124	A-D Test Statistic				0.45		Anderson-Darling Gamma GOF Test					
125	5% A-D Critical Value				0.686		Detected data appear Gamma Distributed at 5% Significance Level					
126	K-S Test Statistic				0.266		Kolmogorov-Smirnov Gamma GOF Test					
127	5% K-S Critical Value				0.362		Detected data appear Gamma Distributed at 5% Significance Level					
128	Detected data appear Gamma Distributed at 5% Significance Level											
129												
130	Gamma Statistics											
131	k hat (MLE)				1.544		k star (bias corrected MLE)				0.751	
132	Theta hat (MLE)				5.479		Theta star (bias corrected MLE)				11.27	
133	nu hat (MLE)				15.44		nu star (bias corrected)				7.509	
134	MLE Mean (bias corrected)				8.46		MLE Sd (bias corrected)				9.763	
135							Approximate Chi Square Value (0.05)				2.454	
136	Adjusted Level of Significance				0.0086		Adjusted Chi Square Value				1.383	
137												
138	Assuming Gamma Distribution											
139	95% Approximate Gamma UCL (use when n>=50))				25.88		95% Adjusted Gamma UCL (use when n<50)				45.93	
140												
141	Lognormal GOF Test											
142	Shapiro Wilk Test Statistic				0.919		Shapiro Wilk Lognormal GOF Test					
143	5% Shapiro Wilk Critical Value				0.762		Data appear Lognormal at 5% Significance Level					
144	Lilliefors Test Statistic				0.221		Lilliefors Lognormal GOF Test					
145	5% Lilliefors Critical Value				0.343		Data appear Lognormal at 5% Significance Level					
146	Data appear Lognormal at 5% Significance Level											
147												

	A	B	C	D	E	F	G	H	I	J	K	L
148	Lognormal Statistics											
149	Minimum of Logged Data					0.916	Mean of logged Data					1.778
150	Maximum of Logged Data					3.178	SD of logged Data					0.89
151												
152	Assuming Lognormal Distribution											
153	95% H-UCL					63.29	90% Chebyshev (MVUE) UCL					17.25
154	95% Chebyshev (MVUE) UCL					21.44	97.5% Chebyshev (MVUE) UCL					27.25
155	99% Chebyshev (MVUE) UCL					38.67						
156												
157	Nonparametric Distribution Free UCL Statistics											
158	Data appear to follow a Discernible Distribution at 5% Significance Level											
159												
160	Nonparametric Distribution Free UCLs											
161	95% CLT UCL					15.03	95% Jackknife UCL					16.97
162	95% Standard Bootstrap UCL					14.35	95% Bootstrap-t UCL					53.54
163	95% Hall's Bootstrap UCL					43.32	95% Percentile Bootstrap UCL					15.58
164	95% BCA Bootstrap UCL					16.66						
165	90% Chebyshev(Mean, Sd) UCL					20.43	95% Chebyshev(Mean, Sd) UCL					25.86
166	97.5% Chebyshev(Mean, Sd) UCL					33.39	99% Chebyshev(Mean, Sd) UCL					48.17
167												
168	Suggested UCL to Use											
169	95% Student's-t UCL					16.97						
170												
171	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
172	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
173												
174	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
175	Recommendations are based upon data size, data distribution, and skewness.											
176	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
177	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
178												
179												
180	Perfluoro-n-octane sulfonic acid (PFOS) (Zone B)											
181												
182	General Statistics											
183	Total Number of Observations					18	Number of Distinct Observations					17
184							Number of Missing Observations					0
185	Minimum					1.1	Mean					13.34
186	Maximum					39	Median					8.3
187	SD					11.25	Std. Error of Mean					2.651
188	Coefficient of Variation					0.843	Skewness					0.96
189												
190	Normal GOF Test											
191	Shapiro Wilk Test Statistic					0.887	Shapiro Wilk GOF Test					
192	5% Shapiro Wilk Critical Value					0.897	Data Not Normal at 5% Significance Level					
193	Lilliefors Test Statistic					0.223	Lilliefors GOF Test					
194	5% Lilliefors Critical Value					0.202	Data Not Normal at 5% Significance Level					
195	Data Not Normal at 5% Significance Level											
196												
197	Assuming Normal Distribution											
198	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
199	95% Student's-t UCL					17.96	95% Adjusted-CLT UCL (Chen-1995)					18.35
200							95% Modified-t UCL (Johnson-1978)					18.06
201												
202	Gamma GOF Test											
203	A-D Test Statistic					0.276	Anderson-Darling Gamma GOF Test					

	A	B	C	D	E	F	G	H	I	J	K	L
204				5% A-D Critical Value		0.759	Detected data appear Gamma Distributed at 5% Significance Level					
205				K-S Test Statistic		0.162	Kolmogorov-Smirnov Gamma GOF Test					
206				5% K-S Critical Value		0.208	Detected data appear Gamma Distributed at 5% Significance Level					
207	Detected data appear Gamma Distributed at 5% Significance Level											
208												
209	Gamma Statistics											
210				k hat (MLE)		1.359					k star (bias corrected MLE)	1.17
211				Theta hat (MLE)		9.818					Theta star (bias corrected MLE)	11.41
212				nu hat (MLE)		48.93					nu star (bias corrected)	42.11
213				MLE Mean (bias corrected)		13.34					MLE Sd (bias corrected)	12.34
214											Approximate Chi Square Value (0.05)	28.23
215				Adjusted Level of Significance		0.0357					Adjusted Chi Square Value	27.14
216												
217	Assuming Gamma Distribution											
218				95% Approximate Gamma UCL (use when n>=50)		19.9					95% Adjusted Gamma UCL (use when n<50)	20.7
219												
220	Lognormal GOF Test											
221				Shapiro Wilk Test Statistic		0.956	Shapiro Wilk Lognormal GOF Test					
222				5% Shapiro Wilk Critical Value		0.897	Data appear Lognormal at 5% Significance Level					
223				Lilliefors Test Statistic		0.128	Lilliefors Lognormal GOF Test					
224				5% Lilliefors Critical Value		0.202	Data appear Lognormal at 5% Significance Level					
225	Data appear Lognormal at 5% Significance Level											
226												
227	Lognormal Statistics											
228				Minimum of Logged Data		0.0953					Mean of logged Data	2.18
229				Maximum of Logged Data		3.664					SD of logged Data	1.021
230												
231	Assuming Lognormal Distribution											
232				95% H-UCL		28.84					90% Chebyshev (MVUE) UCL	25.79
233				95% Chebyshev (MVUE) UCL		30.99					97.5% Chebyshev (MVUE) UCL	38.22
234				99% Chebyshev (MVUE) UCL		52.41						
235												
236	Nonparametric Distribution Free UCL Statistics											
237	Data appear to follow a Discernible Distribution at 5% Significance Level											
238												
239	Nonparametric Distribution Free UCLs											
240				95% CLT UCL		17.71					95% Jackknife UCL	17.96
241				95% Standard Bootstrap UCL		17.55					95% Bootstrap-t UCL	18.83
242				95% Hall's Bootstrap UCL		18.36					95% Percentile Bootstrap UCL	17.88
243				95% BCA Bootstrap UCL		18.18						
244				90% Chebyshev(Mean, Sd) UCL		21.3					95% Chebyshev(Mean, Sd) UCL	24.9
245				97.5% Chebyshev(Mean, Sd) UCL		29.9					99% Chebyshev(Mean, Sd) UCL	39.73
246												
247	Suggested UCL to Use											
248				95% Adjusted Gamma UCL		20.7						
249												
250	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
251	Recommendations are based upon data size, data distribution, and skewness.											
252	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
253	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
254												
255												
256	Perfluoro-n-octane sulfonic acid (PFOS) (offsite nth)											
257												
258	General Statistics											
259				Total Number of Observations		6					Number of Distinct Observations	6

	A	B	C	D	E	F	G	H	I	J	K	L	
260											Number of Missing Observations	0	
261					Minimum	3.5					Mean	8.517	
262					Maximum	16					Median	8.8	
263					SD	4.467					Std. Error of Mean	1.824	
264					Coefficient of Variation	0.524					Skewness	0.756	
265	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use												
266	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.												
267	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).												
268	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1												
269													
270	Normal GOF Test												
271													
272					Shapiro Wilk Test Statistic	0.918					Shapiro Wilk GOF Test		
273					5% Shapiro Wilk Critical Value	0.788					Data appear Normal at 5% Significance Level		
274					Lilliefors Test Statistic	0.238					Lilliefors GOF Test		
275					5% Lilliefors Critical Value	0.325					Data appear Normal at 5% Significance Level		
276	Data appear Normal at 5% Significance Level												
277													
278	Assuming Normal Distribution												
279					95% Normal UCL						95% UCLs (Adjusted for Skewness)		
280					95% Student's-t UCL	12.19					95% Adjusted-CLT UCL (Chen-1995)	12.12	
281											95% Modified-t UCL (Johnson-1978)	12.29	
282													
283	Gamma GOF Test												
284					A-D Test Statistic	0.323					Anderson-Darling Gamma GOF Test		
285					5% A-D Critical Value	0.7					Detected data appear Gamma Distributed at 5% Significance Level		
286					K-S Test Statistic	0.22					Kolmogorov-Smirnov Gamma GOF Test		
287					5% K-S Critical Value	0.333					Detected data appear Gamma Distributed at 5% Significance Level		
288	Detected data appear Gamma Distributed at 5% Significance Level												
289													
290	Gamma Statistics												
291					k hat (MLE)	4.236					k star (bias corrected MLE)	2.229	
292					Theta hat (MLE)	2.011					Theta star (bias corrected MLE)	3.821	
293					nu hat (MLE)	50.83					nu star (bias corrected)	26.75	
294					MLE Mean (bias corrected)	8.517					MLE Sd (bias corrected)	5.705	
295											Approximate Chi Square Value (0.05)	15.96	
296					Adjusted Level of Significance	0.0122					Adjusted Chi Square Value	13.04	
297													
298	Assuming Gamma Distribution												
299					95% Approximate Gamma UCL (use when n>=50))	14.28					95% Adjusted Gamma UCL (use when n<50)	17.46	
300													
301	Lognormal GOF Test												
302					Shapiro Wilk Test Statistic	0.933					Shapiro Wilk Lognormal GOF Test		
303					5% Shapiro Wilk Critical Value	0.788					Data appear Lognormal at 5% Significance Level		
304					Lilliefors Test Statistic	0.244					Lilliefors Lognormal GOF Test		
305					5% Lilliefors Critical Value	0.325					Data appear Lognormal at 5% Significance Level		
306	Data appear Lognormal at 5% Significance Level												
307													
308	Lognormal Statistics												
309					Minimum of Logged Data	1.253					Mean of logged Data	2.019	
310					Maximum of Logged Data	2.773					SD of logged Data	0.558	
311													
312	Assuming Lognormal Distribution												
313					95% H-UCL	17.61					90% Chebyshev (MVUE) UCL	14.39	
314					95% Chebyshev (MVUE) UCL	17.03					97.5% Chebyshev (MVUE) UCL	20.69	
315					99% Chebyshev (MVUE) UCL	27.9							

	A	B	C	D	E	F	G	H	I	J	K	L	
316													
317	Nonparametric Distribution Free UCL Statistics												
318	Data appear to follow a Discernible Distribution at 5% Significance Level												
319													
320	Nonparametric Distribution Free UCLs												
321	95% CLT UCL				11.52						95% Jackknife UCL		12.19
322	95% Standard Bootstrap UCL				11.23						95% Bootstrap-t UCL		12.9
323	95% Hall's Bootstrap UCL				12.99						95% Percentile Bootstrap UCL		11.47
324	95% BCA Bootstrap UCL				11.67								
325	90% Chebyshev(Mean, Sd) UCL				13.99						95% Chebyshev(Mean, Sd) UCL		16.47
326	97.5% Chebyshev(Mean, Sd) UCL				19.91						99% Chebyshev(Mean, Sd) UCL		26.66
327													
328	Suggested UCL to Use												
329	95% Student's-t UCL				12.19								
330													
331	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.												
332	Recommendations are based upon data size, data distribution, and skewness.												
333	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).												
334	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.												
335													
336													
337	Perfluoro-n-octane sulfonic acid (PFOS) (Zone A)												
338													
339	General Statistics												
340	Total Number of Observations				21						Number of Distinct Observations		20
341											Number of Missing Observations		0
342	Minimum				3						Mean		654.2
343	Maximum				7200						Median		52
344	SD				1690						Std. Error of Mean		368.7
345	Coefficient of Variation				2.583						Skewness		3.355
346													
347	Normal GOF Test												
348	Shapiro Wilk Test Statistic				0.434						Shapiro Wilk GOF Test		
349	5% Shapiro Wilk Critical Value				0.908						Data Not Normal at 5% Significance Level		
350	Lilliefors Test Statistic				0.449						Lilliefors GOF Test		
351	5% Lilliefors Critical Value				0.188						Data Not Normal at 5% Significance Level		
352	Data Not Normal at 5% Significance Level												
353													
354	Assuming Normal Distribution												
355	95% Normal UCL						95% UCLs (Adjusted for Skewness)						
356	95% Student's-t UCL				1290						95% Adjusted-CLT UCL (Chen-1995)		1549
357											95% Modified-t UCL (Johnson-1978)		1335
358													

	A	B	C	D	E	F	G	H	I	J	K	L
359	Gamma GOF Test											
360	A-D Test Statistic				2.588		Anderson-Darling Gamma GOF Test					
361	5% A-D Critical Value				0.841		Data Not Gamma Distributed at 5% Significance Level					
362	K-S Test Statistic				0.312		Kolmogorov-Smirnov Gamma GOF Test					
363	5% K-S Critical Value				0.205		Data Not Gamma Distributed at 5% Significance Level					
364	Data Not Gamma Distributed at 5% Significance Level											
365												
366	Gamma Statistics											
367	k hat (MLE)				0.322		k star (bias corrected MLE)				0.308	
368	Theta hat (MLE)				2031		Theta star (bias corrected MLE)				2126	
369	nu hat (MLE)				13.53		nu star (bias corrected)				12.93	
370	MLE Mean (bias corrected)				654.2		MLE Sd (bias corrected)				1179	
371							Approximate Chi Square Value (0.05)				5.844	
372	Adjusted Level of Significance				0.0383		Adjusted Chi Square Value				5.48	
373												
374	Assuming Gamma Distribution											
375	95% Approximate Gamma UCL (use when n>=50))				1447		95% Adjusted Gamma UCL (use when n<50)				1543	
376												
377	Lognormal GOF Test											
378	Shapiro Wilk Test Statistic				0.906		Shapiro Wilk Lognormal GOF Test					
379	5% Shapiro Wilk Critical Value				0.908		Data Not Lognormal at 5% Significance Level					
380	Lilliefors Test Statistic				0.192		Lilliefors Lognormal GOF Test					
381	5% Lilliefors Critical Value				0.188		Data Not Lognormal at 5% Significance Level					
382	Data Not Lognormal at 5% Significance Level											
383												
384	Lognormal Statistics											
385	Minimum of Logged Data				1.099		Mean of logged Data				4.367	
386	Maximum of Logged Data				8.882		SD of logged Data				1.955	
387												
388	Assuming Lognormal Distribution											
389	95% H-UCL				3146		90% Chebyshev (MVUE) UCL				1112	
390	95% Chebyshev (MVUE) UCL				1421		97.5% Chebyshev (MVUE) UCL				1850	
391	99% Chebyshev (MVUE) UCL				2694							
392												
393	Nonparametric Distribution Free UCL Statistics											
394	Data do not follow a Discernible Distribution (0.05)											
395												
396	Nonparametric Distribution Free UCLs											
397	95% CLT UCL				1261		95% Jackknife UCL				1290	
398	95% Standard Bootstrap UCL				1253		95% Bootstrap-t UCL				2165	
399	95% Hall's Bootstrap UCL				1879		95% Percentile Bootstrap UCL				1335	
400	95% BCA Bootstrap UCL				1581							
401	90% Chebyshev(Mean, Sd) UCL				1760		95% Chebyshev(Mean, Sd) UCL				2262	
402	97.5% Chebyshev(Mean, Sd) UCL				2957		99% Chebyshev(Mean, Sd) UCL				4323	
403												
404	Suggested UCL to Use											
405	95% Chebyshev (Mean, Sd) UCL				2262							
406												
407	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
408	Recommendations are based upon data size, data distribution, and skewness.											
409	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
410	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
411												

	A	B	C	D	E	F	G	H	I	J	K	L				
412																
413	Perfluoro-n-octane sulfonic acid (PFOS) (Zone C)															
414																
415	General Statistics															
416	Total Number of Observations				19				Number of Distinct Observations				17			
417									Number of Missing Observations				0			
418	Minimum				0.8				Mean				12.41			
419	Maximum				69				Median				2.6			
420	SD				19.2				Std. Error of Mean				4.404			
421	Coefficient of Variation				1.547				Skewness				1.888			
422																
423	Normal GOF Test															
424	Shapiro Wilk Test Statistic				0.658				Shapiro Wilk GOF Test							
425	5% Shapiro Wilk Critical Value				0.901				Data Not Normal at 5% Significance Level							
426	Lilliefors Test Statistic				0.366				Lilliefors GOF Test							
427	5% Lilliefors Critical Value				0.197				Data Not Normal at 5% Significance Level							
428	Data Not Normal at 5% Significance Level															
429																
430	Assuming Normal Distribution															
431	95% Normal UCL						95% UCLs (Adjusted for Skewness)									
432	95% Student's-t UCL				20.05				95% Adjusted-CLT UCL (Chen-1995)				21.69			
433									95% Modified-t UCL (Johnson-1978)				20.37			
434																
435	Gamma GOF Test															
436	A-D Test Statistic				1.752				Anderson-Darling Gamma GOF Test							
437	5% A-D Critical Value				0.795				Data Not Gamma Distributed at 5% Significance Level							
438	K-S Test Statistic				0.297				Kolmogorov-Smirnov Gamma GOF Test							
439	5% K-S Critical Value				0.209				Data Not Gamma Distributed at 5% Significance Level							
440	Data Not Gamma Distributed at 5% Significance Level															
441																
442	Gamma Statistics															
443	k hat (MLE)				0.581				k star (bias corrected MLE)				0.524			
444	Theta hat (MLE)				21.37				Theta star (bias corrected MLE)				23.68			
445	nu hat (MLE)				22.07				nu star (bias corrected)				19.91			
446	MLE Mean (bias corrected)				12.41				MLE Sd (bias corrected)				17.14			
447									Approximate Chi Square Value (0.05)				10.79			
448	Adjusted Level of Significance				0.0369				Adjusted Chi Square Value				10.2			
449																
450	Assuming Gamma Distribution															
451	95% Approximate Gamma UCL (use when n>=50))				22.91				95% Adjusted Gamma UCL (use when n<50)				24.22			
452																
453	Lognormal GOF Test															
454	Shapiro Wilk Test Statistic				0.863				Shapiro Wilk Lognormal GOF Test							
455	5% Shapiro Wilk Critical Value				0.901				Data Not Lognormal at 5% Significance Level							
456	Lilliefors Test Statistic				0.236				Lilliefors Lognormal GOF Test							
457	5% Lilliefors Critical Value				0.197				Data Not Lognormal at 5% Significance Level							
458	Data Not Lognormal at 5% Significance Level															
459																
460	Lognormal Statistics															
461	Minimum of Logged Data				-0.223				Mean of logged Data				1.449			
462	Maximum of Logged Data				4.234				SD of logged Data				1.453			
463																
464	Assuming Lognormal Distribution															
465	95% H-UCL				38.05				90% Chebyshev (MVUE) UCL				24.16			
466	95% Chebyshev (MVUE) UCL				30.08				97.5% Chebyshev (MVUE) UCL				38.31			
467	99% Chebyshev (MVUE) UCL				54.46											

	A	B	C	D	E	F	G	H	I	J	K	L
468	Nonparametric Distribution Free UCL Statistics											
469	Data do not follow a Discernible Distribution (0.05)											
470												
471	Nonparametric Distribution Free UCLs											
472												
473	95% CLT UCL				19.66		95% Jackknife UCL				20.05	
474	95% Standard Bootstrap UCL				19.57		95% Bootstrap-t UCL				24.76	
475	95% Hall's Bootstrap UCL				20.65		95% Percentile Bootstrap UCL				19.94	
476	95% BCA Bootstrap UCL				21.61							
477	90% Chebyshev(Mean, Sd) UCL				25.62		95% Chebyshev(Mean, Sd) UCL				31.61	
478	97.5% Chebyshev(Mean, Sd) UCL				39.92		99% Chebyshev(Mean, Sd) UCL				56.23	
479												
480	Suggested UCL to Use											
481	95% Chebyshev (Mean, Sd) UCL				31.61							
482												
483	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
484	Recommendations are based upon data size, data distribution, and skewness.											
485	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
486	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
487												

A	B	C	D	E	F	G	H	I	J	K	L		
1	UCL Statistics for Uncensored Full Data Sets												
2	Reptiles and Amphibians by Media												
3	User Selected Options												
4	Date/Time of Computation	ProUCL 5.17/3/2018 10:57:20 AM											
5	From File	Data_Darwin_Terrestrial Vertebrates Results Table_20180703_i.xls											
6	Full Precision	OFF											
7	Confidence Coefficient	95%											
8	Number of Bootstrap Operations	2000											
9													
10													
11	Perfluoro-n-octanoate acid (PFOA) (estuary)												
12													
13	General Statistics												
14	Total Number of Observations	0				Number of Distinct Observations				0			
15						Number of Missing Observations				42			
16		Minimum	N/A				Mean				N/A		
17		Maximum	N/A				Median				N/A		
18													
19	Warning: This data set only has 0 observations!												
20	Data set is too small to compute reliable and meaningful statistics and estimates!												
21	The data set for variable Perfluoro-n-octanoate acid (PFOA) (estuary) was not processed!												
22													
23	It is suggested to collect at least 8 to 10 observations before using these statistical methods!												
24	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.												
25													
26													
27													
28	Perfluoro-n-octanoate acid (PFOA) (freshwater)												
29													
30	General Statistics												
31	Total Number of Observations	0				Number of Distinct Observations				0			
32						Number of Missing Observations				21			
33		Minimum	N/A				Mean				N/A		
34		Maximum	N/A				Median				N/A		
35													
36	Warning: This data set only has 0 observations!												
37	Data set is too small to compute reliable and meaningful statistics and estimates!												
38	The data set for variable Perfluoro-n-octanoate acid (PFOA) (freshwater) was not processed!												
39													
40	It is suggested to collect at least 8 to 10 observations before using these statistical methods!												
41	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.												
42													
43													
44													
45	Perfluoro-n-octanoate acid (PFOA) (offsite)												
46													
47	General Statistics												
48	Total Number of Observations	0				Number of Distinct Observations				0			
49						Number of Missing Observations				6			
50		Minimum	N/A				Mean				N/A		
51		Maximum	N/A				Median				N/A		
52													
53	Warning: This data set only has 0 observations!												
54	Data set is too small to compute reliable and meaningful statistics and estimates!												
55	The data set for variable Perfluoro-n-octanoate acid (PFOA) (offsite) was not processed!												
56													
57	It is suggested to collect at least 8 to 10 observations before using these statistical methods!												
58	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.												

	A	B	C	D	E	F	G	H	I	J	K	L
59												
60												
61												
62	Perfluoro-n-octane sulfonic acid (PFOS) (estuary)											
63												
64	General Statistics											
65	Total Number of Observations			42			Number of Distinct Observations			36		
66							Number of Missing Observations			0		
67	Minimum			0.8			Mean			12.34		
68	Maximum			69			Median			5.55		
69	SD			14.98			Std. Error of Mean			2.311		
70	Coefficient of Variation			1.214			Skewness			1.853		
71												
72	Normal GOF Test											
73	Shapiro Wilk Test Statistic			0.728			Shapiro Wilk GOF Test					
74	5% Shapiro Wilk Critical Value			0.942			Data Not Normal at 5% Significance Level					
75	Lilliefors Test Statistic			0.266			Lilliefors GOF Test					
76	5% Lilliefors Critical Value			0.135			Data Not Normal at 5% Significance Level					
77	Data Not Normal at 5% Significance Level											
78												
79	Assuming Normal Distribution											
80	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
81	95% Student's-t UCL			16.23			95% Adjusted-CLT UCL (Chen-1995)			16.85		
82							95% Modified-t UCL (Johnson-1978)			16.34		
83												
84	Gamma GOF Test											
85	A-D Test Statistic			1.24			Anderson-Darling Gamma GOF Test					
86	5% A-D Critical Value			0.786			Data Not Gamma Distributed at 5% Significance Level					
87	K-S Test Statistic			0.168			Kolmogorov-Smirnov Gamma GOF Test					
88	5% K-S Critical Value			0.141			Data Not Gamma Distributed at 5% Significance Level					
89	Data Not Gamma Distributed at 5% Significance Level											
90												
91	Gamma Statistics											
92	k hat (MLE)			0.83			k star (bias corrected MLE)			0.787		
93	Theta hat (MLE)			14.86			Theta star (bias corrected MLE)			15.68		
94	nu hat (MLE)			69.75			nu star (bias corrected)			66.1		
95	MLE Mean (bias corrected)			12.34			MLE Sd (bias corrected)			13.91		
96							Approximate Chi Square Value (0.05)			48.39		
97	Adjusted Level of Significance			0.0443			Adjusted Chi Square Value			47.85		
98												
99	Assuming Gamma Distribution											
100	95% Approximate Gamma UCL (use when n>=50))			16.86			95% Adjusted Gamma UCL (use when n<50)			17.05		
101												
102	Lognormal GOF Test											
103	Shapiro Wilk Test Statistic			0.892			Shapiro Wilk Lognormal GOF Test					
104	5% Shapiro Wilk Critical Value			0.942			Data Not Lognormal at 5% Significance Level					
105	Lilliefors Test Statistic			0.105			Lilliefors Lognormal GOF Test					
106	5% Lilliefors Critical Value			0.135			Data appear Lognormal at 5% Significance Level					
107	Data appear Approximate Lognormal at 5% Significance Level											
108												
109	Lognormal Statistics											
110	Minimum of Logged Data			-0.223			Mean of logged Data			1.802		
111	Maximum of Logged Data			4.234			SD of logged Data			1.248		

A	B	C	D	E	F	G	H	I	J	K	L
112											
113	Assuming Lognormal Distribution										
114		95% H-UCL	22.1						90% Chebyshev (MVUE) UCL	21.93	
115		95% Chebyshev (MVUE) UCL	26.08						97.5% Chebyshev (MVUE) UCL	31.83	
116		99% Chebyshev (MVUE) UCL	43.12								
117											
118	Nonparametric Distribution Free UCL Statistics										
119	Data appear to follow a Discernible Distribution at 5% Significance Level										
120											
121	Nonparametric Distribution Free UCLs										
122		95% CLT UCL	16.14						95% Jackknife UCL	16.23	
123		95% Standard Bootstrap UCL	16.13						95% Bootstrap-t UCL	17.45	
124		95% Hall's Bootstrap UCL	17.33						95% Percentile Bootstrap UCL	16.16	
125		95% BCA Bootstrap UCL	16.66								
126		90% Chebyshev(Mean, Sd) UCL	19.27						95% Chebyshev(Mean, Sd) UCL	22.41	
127		97.5% Chebyshev(Mean, Sd) UCL	26.77						99% Chebyshev(Mean, Sd) UCL	35.34	
128											
129	Suggested UCL to Use										
130		95% H-UCL	22.1								
131											
132	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
133	Recommendations are based upon data size, data distribution, and skewness.										
134	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
135	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
136											
137	ProUCL computes and outputs H-statistic based UCLs for historical reasons only.										
138	H-statistic often results in unstable (both high and low) values of UCL95 as shown in examples in the Technical Guide.										
139	It is therefore recommended to avoid the use of H-statistic based 95% UCLs.										
140	Use of nonparametric methods are preferred to compute UCL95 for skewed data sets which do not follow a gamma distribution.										
141											
142											
143	Perfluoro-n-octane sulfonic acid (PFOS) (freshwater)										
144											
145	General Statistics										
146		Total Number of Observations	21						Number of Distinct Observations	20	
147									Number of Missing Observations	0	
148		Minimum	3						Mean	654.2	
149		Maximum	7200						Median	52	
150		SD	1690						Std. Error of Mean	368.7	
151		Coefficient of Variation	2.583						Skewness	3.355	
152											
153	Normal GOF Test										
154		Shapiro Wilk Test Statistic	0.434						Shapiro Wilk GOF Test		
155		5% Shapiro Wilk Critical Value	0.908						Data Not Normal at 5% Significance Level		
156		Lilliefors Test Statistic	0.449						Lilliefors GOF Test		
157		5% Lilliefors Critical Value	0.188						Data Not Normal at 5% Significance Level		
158	Data Not Normal at 5% Significance Level										
159											
160	Assuming Normal Distribution										
161	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
162		95% Student's-t UCL	1290						95% Adjusted-CLT UCL (Chen-1995)	1549	
163									95% Modified-t UCL (Johnson-1978)	1335	
164											
165	Gamma GOF Test										
166		A-D Test Statistic	2.588						Anderson-Darling Gamma GOF Test		
167		5% A-D Critical Value	0.841						Data Not Gamma Distributed at 5% Significance Level		
168		K-S Test Statistic	0.312						Kolmogorov-Smirnov Gamma GOF Test		
169		5% K-S Critical Value	0.205						Data Not Gamma Distributed at 5% Significance Level		
170	Data Not Gamma Distributed at 5% Significance Level										

A	B	C	D	E	F	G	H	I	J	K	L	
171												
172	Gamma Statistics											
173	k hat (MLE)	0.322						k star (bias corrected MLE)	0.308			
174	Theta hat (MLE)	2031						Theta star (bias corrected MLE)	2126			
175	nu hat (MLE)	13.53						nu star (bias corrected)	12.93			
176	MLE Mean (bias corrected)	654.2						MLE Sd (bias corrected)	1179			
177								Approximate Chi Square Value (0.05)	5.844			
178	Adjusted Level of Significance	0.0383						Adjusted Chi Square Value	5.48			
179												
180	Assuming Gamma Distribution											
181	95% Approximate Gamma UCL (use when n>=50)	1447						95% Adjusted Gamma UCL (use when n<50)	1543			
182												
183	Lognormal GOF Test											
184	Shapiro Wilk Test Statistic	0.906						Shapiro Wilk Lognormal GOF Test				
185	5% Shapiro Wilk Critical Value	0.908						Data Not Lognormal at 5% Significance Level				
186	Lilliefors Test Statistic	0.192						Lilliefors Lognormal GOF Test				
187	5% Lilliefors Critical Value	0.188						Data Not Lognormal at 5% Significance Level				
188	Data Not Lognormal at 5% Significance Level											
189												
190	Lognormal Statistics											
191	Minimum of Logged Data	1.099						Mean of logged Data	4.367			
192	Maximum of Logged Data	8.882						SD of logged Data	1.955			
193												
194	Assuming Lognormal Distribution											
195	95% H-UCL	3146						90% Chebyshev (MVUE) UCL	1112			
196	95% Chebyshev (MVUE) UCL	1421						97.5% Chebyshev (MVUE) UCL	1850			
197	99% Chebyshev (MVUE) UCL	2694										
198												
199	Nonparametric Distribution Free UCL Statistics											
200	Data do not follow a Discernible Distribution (0.05)											
201												
202	Nonparametric Distribution Free UCLs											
203	95% CLT UCL	1261						95% Jackknife UCL	1290			
204	95% Standard Bootstrap UCL	1251						95% Bootstrap-t UCL	2164			
205	95% Hall's Bootstrap UCL	1855						95% Percentile Bootstrap UCL	1331			
206	95% BCA Bootstrap UCL	1605										
207	90% Chebyshev(Mean, Sd) UCL	1760						95% Chebyshev(Mean, Sd) UCL	2262			
208	97.5% Chebyshev(Mean, Sd) UCL	2957						99% Chebyshev(Mean, Sd) UCL	4323			
209												
210	Suggested UCL to Use											
211	95% Chebyshev (Mean, Sd) UCL	2262										
212												
213	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
214	Recommendations are based upon data size, data distribution, and skewness.											
215	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
216	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
217												
218												
219	Perfluoro-n-octane sulfonic acid (PFOS) (offsite)											
220												
221	General Statistics											
222	Total Number of Observations	6						Number of Distinct Observations	6			
223								Number of Missing Observations	0			
224	Minimum	3.5						Mean	8.517			
225	Maximum	16						Median	8.8			
226	SD	4.467						Std. Error of Mean	1.824			
227	Coefficient of Variation	0.524						Skewness	0.756			
228												
229	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
230	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
231	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
232	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											

A	B	C	D	E	F	G	H	I	J	K	L
233											
234	Normal GOF Test										
235	Shapiro Wilk Test Statistic		0.918		Shapiro Wilk GOF Test						
236	5% Shapiro Wilk Critical Value		0.788		Data appear Normal at 5% Significance Level						
237	Lilliefors Test Statistic		0.238		Lilliefors GOF Test						
238	5% Lilliefors Critical Value		0.325		Data appear Normal at 5% Significance Level						
239	Data appear Normal at 5% Significance Level										
240											
241	Assuming Normal Distribution										
242	95% Normal UCL				95% UCLs (Adjusted for Skewness)						
243	95% Student's-t UCL		12.19		95% Adjusted-CLT UCL (Chen-1995)					12.12	
244					95% Modified-t UCL (Johnson-1978)					12.29	
245											
246	Gamma GOF Test										
247	A-D Test Statistic		0.323		Anderson-Darling Gamma GOF Test						
248	5% A-D Critical Value		0.7		Detected data appear Gamma Distributed at 5% Significance Level						
249	K-S Test Statistic		0.22		Kolmogorov-Smirnov Gamma GOF Test						
250	5% K-S Critical Value		0.333		Detected data appear Gamma Distributed at 5% Significance Level						
251	Detected data appear Gamma Distributed at 5% Significance Level										
252											
253	Gamma Statistics										
254	k hat (MLE)		4.236		k star (bias corrected MLE)				2.229		
255	Theta hat (MLE)		2.011		Theta star (bias corrected MLE)				3.821		
256	nu hat (MLE)		50.83		nu star (bias corrected)				26.75		
257	MLE Mean (bias corrected)		8.517		MLE Sd (bias corrected)				5.705		
258					Approximate Chi Square Value (0.05)				15.96		
259	Adjusted Level of Significance		0.0122		Adjusted Chi Square Value				13.04		
260											
261	Assuming Gamma Distribution										
262	95% Approximate Gamma UCL (use when n>=50))		14.28		95% Adjusted Gamma UCL (use when n<50)					17.46	
263											
264	Lognormal GOF Test										
265	Shapiro Wilk Test Statistic		0.933		Shapiro Wilk Lognormal GOF Test						
266	5% Shapiro Wilk Critical Value		0.788		Data appear Lognormal at 5% Significance Level						
267	Lilliefors Test Statistic		0.244		Lilliefors Lognormal GOF Test						
268	5% Lilliefors Critical Value		0.325		Data appear Lognormal at 5% Significance Level						
269	Data appear Lognormal at 5% Significance Level										
270											
271	Lognormal Statistics										
272	Minimum of Logged Data		1.253		Mean of logged Data				2.019		
273	Maximum of Logged Data		2.773		SD of logged Data				0.558		
274											
275	Assuming Lognormal Distribution										
276	95% H-UCL		17.61		90% Chebyshev (MVUE) UCL				14.39		
277	95% Chebyshev (MVUE) UCL		17.03		97.5% Chebyshev (MVUE) UCL				20.69		
278	99% Chebyshev (MVUE) UCL		27.9								
279											
280	Nonparametric Distribution Free UCL Statistics										
281	Data appear to follow a Discernible Distribution at 5% Significance Level										
282											
283	Nonparametric Distribution Free UCLs										
284	95% CLT UCL		11.52		95% Jackknife UCL				12.19		
285	95% Standard Bootstrap UCL		11.28		95% Bootstrap-t UCL				12.79		
286	95% Hall's Bootstrap UCL		13		95% Percentile Bootstrap UCL				11.52		
287	95% BCA Bootstrap UCL		11.72								
288	90% Chebyshev(Mean, Sd) UCL		13.99		95% Chebyshev(Mean, Sd) UCL				16.47		
289	97.5% Chebyshev(Mean, Sd) UCL		19.91		99% Chebyshev(Mean, Sd) UCL				26.66		
290											
291	Suggested UCL to Use										
292	95% Student's-t UCL		12.19								
293											
294	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
295	Recommendations are based upon data size, data distribution, and skewness.										
296	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
297	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										

A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets										
2	Reptiles by AEC										
3	User Selected Options										
4	Date/Time of Computation		ProUCL 5.16/5/2018 3:40:29 PM								
5	From File		Darwin_Terrestrial Vertebrates Results Table_01.06.2018_g.xls								
6	Full Precision		OFF								
7	Confidence Coefficient		95%								
8	Number of Bootstrap Operations		2000								
9											
10											
11	Perfluoro-n-octanoate acid (PFOA)										
12											
13	General Statistics										
14	Total Number of Observations			0		Number of Distinct Observations			0		
15							Number of Missing Observations			17	
16	Minimum			N/A		Mean			N/A		
17	Maximum			N/A		Median			N/A		
18											
19	Warning: This data set only has 0 observations!										
20	Data set is too small to compute reliable and meaningful statistics and estimates!										
21	The data set for variable Perfluoro-n-octanoate acid (PFOA) was not processed!										
22											
23	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
24	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
25											
26											
27											
28	Perfluoro-n-octane sulfonic acid (PFOS)										
29											
30	General Statistics										
31	Total Number of Observations			17		Number of Distinct Observations			17		
32							Number of Missing Observations			0	
33	Minimum			1.8		Mean			758.4		
34	Maximum			7200		Median			22		
35	SD			1874		Std. Error of Mean			454.5		
36	Coefficient of Variation			2.471		Skewness			2.967		
37											
38	Normal GOF Test										
39	Shapiro Wilk Test Statistic			0.475		Shapiro Wilk GOF Test					
40	5% Shapiro Wilk Critical Value			0.892		Data Not Normal at 5% Significance Level					
41	Lilliefors Test Statistic			0.455		Lilliefors GOF Test					
42	5% Lilliefors Critical Value			0.207		Data Not Normal at 5% Significance Level					
43	Data Not Normal at 5% Significance Level										
44											
45	Assuming Normal Distribution										
46	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
47	95% Student's-t UCL			1552		95% Adjusted-CLT UCL (Chen-1995)			1855		
48							95% Modified-t UCL (Johnson-1978)			1606	
49											
50	Gamma GOF Test										
51	A-D Test Statistic			2.08		Anderson-Darling Gamma GOF Test					
52	5% A-D Critical Value			0.869		Data Not Gamma Distributed at 5% Significance Level					
53	K-S Test Statistic			0.324		Kolmogorov-Smirnov Gamma GOF Test					
54	5% K-S Critical Value			0.23		Data Not Gamma Distributed at 5% Significance Level					
55	Data Not Gamma Distributed at 5% Significance Level										

A	B	C	D	E	F	G	H	I	J	K	L	
56												
57	Gamma Statistics											
58	k hat (MLE)				0.237	k star (bias corrected MLE)				0.235		
59	Theta hat (MLE)				3194	Theta star (bias corrected MLE)				3230		
60	nu hat (MLE)				8.075	nu star (bias corrected)				7.983		
61	MLE Mean (bias corrected)				758.4	MLE Sd (bias corrected)				1565		
62					Approximate Chi Square Value (0.05)				2.725			
63	Adjusted Level of Significance				0.0346	Adjusted Chi Square Value				2.413		
64												
65	Assuming Gamma Distribution											
66	95% Approximate Gamma UCL (use when n>=50))				2222	95% Adjusted Gamma UCL (use when n<50)				2509		
67												
68	Lognormal GOF Test											
69	Shapiro Wilk Test Statistic				0.887	Shapiro Wilk Lognormal GOF Test						
70	5% Shapiro Wilk Critical Value				0.892	Data Not Lognormal at 5% Significance Level						
71	Lilliefors Test Statistic				0.19	Lilliefors Lognormal GOF Test						
72	5% Lilliefors Critical Value				0.207	Data appear Lognormal at 5% Significance Level						
73	Data appear Approximate Lognormal at 5% Significance Level											
74												
75	Lognormal Statistics											
76	Minimum of Logged Data				0.588	Mean of logged Data				3.616		
77	Maximum of Logged Data				8.882	SD of logged Data				2.504		
78												
79	Assuming Lognormal Distribution											
80	95% H-UCL				24089	90% Chebyshev (MVUE) UCL				1554		
81	95% Chebyshev (MVUE) UCL				2033	97.5% Chebyshev (MVUE) UCL				2697		
82	99% Chebyshev (MVUE) UCL				4001							
83												
84	Nonparametric Distribution Free UCL Statistics											
85	Data appear to follow a Discernible Distribution at 5% Significance Level											
86												
87	Nonparametric Distribution Free UCLs											
88	95% CLT UCL				1506	95% Jackknife UCL				1552		
89	95% Standard Bootstrap UCL				1490	95% Bootstrap-t UCL				2602		
90	95% Hall's Bootstrap UCL				2102	95% Percentile Bootstrap UCL				1577		
91	95% BCA Bootstrap UCL				1884							
92	90% Chebyshev(Mean, Sd) UCL				2122	95% Chebyshev(Mean, Sd) UCL				2739		
93	97.5% Chebyshev(Mean, Sd) UCL				3597	99% Chebyshev(Mean, Sd) UCL				5280		
94												
95	Suggested UCL to Use											
96	99% Chebyshev (Mean, Sd) UCL				5280							
97												
98	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
99	Recommendations are based upon data size, data distribution, and skewness.											
100	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
101	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
102												

A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets										
2	Reptiles by Media										
3	User Selected Options										
4	Date/Time of Computation		ProUCL 5.17/3/2018 11:41:14 PM								
5	From File		Data_Darwin_Terrestrial Vertebrates Results Table_20180703_j.xls								
6	Full Precision		OFF								
7	Confidence Coefficient		95%								
8	Number of Bootstrap Operations		2000								
9											
10											
11	Perfluoro-n-octanoate acid (PFOA) (estuary)										
12											
13	General Statistics										
14	Total Number of Observations			0		Number of Distinct Observations			0		
15							Number of Missing Observations			12	
16	Minimum			N/A		Mean			N/A		
17	Maximum			N/A		Median			N/A		
18											
19	Warning: This data set only has 0 observations!										
20	Data set is too small to compute reliable and meaningful statistics and estimates!										
21	The data set for variable Perfluoro-n-octanoate acid (PFOA) (estuary) was not processed!										
22											
23	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
24	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
25											
26											
27											
28	Perfluoro-n-octanoate acid (PFOA) (freshwater)										
29											
30	General Statistics										
31	Total Number of Observations			0		Number of Distinct Observations			0		
32							Number of Missing Observations			5	
33	Minimum			N/A		Mean			N/A		
34	Maximum			N/A		Median			N/A		
35											
36	Warning: This data set only has 0 observations!										
37	Data set is too small to compute reliable and meaningful statistics and estimates!										
38	The data set for variable Perfluoro-n-octanoate acid (PFOA) (freshwater) was not processed!										
39											
40	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
41	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
42											
43											
44											
45	Perfluoro-n-octane sulfonic acid (PFOS) (estuary)										
46											
47	General Statistics										
48	Total Number of Observations			12		Number of Distinct Observations			12		
49							Number of Missing Observations			0	
50	Minimum			1.8		Mean			20.78		
51	Maximum			69		Median			13.45		
52	SD			20.8		Std. Error of Mean			6.003		
53	Coefficient of Variation			1.001		Skewness			1.216		
54											

A	B	C	D	E	F	G	H	I	J	K	L	
55	Normal GOF Test											
56	Shapiro Wilk Test Statistic				0.858	Shapiro Wilk GOF Test						
57	5% Shapiro Wilk Critical Value				0.859	Data Not Normal at 5% Significance Level						
58	Lilliefors Test Statistic				0.2	Lilliefors GOF Test						
59	5% Lilliefors Critical Value				0.243	Data appear Normal at 5% Significance Level						
60	Data appear Approximate Normal at 5% Significance Level											
61												
62	Assuming Normal Distribution											
63	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
64	95% Student's-t UCL				31.56	95% Adjusted-CLT UCL (Chen-1995)				32.91		
65						95% Modified-t UCL (Johnson-1978)				31.92		
66												
67	Gamma GOF Test											
68	A-D Test Statistic				0.304	Anderson-Darling Gamma GOF Test						
69	5% A-D Critical Value				0.757	Detected data appear Gamma Distributed at 5% Significance Level						
70	K-S Test Statistic				0.138	Kolmogorov-Smirnov Gamma GOF Test						
71	5% K-S Critical Value				0.253	Detected data appear Gamma Distributed at 5% Significance Level						
72	Detected data appear Gamma Distributed at 5% Significance Level											
73												
74	Gamma Statistics											
75	k hat (MLE)				0.979	k star (bias corrected MLE)				0.79		
76	Theta hat (MLE)				21.23	Theta star (bias corrected MLE)				26.32		
77	nu hat (MLE)				23.49	nu star (bias corrected)				18.95		
78	MLE Mean (bias corrected)				20.78	MLE Sd (bias corrected)				23.39		
79						Approximate Chi Square Value (0.05)				10.08		
80	Adjusted Level of Significance				0.029	Adjusted Chi Square Value				9.109		
81												
82	Assuming Gamma Distribution											
83	95% Approximate Gamma UCL (use when n>=50))				39.07	95% Adjusted Gamma UCL (use when n<50)				43.24		
84												
85	Lognormal GOF Test											
86	Shapiro Wilk Test Statistic				0.933	Shapiro Wilk Lognormal GOF Test						
87	5% Shapiro Wilk Critical Value				0.859	Data appear Lognormal at 5% Significance Level						
88	Lilliefors Test Statistic				0.141	Lilliefors Lognormal GOF Test						
89	5% Lilliefors Critical Value				0.243	Data appear Lognormal at 5% Significance Level						
90	Data appear Lognormal at 5% Significance Level											
91												
92	Lognormal Statistics											
93	Minimum of Logged Data				0.588	Mean of logged Data				2.443		
94	Maximum of Logged Data				4.234	SD of logged Data				1.249		
95												
96	Assuming Lognormal Distribution											
97	95% H-UCL				89.84	90% Chebyshev (MVUE) UCL				49.4		
98	95% Chebyshev (MVUE) UCL				61.49	97.5% Chebyshev (MVUE) UCL				78.26		
99	99% Chebyshev (MVUE) UCL				111.2							
100												
101	Nonparametric Distribution Free UCL Statistics											
102	Data appear to follow a Discernible Distribution at 5% Significance Level											
103												

A	B	C	D	E	F	G	H	I	J	K	L
104	Nonparametric Distribution Free UCLs										
105	95% CLT UCL			30.66		95% Jackknife UCL				31.56	
106	95% Standard Bootstrap UCL			30.08		95% Bootstrap-t UCL				34.68	
107	95% Hall's Bootstrap UCL			33.76		95% Percentile Bootstrap UCL				30.99	
108	95% BCA Bootstrap UCL			32.15							
109	90% Chebyshev(Mean, Sd) UCL			38.79		95% Chebyshev(Mean, Sd) UCL				46.95	
110	97.5% Chebyshev(Mean, Sd) UCL			58.27		99% Chebyshev(Mean, Sd) UCL				80.51	
111											
112	Suggested UCL to Use										
113	95% Student's-t UCL			31.56							
114											
115	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test										
116	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL										
117											
118	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
119	Recommendations are based upon data size, data distribution, and skewness.										
120	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
121	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
122											
123											
124	Perfluoro-n-octane sulfonic acid (PFOS) (freshwater)										
125											
126	General Statistics										
127	Total Number of Observations			5		Number of Distinct Observations				5	
128						Number of Missing Observations				0	
129	Minimum			14		Mean				2529	
130	Maximum			7200		Median				2500	
131	SD			2914		Std. Error of Mean				1303	
132	Coefficient of Variation			1.152		Skewness				1.216	
133											
134	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use										
135	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.										
136	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).										
137	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1										
138											
139	Normal GOF Test										
140	Shapiro Wilk Test Statistic			0.865		Shapiro Wilk GOF Test					
141	5% Shapiro Wilk Critical Value			0.762		Data appear Normal at 5% Significance Level					
142	Lilliefors Test Statistic			0.263		Lilliefors GOF Test					
143	5% Lilliefors Critical Value			0.343		Data appear Normal at 5% Significance Level					
144	Data appear Normal at 5% Significance Level										
145											
146	Assuming Normal Distribution										
147	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
148	95% Student's-t UCL			5307		95% Adjusted-CLT UCL (Chen-1995)				5430	
149						95% Modified-t UCL (Johnson-1978)				5425	
150											
151	Gamma GOF Test										
152	A-D Test Statistic			0.347		Anderson-Darling Gamma GOF Test					
153	5% A-D Critical Value			0.717		Detected data appear Gamma Distributed at 5% Significance Level					
154	K-S Test Statistic			0.287		Kolmogorov-Smirnov Gamma GOF Test					
155	5% K-S Critical Value			0.373		Detected data appear Gamma Distributed at 5% Significance Level					
156	Detected data appear Gamma Distributed at 5% Significance Level										
157											

A	B	C	D	E	F	G	H	I	J	K	L
158	Gamma Statistics										
159	k hat (MLE)		0.458		k star (bias corrected MLE)		0.317				
160	Theta hat (MLE)		5520		Theta star (bias corrected MLE)		7988				
161	nu hat (MLE)		4.581		nu star (bias corrected)		3.166				
162	MLE Mean (bias corrected)		2529		MLE Sd (bias corrected)		4494				
163					Approximate Chi Square Value (0.05)		0.423				
164	Adjusted Level of Significance		0.0086		Adjusted Chi Square Value		0.159				
165											
166	Assuming Gamma Distribution										
167	95% Approximate Gamma UCL (use when n>=50)		18917		95% Adjusted Gamma UCL (use when n<50)		50289				
168											
169	Lognormal GOF Test										
170	Shapiro Wilk Test Statistic		0.884		Shapiro Wilk Lognormal GOF Test						
171	5% Shapiro Wilk Critical Value		0.762		Data appear Lognormal at 5% Significance Level						
172	Lilliefors Test Statistic		0.304		Lilliefors Lognormal GOF Test						
173	5% Lilliefors Critical Value		0.343		Data appear Lognormal at 5% Significance Level						
174	Data appear Lognormal at 5% Significance Level										
175											
176	Lognormal Statistics										
177	Minimum of Logged Data		2.639		Mean of logged Data		6.43				
178	Maximum of Logged Data		8.882		SD of logged Data		2.6				
179											
180	Assuming Lognormal Distribution										
181	95% H-UCL		1.282E+11		90% Chebyshev (MVUE) UCL		16693				
182	95% Chebyshev (MVUE) UCL		22120		97.5% Chebyshev (MVUE) UCL		29653				
183	99% Chebyshev (MVUE) UCL		44450								
184											
185	Nonparametric Distribution Free UCL Statistics										
186	Data appear to follow a Discernible Distribution at 5% Significance Level										
187											
188	Nonparametric Distribution Free UCLs										
189	95% CLT UCL		4673		95% Jackknife UCL		5307				
190	95% Standard Bootstrap UCL		4433		95% Bootstrap-t UCL		5786				
191	95% Hall's Bootstrap UCL		11158		95% Percentile Bootstrap UCL		4500				
192	95% BCA Bootstrap UCL		4906								
193	90% Chebyshev(Mean, Sd) UCL		6439		95% Chebyshev(Mean, Sd) UCL		8210				
194	97.5% Chebyshev(Mean, Sd) UCL		10668		99% Chebyshev(Mean, Sd) UCL		15497				
195											
196	Suggested UCL to Use										
197	95% Student's-t UCL		5307								
198											
199	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
200	Recommendations are based upon data size, data distribution, and skewness.										
201	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
202	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
203											

A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets										
2	Amphibians by AEC										
3	User Selected Options										
4	Date/Time of Computation		ProUCL 5.16/5/2018 3:34:00 PM								
5	From File		Darwin_Terrestrial Vertebrates Results Table_01.06.2018_f.xls								
6	Full Precision		OFF								
7	Confidence Coefficient		95%								
8	Number of Bootstrap Operations		2000								
9											
10											
11	Perfluoro-n-octanoate acid (PFOA) (Zone D)										
12											
13	General Statistics										
14	Total Number of Observations			0		Number of Distinct Observations			0		
15							Number of Missing Observations			3	
16	Minimum			N/A		Mean			N/A		
17	Maximum			N/A		Median			N/A		
18											
19	Warning: This data set only has 0 observations!										
20	Data set is too small to compute reliable and meaningful statistics and estimates!										
21	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone D) was not processed!										
22											
23	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
24	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
25											
26											
27											
28	Perfluoro-n-octanoate acid (PFOA) (Zone B)										
29											
30	General Statistics										
31	Total Number of Observations			0		Number of Distinct Observations			0		
32							Number of Missing Observations			13	
33	Minimum			N/A		Mean			N/A		
34	Maximum			N/A		Median			N/A		
35											
36	Warning: This data set only has 0 observations!										
37	Data set is too small to compute reliable and meaningful statistics and estimates!										
38	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone B) was not processed!										
39											
40	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
41	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
42											
43											
44											
45	Perfluoro-n-octanoate acid (PFOA) (offsite nth)										
46											
47	General Statistics										
48	Total Number of Observations			0		Number of Distinct Observations			0		
49							Number of Missing Observations			6	
50	Minimum			N/A		Mean			N/A		
51	Maximum			N/A		Median			N/A		
52											
53	Warning: This data set only has 0 observations!										
54	Data set is too small to compute reliable and meaningful statistics and estimates!										
55	The data set for variable Perfluoro-n-octanoate acid (PFOA) (offsite nth) was not processed!										
56											
57	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
58	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										

A	B	C	D	E	F	G	H	I	J	K	L
59											
60											
61											
62	Perfluoro-n-octanoate acid (PFOA) (Zone A)										
63											
64	General Statistics										
65	Total Number of Observations			0		Number of Distinct Observations			0		
66						Number of Missing Observations			16		
67	Minimum			N/A		Mean			N/A		
68	Maximum			N/A		Median			N/A		
69											
70	Warning: This data set only has 0 observations!										
71	Data set is too small to compute reliable and meaningful statistics and estimates!										
72	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone A) was not processed!										
73											
74	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
75	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
76											
77											
78											
79	Perfluoro-n-octanoate acid (PFOA) (Zone C)										
80											
81	General Statistics										
82	Total Number of Observations			0		Number of Distinct Observations			0		
83						Number of Missing Observations			14		
84	Minimum			N/A		Mean			N/A		
85	Maximum			N/A		Median			N/A		
86											
87	Warning: This data set only has 0 observations!										
88	Data set is too small to compute reliable and meaningful statistics and estimates!										
89	The data set for variable Perfluoro-n-octanoate acid (PFOA) (Zone C) was not processed!										
90											
91	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
92	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
93											
94											
95											
96	Perfluoro-n-octane sulfonic acid (PFOS) (Zone D)										
97											
98	General Statistics										
99	Total Number of Observations			3		Number of Distinct Observations			3		
100						Number of Missing Observations			0		
101	Minimum			3.4		Mean			10.63		
102	Maximum			24		Median			4.5		
103	SD			11.59		Std. Error of Mean			6.691		
104	Coefficient of Variation			1.09		Skewness			1.715		
105											
106	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.										
107	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).										
108	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1										
109											
110											
111	Normal GOF Test										
112	Shapiro Wilk Test Statistic			0.79		Shapiro Wilk GOF Test					
113	5% Shapiro Wilk Critical Value			0.767		Data appear Normal at 5% Significance Level					
114	Lilliefors Test Statistic			0.368		Lilliefors GOF Test					
115	5% Lilliefors Critical Value			0.425		Data appear Normal at 5% Significance Level					
116	Data appear Normal at 5% Significance Level										
117											
118	Assuming Normal Distribution										
119	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
120	95% Student's-t UCL			30.17		95% Adjusted-CLT UCL (Chen-1995)			28.72		
121						95% Modified-t UCL (Johnson-1978)			31.27		
122											
123	Gamma GOF Test										
124	Not Enough Data to Perform GOF Test										

A	B	C	D	E	F	G	H	I	J	K	L
125											
126	Gamma Statistics										
127	k hat (MLE)		1.408	k star (bias corrected MLE)		N/A					
128	Theta hat (MLE)		7.552	Theta star (bias corrected MLE)		N/A					
129	nu hat (MLE)		8.448	nu star (bias corrected)		N/A					
130	MLE Mean (bias corrected)		N/A	MLE Sd (bias corrected)		N/A					
131				Approximate Chi Square Value (0.05)		N/A					
132	Adjusted Level of Significance		N/A	Adjusted Chi Square Value		N/A					
133											
134	Assuming Gamma Distribution										
135	95% Approximate Gamma UCL (use when n>=50))		N/A	95% Adjusted Gamma UCL (use when n<50)		N/A					
136											
137	Lognormal GOF Test										
138	Shapiro Wilk Test Statistic		0.855	Shapiro Wilk Lognormal GOF Test							
139	5% Shapiro Wilk Critical Value		0.767	Data appear Lognormal at 5% Significance Level							
140	Lilliefors Test Statistic		0.337	Lilliefors Lognormal GOF Test							
141	5% Lilliefors Critical Value		0.425	Data appear Lognormal at 5% Significance Level							
142	Data appear Lognormal at 5% Significance Level										
143											
144	Lognormal Statistics										
145	Minimum of Logged Data		1.224	Mean of logged Data		1.969					
146	Maximum of Logged Data		3.178	SD of logged Data		1.057					
147											
148	Assuming Lognormal Distribution										
149	95% H-UCL		374645	90% Chebyshev (MVUE) UCL		26.38					
150	95% Chebyshev (MVUE) UCL		33.75	97.5% Chebyshev (MVUE) UCL		44					
151	99% Chebyshev (MVUE) UCL		64.12								
152											
153	Nonparametric Distribution Free UCL Statistics										
154	Data appear to follow a Discernible Distribution at 5% Significance Level										
155											
156	Nonparametric Distribution Free UCLs										
157	95% CLT UCL		21.64	95% Jackknife UCL		30.17					
158	95% Standard Bootstrap UCL		N/A	95% Bootstrap-t UCL		N/A					
159	95% Hall's Bootstrap UCL		N/A	95% Percentile Bootstrap UCL		N/A					
160	95% BCA Bootstrap UCL		N/A								
161	90% Chebyshev(Mean, Sd) UCL		30.71	95% Chebyshev(Mean, Sd) UCL		39.8					
162	97.5% Chebyshev(Mean, Sd) UCL		52.42	99% Chebyshev(Mean, Sd) UCL		77.21					
163											
164	Suggested UCL to Use										
165	95% Student's-t UCL		30.17								
166											
167	Recommended UCL exceeds the maximum observation										
168											
169	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
170	Recommendations are based upon data size, data distribution, and skewness.										
171	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
172	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
173											
174											
175	Perfluoro-n-octane sulfonic acid (PFOS) (Zone B)										
176											
177	General Statistics										
178	Total Number of Observations		13	Number of Distinct Observations		13					
179				Number of Missing Observations		0					
180	Minimum		1.1	Mean		15.71					
181	Maximum		39	Median		14					
182	SD		12	Std. Error of Mean		3.329					
183	Coefficient of Variation		0.764	Skewness		0.665					
184											
185	Normal GOF Test										
186	Shapiro Wilk Test Statistic		0.911	Shapiro Wilk GOF Test							
187	5% Shapiro Wilk Critical Value		0.866	Data appear Normal at 5% Significance Level							
188	Lilliefors Test Statistic		0.235	Lilliefors GOF Test							
189	5% Lilliefors Critical Value		0.234	Data Not Normal at 5% Significance Level							
190	Data appear Approximate Normal at 5% Significance Level										

A	B	C	D	E	F	G	H	I	J	K	L	
191												
192	Assuming Normal Distribution											
193	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
194	95% Student's-t UCL			21.64		95% Adjusted-CLT UCL (Chen-1995)				21.84		
195						95% Modified-t UCL (Johnson-1978)				21.74		
196												
197	Gamma GOF Test											
198	A-D Test Statistic		0.348		Anderson-Darling Gamma GOF Test							
199	5% A-D Critical Value		0.75		Detected data appear Gamma Distributed at 5% Significance Level							
200	K-S Test Statistic		0.199		Kolmogorov-Smirnov Gamma GOF Test							
201	5% K-S Critical Value		0.241		Detected data appear Gamma Distributed at 5% Significance Level							
202	Detected data appear Gamma Distributed at 5% Significance Level											
203												
204	Gamma Statistics											
205	k hat (MLE)		1.523		k star (bias corrected MLE)				1.223			
206	Theta hat (MLE)		10.31		Theta star (bias corrected MLE)				12.84			
207	nu hat (MLE)		39.6		nu star (bias corrected)				31.8			
208	MLE Mean (bias corrected)		15.71		MLE Sd (bias corrected)				14.2			
209							Approximate Chi Square Value (0.05)			19.91		
210	Adjusted Level of Significance			0.0301		Adjusted Chi Square Value			18.58			
211												
212	Assuming Gamma Distribution											
213	95% Approximate Gamma UCL (use when n>=50))			25.08		95% Adjusted Gamma UCL (use when n<50)				26.88		
214												
215	Lognormal GOF Test											
216	Shapiro Wilk Test Statistic		0.919		Shapiro Wilk Lognormal GOF Test							
217	5% Shapiro Wilk Critical Value		0.866		Data appear Lognormal at 5% Significance Level							
218	Lilliefors Test Statistic		0.149		Lilliefors Lognormal GOF Test							
219	5% Lilliefors Critical Value		0.234		Data appear Lognormal at 5% Significance Level							
220	Data appear Lognormal at 5% Significance Level											
221												
222	Lognormal Statistics											
223	Minimum of Logged Data		0.0953		Mean of logged Data				2.391			
224	Maximum of Logged Data		3.664		SD of logged Data				1.001			
225												
226	Assuming Lognormal Distribution											
227	95% H-UCL		41.08		90% Chebyshev (MVUE) UCL				32.47			
228	95% Chebyshev (MVUE) UCL		39.42		97.5% Chebyshev (MVUE) UCL				49.08			
229	99% Chebyshev (MVUE) UCL		68.05									
230												
231	Nonparametric Distribution Free UCL Statistics											
232	Data appear to follow a Discernible Distribution at 5% Significance Level											
233												
234	Nonparametric Distribution Free UCLs											
235	95% CLT UCL		21.18		95% Jackknife UCL				21.64			
236	95% Standard Bootstrap UCL		21.02		95% Bootstrap-t UCL				22.85			
237	95% Hall's Bootstrap UCL		21.55		95% Percentile Bootstrap UCL				21.24			
238	95% BCA Bootstrap UCL		21.71									
239	90% Chebyshev(Mean, Sd) UCL		25.69		95% Chebyshev(Mean, Sd) UCL				30.22			
240	97.5% Chebyshev(Mean, Sd) UCL		36.5		99% Chebyshev(Mean, Sd) UCL				48.83			
241												
242	Suggested UCL to Use											
243	95% Student's-t UCL		21.64									
244												
245	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
246	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
247												
248	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
249	Recommendations are based upon data size, data distribution, and skewness.											
250	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
251	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
252												
253												
254	Perfluoro-n-octane sulfonic acid (PFOS) (offsite nth)											
255												
256	General Statistics											

	A	B	C	D	E	F	G	H	I	J	K	L
257	Total Number of Observations					6	Number of Distinct Observations					6
258							Number of Missing Observations					0
259	Minimum					3.5	Mean					8.517
260	Maximum					16	Median					8.8
261	SD					4.467	Std. Error of Mean					1.824
262	Coefficient of Variation					0.524	Skewness					0.756
263												
264	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
265	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
266	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
267	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											
268												
269	Normal GOF Test											
270	Shapiro Wilk Test Statistic					0.918	Shapiro Wilk GOF Test					
271	5% Shapiro Wilk Critical Value					0.788	Data appear Normal at 5% Significance Level					
272	Lilliefors Test Statistic					0.238	Lilliefors GOF Test					
273	5% Lilliefors Critical Value					0.325	Data appear Normal at 5% Significance Level					
274	Data appear Normal at 5% Significance Level											
275												
276	Assuming Normal Distribution											
277	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
278	95% Student's-t UCL					12.19	95% Adjusted-CLT UCL (Chen-1995)					12.12
279							95% Modified-t UCL (Johnson-1978)					12.29
280												
281	Gamma GOF Test											
282	A-D Test Statistic					0.323	Anderson-Darling Gamma GOF Test					
283	5% A-D Critical Value					0.7	Detected data appear Gamma Distributed at 5% Significance Level					
284	K-S Test Statistic					0.22	Kolmogorov-Smirnov Gamma GOF Test					
285	5% K-S Critical Value					0.333	Detected data appear Gamma Distributed at 5% Significance Level					
286	Detected data appear Gamma Distributed at 5% Significance Level											
287												

A	B	C	D	E	F	G	H	I	J	K	L
288	Gamma Statistics										
289	k hat (MLE)		4.236		k star (bias corrected MLE)		2.229				
290	Theta hat (MLE)		2.011		Theta star (bias corrected MLE)		3.821				
291	nu hat (MLE)		50.83		nu star (bias corrected)		26.75				
292	MLE Mean (bias corrected)		8.517		MLE Sd (bias corrected)		5.705				
293					Approximate Chi Square Value (0.05)		15.96				
294	Adjusted Level of Significance		0.0122		Adjusted Chi Square Value		13.04				
295											
296	Assuming Gamma Distribution										
297	95% Approximate Gamma UCL (use when n>=50))		14.28		95% Adjusted Gamma UCL (use when n<50)		17.46				
298											
299	Lognormal GOF Test										
300	Shapiro Wilk Test Statistic		0.933		Shapiro Wilk Lognormal GOF Test						
301	5% Shapiro Wilk Critical Value		0.788		Data appear Lognormal at 5% Significance Level						
302	Lilliefors Test Statistic		0.244		Lilliefors Lognormal GOF Test						
303	5% Lilliefors Critical Value		0.325		Data appear Lognormal at 5% Significance Level						
304	Data appear Lognormal at 5% Significance Level										
305											
306	Lognormal Statistics										
307	Minimum of Logged Data		1.253		Mean of logged Data		2.019				
308	Maximum of Logged Data		2.773		SD of logged Data		0.558				
309											
310	Assuming Lognormal Distribution										
311	95% H-UCL		17.61		90% Chebyshev (MVUE) UCL		14.39				
312	95% Chebyshev (MVUE) UCL		17.03		97.5% Chebyshev (MVUE) UCL		20.69				
313	99% Chebyshev (MVUE) UCL		27.9								
314											
315	Nonparametric Distribution Free UCL Statistics										
316	Data appear to follow a Discernible Distribution at 5% Significance Level										
317											
318	Nonparametric Distribution Free UCLs										
319	95% CLT UCL		11.52		95% Jackknife UCL		12.19				
320	95% Standard Bootstrap UCL		11.32		95% Bootstrap-t UCL		12.78				
321	95% Hall's Bootstrap UCL		13.01		95% Percentile Bootstrap UCL		11.52				
322	95% BCA Bootstrap UCL		11.73								
323	90% Chebyshev(Mean, Sd) UCL		13.99		95% Chebyshev(Mean, Sd) UCL		16.47				
324	97.5% Chebyshev(Mean, Sd) UCL		19.91		99% Chebyshev(Mean, Sd) UCL		26.66				
325											
326	Suggested UCL to Use										
327	95% Student's-t UCL		12.19								
328											
329	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
330	Recommendations are based upon data size, data distribution, and skewness.										
331	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
332	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
333											
334											
335	Perfluoro-n-octane sulfonic acid (PFOS) (Zone A)										
336											
337	General Statistics										
338	Total Number of Observations		16		Number of Distinct Observations		15				
339					Number of Missing Observations		0				
340	Minimum		3		Mean		68.4				
341	Maximum		260		Median		50.5				
342	SD		70.01		Std. Error of Mean		17.5				
343	Coefficient of Variation		1.023		Skewness		2.012				
344											

A	B	C	D	E	F	G	H	I	J	K	L
345	Normal GOF Test										
346	Shapiro Wilk Test Statistic			0.738	Shapiro Wilk GOF Test						
347	5% Shapiro Wilk Critical Value			0.887	Data Not Normal at 5% Significance Level						
348	Lilliefors Test Statistic			0.269	Lilliefors GOF Test						
349	5% Lilliefors Critical Value			0.213	Data Not Normal at 5% Significance Level						
350	Data Not Normal at 5% Significance Level										
351											
352	Assuming Normal Distribution										
353	95% Normal UCL				95% UCLs (Adjusted for Skewness)						
354	95% Student's-t UCL			99.08	95% Adjusted-CLT UCL (Chen-1995)					106.6	
355					95% Modified-t UCL (Johnson-1978)					100.5	
356											
357	Gamma GOF Test										
358	A-D Test Statistic			0.588	Anderson-Darling Gamma GOF Test						
359	5% A-D Critical Value			0.761	Detected data appear Gamma Distributed at 5% Significance Level						
360	K-S Test Statistic			0.155	Kolmogorov-Smirnov Gamma GOF Test						
361	5% K-S Critical Value			0.221	Detected data appear Gamma Distributed at 5% Significance Level						
362	Detected data appear Gamma Distributed at 5% Significance Level										
363											
364	Gamma Statistics										
365	k hat (MLE)			1.131	k star (bias corrected MLE)					0.961	
366	Theta hat (MLE)			60.47	Theta star (bias corrected MLE)					71.19	
367	nu hat (MLE)			36.2	nu star (bias corrected)					30.74	
368	MLE Mean (bias corrected)			68.4	MLE Sd (bias corrected)					69.78	
369					Approximate Chi Square Value (0.05)					19.08	
370	Adjusted Level of Significance			0.0335	Adjusted Chi Square Value					18.04	
371											
372	Assuming Gamma Distribution										
373	95% Approximate Gamma UCL (use when n>=50)			110.2	95% Adjusted Gamma UCL (use when n<50)					116.6	
374											
375	Lognormal GOF Test										
376	Shapiro Wilk Test Statistic			0.878	Shapiro Wilk Lognormal GOF Test						
377	5% Shapiro Wilk Critical Value			0.887	Data Not Lognormal at 5% Significance Level						
378	Lilliefors Test Statistic			0.207	Lilliefors Lognormal GOF Test						
379	5% Lilliefors Critical Value			0.213	Data appear Lognormal at 5% Significance Level						
380	Data appear Approximate Lognormal at 5% Significance Level										
381											
382	Lognormal Statistics										
383	Minimum of Logged Data			1.099	Mean of logged Data					3.722	
384	Maximum of Logged Data			5.561	SD of logged Data					1.196	
385											
386	Assuming Lognormal Distribution										
387	95% H-UCL			214.7	90% Chebyshev (MVUE) UCL					158.5	
388	95% Chebyshev (MVUE) UCL			194.5	97.5% Chebyshev (MVUE) UCL					244.6	
389	99% Chebyshev (MVUE) UCL			342.9							
390											
391	Nonparametric Distribution Free UCL Statistics										
392	Data appear to follow a Discernible Distribution at 5% Significance Level										
393											
394	Nonparametric Distribution Free UCLs										
395	95% CLT UCL			97.19	95% Jackknife UCL					99.08	
396	95% Standard Bootstrap UCL			96.39	95% Bootstrap-t UCL					137.4	
397	95% Hall's Bootstrap UCL			277.1	95% Percentile Bootstrap UCL					99.44	
398	95% BCA Bootstrap UCL			106.2							
399	90% Chebyshev(Mean, Sd) UCL			120.9	95% Chebyshev(Mean, Sd) UCL					144.7	
400	97.5% Chebyshev(Mean, Sd) UCL			177.7	99% Chebyshev(Mean, Sd) UCL					242.5	
401											
402	Suggested UCL to Use										
403	95% Adjusted Gamma UCL			116.6							
404											
405	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
406	Recommendations are based upon data size, data distribution, and skewness.										
407	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
408	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										

	A	B	C	D	E	F	G	H	I	J	K	L
470	Nonparametric Distribution Free UCLs											
471	95% CLT UCL				3.04		95% Jackknife UCL				3.094	
472	95% Standard Bootstrap UCL				3.013		95% Bootstrap-t UCL				3.678	
473	95% Hall's Bootstrap UCL				6.953		95% Percentile Bootstrap UCL				3.036	
474	95% BCA Bootstrap UCL				3.221							
475	90% Chebyshev(Mean, Sd) UCL				3.615		95% Chebyshev(Mean, Sd) UCL				4.191	
476	97.5% Chebyshev(Mean, Sd) UCL				4.991		99% Chebyshev(Mean, Sd) UCL				6.563	
477												
478	Suggested UCL to Use											
479	95% Student's-t UCL				3.094							
480												
481	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
482	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
483												
484	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
485	Recommendations are based upon data size, data distribution, and skewness.											
486	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
487	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
488												

A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets										
2	Aquatic Invertebrates										
3	User Selected Options										
4	Date/Time of Computation		ProUCL 5.16/5/2018 2:55:45 PM								
5	From File		Darwin_aquatic inverts for ProUCL_20180602_c.xls								
6	Full Precision		OFF								
7	Confidence Coefficient		95%								
8	Number of Bootstrap Operations		2000								
9											
10											
11	Perfluoro-n-octanoate acid (PFOA) (darwin harbour (incl sadgroves and reichardt))										
12											
13	General Statistics										
14	Total Number of Observations			5		Number of Distinct Observations			5		
15						Number of Missing Observations			20		
16	Minimum			0.5		Mean			1.74		
17	Maximum			4.2		Median			1.4		
18	SD			1.45		Std. Error of Mean			0.649		
19	Coefficient of Variation			0.833		Skewness			1.687		
20											
21	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use										
22	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.										
23	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).										
24	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1										
25											
26	Normal GOF Test										
27	Shapiro Wilk Test Statistic			0.836		Shapiro Wilk GOF Test					
28	5% Shapiro Wilk Critical Value			0.762		Data appear Normal at 5% Significance Level					
29	Lilliefors Test Statistic			0.311		Lilliefors GOF Test					
30	5% Lilliefors Critical Value			0.343		Data appear Normal at 5% Significance Level					
31	Data appear Normal at 5% Significance Level										
32											
33	Assuming Normal Distribution										
34	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
35	95% Student's-t UCL			3.123		95% Adjusted-CLT UCL (Chen-1995)			3.33		
36						95% Modified-t UCL (Johnson-1978)			3.204		
37											
38	Gamma GOF Test										
39	A-D Test Statistic			0.261		Anderson-Darling Gamma GOF Test					
40	5% A-D Critical Value			0.684		Detected data appear Gamma Distributed at 5% Significance Level					
41	K-S Test Statistic			0.222		Kolmogorov-Smirnov Gamma GOF Test					
42	5% K-S Critical Value			0.36		Detected data appear Gamma Distributed at 5% Significance Level					
43	Detected data appear Gamma Distributed at 5% Significance Level										
44											
45	Gamma Statistics										
46	k hat (MLE)			2.127		k star (bias corrected MLE)			0.984		
47	Theta hat (MLE)			0.818		Theta star (bias corrected MLE)			1.768		
48	nu hat (MLE)			21.27		nu star (bias corrected)			9.84		
49	MLE Mean (bias corrected)			1.74		MLE Sd (bias corrected)			1.754		
50						Approximate Chi Square Value (0.05)			3.842		
51	Adjusted Level of Significance			0.0086		Adjusted Chi Square Value			2.392		
52											
53	Assuming Gamma Distribution										
54	95% Approximate Gamma UCL (use when n>=50))			4.456		95% Adjusted Gamma UCL (use when n<50)			7.157		
55											

	A	B	C	D	E	F	G	H	I	J	K	L		
56	Lognormal GOF Test													
57	Shapiro Wilk Test Statistic				0.986		Shapiro Wilk Lognormal GOF Test							
58	5% Shapiro Wilk Critical Value				0.762		Data appear Lognormal at 5% Significance Level							
59	Lilliefors Test Statistic				0.185		Lilliefors Lognormal GOF Test							
60	5% Lilliefors Critical Value				0.343		Data appear Lognormal at 5% Significance Level							
61	Data appear Lognormal at 5% Significance Level													
62														
63	Lognormal Statistics													
64	Minimum of Logged Data				-0.693		Mean of logged Data				0.301			
65	Maximum of Logged Data				1.435		SD of logged Data				0.79			
66														
67	Assuming Lognormal Distribution													
68	95% H-UCL				9.017		90% Chebyshev (MVUE) UCL				3.491			
69	95% Chebyshev (MVUE) UCL				4.295		97.5% Chebyshev (MVUE) UCL				5.41			
70	99% Chebyshev (MVUE) UCL				7.601									
71														
72	Nonparametric Distribution Free UCL Statistics													
73	Data appear to follow a Discernible Distribution at 5% Significance Level													
74														
75	Nonparametric Distribution Free UCLs													
76	95% CLT UCL				2.807		95% Jackknife UCL				3.123			
77	95% Standard Bootstrap UCL				2.718		95% Bootstrap-t UCL				4.463			
78	95% Hall's Bootstrap UCL				7.622		95% Percentile Bootstrap UCL				2.64			
79	95% BCA Bootstrap UCL				3.04									
80	90% Chebyshev(Mean, Sd) UCL				3.686		95% Chebyshev(Mean, Sd) UCL				4.567			
81	97.5% Chebyshev(Mean, Sd) UCL				5.79		99% Chebyshev(Mean, Sd) UCL				8.193			
82														
83	Suggested UCL to Use													
84	95% Student's-t UCL				3.123									
85														
86	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.													
87	Recommendations are based upon data size, data distribution, and skewness.													
88	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).													
89	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.													
90														
91														
92	Perfluoro-n-octanoate acid (PFOA) (Iudmilla creek)													
93														
94	General Statistics													
95	Total Number of Observations				50		Number of Distinct Observations				44			
96							Number of Missing Observations				21			
97	Minimum				0.09		Mean				4.41			
98	Maximum				47		Median				2.25			
99	SD				7.435		Std. Error of Mean				1.051			
100	Coefficient of Variation				1.686		Skewness				4.186			
101														
102	Normal GOF Test													
103	Shapiro Wilk Test Statistic				0.574		Shapiro Wilk GOF Test							
104	5% Shapiro Wilk Critical Value				0.947		Data Not Normal at 5% Significance Level							
105	Lilliefors Test Statistic				0.281		Lilliefors GOF Test							
106	5% Lilliefors Critical Value				0.125		Data Not Normal at 5% Significance Level							
107	Data Not Normal at 5% Significance Level													
108														
109	Assuming Normal Distribution													
110	95% Normal UCL						95% UCLs (Adjusted for Skewness)							
111	95% Student's-t UCL				6.173		95% Adjusted-CLT UCL (Chen-1995)				6.805			
112							95% Modified-t UCL (Johnson-1978)				6.277			

A	B	C	D	E	F	G	H	I	J	K	L
113											
114	Gamma GOF Test										
115	A-D Test Statistic		0.709		Anderson-Darling Gamma GOF Test						
116	5% A-D Critical Value		0.805		Detected data appear Gamma Distributed at 5% Significance Level						
117	K-S Test Statistic		0.107		Kolmogorov-Smirnov Gamma GOF Test						
118	5% K-S Critical Value		0.132		Detected data appear Gamma Distributed at 5% Significance Level						
119	Detected data appear Gamma Distributed at 5% Significance Level										
120											
121	Gamma Statistics										
122	k hat (MLE)		0.605		k star (bias corrected MLE)		0.582				
123	Theta hat (MLE)		7.289		Theta star (bias corrected MLE)		7.576				
124	nu hat (MLE)		60.51		nu star (bias corrected)		58.21				
125	MLE Mean (bias corrected)		4.41		MLE Sd (bias corrected)		5.78				
126					Approximate Chi Square Value (0.05)		41.67				
127	Adjusted Level of Significance		0.0452		Adjusted Chi Square Value		41.25				
128											
129	Assuming Gamma Distribution										
130	95% Approximate Gamma UCL (use when n>=50)		6.161		95% Adjusted Gamma UCL (use when n<50)		6.223				
131											
132	Lognormal GOF Test										
133	Shapiro Wilk Test Statistic		0.958		Shapiro Wilk Lognormal GOF Test						
134	5% Shapiro Wilk Critical Value		0.947		Data appear Lognormal at 5% Significance Level						
135	Lilliefors Test Statistic		0.105		Lilliefors Lognormal GOF Test						
136	5% Lilliefors Critical Value		0.125		Data appear Lognormal at 5% Significance Level						
137	Data appear Lognormal at 5% Significance Level										
138											
139	Lognormal Statistics										
140	Minimum of Logged Data		-2.408		Mean of logged Data		0.464				
141	Maximum of Logged Data		3.85		SD of logged Data		1.575				
142											
143	Assuming Lognormal Distribution										
144	95% H-UCL		10.89		90% Chebyshev (MVUE) UCL		9.92				
145	95% Chebyshev (MVUE) UCL		12.05		97.5% Chebyshev (MVUE) UCL		15.01				
146	99% Chebyshev (MVUE) UCL		20.81								
147											
148	Nonparametric Distribution Free UCL Statistics										
149	Data appear to follow a Discernible Distribution at 5% Significance Level										
150											
151	Nonparametric Distribution Free UCLs										
152	95% CLT UCL		6.14		95% Jackknife UCL		6.173				
153	95% Standard Bootstrap UCL		6.083		95% Bootstrap-t UCL		7.635				
154	95% Hall's Bootstrap UCL		13.62		95% Percentile Bootstrap UCL		6.273				
155	95% BCA Bootstrap UCL		7.056								
156	90% Chebyshev(Mean, Sd) UCL		7.565		95% Chebyshev(Mean, Sd) UCL		8.993				
157	97.5% Chebyshev(Mean, Sd) UCL		10.98		99% Chebyshev(Mean, Sd) UCL		14.87				
158											
159	Suggested UCL to Use										
160	95% Approximate Gamma UCL		6.161								
161											
162	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
163	Recommendations are based upon data size, data distribution, and skewness.										
164	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
165	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
166											
167											

	A	B	C	D	E	F	G	H	I	J	K	L
168	Perfluoro-n-octanoate acid (PFOA) (rapid creek estuary)											
169												
170	General Statistics											
171	Total Number of Observations			23		Number of Distinct Observations			20			
172						Number of Missing Observations			21			
173	Minimum			0.15		Mean			2.166			
174	Maximum			9.1		Median			1.3			
175	SD			2.322		Std. Error of Mean			0.484			
176	Coefficient of Variation			1.072		Skewness			1.928			
177												
178	Normal GOF Test											
179	Shapiro Wilk Test Statistic			0.738		Shapiro Wilk GOF Test						
180	5% Shapiro Wilk Critical Value			0.914		Data Not Normal at 5% Significance Level						
181	Lilliefors Test Statistic			0.277		Lilliefors GOF Test						
182	5% Lilliefors Critical Value			0.18		Data Not Normal at 5% Significance Level						
183	Data Not Normal at 5% Significance Level											
184												
185	Assuming Normal Distribution											
186	95% Normal UCL					95% UCLs (Adjusted for Skewness)						
187	95% Student's-t UCL			2.998		95% Adjusted-CLT UCL (Chen-1995)			3.171			
188						95% Modified-t UCL (Johnson-1978)			3.03			
189												
190	Gamma GOF Test											
191	A-D Test Statistic			0.664		Anderson-Darling Gamma GOF Test						
192	5% A-D Critical Value			0.765		Detected data appear Gamma Distributed at 5% Significance Level						
193	K-S Test Statistic			0.156		Kolmogorov-Smirnov Gamma GOF Test						
194	5% K-S Critical Value			0.186		Detected data appear Gamma Distributed at 5% Significance Level						
195	Detected data appear Gamma Distributed at 5% Significance Level											
196												
197	Gamma Statistics											
198	k hat (MLE)			1.221		k star (bias corrected MLE)			1.091			
199	Theta hat (MLE)			1.774		Theta star (bias corrected MLE)			1.986			
200	nu hat (MLE)			56.18		nu star (bias corrected)			50.18			
201	MLE Mean (bias corrected)			2.166		MLE Sd (bias corrected)			2.074			
202						Approximate Chi Square Value (0.05)			34.92			
203	Adjusted Level of Significance			0.0389		Adjusted Chi Square Value			33.99			
204												
205	Assuming Gamma Distribution											
206	95% Approximate Gamma UCL (use when n>=50)			3.113		95% Adjusted Gamma UCL (use when n<50)			3.198			
207												
208	Lognormal GOF Test											
209	Shapiro Wilk Test Statistic			0.965		Shapiro Wilk Lognormal GOF Test						
210	5% Shapiro Wilk Critical Value			0.914		Data appear Lognormal at 5% Significance Level						
211	Lilliefors Test Statistic			0.11		Lilliefors Lognormal GOF Test						
212	5% Lilliefors Critical Value			0.18		Data appear Lognormal at 5% Significance Level						
213	Data appear Lognormal at 5% Significance Level											
214												
215	Lognormal Statistics											
216	Minimum of Logged Data			-1.897		Mean of logged Data			0.311			
217	Maximum of Logged Data			2.208		SD of logged Data			1.008			
218												
219	Assuming Lognormal Distribution											
220	95% H-UCL			3.908		90% Chebyshev (MVUE) UCL			3.763			
221	95% Chebyshev (MVUE) UCL			4.473		97.5% Chebyshev (MVUE) UCL			5.457			
222	99% Chebyshev (MVUE) UCL			7.392								
223												
224	Nonparametric Distribution Free UCL Statistics											
225	Data appear to follow a Discernible Distribution at 5% Significance Level											

A	B	C	D	E	F	G	H	I	J	K	L
226											
227	Nonparametric Distribution Free UCLs										
228	95% CLT UCL		2.963					95% Jackknife UCL		2.998	
229	95% Standard Bootstrap UCL		2.96					95% Bootstrap-t UCL		3.635	
230	95% Hall's Bootstrap UCL		3.245					95% Percentile Bootstrap UCL		3.013	
231	95% BCA Bootstrap UCL		3.144								
232	90% Chebyshev(Mean, Sd) UCL		3.619					95% Chebyshev(Mean, Sd) UCL		4.277	
233	97.5% Chebyshev(Mean, Sd) UCL		5.19					99% Chebyshev(Mean, Sd) UCL		6.984	
234											
235	Suggested UCL to Use										
236	95% Adjusted Gamma UCL		3.198								
237											
238	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
239	Recommendations are based upon data size, data distribution, and skewness.										
240	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
241	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
242											
243											
244	Perfluoro-n-octanoate acid (PFOA) (rapid creek freshwater)										
245											
246	General Statistics										
247	Total Number of Observations		6					Number of Distinct Observations		6	
248								Number of Missing Observations		0	
249	Minimum		0.41					Mean		0.737	
250	Maximum		1.3					Median		0.59	
251	SD		0.373					Std. Error of Mean		0.152	
252	Coefficient of Variation		0.507					Skewness		0.897	
253											
254	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use										
255	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.										
256	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).										
257	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1										
258											
259	Normal GOF Test										
260	Shapiro Wilk Test Statistic		0.846					Shapiro Wilk GOF Test			
261	5% Shapiro Wilk Critical Value		0.788					Data appear Normal at 5% Significance Level			
262	Lilliefors Test Statistic		0.279					Lilliefors GOF Test			
263	5% Lilliefors Critical Value		0.325					Data appear Normal at 5% Significance Level			
264	Data appear Normal at 5% Significance Level										
265											
266	Assuming Normal Distribution										
267	95% Normal UCL				95% UCLs (Adjusted for Skewness)						
268	95% Student's-t UCL		1.044					95% Adjusted-CLT UCL (Chen-1995)		1.047	
269								95% Modified-t UCL (Johnson-1978)		1.053	
270											
271	Gamma GOF Test										
272	A-D Test Statistic		0.452					Anderson-Darling Gamma GOF Test			
273	5% A-D Critical Value		0.698					Detected data appear Gamma Distributed at 5% Significance Level			
274	K-S Test Statistic		0.244					Kolmogorov-Smirnov Gamma GOF Test			
275	5% K-S Critical Value		0.333					Detected data appear Gamma Distributed at 5% Significance Level			
276	Detected data appear Gamma Distributed at 5% Significance Level										
277											
278	Gamma Statistics										
279	k hat (MLE)		5.127					k star (bias corrected MLE)		2.675	
280	Theta hat (MLE)		0.144					Theta star (bias corrected MLE)		0.275	
281	nu hat (MLE)		61.53					nu star (bias corrected)		32.1	
282	MLE Mean (bias corrected)		0.737					MLE Sd (bias corrected)		0.45	
283									Approximate Chi Square Value (0.05)		20.15
284	Adjusted Level of Significance		0.0122					Adjusted Chi Square Value		16.82	
285											

A	B	C	D	E	F	G	H	I	J	K	L
286	Assuming Gamma Distribution										
287	95% Approximate Gamma UCL (use when n>=50))			1.173	95% Adjusted Gamma UCL (use when n<50)			1.406			
288											
289	Lognormal GOF Test										
290	Shapiro Wilk Test Statistic			0.888	Shapiro Wilk Lognormal GOF Test						
291	5% Shapiro Wilk Critical Value			0.788	Data appear Lognormal at 5% Significance Level						
292	Lilliefors Test Statistic			0.213	Lilliefors Lognormal GOF Test						
293	5% Lilliefors Critical Value			0.325	Data appear Lognormal at 5% Significance Level						
294	Data appear Lognormal at 5% Significance Level										
295											
296	Lognormal Statistics										
297	Minimum of Logged Data			-0.892	Mean of logged Data			-0.406			
298	Maximum of Logged Data			0.262	SD of logged Data			0.483			
299											
300	Assuming Lognormal Distribution										
301	95% H-UCL			1.311	90% Chebyshev (MVUE) UCL			1.166			
302	95% Chebyshev (MVUE) UCL			1.362	97.5% Chebyshev (MVUE) UCL			1.634			
303	99% Chebyshev (MVUE) UCL			2.169							
304											
305	Nonparametric Distribution Free UCL Statistics										
306	Data appear to follow a Discernible Distribution at 5% Significance Level										
307											
308	Nonparametric Distribution Free UCLs										
309	95% CLT UCL			0.987	95% Jackknife UCL			1.044			
310	95% Standard Bootstrap UCL			0.962	95% Bootstrap-t UCL			1.703			
311	95% Hall's Bootstrap UCL			3.048	95% Percentile Bootstrap UCL			0.977			
312	95% BCA Bootstrap UCL			1.01							
313	90% Chebyshev(Mean, Sd) UCL			1.194	95% Chebyshev(Mean, Sd) UCL			1.401			
314	97.5% Chebyshev(Mean, Sd) UCL			1.688	99% Chebyshev(Mean, Sd) UCL			2.253			
315											
316	Suggested UCL to Use										
317	95% Student's-t UCL			1.044							
318											
319	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
320	Recommendations are based upon data size, data distribution, and skewness.										
321	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
322	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
323											
324											
325	Perfluoro-n-octane sulfonic acid (PFOS) (darwin harbour (incl sadgroves and reichardt))										
326											
327	General Statistics										
328	Total Number of Observations			18	Number of Distinct Observations			13			
329					Number of Missing Observations			7			
330	Minimum			0.4	Mean			3.122			
331	Maximum			32	Median			0.9			
332	SD			7.3	Std. Error of Mean			1.721			
333	Coefficient of Variation			2.338	Skewness			4.069			
334											
335	Normal GOF Test										
336	Shapiro Wilk Test Statistic			0.378	Shapiro Wilk GOF Test						
337	5% Shapiro Wilk Critical Value			0.897	Data Not Normal at 5% Significance Level						
338	Lilliefors Test Statistic			0.38	Lilliefors GOF Test						
339	5% Lilliefors Critical Value			0.202	Data Not Normal at 5% Significance Level						
340	Data Not Normal at 5% Significance Level										
341											
342	Assuming Normal Distribution										
343	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
344	95% Student's-t UCL			6.115	95% Adjusted-CLT UCL (Chen-1995)			7.715			
345					95% Modified-t UCL (Johnson-1978)			6.39			
346											
347	Gamma GOF Test										

	A	B	C	D	E	F	G	H	I	J	K	L
348	A-D Test Statistic					1.974	Anderson-Darling Gamma GOF Test					
349	5% A-D Critical Value					0.784	Data Not Gamma Distributed at 5% Significance Level					
350	K-S Test Statistic					0.231	Kolmogorov-Smirnov Gamma GOF Test					
351	5% K-S Critical Value					0.212	Data Not Gamma Distributed at 5% Significance Level					
352	Data Not Gamma Distributed at 5% Significance Level											
353												
354	Gamma Statistics											
355	k hat (MLE)					0.68	k star (bias corrected MLE)					0.604
356	Theta hat (MLE)					4.59	Theta star (bias corrected MLE)					5.17
357	nu hat (MLE)					24.49	nu star (bias corrected)					21.74
358	MLE Mean (bias corrected)					3.122	MLE Sd (bias corrected)					4.018
359							Approximate Chi Square Value (0.05)					12.14
360	Adjusted Level of Significance					0.0357	Adjusted Chi Square Value					11.46
361												
362	Assuming Gamma Distribution											
363	95% Approximate Gamma UCL (use when n>=50)					5.589	95% Adjusted Gamma UCL (use when n<50)					5.924
364												
365	Lognormal GOF Test											
366	Shapiro Wilk Test Statistic					0.864	Shapiro Wilk Lognormal GOF Test					
367	5% Shapiro Wilk Critical Value					0.897	Data Not Lognormal at 5% Significance Level					
368	Lilliefors Test Statistic					0.181	Lilliefors Lognormal GOF Test					
369	5% Lilliefors Critical Value					0.202	Data appear Lognormal at 5% Significance Level					
370	Data appear Approximate Lognormal at 5% Significance Level											
371												
372	Lognormal Statistics											
373	Minimum of Logged Data					-0.916	Mean of logged Data					0.247
374	Maximum of Logged Data					3.466	SD of logged Data					1.102
375												
376	Assuming Lognormal Distribution											
377	95% H-UCL					4.945	90% Chebyshev (MVUE) UCL					4.191
378	95% Chebyshev (MVUE) UCL					5.078	97.5% Chebyshev (MVUE) UCL					6.308
379	99% Chebyshev (MVUE) UCL					8.726						
380												
381	Nonparametric Distribution Free UCL Statistics											
382	Data appear to follow a Discernible Distribution at 5% Significance Level											
383												
384	Nonparametric Distribution Free UCLs											
385	95% CLT UCL					5.952	95% Jackknife UCL					6.115
386	95% Standard Bootstrap UCL					5.874	95% Bootstrap-t UCL					19.15
387	95% Hall's Bootstrap UCL					16.06	95% Percentile Bootstrap UCL					6.406
388	95% BCA Bootstrap UCL					8.356						
389	90% Chebyshev(Mean, Sd) UCL					8.284	95% Chebyshev(Mean, Sd) UCL					10.62
390	97.5% Chebyshev(Mean, Sd) UCL					13.87	99% Chebyshev(Mean, Sd) UCL					20.24
391												
392	Suggested UCL to Use											
393	95% Chebyshev (Mean, Sd) UCL					10.62						
394												
395	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
396	Recommendations are based upon data size, data distribution, and skewness.											
397	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
398	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
399												
400												

	A	B	C	D	E	F	G	H	I	J	K	L
401	Perfluoro-n-octane sulfonic acid (PFOS) (Iudmilla creek)											
402												
403	General Statistics											
404	Total Number of Observations				71		Number of Distinct Observations				62	
405							Number of Missing Observations				0	
406	Minimum				0.08		Mean				14.13	
407	Maximum				100		Median				5.3	
408	SD				21.62		Std. Error of Mean				2.566	
409	Coefficient of Variation				1.53		Skewness				2.419	
410												
411	Normal GOF Test											
412	Shapiro Wilk Test Statistic				0.659		Shapiro Wilk GOF Test					
413	5% Shapiro Wilk P Value				0		Data Not Normal at 5% Significance Level					
414	Lilliefors Test Statistic				0.263		Lilliefors GOF Test					
415	5% Lilliefors Critical Value				0.105		Data Not Normal at 5% Significance Level					
416	Data Not Normal at 5% Significance Level											
417												
418	Assuming Normal Distribution											
419	95% Normal UCL						95% UCLs (Adjusted for Skewness)					
420	95% Student's-t UCL				18.41		95% Adjusted-CLT UCL (Chen-1995)				19.14	
421							95% Modified-t UCL (Johnson-1978)				18.53	
422												
423	Gamma GOF Test											
424	A-D Test Statistic				0.993		Anderson-Darling Gamma GOF Test					
425	5% A-D Critical Value				0.811		Data Not Gamma Distributed at 5% Significance Level					
426	K-S Test Statistic				0.107		Kolmogorov-Smirnov Gamma GOF Test					
427	5% K-S Critical Value				0.111		Detected data appear Gamma Distributed at 5% Significance Level					
428	Detected data follow Appr. Gamma Distribution at 5% Significance Level											
429												
430	Gamma Statistics											
431	k hat (MLE)				0.559		k star (bias corrected MLE)				0.545	
432	Theta hat (MLE)				25.28		Theta star (bias corrected MLE)				25.94	
433	nu hat (MLE)				79.38		nu star (bias corrected)				77.36	
434	MLE Mean (bias corrected)				14.13		MLE Sd (bias corrected)				19.14	
435							Approximate Chi Square Value (0.05)				58.1	
436	Adjusted Level of Significance				0.0466		Adjusted Chi Square Value				57.75	
437												
438	Assuming Gamma Distribution											
439	95% Approximate Gamma UCL (use when n>=50)				18.81		95% Adjusted Gamma UCL (use when n<50)				18.93	
440												
441	Lognormal GOF Test											
442	Shapiro Wilk Test Statistic				0.971		Shapiro Wilk Lognormal GOF Test					
443	5% Shapiro Wilk P Value				0.283		Data appear Lognormal at 5% Significance Level					
444	Lilliefors Test Statistic				0.0489		Lilliefors Lognormal GOF Test					
445	5% Lilliefors Critical Value				0.105		Data appear Lognormal at 5% Significance Level					
446	Data appear Lognormal at 5% Significance Level											
447												
448	Lognormal Statistics											
449	Minimum of Logged Data				-2.526		Mean of logged Data				1.531	
450	Maximum of Logged Data				4.605		SD of logged Data				1.687	
451												
452	Assuming Lognormal Distribution											
453	95% H-UCL				35.22		90% Chebyshev (MVUE) UCL				34.01	
454	95% Chebyshev (MVUE) UCL				41.11		97.5% Chebyshev (MVUE) UCL				50.97	
455	99% Chebyshev (MVUE) UCL				70.34							
456												
457	Nonparametric Distribution Free UCL Statistics											
458	Data appear to follow a Discernible Distribution at 5% Significance Level											
459												

A	B	C	D	E	F	G	H	I	J	K	L	
460	Nonparametric Distribution Free UCLs											
461	95% CLT UCL			18.35	95% Jackknife UCL			18.41				
462	95% Standard Bootstrap UCL			18.32	95% Bootstrap-t UCL			19.47				
463	95% Hall's Bootstrap UCL			19.09	95% Percentile Bootstrap UCL			18.56				
464	95% BCA Bootstrap UCL			19.08								
465	90% Chebyshev(Mean, Sd) UCL			21.83	95% Chebyshev(Mean, Sd) UCL			25.31				
466	97.5% Chebyshev(Mean, Sd) UCL			30.15	99% Chebyshev(Mean, Sd) UCL			39.66				
467												
468	Suggested UCL to Use											
469	95% Approximate Gamma UCL			18.81								
470												
471	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
472	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
473												
474	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
475	Recommendations are based upon data size, data distribution, and skewness.											
476	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
477	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
478												
479												
480	Perfluoro-n-octane sulfonic acid (PFOS) (rapid creek estuary)											
481												
482	General Statistics											
483	Total Number of Observations			43	Number of Distinct Observations			38				
484					Number of Missing Observations			1				
485	Minimum			0.9	Mean			19.38				
486	Maximum			120	Median			12				
487	SD			21.54	Std. Error of Mean			3.285				
488	Coefficient of Variation			1.112	Skewness			2.747				
489												
490	Normal GOF Test											
491	Shapiro Wilk Test Statistic			0.74	Shapiro Wilk GOF Test							
492	5% Shapiro Wilk Critical Value			0.943	Data Not Normal at 5% Significance Level							
493	Lilliefors Test Statistic			0.196	Lilliefors GOF Test							
494	5% Lilliefors Critical Value			0.134	Data Not Normal at 5% Significance Level							
495	Data Not Normal at 5% Significance Level											
496												
497	Assuming Normal Distribution											
498	95% Normal UCL				95% UCLs (Adjusted for Skewness)							
499	95% Student's-t UCL			24.9	95% Adjusted-CLT UCL (Chen-1995)			26.25				
500					95% Modified-t UCL (Johnson-1978)			25.13				
501												
502	Gamma GOF Test											
503	A-D Test Statistic			0.315	Anderson-Darling Gamma GOF Test							
504	5% A-D Critical Value			0.776	Detected data appear Gamma Distributed at 5% Significance Level							
505	K-S Test Statistic			0.0823	Kolmogorov-Smirnov Gamma GOF Test							
506	5% K-S Critical Value			0.139	Detected data appear Gamma Distributed at 5% Significance Level							
507	Detected data appear Gamma Distributed at 5% Significance Level											
508												
509	Gamma Statistics											
510	k hat (MLE)			1.094	k star (bias corrected MLE)			1.033				
511	Theta hat (MLE)			17.71	Theta star (bias corrected MLE)			18.75				
512	nu hat (MLE)			94.1	nu star (bias corrected)			88.87				
513	MLE Mean (bias corrected)			19.38	MLE Sd (bias corrected)			19.06				
514					Approximate Chi Square Value (0.05)			68.13				
515	Adjusted Level of Significance			0.0444	Adjusted Chi Square Value			67.5				
516												
517	Assuming Gamma Distribution											
518	95% Approximate Gamma UCL (use when n>=50)			25.27	95% Adjusted Gamma UCL (use when n<50)			25.51				
519												

A	B	C	D	E	F	G	H	I	J	K	L
520	Lognormal GOF Test										
521	Shapiro Wilk Test Statistic		0.983	Shapiro Wilk Lognormal GOF Test							
522	5% Shapiro Wilk Critical Value		0.943	Data appear Lognormal at 5% Significance Level							
523	Lilliefors Test Statistic		0.0738	Lilliefors Lognormal GOF Test							
524	5% Lilliefors Critical Value		0.134	Data appear Lognormal at 5% Significance Level							
525	Data appear Lognormal at 5% Significance Level										
526											
527	Lognormal Statistics										
528	Minimum of Logged Data		-0.105					Mean of logged Data		2.442	
529	Maximum of Logged Data		4.787					SD of logged Data		1.096	
530											
531	Assuming Lognormal Distribution										
532	95% H-UCL		31.83					90% Chebyshev (MVUE) UCL		32.82	
533	95% Chebyshev (MVUE) UCL		38.4					97.5% Chebyshev (MVUE) UCL		46.13	
534	99% Chebyshev (MVUE) UCL		61.33								
535											
536	Nonparametric Distribution Free UCL Statistics										
537	Data appear to follow a Discernible Distribution at 5% Significance Level										
538											
539	Nonparametric Distribution Free UCLs										
540	95% CLT UCL		24.78					95% Jackknife UCL		24.9	
541	95% Standard Bootstrap UCL		24.75					95% Bootstrap-t UCL		27.33	
542	95% Hall's Bootstrap UCL		33					95% Percentile Bootstrap UCL		25.25	
543	95% BCA Bootstrap UCL		26.67								
544	90% Chebyshev(Mean, Sd) UCL		29.23					95% Chebyshev(Mean, Sd) UCL		33.69	
545	97.5% Chebyshev(Mean, Sd) UCL		39.89					99% Chebyshev(Mean, Sd) UCL		52.06	
546											
547	Suggested UCL to Use										
548	95% Adjusted Gamma UCL		25.51								
549											
550	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
551	Recommendations are based upon data size, data distribution, and skewness.										
552	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
553	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
554											
555											
556	Perfluoro-n-octane sulfonic acid (PFOS) (rapid creek freshwater)										
557											
558	General Statistics										
559	Total Number of Observations		6					Number of Distinct Observations		6	
560								Number of Missing Observations		0	
561	Minimum		3.5					Mean		30.36	
562	Maximum		78					Median		14.33	
563	SD		30.42					Std. Error of Mean		12.42	
564	Coefficient of Variation		1.002					Skewness		1.052	
565											
566	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use										
567	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.										
568	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).										
569	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1										
570											
571	Normal GOF Test										
572	Shapiro Wilk Test Statistic		0.802	Shapiro Wilk GOF Test							
573	5% Shapiro Wilk Critical Value		0.788	Data appear Normal at 5% Significance Level							
574	Lilliefors Test Statistic		0.36	Lilliefors GOF Test							
575	5% Lilliefors Critical Value		0.325	Data Not Normal at 5% Significance Level							
576	Data appear Approximate Normal at 5% Significance Level										
577											
578	Assuming Normal Distribution										
579	95% Normal UCL			95% UCLs (Adjusted for Skewness)							
580	95% Student's-t UCL		55.39					95% Adjusted-CLT UCL (Chen-1995)		56.49	
581								95% Modified-t UCL (Johnson-1978)		56.27	

	A	B	C	D	E	F	G	H	I	J	K	L
582												
583	Gamma GOF Test											
584	A-D Test Statistic			0.47		Anderson-Darling Gamma GOF Test						
585	5% A-D Critical Value			0.713		Detected data appear Gamma Distributed at 5% Significance Level						
586	K-S Test Statistic			0.307		Kolmogorov-Smirnov Gamma GOF Test						
587	5% K-S Critical Value			0.34		Detected data appear Gamma Distributed at 5% Significance Level						
588	Detected data appear Gamma Distributed at 5% Significance Level											
589												
590	Gamma Statistics											
591	k hat (MLE)			1.171		k star (bias corrected MLE)			0.697			
592	Theta hat (MLE)			25.92		Theta star (bias corrected MLE)			43.57			
593	nu hat (MLE)			14.06		nu star (bias corrected)			8.362			
594	MLE Mean (bias corrected)			30.36		MLE Sd (bias corrected)			36.37			
595							Approximate Chi Square Value (0.05)			2.946		
596	Adjusted Level of Significance			0.0122		Adjusted Chi Square Value			1.915			
597												
598	Assuming Gamma Distribution											
599	95% Approximate Gamma UCL (use when n>=50))			86.16		95% Adjusted Gamma UCL (use when n<50)			132.5			
600												
601	Lognormal GOF Test											
602	Shapiro Wilk Test Statistic			0.915		Shapiro Wilk Lognormal GOF Test						
603	5% Shapiro Wilk Critical Value			0.788		Data appear Lognormal at 5% Significance Level						
604	Lilliefors Test Statistic			0.244		Lilliefors Lognormal GOF Test						
605	5% Lilliefors Critical Value			0.325		Data appear Lognormal at 5% Significance Level						
606	Data appear Lognormal at 5% Significance Level											
607												
608	Lognormal Statistics											
609	Minimum of Logged Data			1.253		Mean of logged Data			2.929			
610	Maximum of Logged Data			4.357		SD of logged Data			1.136			
611												
612	Assuming Lognormal Distribution											
613	95% H-UCL		368.8		90% Chebyshev (MVUE) UCL			72.78				
614	95% Chebyshev (MVUE) UCL		91.75		97.5% Chebyshev (MVUE) UCL			118.1				
615	99% Chebyshev (MVUE) UCL		169.8									
616												
617	Nonparametric Distribution Free UCL Statistics											
618	Data appear to follow a Discernible Distribution at 5% Significance Level											
619												
620	Nonparametric Distribution Free UCLs											
621	95% CLT UCL		50.79		95% Jackknife UCL			55.39				
622	95% Standard Bootstrap UCL		49.26		95% Bootstrap-t UCL			151.9				
623	95% Hall's Bootstrap UCL		316.2		95% Percentile Bootstrap UCL			48.75				
624	95% BCA Bootstrap UCL		53.28									
625	90% Chebyshev(Mean, Sd) UCL		67.62		95% Chebyshev(Mean, Sd) UCL			84.5				
626	97.5% Chebyshev(Mean, Sd) UCL		107.9		99% Chebyshev(Mean, Sd) UCL			153.9				
627												
628	Suggested UCL to Use											
629	95% Student's-t UCL		55.39									
630												
631	When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test											
632	When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL											
633												
634	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
635	Recommendations are based upon data size, data distribution, and skewness.											
636	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
637	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
638												

A	B	C	D	E	F	G	H	I	J	K	L
1	UCL Statistics for Uncensored Full Data Sets										
2	Fish										
3	User Selected Options										
4	Date/Time of Computation		ProUCL 5.17/3/2018 10:31:56 AM								
5	From File		Data_Darwin_fish for ProUCL_20180703_a.xls								
6	Full Precision		OFF								
7	Confidence Coefficient		95%								
8	Number of Bootstrap Operations		2000								
9											
10											
11	Perfluoro-n-octanoate acid (PFOA) (estuary)										
12											
13	General Statistics										
14	Total Number of Observations			3		Number of Distinct Observations			3		
15							Number of Missing Observations			108	
16	Minimum			0.04		Mean			0.337		
17	Maximum			0.9		Median			0.07		
18	SD			0.488		Std. Error of Mean			0.282		
19	Coefficient of Variation			1.45		Skewness			1.725		
20											
21	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use										
22	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.										
23	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).										
24	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1										
25											
26	Normal GOF Test										
27	Shapiro Wilk Test Statistic			0.776		Shapiro Wilk GOF Test					
28	5% Shapiro Wilk Critical Value			0.767		Data appear Normal at 5% Significance Level					
29	Lilliefors Test Statistic			0.374		Lilliefors GOF Test					
30	5% Lilliefors Critical Value			0.425		Data appear Normal at 5% Significance Level					
31	Data appear Normal at 5% Significance Level										
32											
33	Assuming Normal Distribution										
34	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
35	95% Student's-t UCL			1.16		95% Adjusted-CLT UCL (Chen-1995)			1.1		
36						95% Modified-t UCL (Johnson-1978)			1.206		
37											
38	Gamma GOF Test										
39	Not Enough Data to Perform GOF Test										
40											
41	Gamma Statistics										
42	k hat (MLE)			0.671		k star (bias corrected MLE)			N/A		
43	Theta hat (MLE)			0.502		Theta star (bias corrected MLE)			N/A		
44	nu hat (MLE)			4.027		nu star (bias corrected)			N/A		
45	MLE Mean (bias corrected)			N/A		MLE Sd (bias corrected)			N/A		
46						Approximate Chi Square Value (0.05)			N/A		
47	Adjusted Level of Significance			N/A		Adjusted Chi Square Value			N/A		
48											
49	Assuming Gamma Distribution										
50	95% Approximate Gamma UCL (use when n>=50))			N/A		95% Adjusted Gamma UCL (use when n<50)			N/A		
51											
52	Lognormal GOF Test										
53	Shapiro Wilk Test Statistic			0.88		Shapiro Wilk Lognormal GOF Test					
54	5% Shapiro Wilk Critical Value			0.767		Data appear Lognormal at 5% Significance Level					
55	Lilliefors Test Statistic			0.322		Lilliefors Lognormal GOF Test					
56	5% Lilliefors Critical Value			0.425		Data appear Lognormal at 5% Significance Level					
57	Data appear Lognormal at 5% Significance Level										

A	B	C	D	E	F	G	H	I	J	K	L
58											
59	Lognormal Statistics										
60	Minimum of Logged Data				-3.219		Mean of logged Data				-1.994
61	Maximum of Logged Data				-0.105		SD of logged Data				1.66
62											
63	Assuming Lognormal Distribution										
64	95% H-UCL				6.134E+10		90% Chebyshev (MVUE) UCL				0.936
65	95% Chebyshev (MVUE) UCL				1.227		97.5% Chebyshev (MVUE) UCL				1.631
66	99% Chebyshev (MVUE) UCL				2.425						
67											
68	Nonparametric Distribution Free UCL Statistics										
69	Data appear to follow a Discernible Distribution at 5% Significance Level										
70											
71	Nonparametric Distribution Free UCLs										
72	95% CLT UCL				0.8		95% Jackknife UCL				1.16
73	95% Standard Bootstrap UCL				N/A		95% Bootstrap-t UCL				N/A
74	95% Hall's Bootstrap UCL				N/A		95% Percentile Bootstrap UCL				N/A
75	95% BCA Bootstrap UCL				N/A						
76	90% Chebyshev(Mean, Sd) UCL				1.182		95% Chebyshev(Mean, Sd) UCL				1.565
77	97.5% Chebyshev(Mean, Sd) UCL				2.097		99% Chebyshev(Mean, Sd) UCL				3.141
78											
79	Suggested UCL to Use										
80	95% Student's-t UCL				1.16						
81											
82	Recommended UCL exceeds the maximum observation										
83											
84	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
85	Recommendations are based upon data size, data distribution, and skewness.										
86	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
87	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
88											
89											
90	Perfluoro-n-octanoate acid (PFOA) (freshwater)										
91											
92	General Statistics										
93	Total Number of Observations				1		Number of Distinct Observations				1
94							Number of Missing Observations				35
95	Minimum				0.34		Mean				0.34
96	Maximum				0.34		Median				0.34
97											
98	Warning: This data set only has 1 observations!										
99	Data set is too small to compute reliable and meaningful statistics and estimates!										
100	The data set for variable Perfluoro-n-octanoate acid (PFOA) (freshwater) was not processed!										
101											
102	It is suggested to collect at least 8 to 10 observations before using these statistical methods!										
103	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.										
104											
105											
106											

A	B	C	D	E	F	G	H	I	J	K	L
107	Perfluoro-n-octane sulfonic acid (PFOS) (estuary)										
108											
109	General Statistics										
110	Total Number of Observations			91		Number of Distinct Observations			59		
111						Number of Missing Observations			20		
112	Minimum			0.3		Mean			14.03		
113	Maximum			160		Median			2.3		
114	SD			25.8		Std. Error of Mean			2.704		
115	Coefficient of Variation			1.839		Skewness			3.422		
116											
117	Normal GOF Test										
118	Shapiro Wilk Test Statistic			0.578		Shapiro Wilk GOF Test					
119	5% Shapiro Wilk P Value			0		Data Not Normal at 5% Significance Level					
120	Lilliefors Test Statistic			0.297		Lilliefors GOF Test					
121	5% Lilliefors Critical Value			0.0931		Data Not Normal at 5% Significance Level					
122	Data Not Normal at 5% Significance Level										
123											
124	Assuming Normal Distribution										
125	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
126	95% Student's-t UCL			18.52		95% Adjusted-CLT UCL (Chen-1995)			19.51		
127						95% Modified-t UCL (Johnson-1978)			18.68		
128											
129	Gamma GOF Test										
130	A-D Test Statistic			4.665		Anderson-Darling Gamma GOF Test					
131	5% A-D Critical Value			0.82		Data Not Gamma Distributed at 5% Significance Level					
132	K-S Test Statistic			0.218		Kolmogorov-Smirnov Gamma GOF Test					
133	5% K-S Critical Value			0.0992		Data Not Gamma Distributed at 5% Significance Level					
134	Data Not Gamma Distributed at 5% Significance Level										
135											
136	Gamma Statistics										
137	k hat (MLE)			0.494		k star (bias corrected MLE)			0.485		
138	Theta hat (MLE)			28.39		Theta star (bias corrected MLE)			28.92		
139	nu hat (MLE)			89.91		nu star (bias corrected)			88.28		
140	MLE Mean (bias corrected)			14.03		MLE Sd (bias corrected)			20.14		
141						Approximate Chi Square Value (0.05)			67.62		
142	Adjusted Level of Significance			0.0474		Adjusted Chi Square Value			67.33		
143											
144	Assuming Gamma Distribution										
145	95% Approximate Gamma UCL (use when n>=50))			18.31		95% Adjusted Gamma UCL (use when n<50)			18.39		
146											
147	Lognormal GOF Test										
148	Shapiro Wilk Test Statistic			0.909		Shapiro Wilk Lognormal GOF Test					
149	5% Shapiro Wilk P Value			4.9126E-7		Data Not Lognormal at 5% Significance Level					
150	Lilliefors Test Statistic			0.136		Lilliefors Lognormal GOF Test					
151	5% Lilliefors Critical Value			0.0931		Data Not Lognormal at 5% Significance Level					
152	Data Not Lognormal at 5% Significance Level										
153											
154	Lognormal Statistics										
155	Minimum of Logged Data			-1.204		Mean of logged Data			1.353		
156	Maximum of Logged Data			5.075		SD of logged Data			1.633		
157											
158	Assuming Lognormal Distribution										
159	95% H-UCL			24.34		90% Chebyshev (MVUE) UCL			24.64		
160	95% Chebyshev (MVUE) UCL			29.37		97.5% Chebyshev (MVUE) UCL			35.93		
161	99% Chebyshev (MVUE) UCL			48.82							
162											
163	Nonparametric Distribution Free UCL Statistics										
164	Data do not follow a Discernible Distribution (0.05)										

A	B	C	D	E	F	G	H	I	J	K	L	
165												
166	Nonparametric Distribution Free UCLs											
167	95% CLT UCL			18.47	95% Jackknife UCL			18.52				
168	95% Standard Bootstrap UCL			18.3	95% Bootstrap-t UCL			20.13				
169	95% Hall's Bootstrap UCL			20.41	95% Percentile Bootstrap UCL			18.74				
170	95% BCA Bootstrap UCL			19.69								
171	90% Chebyshev(Mean, Sd) UCL			22.14	95% Chebyshev(Mean, Sd) UCL			25.81				
172	97.5% Chebyshev(Mean, Sd) UCL			30.91	99% Chebyshev(Mean, Sd) UCL			40.93				
173												
174	Suggested UCL to Use											
175	95% Chebyshev (Mean, Sd) UCL			25.81								
176												
177	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
178	Recommendations are based upon data size, data distribution, and skewness.											
179	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
180	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
181												
182												
183	Perfluoro-n-octane sulfonic acid (PFOS) (freshwater)											
184												
185	General Statistics											
186	Total Number of Observations			36	Number of Distinct Observations			32				
187					Number of Missing Observations			0				
188	Minimum			5.8	Mean			434.5				
189	Maximum			1600	Median			330				
190	SD			417.8	Std. Error of Mean			69.63				
191	Coefficient of Variation			0.961	Skewness			1.218				
192												
193	Normal GOF Test											
194	Shapiro Wilk Test Statistic			0.851	Shapiro Wilk GOF Test							
195	5% Shapiro Wilk Critical Value			0.935	Data Not Normal at 5% Significance Level							
196	Lilliefors Test Statistic			0.19	Lilliefors GOF Test							
197	5% Lilliefors Critical Value			0.145	Data Not Normal at 5% Significance Level							
198	Data Not Normal at 5% Significance Level											
199												
200	Assuming Normal Distribution											
201	95% Normal UCL				95% UCLs (Adjusted for Skewness)							
202	95% Student's-t UCL			552.1	95% Adjusted-CLT UCL (Chen-1995)			564.1				
203					95% Modified-t UCL (Johnson-1978)			554.5				
204												
205	Gamma GOF Test											
206	A-D Test Statistic			0.266	Anderson-Darling Gamma GOF Test							
207	5% A-D Critical Value			0.778	Detected data appear Gamma Distributed at 5% Significance Level							
208	K-S Test Statistic			0.0925	Kolmogorov-Smirnov Gamma GOF Test							
209	5% K-S Critical Value			0.151	Detected data appear Gamma Distributed at 5% Significance Level							
210	Detected data appear Gamma Distributed at 5% Significance Level											
211												
212	Gamma Statistics											
213	k hat (MLE)			0.961	k star (bias corrected MLE)			0.899				
214	Theta hat (MLE)			452.3	Theta star (bias corrected MLE)			483.2				
215	nu hat (MLE)			69.17	nu star (bias corrected)			64.74				
216	MLE Mean (bias corrected)			434.5	MLE Sd (bias corrected)			458.2				
217					Approximate Chi Square Value (0.05)			47.23				
218	Adjusted Level of Significance			0.0428	Adjusted Chi Square Value			46.55				
219												
220	Assuming Gamma Distribution											
221	95% Approximate Gamma UCL (use when n>=50)			595.6	95% Adjusted Gamma UCL (use when n<50)			604.3				
222												

A	B	C	D	E	F	G	H	I	J	K	L	
223	Lognormal GOF Test											
224	Shapiro Wilk Test Statistic				0.94	Shapiro Wilk Lognormal GOF Test						
225	5% Shapiro Wilk Critical Value				0.935	Data appear Lognormal at 5% Significance Level						
226	Lilliefors Test Statistic				0.154	Lilliefors Lognormal GOF Test						
227	5% Lilliefors Critical Value				0.145	Data Not Lognormal at 5% Significance Level						
228	Data appear Approximate Lognormal at 5% Significance Level											
229												
230	Lognormal Statistics											
231	Minimum of Logged Data				1.758	Mean of logged Data				5.47		
232	Maximum of Logged Data				7.378	SD of logged Data				1.317		
233												
234	Assuming Lognormal Distribution											
235	95% H-UCL				1046	90% Chebyshev (MVUE) UCL				985		
236	95% Chebyshev (MVUE) UCL				1186	97.5% Chebyshev (MVUE) UCL				1464		
237	99% Chebyshev (MVUE) UCL				2011							
238												
239	Nonparametric Distribution Free UCL Statistics											
240	Data appear to follow a Discernible Distribution at 5% Significance Level											
241												
242	Nonparametric Distribution Free UCLs											
243	95% CLT UCL				549	95% Jackknife UCL				552.1		
244	95% Standard Bootstrap UCL				547.4	95% Bootstrap-t UCL				572.9		
245	95% Hall's Bootstrap UCL				571.1	95% Percentile Bootstrap UCL				545.6		
246	95% BCA Bootstrap UCL				555.6							
247	90% Chebyshev(Mean, Sd) UCL				643.4	95% Chebyshev(Mean, Sd) UCL				738		
248	97.5% Chebyshev(Mean, Sd) UCL				869.3	99% Chebyshev(Mean, Sd) UCL				1127		
249												
250	Suggested UCL to Use											
251	95% Adjusted Gamma UCL				604.3							
252												
253	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
254	Recommendations are based upon data size, data distribution, and skewness.											
255	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
256	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
257												

A	B	C	D	E	F	G	H	I	J	K	L	
1	UCL Statistics for Uncensored Full Data Sets											
2	Fish by Media											
3	User Selected Options											
4	Date/Time of Computation	ProUCL 5.16/8/2018 10:03:12 AM										
5	From File	Data_Darwin_fish for ProUCL_20180607_a.xls										
6	Full Precision	OFF										
7	Confidence Coefficient	95%										
8	Number of Bootstrap Operations	2000										
9												
10												
11	Perfluoro-n-octanoate acid (PFOA) (EMPTY)											
12												
13	General Statistics											
14	Total Number of Observations	1						Number of Distinct Observations	1			
15								Number of Missing Observations	8			
16		Minimum	0.34						Mean	0.34		
17		Maximum	0.34						Median	0.34		
18												
19	Warning: This data set only has 1 observations!											
20	Data set is too small to compute reliable and meaningful statistics and estimates!											
21	The data set for variable Perfluoro-n-octanoate acid (PFOA) (EMPTY) was not processed!											
22												
23	It is suggested to collect at least 8 to 10 observations before using these statistical methods!											
24	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.											
25												
26												
27												
28	Perfluoro-n-octanoate acid (PFOA) (estuary)											
29												
30	General Statistics											
31	Total Number of Observations	0						Number of Distinct Observations	0			
32								Number of Missing Observations	83			
33		Minimum	N/A						Mean	N/A		
34		Maximum	N/A						Median	N/A		
35												
36	Warning: This data set only has 0 observations!											
37	Data set is too small to compute reliable and meaningful statistics and estimates!											
38	The data set for variable Perfluoro-n-octanoate acid (PFOA) (estuary) was not processed!											
39												
40	It is suggested to collect at least 8 to 10 observations before using these statistical methods!											
41	If possible, compute and collect Data Quality Objectives (DQO) based sample size and analytical results.											
42												
43												
44												
45	Perfluoro-n-octanoate acid (PFOA) (freshwater)											
46												
47	General Statistics											
48	Total Number of Observations	3						Number of Distinct Observations	3			
49								Number of Missing Observations	52			
50		Minimum	0.04						Mean	0.337		
51		Maximum	0.9						Median	0.07		
52		SD	0.488						Std. Error of Mean	0.282		
53		Coefficient of Variation	1.45						Skewness	1.725		
54												
55	Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use											
56	guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.											
57	For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).											
58	Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.1											

A	B	C	D	E	F	G	H	I	J	K	L
59											
60	Normal GOF Test										
61	Shapiro Wilk Test Statistic	0.776	Shapiro Wilk GOF Test								
62	5% Shapiro Wilk Critical Value	0.767	Data appear Normal at 5% Significance Level								
63	Lilliefors Test Statistic	0.374	Lilliefors GOF Test								
64	5% Lilliefors Critical Value	0.425	Data appear Normal at 5% Significance Level								
65	Data appear Normal at 5% Significance Level										
66											
67	Assuming Normal Distribution										
68	95% Normal UCL				95% UCLs (Adjusted for Skewness)						
69	95% Student's-t UCL	1.16	95% Adjusted-CLT UCL (Chen-1995)					1.1			
70			95% Modified-t UCL (Johnson-1978)					1.206			
71											
72	Gamma GOF Test										
73	Not Enough Data to Perform GOF Test										
74											
75	Gamma Statistics										
76	k hat (MLE)	0.671	k star (bias corrected MLE)					N/A			
77	Theta hat (MLE)	0.502	Theta star (bias corrected MLE)					N/A			
78	nu hat (MLE)	4.027	nu star (bias corrected)					N/A			
79	MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)					N/A			
80			Approximate Chi Square Value (0.05)					N/A			
81	Adjusted Level of Significance	N/A	Adjusted Chi Square Value					N/A			
82											
83	Assuming Gamma Distribution										
84	95% Approximate Gamma UCL (use when n>=50))	N/A	95% Adjusted Gamma UCL (use when n<50)					N/A			
85											
86	Lognormal GOF Test										
87	Shapiro Wilk Test Statistic	0.88	Shapiro Wilk Lognormal GOF Test								
88	5% Shapiro Wilk Critical Value	0.767	Data appear Lognormal at 5% Significance Level								
89	Lilliefors Test Statistic	0.322	Lilliefors Lognormal GOF Test								
90	5% Lilliefors Critical Value	0.425	Data appear Lognormal at 5% Significance Level								
91	Data appear Lognormal at 5% Significance Level										
92											
93	Lognormal Statistics										
94	Minimum of Logged Data	-3.219	Mean of logged Data					-1.994			
95	Maximum of Logged Data	-0.105	SD of logged Data					1.66			
96											
97	Assuming Lognormal Distribution										
98	95% H-UCL	6.134E+10	90% Chebyshev (MVUE) UCL					0.936			
99	95% Chebyshev (MVUE) UCL	1.227	97.5% Chebyshev (MVUE) UCL					1.631			
100	99% Chebyshev (MVUE) UCL	2.425									
101											
102	Nonparametric Distribution Free UCL Statistics										
103	Data appear to follow a Discernible Distribution at 5% Significance Level										
104											
105	Nonparametric Distribution Free UCLs										
106	95% CLT UCL	0.8	95% Jackknife UCL					1.16			
107	95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL					N/A			
108	95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL					N/A			
109	95% BCA Bootstrap UCL	N/A									
110	90% Chebyshev(Mean, Sd) UCL	1.182	95% Chebyshev(Mean, Sd) UCL					1.565			
111	97.5% Chebyshev(Mean, Sd) UCL	2.097	99% Chebyshev(Mean, Sd) UCL					3.141			
112											
113	Suggested UCL to Use										
114	95% Student's-t UCL	1.16									
115											
116	Recommended UCL exceeds the maximum observation										
117											
118	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
119	Recommendations are based upon data size, data distribution, and skewness.										
120	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
121	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										

A	B	C	D	E	F	G	H	I	J	K	L	
185	Nonparametric Distribution Free UCL Statistics											
186	Data appear to follow a Discernible Distribution at 5% Significance Level											
187												
188	Nonparametric Distribution Free UCLs											
189	95% CLT UCL			91.6	95% Jackknife UCL			94.46				
190	95% Standard Bootstrap UCL			90.41	95% Bootstrap-t UCL			95.91				
191	95% Hall's Bootstrap UCL			87.37	95% Percentile Bootstrap UCL			90.67				
192	95% BCA Bootstrap UCL			90.33								
193	90% Chebyshev(Mean, Sd) UCL			109.7	95% Chebyshev(Mean, Sd) UCL			127.8				
194	97.5% Chebyshev(Mean, Sd) UCL			152.9	99% Chebyshev(Mean, Sd) UCL			202.3				
195												
196	Suggested UCL to Use											
197	95% Student's-t UCL			94.46								
198												
199	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
200	Recommendations are based upon data size, data distribution, and skewness.											
201	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
202	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
203												
204												
205	Perfluoro-n-octane sulfonic acid (PFOS) (estuary)											
206												
207	General Statistics											
208	Total Number of Observations			65	Number of Distinct Observations			39				
209					Number of Missing Observations			18				
210	Minimum			0.3	Mean			6.72				
211	Maximum			45	Median			1.5				
212	SD			10.91	Std. Error of Mean			1.353				
213	Coefficient of Variation			1.624	Skewness			2.001				
214												
215	Normal GOF Test											
216	Shapiro Wilk Test Statistic			0.621	Shapiro Wilk GOF Test							
217	5% Shapiro Wilk P Value			0	Data Not Normal at 5% Significance Level							
218	Lilliefors Test Statistic			0.368	Lilliefors GOF Test							
219	5% Lilliefors Critical Value			0.11	Data Not Normal at 5% Significance Level							
220	Data Not Normal at 5% Significance Level											
221												
222	Assuming Normal Distribution											
223	95% Normal UCL				95% UCLs (Adjusted for Skewness)							
224	95% Student's-t UCL			8.979	95% Adjusted-CLT UCL (Chen-1995)			9.305				
225					95% Modified-t UCL (Johnson-1978)			9.035				
226												
227	Gamma GOF Test											
228	A-D Test Statistic			5.816	Anderson-Darling Gamma GOF Test							
229	5% A-D Critical Value			0.809	Data Not Gamma Distributed at 5% Significance Level							
230	K-S Test Statistic			0.27	Kolmogorov-Smirnov Gamma GOF Test							
231	5% K-S Critical Value			0.116	Data Not Gamma Distributed at 5% Significance Level							
232	Data Not Gamma Distributed at 5% Significance Level											
233												
234	Gamma Statistics											
235	k hat (MLE)			0.573	k star (bias corrected MLE)			0.557				
236	Theta hat (MLE)			11.72	Theta star (bias corrected MLE)			12.06				
237	nu hat (MLE)			74.52	nu star (bias corrected)			72.41				
238	MLE Mean (bias corrected)			6.72	MLE Sd (bias corrected)			9.004				
239					Approximate Chi Square Value (0.05)			53.82				
240	Adjusted Level of Significance			0.0463	Adjusted Chi Square Value			53.46				
241												
242	Assuming Gamma Distribution											
243	95% Approximate Gamma UCL (use when n>=50))			9.042	95% Adjusted Gamma UCL (use when n<50)			9.103				
244												
245	Lognormal GOF Test											
246	Shapiro Wilk Test Statistic			0.864	Shapiro Wilk Lognormal GOF Test							
247	5% Shapiro Wilk P Value			6.8631E-8	Data Not Lognormal at 5% Significance Level							
248	Lilliefors Test Statistic			0.169	Lilliefors Lognormal GOF Test							
249	5% Lilliefors Critical Value			0.11	Data Not Lognormal at 5% Significance Level							
250	Data Not Lognormal at 5% Significance Level											

A	B	C	D	E	F	G	H	I	J	K	L
251											
252	Lognormal Statistics										
253	Minimum of Logged Data			-1.204		Mean of logged Data			0.82		
254	Maximum of Logged Data			3.807		SD of logged Data			1.402		
255											
256	Assuming Lognormal Distribution										
257	95% H-UCL			9.071		90% Chebyshev (MVUE) UCL			9.949		
258	95% Chebyshev (MVUE) UCL			11.79		97.5% Chebyshev (MVUE) UCL			14.34		
259	99% Chebyshev (MVUE) UCL			19.35							
260											
261	Nonparametric Distribution Free UCL Statistics										
262	Data do not follow a Discernible Distribution (0.05)										
263											
264	Nonparametric Distribution Free UCLs										
265	95% CLT UCL			8.946		95% Jackknife UCL			8.979		
266	95% Standard Bootstrap UCL			8.921		95% Bootstrap-t UCL			9.542		
267	95% Hall's Bootstrap UCL			9.185		95% Percentile Bootstrap UCL			8.971		
268	95% BCA Bootstrap UCL			9.397							
269	90% Chebyshev(Mean, Sd) UCL			10.78		95% Chebyshev(Mean, Sd) UCL			12.62		
270	97.5% Chebyshev(Mean, Sd) UCL			15.17		99% Chebyshev(Mean, Sd) UCL			20.19		
271											
272	Suggested UCL to Use										
273	95% Chebyshev (Mean, Sd) UCL			12.62							
274											
275	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.										
276	Recommendations are based upon data size, data distribution, and skewness.										
277	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).										
278	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.										
279											
280											
281	Perfluoro-n-octane sulfonic acid (PFOS) (freshwater)										
282											
283	General Statistics										
284	Total Number of Observations			53		Number of Distinct Observations			47		
285						Number of Missing Observations			2		
286	Minimum			0.9		Mean			299.1		
287	Maximum			1600		Median			110		
288	SD			396.4		Std. Error of Mean			54.46		
289	Coefficient of Variation			1.325		Skewness			1.636		
290											
291	Normal GOF Test										
292	Shapiro Wilk Test Statistic			0.756		Shapiro Wilk GOF Test					
293	5% Shapiro Wilk P Value			3.391E-11		Data Not Normal at 5% Significance Level					
294	Lilliefors Test Statistic			0.226		Lilliefors GOF Test					
295	5% Lilliefors Critical Value			0.121		Data Not Normal at 5% Significance Level					
296	Data Not Normal at 5% Significance Level										
297											
298	Assuming Normal Distribution										
299	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
300	95% Student's-t UCL			390.3		95% Adjusted-CLT UCL (Chen-1995)			401.8		
301						95% Modified-t UCL (Johnson-1978)			392.4		
302											
303	Gamma GOF Test										
304	A-D Test Statistic			0.684		Anderson-Darling Gamma GOF Test					
305	5% A-D Critical Value			0.821		Detected data appear Gamma Distributed at 5% Significance Level					
306	K-S Test Statistic			0.111		Kolmogorov-Smirnov Gamma GOF Test					
307	5% K-S Critical Value			0.13		Detected data appear Gamma Distributed at 5% Significance Level					
308	Detected data appear Gamma Distributed at 5% Significance Level										
309											
310	Gamma Statistics										
311	k hat (MLE)			0.472		k star (bias corrected MLE)			0.458		
312	Theta hat (MLE)			633.1		Theta star (bias corrected MLE)			652.7		
313	nu hat (MLE)			50.08		nu star (bias corrected)			48.58		
314	MLE Mean (bias corrected)			299.1		MLE Sd (bias corrected)			441.9		
315						Approximate Chi Square Value (0.05)			33.58		
316	Adjusted Level of Significance			0.0455		Adjusted Chi Square Value			33.23		

	A	B	C	D	E	F	G	H	I	J	K	L
317												
318	Assuming Gamma Distribution											
319	95% Approximate Gamma UCL (use when n>=50)				432.8		95% Adjusted Gamma UCL (use when n<50)				437.3	
320												
321	Lognormal GOF Test											
322	Shapiro Wilk Test Statistic				0.93		Shapiro Wilk Lognormal GOF Test					
323	5% Shapiro Wilk P Value				0.00506		Data Not Lognormal at 5% Significance Level					
324	Lilliefors Test Statistic				0.143		Lilliefors Lognormal GOF Test					
325	5% Lilliefors Critical Value				0.121		Data Not Lognormal at 5% Significance Level					
326	Data Not Lognormal at 5% Significance Level											
327												
328	Lognormal Statistics											
329	Minimum of Logged Data				-0.105		Mean of logged Data				4.345	
330	Maximum of Logged Data				7.378		SD of logged Data				2.071	
331												
332	Assuming Lognormal Distribution											
333	95% H-UCL				1909		90% Chebyshev (MVUE) UCL				1330	
334	95% Chebyshev (MVUE) UCL				1667		97.5% Chebyshev (MVUE) UCL				2135	
335	99% Chebyshev (MVUE) UCL				3053							
336												
337	Nonparametric Distribution Free UCL Statistics											
338	Data appear to follow a Discernible Distribution at 5% Significance Level											
339												
340	Nonparametric Distribution Free UCLs											
341	95% CLT UCL				388.7		95% Jackknife UCL				390.3	
342	95% Standard Bootstrap UCL				389.3		95% Bootstrap-t UCL				406.3	
343	95% Hall's Bootstrap UCL				409.1		95% Percentile Bootstrap UCL				391.7	
344	95% BCA Bootstrap UCL				405.6							
345	90% Chebyshev(Mean, Sd) UCL				462.5		95% Chebyshev(Mean, Sd) UCL				536.5	
346	97.5% Chebyshev(Mean, Sd) UCL				639.2		99% Chebyshev(Mean, Sd) UCL				841	
347												
348	Suggested UCL to Use											
349	95% Adjusted Gamma UCL				437.3							
350												
351	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
352	Recommendations are based upon data size, data distribution, and skewness.											
353	These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).											
354	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.											
355												