



12 April 2019

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Our ref: 2127877
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Dear Melanie and Mauricio

FRNSW Alexandria UST Sampling

1 Background

A 225,000 Litre Underground Storage Tank (UST) is located adjacent to entrance on the southern side of the Fire and Rescue New South Wales (FRNSW) Alexandria Site. This UST was historically used for the capture and storage of water used for fire-fighting training. The use of the UST for this purpose ceased in the early 2000's however stormwater collected from the training area drainage system still flows into the UST. The dimensions of the tank are approximately 11 m x 8 m x 4.5 m. The tank is designed so that the water will fill to a maximum level of approximately 2.875 m from the bottom of the tank and then will overflow into the stormwater discharge drain, which runs from the site to Sheas Creek.

FRNSW was concerned the UST held water and sediments containing high concentrations and Per- and poly- fluoroalkyl substances (PFAS) which may have been acting as a potential secondary source of PFAS contamination. FRNSW engaged GHD Pty Ltd (GHD) to collect samples of the water to identify the concentration of PFAS and other contaminants in this water to help inform disposal options (if required).

2 Objective

GHD's objectives were as follows:

- To collect representative samples of water from the UST and to assess the concentration of PFAS within this water.
- To assess the volume of water current remaining within the UST.
- To assess the condition of the UST including the number and condition of inlets/outlets (this scope item was put on hold pending sampling results).

3 Scope

To complete the objectives listed above, GHD undertook the following scope of work:

- Update of Job Safety and Environmental Assessment (JSEA).
- Gauging of the UST using an interface probe to assess the depth and volume of water.

- Collection of two primary samples and one duplicate sample of water within the tank (one sample collected from the centre of the tank, approximately 2.5 m below ground level (bgl)) and one collected from as close as practicable to the base of the tank, 4.3 m bgl). This allowed water that had settled and stratified over time to be sampled. Samples were collected as “grab” samples collected from the specified depth using a peristaltic pump at low flow rate with no purging being undertaken. A duplicate sample was also collected for QAQC purposes. Samples were collected using a low flow peristaltic pump with the inlet depth determined by attaching the HDPE tubing to the interface probe using HDPE zip ties.
- Samples were analysed for the following analytical suite (as requested by FRNSW):
 - PFAS suite (standard LOR)
 - Major anions
 - Minor anions
 - Total Alkalinity
 - PH
 - Electrical Conductivity
 - Total Organic Carbon
 - Total Recoverable Hydrocarbons (TRH)
 - Oils and grease
 - Volatile Organic Compounds
 - Total Suspended Solids
 - Specific Gravity
 - Free Chlorine
 - Heavy Metals

4 Field Observations

Access to the UST was via a grated manhole cover. Upon arrival at the site, it was noted that leaves and debris had accumulated over the grated cover. These were cleared and the cover opened so that the water in the UST could be observed. The water was still and had leaves and debris on the surface. During sampling from the centre of the UST, the water collected was noted to be generally clear and had a stagnant/decay odour. During sampling from close to the base of the UST, the water was also noted to be clear but contained black sediment particles which were observed flowing into the sampling bottles. The deeper sample also had a strong stagnant/decay odour. The outflows of the UST could not be observed via the manhole however it is understood that when the UST spills over, the water flows into Sheas Creek (underground stormwater culvert) via a 450 mm pipe (observed during previous confined space works at the site).

5 Results

GHD submitted the two primary samples and one duplicate samples to a NATA accredited laboratory for analysis. The results of this analysis are provided in **Tables 1** and **2**.

Table 1 provides a summary of the PFAS results compared against the NEMP 2018 Heath Based Guidance Values for Drinking Water and Recreational Use of water as well as Aquatic Ecosystems Freshwater Guideline Values (95% species protection). It is acknowledged that the water within the UST is unlikely to be consumed or used recreationally however during wet weather events, it is diluted and has the potential to be released to the environment. These guideline values are applied for comparison purposes against the samples previously collected at the outflows of the site and to provide wider context around the levels of PFAS reported in the samples. GHD notes that the assessment of potential risks associated with the water within the UST was beyond the scope of this targeted sampling from the UST.

It is noted that measured concentrations of PFAS and heavy metals were detected above the laboratory LOR. There were no detections of TRH or VOC's with the exception of Toluene in samples collected from close to the base of the UST.

The measured concentration of PFOS exceeded the NEMP 2018 Aquatic Ecosystems Freshwater (95% Species protection) criterion in the three samples analysed (two primary and one duplicate).

The summed concentrations of PFOS and PFHxS exceeded the NEMP 2018 Health Based Guideline Value for Drinking Water in the three samples analysed (two primary and one duplicate)

Table 2 provides the results of all other analytes. Screening criteria have not been applied as this data was gathered to inform management options for the tank contents.

6 Quality Assurance/ Quality Control

6.1 Field QAQC

Given the scope of this sampling event was to collect two grab samples from a single UST, there was no opportunity for cross contamination to occur between the samples. However, several quality control measures were utilised to ensure the representativeness and integrity of samples and accuracy and reliability of analytical results. These measures included:

- Dedicated disposable tubing was used to collect the samples, and the samples were collected in laboratory supplied containers.
- Sampling was undertaken by an experienced GHD Senior Environmental Scientist.
- Sample identification procedures - samples were immediately transferred to sample containers of appropriate composition and preservation for the required laboratory analysis. All sample containers were clearly labelled with a sample number, job number, and sample date. The sample containers were then transferred to a chilled insulated container for sample preservation prior to and during shipment to the analytical laboratory.
- Chain of custody information requirements - a chain of custody form was completed and forwarded to the testing laboratory with the samples.

- **Blind duplicate:** Blind replicates are used to identify the variation in the analyte concentration between samples from the same sampling point and the repeatability of the laboratory's analysis. The results of the blind duplicate (QA01) are provided in Table 3 with calculated relative percentage differences (RPD) between the blind duplicate and the primary sample.

6.2 Laboratory QAQC

Laboratory methods used by the primary laboratory were suitable for environmental contaminant analysis and are based on established internationally recognised procedures such as those published by the United States Environmental Protection Agency (US EPA), American Public Health Association (APHA), AS and National Environment Protection (Assessment of Site Contamination) Measure (NEPM).

The individual testing laboratory conducted an assessment of the laboratory QC program however the results were also independently reviewed and assessed internally by GHD. Recovery targets are defined in the Eurofins QA/QC section of the certificates of analysis reports. All laboratory QA/QC results are documented with the laboratory certificates of analysis appended to this letter.

6.3 Duplicate Results

Duplicate RPD's are presented in **Table 3**. It is noted that variation in heavy metal concentrations have caused elevated RPD's that exceed the nominated acceptance criteria. When the concentration of an analyte in one sample is low and the concentration in the other sample is non detect, this can give rise to large RPD value but does not cast doubt on the overall integrity of the data. The elevated RPD's for heavy metals in these samples are not considered to affect the integrity of the data.

7 Conclusions

Based on the field observations and analytical data, and subject to the limitations presented in Section 7 of this letter, the following conclusions are made:

- The total depth of the tank was measured to be 4.375 m bgl, with a standing water level of 1.50 m bgl. This equates to a water depth of 2.875 m in the UST.
- The water collected was clear but contained sediment particles (noted in deeper sample UST_4.3) and had a stagnant odour.
- The analytical results confirm the presence of PFAS within the water in the UST. The summed concentration of PFHxS and PFOS exceeded the NEMP (2018) Human Health drinking water criteria and the concentration of PFOS exceeded the NEMP (2018) Aquatic Ecosystems Freshwater guidelines (95% species protection). The drinking water screening criteria is conservative in this case, as the likelihood of consumption of this water is very low as it is discharging into a subsurface concrete lined culvert and ultimately into Alexandria Canal (not publically accessible and containing tidal brackish water). The ecological guidelines are also considered conservative as the receiving water bodies are highly disturbed ecosystems however detailed evaluation of potential risk to receptors was beyond the scope of this limited sampling program.

- There were detections of other analytes in the samples collected, specifically heavy metals and toluene however these results were provided to inform management options for disposal and therefore were not screened against environmental or human health based criteria.

8 Limitations

This report has been prepared by GHD for FRNSW and may only be used and relied on by FRNSW for the purpose agreed between GHD and FRNSW as set out in this report. The conclusions and recommendations in this report are based on conditions encountered, and information reviewed, at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as site accessibility, location of buildings, services and operational constraints. As a result, not all relevant site features and conditions may have been identified in this report.

Sincerely
GHD



John Ewing

Team Leader - Contamination and Environmental Management
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Appendix A

Table 1

Table 2

Table 3

Laboratory Results



Appendix A
Table 1
PFAS Results Summary

	Organic																																					
	Perfluoropropanesulfonic acid (PFPrS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTriDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (MeFOSA)	N-Ethyl perfluorooctane sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	4:2 Fluorotelomer sulfonic acid (4:2 FTS)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	10:2 Fluorotelomer sulfonic acid (10:2 FTS)	PFAS (Sum of Total)	Sum of PFHxS and PFOS	PFAS (Sum of Total)(WA DER List)	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	Perfluoronane sulfonate (PFNS)			
	UG/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		
EQL	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.05	0.01	0.01	0.01	0.1	0.01	0.01	0.05	0.01	0.01	0.01	
PFAS NEMP 2018 Freshwater 95%						0.13																																
PFAS NEMP 2018 Health Drinking Water																																						0.07
PFAS NEMP 2018 Health Recreational Water																																						0.7

Field ID	Location Code	Sampled Date Time	<0.01	0.02	0.02	0.15	0.01	0.38	<0.01	0.05	0.03	0.09	0.02	0.06	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	0.06	0.02	<0.01	0.92	0.53	0.88	0.44	0.59	<0.01
QA01	UST_4.3	28/02/2019	<0.01	0.02	0.02	0.15	0.01	0.38	<0.01	0.05	0.03	0.09	0.02	0.06	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	0.06	0.02	<0.01	0.92	0.53	0.88	0.44	0.59	<0.01	
UST_2.5	UST_2.5	28/02/2019	<0.01	0.01	0.01	0.12	<0.01	0.31	<0.01	<0.05	0.04	0.06	0.01	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	0.02	<0.01	0.61	0.43	0.59	0.33	0.45	<0.01	
UST_4.3	UST_4.3	28/02/2019	<0.01	0.02	0.02	0.15	0.01	0.47	<0.01	0.06	0.05	0.1	0.02	0.06	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	0.07	0.02	<0.01	1.06	0.62	1.02	0.53	0.68	<0.01		

Statistical Summary																																					
Number of Results	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Number of Detects	0	3	3	3	2	3	0	2	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	3	3	3	3	3	3	0	
Minimum Concentration	<0.01	0.01	0.01	0.12	<0.01	0.31	<0.01	<0.05	0.03	0.06	0.01	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	0.02	<0.01	0.61	0.43	0.59	0.33	0.45	<0.01		
Minimum Detect	ND	0.01	0.01	0.12	0.01	0.31	ND	0.05	0.03	0.06	0.01	0.02	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	0.02	ND	0.61	0.43	0.59	0.33	0.45	ND		
Maximum Concentration	<0.01	0.02	0.02	0.15	0.01	0.47	<0.01	0.06	0.05	0.1	0.02	0.06	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	0.07	0.02	<0.01	1.06	0.62	1.02	0.53	0.68	<0.01			
Maximum Detect	ND	0.02	0.02	0.15	0.01	0.47	ND	0.06	0.05	0.1	0.02	0.06	0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.07	0.02	ND	1.06	0.62	1.02	0.53	0.68	ND			
Average Concentration	0.005	0.017	0.017	0.14	0.0083	0.39	0.005	0.045	0.04	0.083	0.017	0.047	0.01	0.005	0.005	0.005	0.005	0.005	0.005	0.025	0.025	0.025	0.025	0.025	0.025	0.005	0.052	0.02	0.005	0.86	0.53	0.83	0.43	0.57	0.005		
Median Concentration	0.005	0.02	0.02	0.15	0.01	0.38	0.005	0.05	0.04	0.09	0.02	0.06	0.01	0.005	0.005	0.005	0.005	0.005	0.005	0.025	0.025	0.025	0.025	0.025	0.025	0.005	0.06	0.02	0.005	0.92	0.53	0.88	0.44	0.59	0.005		
Standard Deviation	0	0.0058	0.0058	0.017	0.0029	0.08	0	0.018	0.01	0.021	0.0058	0.023	0	0	0	0	0	0	0	0	0	0	0	0	0	0.024	0	0	0.23	0.095	0.22	0.1	0.12	0			
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Appendix A
Table 2
Results Summary

Field ID	Heavy Metal								Heavy Metals					Inorganic																															
	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Calcium	Magnesium	Potassium	Sodium	Chlorine (Free Residual)	pH (Lab)	Electrical conductivity (lab)	Turbidity	Total Suspended Solids	Alkalinity (Carbonate as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Nitrate (as N)	Oil & Grease	Total Organic Carbon	Chloride	Sulfate	Perfluoropropanesulfonic acid (PFPrS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)			
EQL	0.001	0.0002	0.001	0.001	0.001	0.0001	0.001	0.005	0.5	0.5	0.5	0.5	0.1	0.1	1	1	1	10	20	20	20	0.02	10	5	1	5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Field ID	Location Code	Sampled Date Time	Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Calcium	Magnesium	Potassium	Sodium	Chlorine (Free Residual)	pH (Lab)	Electrical conductivity (lab)	Turbidity	Total Suspended Solids	Alkalinity (Carbonate as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Nitrate (as N)	Oil & Grease	Total Organic Carbon	Chloride	Sulfate	Perfluoropropanesulfonic acid (PFPrS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)
QA01	UST_4.3	28/02/2019	<0.001	<0.0002	<0.001	0.005	0.002	<0.0001	0.001	0.15	26	4.4	3.5	11	<0.1	7.5	260	47	29	<10	100	<20	100	<0.02	<10	14	11	<5	<0.01	0.02	0.02	0.15	0.01	0.38	<0.01	0.05	0.03	0.09	0.02	0.06	0.01	<0.01	<0.01	<0.01
UST_2.5	UST_2.5	28/02/2019	<0.001	<0.0002	0.003	0.005	0.001	<0.0001	0.002	0.086	7.6	1.9	1.3	9.9	<0.1	7.5	110	3	1.5	<10	22	<20	22	<0.02	<10	6.4	14	6.7	<0.01	0.01	0.01	0.12	<0.01	0.31	<0.01	<0.05	0.04	0.06	0.01	0.02	0.01	<0.01	<0.01	<0.01
UST_4.3	UST_4.3	28/02/2019	0.005	0.0007	0.022	0.15	0.084	<0.0001	0.019	2.3	32	5.7	3.8	11	<0.1	7.4	270	42	27	<10	110	<20	110	<0.02	<10	17	14	<5	<0.01	0.02	0.02	0.15	0.01	0.47	<0.01	0.06	0.05	0.1	0.02	0.06	0.01	<0.01	<0.01	<0.01

Statistical Summary			Arsenic	Cadmium	Chromium (III+VI)	Copper	Lead	Mercury	Nickel	Zinc	Calcium	Magnesium	Potassium	Sodium	Chlorine (Free Residual)	pH (Lab)	Electrical conductivity (lab)	Turbidity	Total Suspended Solids	Alkalinity (Carbonate as CaCO3)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Hydroxide as CaCO3)	Alkalinity (total as CaCO3)	Nitrate (as N)	Oil & Grease	Total Organic Carbon	Chloride	Sulfate	Perfluoropropanesulfonic acid (PFPrS)	Perfluorobutane sulfonic acid (PFBS)	Perfluoropentane sulfonic acid (PFPeS)	Perfluorohexane sulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorodecanesulfonic acid (PFDS)	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)		
Number of Results	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Number of Detects	1	1	2	3	3	0	3	3	3	3	3	3	3	3	0	3	3	3	3	0	3	0	3	0	0	3	3	1	0	3	3	3	3	2	3	0	2	3	3	3	3	3	0	0	0	
Minimum Concentration	<0.001	<0.0002	<0.001	0.005	0.001	<0.0001	0.001	0.086	7.6	1.9	1.3	9.9	<0.1	7.4	110	3	1.5	<10	22	<20	22	<0.02	<10	6.4	11	<5	<0.01	0.01	0.01	0.12	<0.01	0.31	<0.01	<0.05	0.03	0.06	0.01	0.02	0.01	<0.01	<0.01	<0.01	ND	ND		
Minimum Detect	0.005	0.0007	0.003	0.005	0.001	ND	0.001	0.086	7.6	1.9	1.3	9.9	ND	7.4	110	3	1.5	ND	22	ND	22	ND	ND	ND	6.4	11	6.7	ND	0.01	0.01	0.12	0.01	0.31	ND	0.05	0.03	0.06	0.01	0.02	0.01	ND	ND	ND			
Maximum Concentration	0.005	0.0007	0.022	0.15	0.084	<0.0001	0.019	2.3	32	5.7	3.8	11	<0.1	7.5	270	47	29	<10	110	<20	110	<0.02	<10	17	14	6.7	<0.01	0.02	0.02	0.15	0.01	0.47	<0.01	0.06	0.05	0.1	0.02	0.06	0.01	<0.01	<0.01	<0.01				
Maximum Detect	0.005	0.0007	0.022	0.15	0.084	ND	0.019	2.3	32	5.7	3.8	11	ND	7.5	270	47	29	ND	110	ND	110	ND	ND	17	14	6.7	ND	0.02	0.02	0.15	0.01	0.47	ND	0.06	0.05	0.1	0.02	0.06	0.01	ND	ND	ND				
Average Concentration	0.002	0.0003	0.0085	0.053	0.029	0.00005	0.0073	0.85	22	4	2.9	11	0.05	7.5	213	31	19	5	77	10	77	0.01	5	12	12	3.9	0.005	0.017	0.017	0.14	0.0083	0.39	0.005	0.045	0.04	0.083	0.017	0.047	0.01	0.005	0.005	0.005				
Median Concentration	0.0005	0.0001	0.003	0.005	0.002	0.00005	0.002	0.15	26	4.4	3.5	11	0.05	7.5	260	42	27	5	100	10	100	0.01	5	14	12	2.5	0.005	0.02	0.02	0.15	0.01	0.38	0.005	0.05	0.04	0.09	0.02	0.06	0.01	0.005	0.005	0.005				
Standard Deviation	0.0026	0.00035	0.012	0.084	0.048	0	0.01	1.3	13	1.9	1.4	0.64	0	0.058	90	24	15	0	48	0	48	0	0	5.5	1.5	2.4	0	0.0058	0.0058	0.017	0.0029	0.08	0	0.018	0.01	0.021	0.0058	0.023	0	0	0					
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				



Appendix A
Table 2
Results Summary

		VOC																																																
		Xylene (m & p)	Xylene Total	1,1-dichloroethene	1,2,3-trichloropropane	1,2-dibromoethane	1,2-dichlorobenzene	1,2-dichloroethane	1,2-dichloropropane	1,3-dichlorobenzene	1,3-dichloropropane	1,4-dichlorobenzene	2-butanone (MEK)	4-chlorotoluene	4-methyl-2-pentanone (MIBK)	Acetone	Allyl chloride	Bromobenzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chlorodibromomethane	Chloroethane	Chloroform	Chloromethane	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Dibromomethane	Dichlorodifluoromethane	Methylene chloride	Iodomethane	Trichloroethene	Tetrachloroethene	trans-1,3-dichloropropene	trans-1,2-dichloroethene	Trichlorofluoromethane	Vinyl chloride									
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L							
EQL		2	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
Field ID Location Code Sampled Date Time																																																		
QA01	UST_4.3	28/02/2019	<2	<3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1					
UST_2.5	UST_2.5	28/02/2019	<2	<3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			
UST_4.3	UST_4.3	28/02/2019	<2	<3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Statistical Summary																																																		
Number of Results		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3				
Number of Detects		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Minimum Concentration		<2	<3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			
Minimum Detect		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Maximum Concentration		<2	<3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Maximum Detect		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration		1	1.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.8	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2.5	1.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			
Median Concentration		1	1.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5			
Standard Deviation		0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	0	0	0	0	0	0	0	0	0	0	0	0	1.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Number of Guideline Exceedances		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
Number of Guideline Exceedances(Detects Only)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			



**Appendix A
Table 3
Duplicate Summary**

Field Duplicates (WATER)
Filter: SDG in('28 Feb 2019')

SDG Field ID	28-Feb-19	28-Feb-19	RPD
Sampled Date/Time	UST_4.3	QA01	
	28/02/2019	28/02/2019	

Method	ChemName	Units	EQL			
Inorganic	Chlorine (Free Residual)	mg/L	0.1	<0.1	<0.1	0
	pH (Lab)	pH Units	0.1	7.4	7.5	1
	Electrical conductivity (lab)	µS/cm	1	270	260	4
	Turbidity	NTU	1	42	47	11
	Total Suspended Solids	mg/L	1	27	29	7
Heavy Met	Calcium	mg/L	0.5	32	26	21
	Magnesium	mg/L	0.5	5.7	4.4	26
	Potassium	mg/L	0.5	3.8	3.5	8
	Sodium	mg/L	0.5	11	11	0
Inorganic	Alkalinity (Carbonate as CaCO3)	mg/L	10	<10	<10	0
	Alkalinity (Bicarbonate as CaCO3)	mg/L	20	110	100	10
	Alkalinity (Hydroxide as CaCO3)	mg/L	20	<20	<20	0
	Alkalinity (total as CaCO3)	mg/L	20	110	100	10
	Chloride	mg/L	1	12	11	9
	Sulfate	mg/L	5	<5	<5	0
	Total Organic Carbon	mg/L	5	17	14	19
	Nitrate (as N)	mg/L	0.02	<0.02	<0.02	0
Heavy Met	Arsenic	mg/L	0.001	0.005	<0.001	133
	Cadmium	mg/L	0.0002	0.0007	<0.0002	111
	Chromium (III+VI)	mg/L	0.001	0.022	<0.001	183
	Copper	mg/L	0.001	0.15	0.005	187
	Lead	mg/L	0.001	0.084	0.002	191
	Mercury	mg/L	0.0001	<0.0001	<0.0001	0
	Nickel	mg/L	0.001	0.019	0.001	180
	Zinc	mg/L	0.005	2.3	0.15	176
Organic	Naphthalene (BTEXN)	µg/l	10	<10	<10	0
VOC	Benzene	µg/l	1	<1	<1	0
	Toluene	µg/l	1	11	12	9
	Ethylbenzene	µg/l	1	<1	<1	0
	Xylene (o)	µg/l	1	<1	<1	0
	Xylene (m & p)	µg/l	2	<2	<2	0
	Xylene Total	µg/l	3	<3	<3	0
Organic	F1 (C6-C10 minus BTEX)	µg/l	20	<20	<20	0
	C6-C10 Fraction	µg/l	20	<20	<20	0
	F2 (>C10-C16 minus Naphthalene)	µg/l	50	<50	<50	0
	>C10-C16 Fraction	µg/l	50	<50	<50	0
	F3 (>C16-C34 Fraction)	µg/l	100	<100	<100	0
	F4 (>C34-C40 Fraction)	µg/l	100	<100	<100	0
	>C10-C40 (Sum of Total)	µg/l	100	<100	<100	0
	C6-C9 Fraction	µg/l	20	<20	<20	0
TPH	C10-C14 Fraction	µg/l	50	<50	<50	0
	C15-C28 Fraction	µg/l	100	<100	<100	0
	C29-C36 Fraction	µg/l	100	<100	<100	0
	C10-C36 (Sum of Total)	µg/l	100	<100	<100	0
VOC	1,1-dichloroethane	µg/l	1	<1	<1	0
	1,2,3-trichloropropane	µg/l	1	<1	<1	0
	1,2-dibromoethane	µg/l	1	<1	<1	0
	1,3-dichlorobenzene	µg/l	1	<1	<1	0
	2-butanone (MEK)	µg/l	1	<1	<1	0
	4-methyl-2-pentanone (MIBK)	µg/l	1	<1	<1	0
	Acetone	µg/l	1	<5	<5	0
	Allyl chloride	µg/l	1	<1	<1	0
	Bromodichloromethane	µg/l	1	<1	<1	0
	Bromoform	µg/l	1	<1	<1	0
	Carbon disulfide	µg/l	1	<1	<1	0
	Chlorodibromomethane	µg/l	1	<1	<1	0
	Chloroethane	µg/l	1	<1	<1	0
	cis-1,3-dichloropropene	µg/l	1	<1	<1	0
	Dibromomethane	µg/l	1	<1	<1	0
	Iodomethane	µg/l	1	<1	<1	0
	Trichloroethene	µg/l	1	<1	<1	0
	Tetrachloroethene	µg/l	1	<1	<1	0
	trans-1,3-dichloropropene	µg/l	1	<1	<1	0
	trans-1,2-dichloroethene	µg/l	1	<1	<1	0
	Trichlorofluoromethane	µg/l	1	<1	<1	0
	1,2,4-trimethylbenzene	µg/l	1	<1	<1	0
	1,3,5-trimethylbenzene	µg/l	1	<1	<1	0
	Isopropylbenzene	µg/l	1	<1	<1	0
	Styrene	µg/l	1	<1	<1	0
	Total MAH	µg/l	3	11	12	9
	Bromomethane	µg/l	1	<1	<1	0
	Dichlorodifluoromethane	µg/l	1	<1	<1	0



**Appendix A
Table 3
Duplicate Summary**

Field Duplicates (WATER)
Filter: SDG in('28 Feb 2019')

SDG	28-Feb-19	28-Feb-19	
Field ID	UST_4.3	QA01	RPD
Sampled Date/Time	28/02/2019	28/02/2019	

Organic						
Perfluoropropanesulfonic acid (PFPrS)	ug/L	0.01	<0.01	<0.01	0	
Perfluorobutane sulfonic acid (PFBS)	ug/L	0.01	0.02	0.02	0	
Perfluoropentane sulfonic acid (PFPeS)	ug/L	0.01	0.02	0.02	0	
Perfluorohexane sulfonic acid (PFHxS)	ug/L	0.01	0.15	0.15	0	
Perfluoroheptane sulfonic acid (PFHpS)	ug/L	0.01	0.01	0.01	0	
Perfluorooctane sulfonic acid (PFOS)	ug/L	0.01	0.47	0.38	21	
Perfluorodecanesulfonic acid (PFDS)	ug/L	0.01	<0.01	<0.01	0	
Perfluorobutanoic acid (PFBA)	ug/L	0.05	0.06	0.05	18	
Perfluoropentanoic acid (PFPeA)	ug/L	0.01	0.05	0.03	50	
Perfluorohexanoic acid (PFHxA)	ug/L	0.01	0.1	0.09	11	
Perfluoroheptanoic acid (PFHpA)	ug/L	0.01	0.02	0.02	0	
Perfluorooctanoic acid (PFOA)	ug/L	0.01	0.06	0.06	0	
Perfluorononanoic acid (PFNA)	ug/L	0.01	0.01	0.01	0	
Perfluorodecanoic acid (PFDA)	ug/L	0.01	<0.01	<0.01	0	
Perfluoroundecanoic acid (PFUnDA)	ug/L	0.01	<0.01	<0.01	0	
Perfluorododecanoic acid (PFDoDA)	ug/L	0.01	<0.01	<0.01	0	
Perfluorotridecanoic acid (PFTrDA)	ug/L	0.01	<0.01	<0.01	0	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	0.01	<0.01	<0.01	0	
Perfluorooctane sulfonamide (FOSA)	ug/L	0.05	<0.05	<0.05	0	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	ug/L	0.05	<0.05	<0.05	0	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	ug/L	0.05	<0.05	<0.05	0	
N-Methyl perfluorooctane sulfonamidoethanol (MEFOSE)	ug/L	0.05	<0.05	<0.05	0	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	ug/L	0.05	<0.05	<0.05	0	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	ug/L	0.05	<0.05	<0.05	0	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	ug/L	0.05	<0.05	<0.05	0	
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	ug/L	0.01	<0.01	<0.01	0	
6:2 Fluorotelomer sulfonate (6:2 FTS)	ug/L	0.05	0.07	0.06	15	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	ug/L	0.01	0.02	0.02	0	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	ug/L	0.01	<0.01	<0.01	0	
PFAS (Sum of Total)	ug/L	0.1	1.06	0.92	14	
Sum of PFHxS and PFOS	ug/L	0.01	0.62	0.53	16	
PFAS (Sum of Total)(WA DER List)	ug/L	0.05	1.02	0.88	15	
Sum of US EPA PFAS (PFOS + PFOA)*	ug/L	0.01	0.53	0.44	19	
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	ug/L	0.01	0.68	0.59	14	
Perfluorononane sulfonate (PFNS)	ug/L	0.01	<0.01	<0.01	0	
Inorganic						
Oil & Grease	mg/L	10	<10	<10	0	
VOC						
Chlorinated hydrocarbons EPAVic	ug/l	5	<5	<5	0	
Other chlorinated hydrocarbons (Total)	ug/l	5	<5	<5	0	
1,1,1,2-tetrachloroethane	ug/l	1	<1	<1	0	
1,1,1-trichloroethane	ug/l	1	<1	<1	0	
1,1,2,2-tetrachloroethane	ug/l	1	<1	<1	0	
1,1,2-trichloroethane	ug/l	1	<1	<1	0	
1,1-dichloroethene	ug/l	1	<1	<1	0	
1,2-dichlorobenzene	ug/l	1	<1	<1	0	
1,2-dichloroethane	ug/l	1	<1	<1	0	
1,2-dichloropropane	ug/l	1	<1	<1	0	
1,3-dichloropropane	ug/l	1	<1	<1	0	
1,4-dichlorobenzene	ug/l	1	<1	<1	0	
4-chlorotoluene	ug/l	1	<1	<1	0	
Bromobenzene	ug/l	1	<1	<1	0	
Bromochloromethane	ug/l	1	<1	<1	0	
Carbon tetrachloride	ug/l	1	<1	<1	0	
Chlorobenzene	ug/l	1	<1	<1	0	
Chloroform	ug/l	5	<5	<5	0	
Chloromethane	ug/l	1	<1	<1	0	
cis-1,2-dichloroethene	ug/l	1	<1	<1	0	
Methylene chloride	ug/l	1	<1	<1	0	
Vinyl chloride	ug/l	1	<1	<1	0	

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

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 200 (1-10 x EQL); 50 (10-30 x EQL); 50 (> 30 x EQL))

***Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Enviro Sample NSW

To: Nibha Vaidya
Cc: Alena Bounkeua; Jack Thompson; Jonathon Angell
Subject: RE: 643028 Change to QTOF Analyis

From: John Ewing
Sent: Friday, 1 March 2019 2:19:28 PM (UTC+10:00) Canberra, Melbourne, Sydney
To: Nibha Vaidya; Charl Du Preez
Subject: 643028 Change to Analyis

EXTERNAL EMAIL*

Hi,

I need to request a change to the analysis for job 643028.

UST_4.3 – Please cancel TOPA analysis and instead schedule for Qtof analysis.

Thanks,

John

John Ewing
Senior Environmental Scientist

GHD

Proudly employee owned

T: +02 9239 7007 | M: +61 450 890 302 | E: john.ewing@ghd.com
Level 15 133 Castlereagh Street Sydney NSW 2000 Australia | www.ghd.com

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Sample Receipt Advice

Company name: **GHD Pty Ltd NSW**
Contact name: **John Ewing**
Project name: **FRNSW ALEXANDRIA**
Project ID: **2127887**
COC number: **Not provided**
Turn around time: **3 Day**
Date/Time received: **Feb 28, 2019 4:00 PM**
Eurofins | mgt reference: **643028**

Sample information

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- Sample Temperature of a random sample selected from the batch as recorded by Eurofins | mgt Sample Receipt : 16.4 degrees Celsius.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- Sample containers for volatile analysis received with zero headspace.
- Split sample sent to requested external lab.
- Some samples have been subcontracted.

N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Nibha Vaidya on Phone : +61 (2) 9900 8415 or by e.mail: NibhaVaidya@eurofins.com

Results will be delivered electronically via e.mail to John Ewing - John.Ewing@ghd.com.

GHD Pty Ltd NSW
 Level 15, 133 Castlereagh Street
 Sydney
 NSW 2000



NATA Accredited
 Accreditation Number 1261
 Site Number 18217

Accredited for compliance with ISO/IEC 17025 – Testing
 The results of the tests, calibrations and/or
 measurements included in this document are traceable
 to Australian/national standards.

Attention: John Ewing

Report 643028-W
 Project name FRNSW ALEXANDRIA
 Project ID 2127887
 Received Date Feb 28, 2019

Client Sample ID			UST_2.5	UST_4.3	QA01
Sample Matrix			Water	Water	Water
Eurofins mgt Sample No.			S19-Fe38670	S19-Fe38671	S19-Fe38672
Date Sampled			Feb 28, 2019	Feb 28, 2019	Feb 28, 2019
Test/Reference	LOR	Unit			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C6-C9	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C10-C14	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH C15-C28	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C29-C36	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH C10-36 (Total)	0.1	mg/L	< 0.1	< 0.1	< 0.1
Volatile Organics					
1.1-Dichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.1-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.1.1-Trichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.1.1.2-Tetrachloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.1.2-Trichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.1.2.2-Tetrachloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.2-Dibromoethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.2-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.2-Dichloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.2-Dichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.2.3-Trichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.2.4-Trimethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.3-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.3-Dichloropropane	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.3.5-Trimethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
1.4-Dichlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
2-Butanone (MEK)	0.001	mg/L	< 0.001	< 0.001	< 0.001
2-Propanone (Acetone)	0.001	mg/L	< 0.001	^{G01} < 0.005	^{G01} < 0.005
4-Chlorotoluene	0.001	mg/L	< 0.001	< 0.001	< 0.001
4-Methyl-2-pentanone (MIBK)	0.001	mg/L	< 0.001	< 0.001	< 0.001
Allyl chloride	0.001	mg/L	< 0.001	< 0.001	< 0.001
Benzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Bromobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Bromochloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
Bromodichloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
Bromoform	0.001	mg/L	< 0.001	< 0.001	< 0.001
Bromomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
Carbon disulfide	0.001	mg/L	< 0.001	< 0.001	< 0.001
Carbon Tetrachloride	0.001	mg/L	< 0.001	< 0.001	< 0.001

Client Sample ID			UST_2.5	UST_4.3	QA01
Sample Matrix			Water	Water	Water
Eurofins mgt Sample No.			S19-Fe38670	S19-Fe38671	S19-Fe38672
Date Sampled			Feb 28, 2019	Feb 28, 2019	Feb 28, 2019
Test/Reference	LOR	Unit			
Volatile Organics					
Chlorobenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Chloroethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
Chloroform	0.005	mg/L	< 0.005	< 0.005	< 0.005
Chloromethane	0.001	mg/L	< 0.001	^{G01} < 0.005	< 0.001
cis-1.2-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001
cis-1.3-Dichloropropene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Dibromochloromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
Dibromomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
Dichlorodifluoromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
Ethylbenzene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Iodomethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
Isopropyl benzene (Cumene)	0.001	mg/L	< 0.001	< 0.001	< 0.001
m&p-Xylenes	0.002	mg/L	< 0.002	< 0.002	< 0.002
Methylene Chloride	0.001	mg/L	< 0.001	< 0.001	< 0.001
o-Xylene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Styrene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Tetrachloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Toluene	0.001	mg/L	< 0.001	0.011	0.012
trans-1.2-Dichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001
trans-1.3-Dichloropropene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Trichloroethene	0.001	mg/L	< 0.001	< 0.001	< 0.001
Trichlorofluoromethane	0.001	mg/L	< 0.001	< 0.001	< 0.001
Vinyl chloride	0.001	mg/L	< 0.001	< 0.001	< 0.001
Xylenes - Total	0.003	mg/L	< 0.003	< 0.003	< 0.003
Total MAH*	0.003	mg/L	< 0.003	0.011	0.012
Vic EPA IWRG 621 CHC (Total)*	0.005	mg/L	< 0.005	< 0.005	< 0.005
Vic EPA IWRG 621 Other CHC (Total)*	0.005	mg/L	< 0.005	< 0.005	< 0.005
4-Bromofluorobenzene (surr.)	1	%	60	81	103
Toluene-d8 (surr.)	1	%	81	120	145
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene ^{N02}	0.01	mg/L	< 0.01	< 0.01	< 0.01
TRH C6-C10	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH C6-C10 less BTEX (F1) ^{N04}	0.02	mg/L	< 0.02	< 0.02	< 0.02
TRH >C10-C16	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	< 0.05	< 0.05	< 0.05
TRH >C16-C34	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH >C34-C40	0.1	mg/L	< 0.1	< 0.1	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	< 0.1	< 0.1	< 0.1
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	0.02	0.02	0.02
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C2-4:2 FTSA (surr.)	1	%	78	74	81
13C2-8:2 FTSA (surr.)	1	%	90	69	159
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.05	ug/L	< 0.05	0.07	0.06
13C2-6:2 FTSA (surr.)	1	%	75	75	105

Client Sample ID			UST_2.5	UST_4.3	QA01
Sample Matrix			Water	Water	Water
Eurofins mgt Sample No.			S19-Fe38670	S19-Fe38671	S19-Fe38672
Date Sampled			Feb 28, 2019	Feb 28, 2019	Feb 28, 2019
Test/Reference	LOR	Unit			
PFASs Summations					
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	0.59	1.02	0.88
Sum (PFHxS + PFOS)*	0.01	ug/L	0.43	0.62	0.53
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	0.33	0.53	0.44
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	0.45	0.68	0.59
Sum of PFASs (n=30)*	0.1	ug/L	0.61	1.06	0.92
Chloride					
Chloride	1	mg/L	14	12	11
Chlorine (Free Residual)					
Chlorine (Free Residual)	0.1	mg/L	< 0.1	< 0.1	< 0.1
Conductivity (at 25°C)					
Conductivity (at 25°C)	1	uS/cm	110	270	260
Nitrate (as N)					
Nitrate (as N)	0.02	mg/L	< 0.02	< 0.02	< 0.02
Oil & Grease (HEM)					
Oil & Grease (HEM)	10	mg/L	< 10	< 10	< 10
pH (at 25°C)					
pH (at 25°C)	0.1	pH Units	7.5	7.4	7.5
Sulphate (as SO4)					
Sulphate (as SO4)	5	mg/L	6.7	< 5	< 5
Total Organic Carbon					
Total Organic Carbon	5	mg/L	6.4	17	14
Total Suspended Solids Dried at 103–105°C					
Total Suspended Solids Dried at 103–105°C	1	mg/L	1.5	27	29
Turbidity					
Turbidity	1	NTU	3.0	42	47
Specific Gravity*					
Specific Gravity*	0.01	ASB	1.00	1.00	1.00
Alkalinity (speciated)					
Bicarbonate Alkalinity (as CaCO3)					
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	22	110	100
Carbonate Alkalinity (as CaCO3)					
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	< 10
Hydroxide Alkalinity (as CaCO3)					
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	< 20
Total Alkalinity (as CaCO3)					
Total Alkalinity (as CaCO3)	20	mg/L	22	110	100
Heavy Metals					
Arsenic					
Arsenic	0.001	mg/L	< 0.001	0.005	< 0.001
Cadmium					
Cadmium	0.0002	mg/L	< 0.0002	0.0007	< 0.0002
Chromium					
Chromium	0.001	mg/L	0.003	0.022	< 0.001
Copper					
Copper	0.001	mg/L	0.005	0.15	0.005
Lead					
Lead	0.001	mg/L	0.001	0.084	0.002
Mercury					
Mercury	0.0001	mg/L	< 0.0001	< 0.0001	< 0.0001
Nickel					
Nickel	0.001	mg/L	0.002	0.019	0.001
Zinc					
Zinc	0.005	mg/L	0.086	2.3	0.15
Alkali Metals					
Calcium					
Calcium	0.5	mg/L	7.6	32	26
Magnesium					
Magnesium	0.5	mg/L	1.9	5.7	4.4
Potassium					
Potassium	0.5	mg/L	1.3	3.8	3.5
Sodium					
Sodium	0.5	mg/L	9.9	11	11
Perfluoroalkyl carboxylic acids (PFCAs)					
Perfluorobutanoic acid (PFBA)^{N11}					
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05	0.06	0.05
Perfluoropentanoic acid (PFPeA)^{N11}					
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	0.04	0.05	0.03
Perfluorohexanoic acid (PFHxA)^{N11}					
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	^{N09} 0.06	^{N09} 0.10	^{N09} 0.09
Perfluoroheptanoic acid (PFHpA)^{N11}					
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	^{N09} 0.01	^{N09} 0.02	^{N09} 0.02
Perfluorooctanoic acid (PFOA)^{N11}					
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	^{N09} 0.02	^{N09} 0.06	^{N09} 0.06
Perfluorononanoic acid (PFNA)^{N11}					
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	0.01	0.01	0.01
Perfluorodecanoic acid (PFDA)^{N11}					
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA)^{N11}					
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA)^{N11}					
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTrDA)^{N15}					
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTeDA)^{N11}					
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)					
13C4-PFBA (surr.)	1	%	98	108	118

Client Sample ID			UST_2.5	UST_4.3	QA01
Sample Matrix			Water	Water	Water
Eurofins mgt Sample No.			S19-Fe38670	S19-Fe38671	S19-Fe38672
Date Sampled			Feb 28, 2019	Feb 28, 2019	Feb 28, 2019
Test/Reference	LOR	Unit			
Perfluoroalkyl carboxylic acids (PFCAs)					
13C5-PFPeA (surr.)	1	%	89	103	105
13C5-PFHxA (surr.)	1	%	104	116	130
13C4-PFHpA (surr.)	1	%	100	117	127
13C8-PFOA (surr.)	1	%	112	107	116
13C5-PFNA (surr.)	1	%	102	110	118
13C6-PFDA (surr.)	1	%	111	106	111
13C2-PFUnDA (surr.)	1	%	91	80	89
13C2-PFDoDA (surr.)	1	%	52	42	52
13C2-PFTeDA (surr.)	1	%	42	39	38
Perfluoroalkyl sulfonamido substances					
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	89	93	114
D3-N-MeFOSA (surr.)	1	%	28	27	32
D5-N-EtFOSA (surr.)	1	%	36	36	37
D7-N-MeFOSE (surr.)	1	%	68	63	93
D9-N-EtFOSE (surr.)	1	%	40	37	44
D5-N-EtFOSAA (surr.)	1	%	20	116	132
D3-N-MeFOSAA (surr.)	1	%	20	104	123
Perfluoroalkyl sulfonic acids (PFSA)					
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	^{N09} 0.01	^{N09} 0.02	^{N09} 0.02
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	^{N09} 0.01	^{N09} 0.02	^{N09} 0.02
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	^{N09} 0.12	^{N09} 0.15	^{N09} 0.15
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	< 0.01	^{N09} 0.01	^{N09} 0.01
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	^{N09} 0.31	^{N09} 0.47	^{N09} 0.38
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C3-PFBS (surr.)	1	%	107	112	108
18O2-PFHxS (surr.)	1	%	90	92	101
13C8-PFOS (surr.)	1	%	108	105	132

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results (regarding both quality and NATA accreditation).

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Recoverable Hydrocarbons - 1999 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Mar 04, 2019	7 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Mar 01, 2019	7 Day
Total Recoverable Hydrocarbons - 2013 NEPM Fractions - Method: LTM-ORG-2010 TRH C6-C40	Melbourne	Mar 04, 2019	7 Day
Volatile Organics - Method: LTM-ORG-2150 VOCs in Soils Liquid and other Aqueous Matrices	Melbourne	Mar 01, 2019	7 Days
Chlorine (Free Residual) - Method: LTM-INO-4330 Total Residual and Free Residual Chlorine	Melbourne	Mar 07, 2019	1 Day
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Melbourne	Mar 01, 2019	28 Day
Nitrate (as N) - Method: APHA 4500-NO3 Nitrate Nitrogen by FIA	Melbourne	Mar 01, 2019	28 Day
Oil & Grease (HEM) - Method: APHA 5520B Oil & Grease	Melbourne	Mar 01, 2019	28 Day
pH (at 25°C) - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Mar 01, 2019	0 Hours
Total Organic Carbon - Method: APHA 5310B Total Organic Carbon	Melbourne	Mar 05, 2019	28 Day
Total Suspended Solids Dried at 103–105°C - Method: LTM-INO-4070 Analysis of Suspended Solids in Water by Gravimetry	Melbourne	Mar 04, 2019	7 Days
Turbidity - Method: Turbidity by classical using APHA 2130B (LTM-INO-4140)	Melbourne	Mar 06, 2019	2 Day
Specific Gravity* - Method: Specific Gravity:- MGT Method 1950 - Density weight per unit volume.	Melbourne	Mar 04, 2019	5 Day
Metals M8 - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Melbourne	Mar 01, 2019	28 Days
Eurofins mgt Suite B11C: Na/K/Ca/Mg - Method: LTM-MET-3010 Alkali Metals by ICP-AES	Melbourne	Mar 01, 2019	180 Day
Per- and Polyfluoroalkyl Substances (PFASs) n:2 Fluorotelomer sulfonic acids (n:2 FTSAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Mar 01, 2019	14 Day
Perfluoroalkyl carboxylic acids (PFCAs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Mar 01, 2019	14 Day
Perfluoroalkyl sulfonamido substances - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Mar 01, 2019	14 Day
Perfluoroalkyl sulfonic acids (PFASs) - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Mar 01, 2019	14 Day
Eurofins mgt Suite B11E: Cl/SO4/Alkalinity Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Mar 01, 2019	28 Day
Sulphate (as SO4) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Mar 01, 2019	28 Day
Alkalinity (speciated) - Method: APHA 2320 Alkalinity by Titration	Melbourne	Mar 01, 2019	14 Day

Company Name: GHD Pty Ltd NSW	Order No.:	Received: Feb 28, 2019 4:00 PM
Address: Level 15, 133 Castlereagh Street Sydney NSW 2000	Report #: 643028	Due: Mar 5, 2019
Project Name: FRNSW ALEXANDRIA	Phone: 02 9239 7100	Priority: 3 Day
Project ID: 2127887	Fax: 02 9239 7199	Contact Name: John Ewing

Eurofins | mgt Analytical Services Manager : Nibha Vaidya

Sample Detail						Chlorine (Free Residual)	Chlorine (free)	Conductivity (at 25°C)	Nitrate (as N)	Oil & Grease (HEM)	pH (at 25°C)	Specific Gravity*	Total Organic Carbon	Total Suspended Solids Dried at 103-105°C	Turbidity	Metals M8	Volatile Organics	Total Recoverable Hydrocarbons	Eurofins mgt Suite B11E: Cl/SO4/Alkalinity	Per- and Polyfluoroalkyl Substances (PFASs)	Eurofins mgt Suite B11C: Na/K/Ca/Mg		
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Sydney Laboratory - NATA Site # 18217																							
Brisbane Laboratory - NATA Site # 20794																				X			
Perth Laboratory - NATA Site # 23736																							
External Laboratory																							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																		
1	UST_2.5	Feb 28, 2019		Water	S19-Fe38670	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2	UST_4.3	Feb 28, 2019		Water	S19-Fe38671	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
3	QA01	Feb 28, 2019		Water	S19-Fe38672	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Test Counts						3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure, April 2011 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.2 2018
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 50-150%-Phenols & PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.2 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Method Blank						
Total Recoverable Hydrocarbons - 1999 NEPM Fractions						
TRH C6-C9	mg/L	< 0.02		0.02	Pass	
TRH C10-C14	mg/L	< 0.05		0.05	Pass	
TRH C15-C28	mg/L	< 0.1		0.1	Pass	
TRH C29-C36	mg/L	< 0.1		0.1	Pass	
Method Blank						
Volatile Organics						
1.1-Dichloroethane	mg/L	< 0.001		0.001	Pass	
1.1-Dichloroethene	mg/L	< 0.001		0.001	Pass	
1.1.1-Trichloroethane	mg/L	< 0.001		0.001	Pass	
1.1.1.2-Tetrachloroethane	mg/L	< 0.001		0.001	Pass	
1.1.2-Trichloroethane	mg/L	< 0.001		0.001	Pass	
1.1.2.2-Tetrachloroethane	mg/L	< 0.001		0.001	Pass	
1.2-Dibromoethane	mg/L	< 0.001		0.001	Pass	
1.2-Dichlorobenzene	mg/L	< 0.001		0.001	Pass	
1.2-Dichloroethane	mg/L	< 0.001		0.001	Pass	
1.2-Dichloropropane	mg/L	< 0.001		0.001	Pass	
1.2.3-Trichloropropane	mg/L	< 0.001		0.001	Pass	
1.2.4-Trimethylbenzene	mg/L	< 0.001		0.001	Pass	
1.3-Dichlorobenzene	mg/L	< 0.001		0.001	Pass	
1.3-Dichloropropane	mg/L	< 0.001		0.001	Pass	
1.3.5-Trimethylbenzene	mg/L	< 0.001		0.001	Pass	
1.4-Dichlorobenzene	mg/L	< 0.001		0.001	Pass	
2-Butanone (MEK)	mg/L	< 0.001		0.001	Pass	
2-Propanone (Acetone)	mg/L	< 0.001		0.001	Pass	
4-Chlorotoluene	mg/L	< 0.001		0.001	Pass	
4-Methyl-2-pentanone (MIBK)	mg/L	< 0.001		0.001	Pass	
Allyl chloride	mg/L	< 0.001		0.001	Pass	
Benzene	mg/L	< 0.001		0.001	Pass	
Bromobenzene	mg/L	< 0.001		0.001	Pass	
Bromochloromethane	mg/L	< 0.001		0.001	Pass	
Bromodichloromethane	mg/L	< 0.001		0.001	Pass	
Bromoform	mg/L	< 0.001		0.001	Pass	
Carbon disulfide	mg/L	< 0.001		0.001	Pass	
Carbon Tetrachloride	mg/L	< 0.001		0.001	Pass	
Chlorobenzene	mg/L	< 0.001		0.001	Pass	
Chloroethane	mg/L	< 0.001		0.001	Pass	
Chloroform	mg/L	< 0.005		0.005	Pass	
Chloromethane	mg/L	< 0.001		0.001	Pass	
cis-1.2-Dichloroethene	mg/L	< 0.001		0.001	Pass	
cis-1.3-Dichloropropene	mg/L	< 0.001		0.001	Pass	
Dibromochloromethane	mg/L	< 0.001		0.001	Pass	
Dibromomethane	mg/L	< 0.001		0.001	Pass	
Dichlorodifluoromethane	mg/L	< 0.001		0.001	Pass	
Ethylbenzene	mg/L	< 0.001		0.001	Pass	
Iodomethane	mg/L	< 0.001		0.001	Pass	
Isopropyl benzene (Cumene)	mg/L	< 0.001		0.001	Pass	
m&p-Xylenes	mg/L	< 0.002		0.002	Pass	
Methylene Chloride	mg/L	< 0.001		0.001	Pass	
o-Xylene	mg/L	< 0.001		0.001	Pass	
Styrene	mg/L	< 0.001		0.001	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Tetrachloroethene	mg/L	< 0.001			0.001	Pass	
Toluene	mg/L	< 0.001			0.001	Pass	
trans-1,2-Dichloroethene	mg/L	< 0.001			0.001	Pass	
trans-1,3-Dichloropropene	mg/L	< 0.001			0.001	Pass	
Trichloroethene	mg/L	< 0.001			0.001	Pass	
Trichlorofluoromethane	mg/L	< 0.001			0.001	Pass	
Vinyl chloride	mg/L	< 0.001			0.001	Pass	
Xylenes - Total	mg/L	< 0.003			0.003	Pass	
Method Blank							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	mg/L	< 0.01			0.01	Pass	
TRH C6-C10	mg/L	< 0.02			0.02	Pass	
TRH >C10-C16	mg/L	< 0.05			0.05	Pass	
TRH >C16-C34	mg/L	< 0.1			0.1	Pass	
TRH >C34-C40	mg/L	< 0.1			0.1	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Chloride	mg/L	< 1			1	Pass	
Chlorine (Free Residual)	mg/L	< 0.1			0.1	Pass	
Nitrate (as N)	mg/L	< 0.02			0.02	Pass	
Oil & Grease (HEM)	mg/L	< 10			10	Pass	
Sulphate (as SO ₄)	mg/L	< 5			5	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Total Suspended Solids Dried at 103–105°C	mg/L	< 1			1	Pass	
Turbidity	NTU	< 1			1	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO ₃)	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Method Blank							
Heavy Metals							
Arsenic	mg/L	< 0.001			0.001	Pass	
Cadmium	mg/L	< 0.0002			0.0002	Pass	
Chromium	mg/L	< 0.001			0.001	Pass	
Copper	mg/L	< 0.001			0.001	Pass	
Lead	mg/L	< 0.001			0.001	Pass	
Mercury	mg/L	< 0.0001			0.0001	Pass	
Nickel	mg/L	< 0.001			0.001	Pass	
Zinc	mg/L	< 0.005			0.005	Pass	
Method Blank							
Alkali Metals							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCA)							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 1999 NEPM Fractions							
TRH C6-C9	%	97			70-130	Pass	
TRH C10-C14	%	72			70-130	Pass	
LCS - % Recovery							
Volatile Organics							
1.1-Dichloroethene	%	105			70-130	Pass	
1.1.1-Trichloroethane	%	91			70-130	Pass	
1.2-Dichlorobenzene	%	116			70-130	Pass	
1.2-Dichloroethane	%	111			70-130	Pass	
Benzene	%	112			70-130	Pass	
Ethylbenzene	%	121			70-130	Pass	
m&p-Xylenes	%	104			70-130	Pass	
Toluene	%	114			70-130	Pass	
Trichloroethene	%	94			70-130	Pass	
Xylenes - Total	%	106			70-130	Pass	
LCS - % Recovery							
Total Recoverable Hydrocarbons - 2013 NEPM Fractions							
Naphthalene	%	85			70-130	Pass	
TRH C6-C10	%	99			70-130	Pass	
TRH >C10-C16	%	74			70-130	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	95			50-150	Pass	

Test	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	82		50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	94		50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	98		50-150	Pass	
LCS - % Recovery						
Chloride	%	116		70-130	Pass	
Nitrate (as N)	%	95		70-130	Pass	
Oil & Grease (HEM)	%	95		70-130	Pass	
Sulphate (as SO4)	%	109		70-130	Pass	
Total Organic Carbon	%	105		70-130	Pass	
Total Suspended Solids Dried at 103–105°C	%	104		70-130	Pass	
LCS - % Recovery						
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	%	85		70-130	Pass	
Carbonate Alkalinity (as CaCO3)	%	84		70-130	Pass	
Total Alkalinity (as CaCO3)	%	88		70-130	Pass	
LCS - % Recovery						
Heavy Metals						
Arsenic	%	101		80-120	Pass	
Cadmium	%	98		80-120	Pass	
Chromium	%	99		80-120	Pass	
Copper	%	102		80-120	Pass	
Lead	%	100		80-120	Pass	
Mercury	%	95		75-125	Pass	
Nickel	%	102		80-120	Pass	
Zinc	%	102		80-120	Pass	
LCS - % Recovery						
Alkali Metals						
Calcium	%	108		70-130	Pass	
Magnesium	%	106		70-130	Pass	
Potassium	%	108		70-130	Pass	
Sodium	%	115		70-130	Pass	
LCS - % Recovery						
Perfluoroalkyl carboxylic acids (PFCAs)						
Perfluorobutanoic acid (PFBA)	%	83		50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	118		50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	97		50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	96		50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	92		50-150	Pass	
Perfluorononanoic acid (PFNA)	%	92		50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	90		50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	91		50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	102		50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	55		50-150	Pass	
Perfluorotetradecanoic acid (PFTTeDA)	%	88		50-150	Pass	
LCS - % Recovery						
Perfluoroalkyl sulfonamido substances						
Perfluorooctane sulfonamide (FOSA)	%	90		50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	79		50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	56		50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	61		50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	97		50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	77		50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	100		50-150	Pass	
LCS - % Recovery						

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Perfluoroalkyl sulfonic acids (PFSA's)										
Perfluorobutanesulfonic acid (PFBS)				%	82			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)				%	79			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)				%	90			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)				%	79			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)				%	82			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)				%	84			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)				%	101			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)				%	58			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1				Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)					Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	M19-Fe35684	NCP	%	91				50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	M19-Fe35684	NCP	%	84				50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	M19-Fe35684	NCP	%	127				50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	M19-Fe35684	NCP	%	82				50-150	Pass	
Spike - % Recovery										
					Result 1					
Chloride	M19-Fe37623	NCP	%	113				70-130	Pass	
Nitrate (as N)	M19-Fe38913	NCP	%	96				70-130	Pass	
Sulphate (as SO4)	M19-Fe38321	NCP	%	118				70-130	Pass	
Spike - % Recovery										
Alkalinity (speciated)					Result 1					
Bicarbonate Alkalinity (as CaCO3)	M19-Fe35520	NCP	%	77				70-130	Pass	
Carbonate Alkalinity (as CaCO3)	M19-Fe35761	NCP	%	96				70-130	Pass	
Total Alkalinity (as CaCO3)	M19-Fe35761	NCP	%	113				70-130	Pass	
Spike - % Recovery										
Perfluoroalkyl carboxylic acids (PFCA's)					Result 1					
Perfluorobutanoic acid (PFBA)	M19-Fe35684	NCP	%	85				50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M19-Fe35684	NCP	%	126				50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M19-Fe35684	NCP	%	103				50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M19-Fe35684	NCP	%	98				50-150	Pass	
Perfluorooctanoic acid (PFOA)	M19-Fe35684	NCP	%	96				50-150	Pass	
Perfluorononanoic acid (PFNA)	M19-Fe35684	NCP	%	94				50-150	Pass	
Perfluorodecanoic acid (PFDA)	M19-Fe35684	NCP	%	91				50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	M19-Fe35684	NCP	%	96				50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M19-Fe35684	NCP	%	121				50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	M19-Fe35684	NCP	%	126				50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M19-Fe35684	NCP	%	93				50-150	Pass	
Spike - % Recovery										
Perfluoroalkyl sulfonamido substances					Result 1					
Perfluorooctane sulfonamide (FOSA)	M19-Fe35684	NCP	%	95				50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M19-Fe35684	NCP	%	74				50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M19-Fe35684	NCP	%	56				50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M19-Fe35684	NCP	%	59			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M19-Fe35684	NCP	%	92			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M19-Fe35684	NCP	%	87			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M19-Fe35684	NCP	%	83			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	M19-Fe35684	NCP	%	84			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M19-Fe35684	NCP	%	85			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M19-Fe35684	NCP	%	68			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M19-Fe35684	NCP	%	81			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M19-Fe35684	NCP	%	81			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M19-Fe35684	NCP	%	90			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M19-Fe35684	NCP	%	104			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M19-Fe35684	NCP	%	55			50-150	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Arsenic	S19-Fe38672	CP	%	97			75-125	Pass	
Cadmium	S19-Fe38672	CP	%	91			75-125	Pass	
Chromium	S19-Fe38672	CP	%	93			75-125	Pass	
Copper	S19-Fe38672	CP	%	95			75-125	Pass	
Lead	S19-Fe38672	CP	%	94			75-125	Pass	
Mercury	S19-Fe38672	CP	%	92			70-130	Pass	
Nickel	S19-Fe38672	CP	%	95			75-125	Pass	
Zinc	S19-Fe38672	CP	%	96			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1	Result 2	RPD			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S19-Fe38459	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
Chloride	M19-Fe35771	NCP	mg/L	2100	2200	1.0	30%	Pass	
Conductivity (at 25°C)	M19-Fe38148	NCP	uS/cm	840	850	<1	30%	Pass	
Nitrate (as N)	M19-Fe38913	NCP	mg/L	0.07	0.08	8.0	30%	Pass	
Oil & Grease (HEM)	M19-Fe38216	NCP	mg/L	< 10	< 10	<1	30%	Pass	
pH (at 25°C)	M19-Fe38148	NCP	pH Units	7.6	7.5	pass	30%	Pass	
Sulphate (as SO4)	M19-Fe35771	NCP	mg/L	7.8	9.4	18	30%	Pass	

Duplicate								
				Result 1	Result 2	RPD		
Total Organic Carbon	S19-Fe38670	CP	mg/L	6.4	7.2	11	30%	Pass
Total Suspended Solids Dried at 103–105°C	M19-Fe21611	NCP	mg/L	150	140	5.0	30%	Pass
Turbidity	S19-Fe38663	NCP	NTU	1.3	1.3	1.0	30%	Pass
Duplicate								
Alkalinity (speciated)				Result 1	Result 2	RPD		
Bicarbonate Alkalinity (as CaCO ₃)	M19-Fe38148	NCP	mg/L	31	32	1.0	30%	Pass
Carbonate Alkalinity (as CaCO ₃)	M19-Fe38148	NCP	mg/L	< 10	< 10	<1	30%	Pass
Hydroxide Alkalinity (as CaCO ₃)	M19-Fe38148	NCP	mg/L	< 20	< 20	<1	30%	Pass
Total Alkalinity (as CaCO ₃)	M19-Fe38148	NCP	mg/L	31	32	1.0	30%	Pass
Duplicate								
Alkali Metals				Result 1	Result 2	RPD		
Calcium	S19-Fe38670	CP	mg/L	7.6	7.7	1.0	30%	Pass
Magnesium	S19-Fe38670	CP	mg/L	1.9	1.9	<1	30%	Pass
Potassium	S19-Fe38670	CP	mg/L	1.3	1.3	2.0	30%	Pass
Sodium	S19-Fe38670	CP	mg/L	9.9	10	1.0	30%	Pass
Duplicate								
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD		
Perfluorobutanoic acid (PFBA)	S19-Fe38459	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
Perfluoropentanoic acid (PFPeA)	S19-Fe38459	NCP	ug/L	0.03	0.03	3.0	30%	Pass
Perfluorohexanoic acid (PFHxA)	S19-Fe38459	NCP	ug/L	0.02	0.02	<1	30%	Pass
Perfluoroheptanoic acid (PFHpA)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanoic acid (PFOA)	S19-Fe38459	NCP	ug/L	0.02	0.02	6.0	30%	Pass
Perfluorononanoic acid (PFNA)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorodecanoic acid (PFDA)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoroundecanoic acid (PFUnDA)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorododecanoic acid (PFDoDA)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotridecanoic acid (PFTTrDA)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorotetradecanoic acid (PFTeDA)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	S19-Fe38459	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S19-Fe38459	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S19-Fe38459	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S19-Fe38459	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S19-Fe38459	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S19-Fe38459	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S19-Fe38459	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass

Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorononanesulfonic acid (PFNS)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	S19-Fe38459	NCP	ug/L	0.03	0.03	5.0	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	S19-Fe38459	NCP	ug/L	0.06	0.06	2.0	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	S19-Fe38459	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				Result 1	Result 2	RPD		
TRH C10-C14	S19-Fe38671	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
TRH C15-C28	S19-Fe38671	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
TRH C29-C36	S19-Fe38671	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
Duplicate								
Total Recoverable Hydrocarbons - 2013 NEPM Fractions				Result 1	Result 2	RPD		
TRH >C10-C16	S19-Fe38671	CP	mg/L	< 0.05	< 0.05	<1	30%	Pass
TRH >C16-C34	S19-Fe38671	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
TRH >C34-C40	S19-Fe38671	CP	mg/L	< 0.1	< 0.1	<1	30%	Pass
Duplicate								
Heavy Metals				Result 1	Result 2	RPD		
Arsenic	S19-Fe38672	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Cadmium	S19-Fe38672	CP	mg/L	< 0.0002	< 0.0002	<1	30%	Pass
Chromium	S19-Fe38672	CP	mg/L	< 0.001	< 0.001	<1	30%	Pass
Copper	S19-Fe38672	CP	mg/L	0.005	0.005	<1	30%	Pass
Lead	S19-Fe38672	CP	mg/L	0.002	0.002	8.0	30%	Pass
Mercury	S19-Fe38672	CP	mg/L	< 0.0001	< 0.0001	<1	30%	Pass
Nickel	S19-Fe38672	CP	mg/L	0.001	< 0.001	5.0	30%	Pass
Zinc	S19-Fe38672	CP	mg/L	0.15	0.15	2.0	30%	Pass

Comments
Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
N01	F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).
N02	Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.
N04	F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes.
N09	Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference

Authorised By

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Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please [click here](#).

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