

# **Final Report**

#### 28 July 2023

То	Krystle Mitchell	Contact No.	08 8204 3714
Copy to	Ruby Jones	Email	Krystle.Mitchell@eso.sa.gov.au
From	Ben Petticrew	Project No.	12611012
Project Name	MFS Mt Barker PFAS Investigation		
Subject	MFS Mt Barker - PFAS Baseline Assessme	nt in Surface Soils	

Dear Krystle,

# 1. Introduction

GHD Pty Ltd (GHD) has been engaged by the South Australian Metropolitan Fire Service (MFS) to conduct a baseline soil assessment for the presence of Per- and polyfluoroalkyl substances (PFAS) contamination at the MFS Mount Barker Fire Station, located at 43 Secker Rd, Mt Barker SA 5251 (the site). For context, a summary background of the site is provided below.

- The Mount Barker Fire Station was established and commissioned into service in 2019,
- PFAS contamination has been associated with the historical use of aqueous film-forming foams (AFFF) at fire stations; however, the MFS commenced phasing out the use of AFFF containing perfluorooctane sulfonate (PFOS) in 2007 and perfluorooctanoic acid (PFOA) in 2014 and replaced all AFFF in 2016 with "fluorine-free" products. AFFF has never been used by the MFS at the site,
- Based on historical aerial imagery of the area, the plot of land occupied by the fire station was first developed by others in 2010. During this period (prior to 2019), the facility was used for various commercial services, including a home renovation supply store and a horse float warehouse,
- Currently, the site is surrounded by several commercial retailers and a sewerage treatment facility located approximately 150 m north of the fire station,
- The site location and layout are shown in Figure 1 of Attachment 1 to this document.

# **1.1 Purpose of this report**

Given the absence of PFAS containing AFFF in any MFS appliances or activities, and the site's recent acquisition and development by MFS, any identified PFAS contamination is considered likely to be representative of "baseline" conditions. This report summarises the findings of a baseline soil assessment for PFAS from four surface soil samples collected over two site visits.

# 1.2 Scope of work

The scope of work for this investigation comprises:

- Collection of four surface soil samples from between surface (0.0) and 0.1 meters below ground level (m bgl), and two duplicate QA/QC samples at accessible, unpaved locations at the site (note a second site visit was conducted to collect QAQC samples which were misplaced during the Initial sampling event),
- Submission of samples to NATA accredited laboratory for analysis,

- Comparison of analytical results to relevant assessment criteria,
- Assessment of the likely source of any identified PFAS contamination and potential risks to human health and the environment,
- Recommendations for supplementary investigations to inform mitigation measures (if required).

# 1.3 Guidelines

The assessment works and reporting were undertaken in accordance with the South Australian *Environment Protection Act 1993*, the *Environment Protection Regulations 2009*, relevant SA Environment Protection Policies (EPPs) and the following guidelines / standards:

- NSW EPA (2022) Sampling design Part 1 and Part 2.
- HEPA (2020) PFAS National Environmental Management Plan, version 2.0 (PFAS NEMP).
- NEPC (1999) National Environment (Assessment of Site Contamination) Protection Measure 1999, as amended 2013 (ASC NEPM).
- SA EPA (2019) Guidelines for the Assessment and Remediation of Site Contamination (the GAR).

## 1.4 Limitations

This report has been prepared by GHD for the South Australian Metropolitan Fire Service and may only be used and relied on by the South Australian Metropolitan Fire Service for the purpose agreed between GHD and the South Australian Metropolitan Fire Service as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than the South Australian Metropolitan Fire Service arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any 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 assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

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 the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

# 2. Methodology

Two surface soil samples (0.0 - 0.1m bgl) were collected as part of this baseline investigation (refer to Figure 2 in Attachment 1).

A summary of the sampling methodology is provided in Table 1.

 Table 1
 Summary of sampling methodology

Activity	Description of methodology
General	Design and implementation of site-and-task-specific Job Safety and Environmental Assessments (JSEAs) prior to field mobilisation.
Soil sampling	<ul> <li>Soil samples were collected directly from surface by hand with a pair of clean nitrile gloves.</li> <li>Soil samples were placed in laboratory-supplied jars and placed immediately into a cooler and transported to the analytical laboratories under chain of custody (COC) documentation.</li> </ul>
NATA accredited laboratories	<ul> <li>Samples were tested by the following NATA accredited laboratories:</li> <li>Primary laboratory: ALS Environmental</li> <li>Secondary laboratory: Eurofins</li> </ul>

# 2.1 Laboratory analysis

Samples were subjected to PFAS testing for the full suite of analytes. Laboratory reports, which lists what comprises the PFAS full suite test, are provided in Attachment 4. The laboratory analytical schedule is summarised in Table 2.

Number of samples	Analytical schedule
2 primary soil samples	PFAS (full suite)
QA/QC	
1 intra-laboratory duplicate sample	PFAS (full suite)
1 inter-laboratory duplicate sample	PFAS (full suite)

# 3. Assessment Criteria

PFAS are the key contaminants of concern being addressed by this environmental investigation. As such, the assessment criteria for this investigation were adopted from the following document:

 HEPA 2020, PFAS National Environmental Management Plan (Version 2.0), Heads of Environment Protection Authorities Australia and New Zealand, January 2020, (PFAS NEMP).

The PFAS NEMP (Section 8, 2020) provides nationally agreed criteria that are to be used to inform site investigations. The criteria have been derived based on existing nationally agreed long standing Australian processes.

Given the site's use as a fire station, Human Health Investigation Levels for Industrial / Commercial (HIL D) landuse are considered appropriate under the definitions provided in the PFAS NEMP. GHD understands that the MFS, in consultation with the United Fire Fighters Union of South Australia, have agreed to also adopt a more stringent health investigation level (residential with minimal soil access [HIL B]), as a "trigger" for further engagement. This has been included at the direction of the MFS and is for comparison purposes only.

The ecological criteria have been applied to provide a preliminary assessment of potential ecological risks for organisms through direct and indirect exposure; however, as the PFAS NEMP states, the indirect exposure value

may be over-protective for a number of considerations, including where the area of exposed soil is too small to have any material impact on the food chain transfer to higher order organisms, or in areas where the contaminated area does not support high value foraging habitat, or secondary consumers are effectively absent from the site.

In accordance with the PFAS NEMP, the following assessment criteria have been adopted based on potential source-pathway-receptor linkages for the site:

#### Table 3 Adopted PFAS Assessment Criteria

Exposure Scenario	PFOA <sup>1</sup> (mg/kg)	PFHxS <sup>2</sup> (mg/kg)	PFOS <sup>3</sup> (mg/kg)	Sum of PFHxS and PFOS (mg/kg)
PFAS NEMP 2.0 2020 Ecological Direct Exposure	10	-	1	-
PFAS NEMP 2.0 2020 Ecological Indirect Exposure	-	-	0.14	-
PFAS NEMP 2.0 2020 Residential – minimal soil access (HIL B)	20	2	2	2
PFAS NEMP 2.0 2020 Industrial / Commercial (HIL D)	50	20	20	20

Notes:

<sup>1</sup> PFOA – perfluorooctanoic acid

<sup>2</sup> PFHxS – perfluorohexane sulfonate

#### <sup>3</sup> PFOS – perfluorooctane sulfonate

# 4. Data validation

A Quality Assurance and Quality Control (QA/QC) assessment was completed for all analytical sample data, to determine whether the results are of appropriate quality on which to base the site assessment. This included the collection and review of inter- (split) and intra- (blind) laboratory duplicates. A good indicator of the representativeness and/or precision of duplicate samples is the relative percentage difference (RPD) between primary and blind duplicate / split duplicate samples.

None of the RPD results (Attachment 2) exceeded the adopted 30% acceptance criterion. A copy of the detailed QA/QC RPD results is provided in Attachment 2. Consequently, the data is valid and of sufficient quality to rely on for the purpose and objectives of this assessment.

# 5. Results

## 5.1 Field observations

No odours or staining (indicative of the potential presence of other contaminants) were noted in the surface samples obtained.

# 5.2 Analytical results

A summary of the analytical results is presented in Attachment 3. The laboratory certificates of analysis, including laboratory QA/QC results, are provided in Attachment 4.

With the exception of the following PFAS analytes, the laboratory analysis of soil samples yielded PFAS results below the laboratory's limits of reporting (LOR).

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Table 4 PFAS analytes detected

Sample ID	Date	Perfluoro- butane sulfonic acid (PFBS) (mg/kg)	Perfluoro- hexane sulfonic acid (PFHxS) (mg/kg)	Perfluoro- heptane sulfonic acid (PFHpS) (mg/kg)	Perfluoro- octane sulfonic acid (PFOS) (mg/kg)	Perfluoro- hexanoic acid (PFHxA) (mg/kg)	Perfluoro- octanoic acid (PFOA) (mg/kg)
MtBarker_SS1	14 April 2023	0.0007	< LOR	< LOR	0.0003	< LOR	0.0002
	27 April 2023	0.0005	< LOR	< LOR	< LOR	< LOR	< LOR
MtBarker_SS2	14 April 2023	0.0043	0.0003	< LOR	0.0011	< LOR	< LOR
	27 April 2023	< LOR	0.0014	0.0004	0.0059	0.0003	0.0002

## 5.3 Discussion

No exceedances of the adopted guideline criteria for potential human health or ecological risks (Table 3) were identified in soil samples collected from the site.

The site's historical commercial use and proximity of the site to other commercial/industrial activities (waste water treatment) and recognised sources of PFAS contamination in the environment and are considered the likely source of the identified PFAS compounds in surface soils at the site. Wastewater treatment plants particularly, are a known source of PFAS contamination to the environment (Moodie et al 2021). PFAS are typically found in both effluent and biosolids due to their surfactant properties (Coggan et al. 2019). The main identified PFAS compounds are also known constituents in water-resistant coatings utilised in the production of various commercial products, including food packaging.

# 6. Conclusions

The analytical results identified the presence of PFAS in surface soils at the site in concentrations below the adopted guideline criteria. Given there is no evidence of potentially contaminating activities having occurred at the site, the relatively marginal PFAS concentrations detected within the soil samples is considered most likely attributable to a diffuse source.

The identified PFAS concentrations are significantly below the adopted assessment criteria and do not warrant further investigation.

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# 7. References

- Coggan, T.L., Moodie, D., Kolobaric, A., Szabo, D., Shimeta, J., Crosbie, N.D., Lee, E., Fernandes, M. & Clarke, B.O. 2019. An investigation into per- and polyfluoroalkyl substances (PFAS) in nineteen Australian wastewater treatment plants (WWTPs), Heliyon, Vol 5, August 2019.
- Gov SA (1993), Environment Protection Act, Government of South Australia, Version 11.2.2023.
- Gov SA (2009), Environment Protection Regulations 2009, Government of South Australia, Version 1.7.2022.
- HEPA 2020, PFAS National Environmental Management Plan (PFAS NEMP), Version 2.0, Heads of Environment Protection Authorities Australia and New Zealand, January 2020.
- Moodie, D., Coggan, T., Berry, K., Kolobaric, A., Fernandes, M., Lee, E., Reichman, S., Nugegoda, D. & Clarke, B.O. 2021. Legacy and emerging per- and polyfluoroalkyl substances (PFASs) in Australian biosolids, Chemosphere, Vol 270, May 2021.
- NEPC (1999) National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 (ASC NEPM), National Environment Protection Council, revised 2013.
- NSW EPA (2022) Sampling design Part 1 and Part 2, Contaminated Land Guidelines, Environment Protection Authority, New South Wales, August 2022.
- SA EPA (2019) Guidelines for the Assessment and Remediation of Site Contamination (GAR), Environment Protection Authority, South Australia, revised November 2019.
- Victoria EPA (2022) Summary of PFAS concentrations detected in the Environment in Victoria, Publication 2049, Environment Protection Authority, Victoria, October 2022.
- Xie, Z., Wang, Z., Mi, W., Moller, A., Wolschke, H. & Ebinghaus, R. (2015) Neutral Poly- perfluoroalkyl Substances in Air and Snow from the Arctic. Scientific Reports, 5, 8912.

# Attachments

# Attachment 1 Figures





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Paper Size ISO A3 10 15 20 ЯÐ Meters Map Projection: Transverse Mercator Horizontal Datum: GDA 1994 Grid: GDA 1994 MGA Zone 54

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MFS Mt Barker PFAS Investigation

Revision No. A Date 16/05/2023

**FIGURE 2** 

#### Sampling Locations Plan

urce: GHD: Site Boundary and Sampling Locations (2023); DPTI: Cadastre, Roads, Railways (2015). MetroMap: Imagery (Imagery Date: 17/10/20233; Date Extracted: 16/05/2023) Created by: ejuan

# Attachment 2

# **QA/QC** Assessment



EQL

#### Attachment 2 Table 1 RPD Calculation Results

	DEAO			A												
	PFAS -	Perfluoroa	ikyi Sulfoni	c Acias						AS - Perflu	oroalkyl Ca	irboxylic Ac	las			
erfluorobutane sulfonic acid FBS)	arfluoropentane sulfonic acid FPeS)	erfluorohexane sulfonic acid FHxS)	erfluoroheptane sulfonic acid FHpS)	erfluorooctane sulfonic acid FOS)	erfluorodecanesulfonic acid FDS)	arfluorobutanoic acid (PFBA)	arfluoropentanoic acid (PFPeA)	srfluorohexanoic acid (PFHxA)	erfluoroheptanoic acid (PFHpA)	erfluorooctanoic acid (PFOA)	srfluorononanoic acid (PFNA)	srfluorodecanoic acid (PFDA)	srfluoroundecanoic acid FUnDA)	erfluorododecanoic acid FDoDA)	erfluorotridecanoic acid FTrDA)	erfluorotetradecanoic acid FTeDA)
<u>Ч</u>		_ Ч Ц	<u>ч</u>	<u>ч</u>	<u>ч</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>		<u>ч</u>	<u>Ч</u>	<u>Ч</u> ,	<u>Ч</u>
mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005

#### Location Code Date Field ID Matrix Sample Type Lab Report

Eccution Couc	Duic		Matrix	oumpic Type																		
MtBarker_SS1	27/04/2023	MtBarker_SS1	Surface Soil	Normal	EM2307461	0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	<0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005
	27/04/2023	FD01	Surface Soil	Field_D	EM2307461	0.0004	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	<0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	<0.0005
					RPD (%)	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MtBarker_SS1	27/04/2023	MtBarker_SS1	Surface Soil	Normal	EM2307461	0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	<0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	<0.0005
	27/04/2023	FS01	Surface Soil	Interlab_D	985621	<0.005	< 0.005	< 0.005	< 0.005	<0.005	<0.005	<0.005	< 0.005	<0.005	<0.005	<0.005	< 0.005	< 0.005	<0.005	<0.005	<0.005	<0.005
																				(		

\*Relative percentage differences (RPDs) have only been considered where the concentration of both samples is greater than 1 times the EQL.

\*\*Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: No Limit (1 - 10 x EQL); 30 (10 - 30 x EQL); 30 ( > 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

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EQL

#### Attachment 2 Table 1 RPD Calculation Results

ulfonamide loSA) boctane OSA) ctane octane acid bl (MEFOSE) bl (ME		WA DER
Perfluorooctane su (FOSA) (FOSA) N-Methyl perfluorco sulfonamide (MeF- sulfonamide (MeF- Sulfonamide (EFFC N-Methyl perfluorco sulfonamidoacetic (MeFOSAA) N-Ethyl perfluorco sulfonamidoacetic (MeFOSAA) N-Ethyl perfluorco sulfonamidoacetic (MeFOSAA) N-Ethyl perfluorco sulfonamidoacetic (MeFOSAA) N-Ethyl perfluorco sulfonamidoacetic (MeFOSAA) N-Ethyl perfluorco sulfonamidoacetic (10:2 FTS) Sum of PFHxS an	PFAS (Sum of Total)	PFAS (Sum of Total)( List)
mg/kgmg/kgmg/kgmg/kgmg/kgmg/kgmg/kgmg/kgmg/kgmg/kgmg/kgmg/kgmg/kg	j mg/kg i	mg/kg
	2 0.0002 0	0.0002

#### Location Code Date Field ID Matrix Sample Type Lab Report

MtBarker_SS1	27/04/2023	MtBarker_SS1	Surface Soil	Normal	EM2307461	< 0.0002	< 0.0005	< 0.0005	< 0.0002	< 0.0005	<0.0005	< 0.0002	<0.0005	< 0.0005	<0.0005	<0.0005	< 0.0002	0.0005	0.0005
	27/04/2023	FD01	Surface Soil	Field_D	EM2307461	< 0.0002	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0002	<0.0005	<0.0005	<0.0005	<0.0005	< 0.0002	0.0004	0.0004
					RPD (%)	-	-	-	-	-	-	-	-	-	-	-	-	22	22
MtBarker_SS1	27/04/2023	MtBarker_SS1	Surface Soil	Normal	EM2307461	<0.0002	<0.0005	<0.0005	< 0.0002	<0.0005	< 0.0005	<0.0002	<0.0005	< 0.0005	<0.0005	< 0.0005	< 0.0002	0.0005	0.0005
MtBarker_SS1	27/04/2023 27/04/2023	MtBarker_SS1 FS01	Surface Soil Surface Soil	Normal Interlab_D	EM2307461 985621	<0.0002 <0.005	<0.0005 <0.005	<0.0005 <0.005	<0.0002 <0.01	<0.0005 <0.005	<0.0005 <0.005	<0.0002 <0.01	<0.0005 <0.005	<0.0005 <0.01	<0.0005 <0.005	<0.0005 <0.005	<0.0002 <0.005	<b>0.0005</b>	<b>0.0005</b> <0.01

\*Relative percentage differences (RPDs) have only been considered where the concentration of both samples is greater than 1 times the EQL.

\*\*Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 1000 (1 - 10 x EQL); 30 (10 - 30 x EQL); 30 ( > 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

#### SA Metropolitan Fire Service 12611012 MFS Mt Barker PFAS investigation

# **Attachment 3**

# **Tabulated Analytical Results**



#### Attachment 3 Table 1 Analytical Results

	Inorganic		PFAS -	Perfluoroa	lkyl Sulfoni	c Acids					PF	AS - Perflu	oroalkyl Ca	rboxylic Aci	ids			
	Moisture (%)	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 (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)
	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.1	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.001	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0005
PFAS NEMP 2.0 2020 Ecological direct exposure						1						10						
PFAS NEMP 2.0 2020 Ecological indirect exposure						0.01												
PFAS NEMP 2.0 2020 Residential - minimal soil access (HIL B)				2		2						20						
PFAS NEMP 2.0 2020 Industrial / Commercial (HIL D)				20		20					-	50						-
Location Code Date Field ID Lab Penort Matrix																		

Location Code	Date	Field ID	Lab Report	Matrix																		
MtBarker_SS1	14 Apr 2023	MountBarker_SS1	EM2307349	Surface soil	29.6	0.0007	< 0.0002	< 0.0002	< 0.0002	0.0003	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005
_	27 Apr 2023	MountBarker_SS1	EM2307461	Surface soil	20.6	0.0005	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005
MtBarker SS2	14 Apr 2023	MountBarker_SS2	EM2307349	Surface soil	10.8	0.0043	< 0.0002	0.0003	< 0.0002	0.0011	< 0.0002	< 0.001	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0005
-	27 Apr 2023	MountBarker_SS2	EM2307461	Surface soil	7.7	< 0.0002	< 0.0002	0.0014	0.0004	0.0059	< 0.0002	< 0.001	< 0.0002	0.0003	< 0.0002	0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002	<0.0005



#### Attachment 3 Table 1 Analytical Results

		PFAS - Perfluoroalkyl Sulfonamide					PFAS - Fluorotelomer Sulfonic Acids			PFAS - Sums		IS		
	B Perfluorooctane sulfonamide 중 (FOSA)	3 N-Methyl perfluorooctane 중 sulfonamide (MeFOSA)	월 N-Ethyl perfluorooctane 중 sulfonamide (EtFOSA)	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	8 N-Methyl perfluorooctane 중 sulfonamidoethanol (MEFOSE)	B N-Ethyl perfluorooctane 중 sulfonamidoethanol (EtFOSE)	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	3 4:2 Fluorotelomer sulfonic acid 중 (4:2 FTS)	8.2 Fluorotelomer Sulfonate (6:2 중 FTS)	월 8:2 Fluorotelomer sulfonic acid 중 (8:2 FTS)	8 10:2 Fluorotelomer sulfonic acid 정 (10:2 FTS)	Sum of PFHxS and PFOS	B PFAS (Sum of Total)	B PFAS (Sum of Total)(WA DER 중 List)
EQL	0.0002	0.0005	0.0005	0.0002	0.0005	0.0005	0.0002	0.0005	0.0005	0.0005	0.0005	0.0002	0.0002	0.0002
PFAS NEMP 2.0 2020 Ecological direct exposure														
PFAS NEMP 2.0 2020 Ecological indirect exposure														
PFAS NEMP 2.0 2020 Residential - minimal soil access (HIL B)												2		
PFAS NEMP 2.0 2020 Industrial / Commercial (HIL D)								-				20		

Location Code	Date	Field ID	Lab Report	Matrix														
MtBarker SS1	14 Apr 2023	MountBarker_SS1	EM2307349	Surface soil	< 0.0002	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0003	0.0012	0.0012
-	27 Apr 2023	MountBarker_SS1	EM2307461	Surface soil	< 0.0002	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0002	0.0005	0.0005
MtBarker SS2	14 Apr 2023	MountBarker_SS2	EM2307349	Surface soil	< 0.0002	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0014	0.0057	0.0057
-	27 Apr 2023	MountBarker_SS2	EM2307461	Surface soil	< 0.0002	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0002	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0073	0.0082	0.0078

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# Attachment 4

Laboratory Reports and Chain of Custody Documentation

Envl	ALS	CHAIN OF CUSTODY ALS Laboratory: please tick →	ELAIDE U3/1 Bu SS1055780528 73243 7222 E s DSTONE 46 Ca 7 7471 5600 E g	rma Road Pooraka SA 5095 di Astratisandrug (P. D. 4053 amples Instance (alsglobal com ilemondah Drive Cinton QL D 4680 ladstone@alsglobal.com	MACKAY 78 Ph 07-1944 0 MELBOUR Ph 03 8549 0 MUDGEE Ph 02 6372	Harboir Boad NE7 E Westan 600 E samples 27 Sydnny Roa 6735 E mudge	Mackay QLD 4740 Balagiabal com Road Springvale VIC i melbourne@alsgio d Mudgee NSW 285 e mai@alsgiobal co	2 3171 bal.com 50 om	Ph 08 9209 7655 E	San Gas Swiraigiatsglobal con y Mataga WA 6090 amples perthigaisg	n jevo k NSW 2304 Dr Prijevo k NSW 2304 Dr 1 Ph. c I Ph. c I Dabi com Dr	VDNEY 277-289 Woodpark Road Smithfield NSW 2164 02 8784 8555 E. samples sydney@alegobat.com WSVILLE 1415 Desma Court Bohle (2),0 4818 7.4766 0600 E. townsville environmental@alsgishal.com SLLONGONG 99 Kenny Stitled Wellongong NSW 2500 0.4225 0325 E. portkambledhalandool
LIENT:	GHD Pty Ltd		TURNAR	ROUND REQUIREMENTS :	Stand	ard TAT (Lis	t due date):				FOR LABORATORY	SE ONLY (Circle)
FFICE:	211 Victoria Square, Level 4, Add	elaide SA 5000	(Standard	TAT may be longer for some tests e.g	□ Non S	tandard or u	rgent TAT (List	due date):			Custody Seal Intert?	SE UNLT (CITCIE)
			ALS QU	OTE:		/		cc	C SEQUENCE NUMB	ER (Circle)	Free ice / frozen ice bricks	present upon
ROJECT	12611012		ORDER	NO.: 12611012				COC: 1	2 3 4	5 6	receipt? 7 Random Sample Tempera	
ROJECT	MANAGER: Vera Biermann	CONTACT	PH: 041262	5108				OF: 1	2 3 - 4	5 6	7 Other comment	
AMPLER	R: Ally Kirkman	SAMPLER	MOBILE:		RELINQUE	SHED BY:		RECEIVE	D BY:	R	FLINOUISHEDBY	DECENED BY:
OC ema	iled to ALS? YES	EDD FORM	IAT (or defa	ult):					11 -			kan a The Car
mail Rep	oorts to: GHDLabReports@ghd.com	n			DATE/TIME	E:		DATE/TIN	ME:	D	ATE/TUNE	- prov to (reg
mail Invo	pice to: vera.biermann@ghd.com				10			20/0	F/22		ry ( La Thinks,	DATE IL
OMMEN	TS/SPECIAL HANDLING/STORAG	E OR DISPOSAL:			A	l.			/			right
ALS SAMPLE DETAILS USE MATRIX: SOLID (S) WATER (W)			CONTAINER INFOR	RMATION ANALYS Where Mer			SIS REQUIRED I tals are required	ncluding SUITES (NB. , specify Total (unfilter requ	. Suite Codes mu ed bottle required uired).	st be listed to attract suite price) I) or <b>Dissolved</b> (field filtered bott	e Additional Information	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVI (refer to codes below)	E	TOTAL CONTAINERS	PFAS - Full suite (28 analytes)					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
1	MountBarker_SS1	14/04/2023	s	1 x plastic PFAS jar			×					
2	MountBarker_SS2	14/04/2023	S	1 x plastic PFAS jar	-		x					
						, i i i i						Environmental Division Melbourne
								71				Work Order Reference EM2307349
												1 29289 II
				7						25		elephone + €1•3-8549-9€00
				a state of the	TOTAL	ł						



#### **CERTIFICATE OF ANALYSIS** Page Work Order : EM2307349 : 1 of 5 Client : GHD PTY LTD Laboratory : Environmental Division Melbourne Contact : VERA BIERMANN Contact : Peter Ravlic Address Address : 4 Westall Rd Springvale VIC Australia 3171 : Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000 Telephone : -----Telephone : +6138549 9645 Project : 12611012 **Date Samples Received** : 27-Apr-2023 11:55 Order number : 12611012 Date Analysis Commenced : 28-Apr-2023 C-O-C number Issue Date : -----: 01-May-2023 15:58 Sampler : ALLY KIRKMAN Site : -----Quote number : MEBQ/005/21 (Vic Only, Primary) "Julula Accreditation No. 825 No. of samples received : 2 Accredited for compliance with

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

ISO/IEC 17025 - Testing

This Certificate of Analysis contains the following information:

: 2

- General Comments
- Analytical Results

No. of samples analysed

• Surrogate Control Limits

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

#### Signatories

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

Signatories	Position	Accreditation Category
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

Page	: 2 of 5
Work Order	EM2307349
Client	: GHD PTY LTD
Project	: 12611012



#### **General Comments**

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

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

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

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

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

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

Key: CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society. LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

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Work Order	: EM2307349
Client	: GHD PTY LTD
Project	: 12611012



### Analytical Results

Sub-Matrix: SOIL			Sample ID	MountBarker_SS1	MountBarker_SS2	 	
		Sampli	na date / time	14-Apr-2023 00:00	14-Apr-2023 00:00	 	
Compound	CAS Number		l Init	EM2307349 001	EM2307349 002		
Compound	CAS Number	LON	0111	EWI2307343-001	EW2307345-002	 	
	44000			Result	Result	 	
EA055: Moisture Content (Dried @ 105-	110°C)	0.1	0/	20.6	10.9		
	 	0.1	70	23.0	10.0	 	
EP231A: Perfluoroalkyl Sulfonic Acids		0.0000					
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0007	0.0043	 	
Perfluoropentane sulfonic acid	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	 	
(PFPeS)							
Perfluorohexane sulfonic acid	355-46-4	0.0002	mg/kg	<0.0002	0.0003	 	
(PFHxS)					0.0000		
Perfluoroheptane sulfonic acid	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	 	
	1700.00.1	0.0002	malka	0.0002	0.0014		
Perfluorooctane sulfonic acid	1763-23-1	0.0002	шу/ку	0.0003	0.0011	 	
(FFOS) Porfluorodocano sulfonic acid	335 77 3	0.0002	ma/ka	<0.0002	<0.0002	 	
(PEDS)	555-77-5	0.0002	mgmg	10.000L	0.0002	 	
EP231B: Porfluoroalky/ Carboxylic Aci	de						
Perfluorobutanoic acid (PEBA)	375 22 4	0.001	ma/ka	<0.001	<0.001	 	
Perfluoropentanoic acid (PEPeA)	2706-90-3	0.0002	ma/ka	<0.0002	<0.0002	 	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	ma/ka	<0.0002	<0.0002	 	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	ma/ka	<0.0002	<0.0002	 	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0002	<0.0002	 	
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	 	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	 	
Perfluoroundecanoic acid	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	 	
(PFUnDA)							
Perfluorododecanoic acid	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	 	
(PFDoDA)							
Perfluorotridecanoic acid	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	 	
(PFTrDA)							
Perfluorotetradecanoic acid	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	 	
(PFTeDA)							
EP231C: Perfluoroalkyl Sulfonamides							
Perfluorooctane sulfonamide	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	 	
(FOSA)							
N-Methyl perfluorooctane	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	 	
sulfonamide (MeFOSA)							

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Work Order	EM2307349
Client	: GHD PTY LTD
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### Analytical Results

Sub-Matrix: SOIL			Sample ID	MountBarker_SS1	MountBarker_SS2					
		Samplii	ng date / time	14-Apr-2023 00:00	14-Apr-2023 00:00					
Compound	CAS Number	LOR	Unit	EM2307349-001	EM2307349-002					
				Result	Result					
EP231C: Perfluoroalkyl Sulfonamide	es - Continued									
N-Ethyl perfluorooctane	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005					
sulfonamide (EtFOSA)										
N-Methyl perfluorooctane	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005					
sulfonamidoethanol (MeFOSE)										
N-Ethyl perfluorooctane	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005					
sulfonamidoethanol (EtFOSE)										
N-Methyl perfluorooctane	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002					
sulfonamidoacetic acid										
(Merosaa)	2001 50 6	0.0002	ma/ka	<0.0002	<0.0002					
N-Ethyl perhuorooctane sulfonamidoacetic acid	2991-50-0	0.0002	iligitg	40.000Z	10.0002					
(EtFOSAA)										
EP231D: (n:2) Eluorotelomer Sulfonic Acids										
4:2 Fluorotelomer sulfonic acid	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005					
(4:2 FTS)										
6:2 Fluorotelomer sulfonic acid	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005					
(6:2 FTS)										
8:2 Fluorotelomer sulfonic acid	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005					
(8:2 FTS)										
10:2 Fluorotelomer sulfonic acid	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005					
(10:2 FTS)										
EP231P: PFAS Sums										
Sum of PFAS		0.0002	mg/kg	0.0012	0.0057					
Sum of PFHxS and PFOS	355-46-4/1763-23-	0.0002	mg/kg	0.0003	0.0014					
	1									
Sum of PFAS (WA DER List)		0.0002	mg/kg	0.0012	0.0057					
EP231S: PFAS Surrogate										
13C4-PFOS		0.0002	%	110	104					
13C8-PFOA		0.0002	%	89.8	91.6					

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#### Surrogate Control Limits

Sub-Matrix: SOIL		Recovery	Limits (%)
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS		68	136
13C8-PFOA		69	133



## QUALITY CONTROL REPORT

Work Order	: EM2307349	Page	: 1 of 6
Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: VERA BIERMANN	Contact	: Peter Ravlic
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	:	Telephone	: +6138549 9645
Project	: 12611012	Date Samples Received	: 27-Apr-2023
Order number	: 12611012	Date Analysis Commenced	: 28-Apr-2023
C-O-C number	:	Issue Date	: 01-May-2023
Sampler	: ALLY KIRKMAN		Hac-MRA NATA
Site	:		
Quote number	: MEBQ/005/21 (Vic Only, Primary)		Accreditation No. 825
No. of samples received	: 2		Accredited for compliance with
No. of samples analysed	: 2		ISO/IEC 17025 - Testing

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

This Quality Control Report contains the following information:

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

#### Signatories

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

Signatories	Position	Accreditation Category
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

Page	÷	2 of 6
Work Order	÷	EM2307349
Client	÷	GHD PTY LTD
Project	÷	12611012



#### **General Comments**

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

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

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

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

# = Indicates failed QC

#### Laboratory Duplicate (DUP) Report

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

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA055: Moisture Co	ntent (Dried @ 105-110°C)	(QC Lot: 5016396)							
EM2306914-004	Anonymous	EA055: Moisture Content		0.1	%	24.0	23.0	4.3	0% - 20%
EM2307285-003	Anonymous	EA055: Moisture Content	A055: Moisture Content		%	19.6	21.6	9.7	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 5016103)									
EM2307292-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231B: Perfluoroa	kyl Carboxylic Acids (QC	CLot: 5016103)							
EM2307292-002	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231C: Perfluoroal	kyl Sulfonamides (QC Lo	t: 5016103)							
EM2307292-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit

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Work Order	: EM2307349
Client	: GHD PTY LTD
Project	: 12611012



Sub-Matrix: SOIL						Laboratory L	Duplicate (DUP) Report		
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroal	xyl Sulfonamides (QC Lot:	5016103) - continued							
EM2307292-002	Anonymous	EP231X: N-Methyl perfluorooctane	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		sulfonamidoacetic acid (MeFOSAA)							
		EP231X: N-Ethyl perfluorooctane	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		sulfonamidoacetic acid (EtFOSAA)							
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		(EIFUSA)	24448-09-7	0.0005	ma/ka	<0.0005	<0.0005	0.0	No Limit
		EP231X: N-Methyl perilubrooctane	24440-09-7	0.0005	iiig/kg	~0.0005	~0.0005	0.0	
		EP231X: N-Ethyl perfluorooctane	1691-99-2	0.0005	ma/ka	<0.0005	<0.0005	0.0	No Limit
		sulfonamidoethanol (EtEOSE)	1001 00 2	0.0000	mgrig		0.0000	0.0	
EP231D: (n:2) Fluoro	otelomer Sulfonic Acids(Q	C Lot: 5016103)							
EM2307292-002	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2	757124-72-4	0.0005	mg/kg	< 0.0005	<0.0005	0.0	No Limit
		FTS)							
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		FTS)							
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		FTS)							
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		FTS)							
EP231P: PFAS Sums	(QC Lot: 5016103)								
EM2307292-002	Anonymous	EP231X: Sum of PFAS		0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763-	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231C: Perfluoroalky           EM2307292-002           /           EM2307292-002           /           EM2307292-002           /           EM2307292-002           /           EM2307292-002			23-1						
		EP231X: Sum of PFAS (WA DER List)		0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit



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

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

Sub-Matrix: SOIL				Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike	Spike Recovery (%)	Acceptable	Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 501610	3)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00111 mg/kg	95.5	72.0	128	
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	109	73.0	123	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00114 mg/kg	85.6	67.0	130	
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	106	70.0	132	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	90.7	68.0	136	
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00121 mg/kg	85.2	59.0	134	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5016	6103)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	87.8	71.0	135	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.2	69.0	132	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	90.6	70.0	132	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.6	71.0	131	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.2	69.0	133	
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.2	72.0	129	
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	82.8	69.0	133	
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	88.8	64.0	136	
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	83.0	69.0	135	
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	72.1	66.0	139	
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.4	69.0	133	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5016103	)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.6	67.0	137	
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	96.4	70.0	130	
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.7	70.0	130	
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	91.1	70.0	130	
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	91.5	70.0	130	
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.5	63.0	144	
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.0	61.0	139	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5	016103)								

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Sub-Matrix: SOIL			Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike	Spike Recovery (%)	Acceptable	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLc								
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00117 mg/kg	89.9	62.0	145
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00119 mg/kg	90.2	64.0	140
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.0012 mg/kg	82.2	65.0	137
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00121 mg/kg	90.2	70.0	130
EP231P: PFAS Sums (QCLot: 5016103)								
EP231X: Sum of PFAS		0.0002	mg/kg	<0.0002				
EP231X: Sum of PFHxS and PFOS	355-46-4/17	0.0002	mg/kg	<0.0002				
	63-23-1							
EP231X: Sum of PFAS (WA DER List)		0.0002	mg/kg	<0.0002				

#### Matrix Spike (MS) Report

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

Sub-Matrix: SOIL	ub-Matrix: SOIL				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable	Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High	
EP231A: Perfluoro	alkyl Sulfonic Acids (QCLot: 5016103)							
EM2307292-020	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00111 mg/kg	89.2	72.0	128	
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00118 mg/kg	111	73.0	123	
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00114 mg/kg	88.9	67.0	130	
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	112	70.0	132	
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	87.8	68.0	136	
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00121 mg/kg	88.4	59.0	134	
EP231B: Perfluoro	alkyl Carboxylic Acids (QCLot: 5016103)							
EM2307292-020	nonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	88.2	71.0	135	
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	84.3	69.0	132	
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	90.3	70.0	132	
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	89.4	71.0	131	
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	87.9	69.0	133	
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	87.6	72.0	129	
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	81.6	69.0	133	
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	87.6	64.0	136	
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	80.3	69.0	135	
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	73.6	66.0	139	
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	87.9	69.0	133	
EP231C: Perfluoro	alkyl Sulfonamides (QCLot: 5016103)							

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Sub-Matrix: SOIL					Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable	Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High	
EP231C: Perfluoro	alkyl Sulfonamides (QCLot: 5016103) - continued							
EM2307292-020	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	85.3	67.0	137	
		EP231X: N-Methyl perfluorooctane sulfonamide	31506-32-8	0.00312 mg/kg	98.7	70.0	130	
		(MeFOSA)						
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	83.4	70.0	130	
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol	24448-09-7	0.00312 mg/kg	90.2	70.0	130	
		(MeFOSE)						
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol	1691-99-2	0.00312 mg/kg	95.3	70.0	130	
		(EIFUSE)	2355-31-9	0.00125 ma/ka	78.1	63.0	144	
		acid (MeFOSAA)	2000 01 0	0.00120 mg/kg	70.1	00.0	177	
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic	2991-50-6	0.00125 mg/kg	82.2	61.0	139	
		acid (EtFOSAA)						
EP231D: (n:2) Flue	protelomer Sulfonic Acids (QCLot: 5016103)							
EM2307292-020	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	84.4	62.0	145	
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00119 mg/kg	89.1	64.0	140	
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	83.9	65.0	137	
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00121 mg/kg	77.8	70.0	130	



QA/QC Compliance Assessment to assist with Quality Review							
Work Order	: EM2307349	Page	: 1 of 4				
Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne				
Contact	: VERA BIERMANN	Telephone	: +6138549 9645				
Project	: 12611012	Date Samples Received	: 27-Apr-2023				
Site	:	Issue Date	: 01-May-2023				
Sampler	: ALLY KIRKMAN	No. of samples received	: 2				
Order number	: 12611012	No. of samples analysed	: 2				

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

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

#### **Summary of Outliers**

#### **Outliers : Quality Control Samples**

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

- <u>NO</u> Method Blank value outliers occur.
- <u>NO</u> Duplicate outliers occur.
- <u>NO</u> Laboratory Control outliers occur.
- <u>NO</u> Matrix Spike outliers occur.
- For all regular sample matrices, <u>NO</u> surrogate recovery outliers occur.

#### **Outliers : Analysis Holding Time Compliance**

• NO Analysis Holding Time Outliers exist.

#### **Outliers : Frequency of Quality Control Samples**

• <u>NO</u> Quality Control Sample Frequency Outliers exist.



#### Analysis Holding Time Compliance

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

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

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

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

Evaluation:	x =	Holding	time	breach	۰.	- =	Within	holding	time
	~ -	1 Iolullig		DIEacII		_		noiunu	unc.

Matrix: SOIL					Evaluation	: × = Holding time	breach ; 🗸 = Withi	n holding time.
Method		Sample Date	E>	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110	°C)							
HDPE Soil Jar (EA055) MountBarker_SS1,	MountBarker_SS2	14-Apr-2023				28-Apr-2023	28-Apr-2023	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X) MountBarker_SS1,	MountBarker_SS2	14-Apr-2023	28-Apr-2023	11-Oct-2023	1	01-May-2023	07-Jun-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X) MountBarker_SS1,	MountBarker_SS2	14-Apr-2023	28-Apr-2023	11-Oct-2023	1	01-May-2023	07-Jun-2023	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X) MountBarker_SS1,	MountBarker_SS2	14-Apr-2023	28-Apr-2023	11-Oct-2023	1	01-May-2023	07-Jun-2023	~
EP231D: (n:2) Fluorotelomer Sulfonic Acid	ls							
HDPE Soil Jar (EP231X) MountBarker_SS1,	MountBarker_SS2	14-Apr-2023	28-Apr-2023	11-Oct-2023	1	01-May-2023	07-Jun-2023	✓
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X) MountBarker_SS1,	MountBarker_SS2	14-Apr-2023	28-Apr-2023	11-Oct-2023	1	01-May-2023	07-Jun-2023	~

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# **Quality Control Parameter Frequency Compliance**

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

Matrix: SOIL		Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification						
Quality Control Sample Type		Co	ount	Rate (%)			Quality Control Specification	
Analytical Methods	Method	QC	Reaular	Actual	Expected	Evaluation		
Laboratory Duplicates (DUP)								
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	11.11	10.00	~	NEPM 2013 B3 & ALS QC Standard	
Laboratory Control Samples (LCS)								
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Method Blanks (MB)								
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Matrix Spikes (MS)								
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	9	11.11	5.00	1	NEPM 2013 B3 & ALS QC Standard	

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#### **Brief Method Summaries**

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

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

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CLIENT:	GHD Pty Ltd		TURNAR	OUND REQUIREMENTS :	Standa	ard TAT (List	due date):					FOR	LABORATO	ORY USE C	ONLY (Circle)
OFFICE:	211 Victoria Square, Level 4, Adelaide	SA 5000	(Standard T) Ultra Trace (	AT may be longer for some tests e.g Organics)	Non S	tandard or ur	gent TAT (List	due dat	te):			Cust	ody Seal Intact	2	Yes No N/A
			ALS QUO	TE:					COC SEQ	UENCE NUM	BER (Circle	Free	ice / frozen ice ipt?	bricks prese	nt upon Yes N/A
PROJECT	: 12611012		ORDER N	0.: 12611012				co	DC: 1 2	3 4	5 6	7 Rand	dom Sample Te	mperature o	n Receipt: 11-2 'C
PROJECT	MANAGER: Vera Biermann	CONTACT	PH: 0435981	783				0	0F: 1 2	3 4	5 6	7 Othe	r comment:		
SAMPLER		SAMPLER	MOBILE: 041	12625108	RELINQUI	SHED BY:		RE	ECEIVED BY:	7		RELINQU	ISHED BY:		RECEIVED BY:
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JOMMEN	IS/SPECIAL HANDLING/STORAGE OR I	DISPOSAL:													
ALS USE	SAMPLE D MATRIX: SOLID (	DETAILS S) WATER (W)		CONTAINER INFO	RMATION		ANALYS Where Met	SIS REQ tals are	UIRED includin required, specif	ig SUITES (N y Total (unfilt re	B. Suite Code: ered bottle req quired).	must be liste uired) or <b>Diss</b> e	d to attract suite blved (field filter	e price) red bottle	Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATI (refer to codes below)	VE )	TOTAL CONTAINERS	PFAS - Full suite (28 inalytes), standard LOR								Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
l	MountBarker_SS1	27/04/2023	s	Plastic PFAS jar		1	X								
2	MountBarker_SS2	27/04/2023	S	Plastic PFAS jar		1	x								
3	FD01	27/04/2023	s	Plastic PFAS jar		1	x								
	FS01	27/04/2023	S	Plastic PFAS jar		1	x								Please forward to Eurofins
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				-										-	
					TOTAL	4				-	Teleptic	ni <b>mi hahiti</b> me: +61-34	' <b>₩ '∏''    <sub>₩</sub>      </b> 9549 9€00		



#### **CERTIFICATE OF ANALYSIS** Page Work Order : EM2307461 : 1 of 5 Client : GHD PTY LTD Laboratory : Environmental Division Melbourne Contact : VERA BIERMANN Contact : Peter Ravlic Address Address : 4 Westall Rd Springvale VIC Australia 3171 : Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000 Telephone : -----Telephone : +6138549 9645 Project : 12611012 **Date Samples Received** : 28-Apr-2023 10:55 Order number Date Analysis Commenced : -----: 29-Apr-2023 C-O-C number Issue Date : -----: 01-May-2023 16:58 Sampler : Ally Kirkman Site Quote number : EN/005 "Julula Accreditation No. 825 No. of samples received : 3 Accredited for compliance with

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

ISO/IEC 17025 - Testing

This Certificate of Analysis contains the following information:

: 3

- General Comments
- Analytical Results

No. of samples analysed

• Surrogate Control Limits

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

#### Signatories

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

Signatories	Position	Accreditation Category
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

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Work Order	EM2307461
Client	: GHD PTY LTD
Project	: 12611012



#### **General Comments**

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

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

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

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

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

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

Key: CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society. LOR = Limit of reporting

^ = This result is computed from individual analyte detections at or above the level of reporting

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

EP231: Stable isotope enriched internal standards are added to samples prior to extraction. Target compounds have a direct analogous internal standard with the exception of PFPeS, PFHpA, PFDS, PFTrDA and 10:2 FTS. These compounds use an internal standard that is chemically related and has a retention time close to that of the target compound. The DQO for internal standard response is 50-150% of that established at initial calibration. PFOS is quantified using a certified, traceable standard consisting of linear and branched PFOS isomers. These practices are in line with recommendations in the National Environmental Management Plan for PFAS (Australian HEPA) and also conform to QSM 5.3 (US DoD) requirements.

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Work Order	EM2307461
Client	: GHD PTY LTD
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### Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	MountBarker_SS1	MountBarker_SS2	FD01	 
		Sampli	ng date / time	27-Apr-2023 00:00	27-Apr-2023 00:00	27-Apr-2023 00:00	 
Compound	CAS Number	LOR	Unit	EM2307461-001	EM2307461-002	EM2307461-003	 
				Result	Result	Result	 
EA055: Moisture Content (Dried @ 105	5-110°C)						
Moisture Content		0.1	%	20.6	7.7	11.3	 
EP231A: Perfluoroalkyl Sulfonic Acids	;						
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	0.0005	<0.0002	0.0004	 
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	 
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.0014	<0.0002	 
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.0004	<0.0002	 
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.0059	<0.0002	 
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	 
EP231B: Perfluoroalkyl Carboxylic Ac	ids						
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	<0.001	 
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	 
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.0003	<0.0002	 
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	 
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.0002	<0.0002	 
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	 
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	 
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	 
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	 
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	 
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	 
EP231C: Perfluoroalkyl Sulfonamides							
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	 
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	 

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### Analytical Results

Sub-Matrix: SOIL			Sample ID	MountBarker_SS1	MountBarker_SS2	FD01	 
(Matrix: SOIL)		Compli	na data (tima	27 Apr 2022 00:00	27 Apr 2022 00:00	27 Apr 2022 00:00	
		Sampin		27-Api-2023 00.00	27-Api-2023 00.00	27-Api-2023 00.00	 
Compound	CAS Number	LOR	Unit	EM2307461-001	EM2307461-002	EM2307461-003	 
				Result	Result	Result	 
EP231C: Perfluoroalkyl Sulfonamide	es - Continued						
N-Ethyl perfluorooctane	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	 
sulfonamide (EtFOSA)							
N-Methyl perfluorooctane	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	 
sulfonamidoethanol (MeFOSE)							
N-Ethyl perfluorooctane	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	 
sulfonamidoethanol (EtFOSE)							
N-Methyl perfluorooctane	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	 
sulfonamidoacetic acid							
(MeFOSAA)							
N-Ethyl perfluorooctane	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	<0.0002	 
sulfonamidoacetic acid							
(EtFOSAA)							
EP231D: (n:2) Fluorotelomer Sulfon	ic Acids						
4:2 Fluorotelomer sulfonic acid	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	 
(4:2 FTS)							
6:2 Fluorotelomer sulfonic acid	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	 
(6:2 FTS)							
8:2 Fluorotelomer sulfonic acid	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	 
(8:2 FTS)							
10:2 Fluorotelomer sulfonic acid	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	<0.0005	 
(10:2 FTS)							
EP231P: PFAS Sums							
Sum of PFAS		0.0002	mg/kg	0.0005	0.0082	0.0004	 
Sum of PFHxS and PFOS	355-46-4/1763-23-	0.0002	mg/kg	<0.0002	0.0073	<0.0002	 
	1						
Sum of PFAS (WA DER List)		0.0002	mg/kg	0.0005	0.0078	0.0004	 
EP231S: PFAS Surrogate							
13C4-PFOS		0.0002	%	93.7	70.7	83.7	 
13C8-PFOA		0.0002	%	88.6	89.5	96.0	 

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#### Surrogate Control Limits

Sub-Matrix: SOIL	Recovery Limits (%)			
Compound	CAS Number	Low	High	
EP231S: PFAS Surrogate				
13C4-PFOS		68	136	
13C8-PFOA		69	133	



## QUALITY CONTROL REPORT

Work Order	: EM2307461	Page	: 1 of 7
Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: VERA BIERMANN	Contact	: Peter Ravlic
Address	: Level 4, 211 VICTORIA SQUARE ADELAIDE SA, AUSTRALIA 5000	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	:	Telephone	: +6138549 9645
Project	: 12611012	Date Samples Received	: 28-Apr-2023
Order number	:	Date Analysis Commenced	: 29-Apr-2023
C-O-C number	:	Issue Date	: 01-May-2023
Sampler	: Ally Kirkman		
Site	:		
Quote number	: EN/005		Appreciation No. 825
No. of samples received	: 3		Accredited for compliance with
No. of samples analysed	: 3		ISO/IEC 17025 - Testing

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

This Quality Control Report contains the following information:

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

#### Signatories

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

Signatories	Position	Accreditation Category
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC

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#### **General Comments**

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

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

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

Key: Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

# = Indicates failed QC

#### Laboratory Duplicate (DUP) Report

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

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Sample ID	Method: Compound CAS Number			Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)	
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 5018822)										
EM2307223-005	Anonymous	EA055: Moisture Content		0.1	%	22.1	22.2	0.5	0% - 20%	
EM2307460-006	Anonymous	EA055: Moisture Content		0.1	%	22.6	23.4	3.5	0% - 20%	
EP231A: Perfluoroal	kyl Sulfonic Acids (QC Lot	5019562)								
EM2307374-003	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
EM2307463-002	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluoroheptane sulfonic acid (PFHpS) 375-92-		0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluorooctane sulfonic acid (PFOS) 1763-23-1			mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
EP231B: Perfluoroa	Ikyl Carboxylic Acids (QC I	_ot: 5019562)				<0.0002         <0.0002         0.0         No Limit           <0.0002				
EM2307374-003	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
	EP231X: Perfluorooctanoic acid (PFOA) 335-6		335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluorononanoic acid (PFNA) 375-95-1		0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit	

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Laboratory angle 0         Sample 0         Mark 0         Sample 0         Mark 0         Oppical Read         MPD (b)         Separate Read         MPD (b)         MPD (b)         Separate Read         MPD (b)         MPD	Sub-Matrix: SOIL					Laboratory Duplicate (DUP) Report				
EP3315: Perfluoroality/ Carbon (Cold Cold 2019565) - continued         Control         No Limit           EN2307374-003         Anonymous         EP331X: Perfluorobalino acid (PFEA)         376-97         0.000         mgkg         -0.001         -0.001         No Limit           EN2307465-002         Anonymous         EP331X: Perfluorobalino acid (PFEA)         3775-47         0.002         mgkg         -0.002         -0.002         -0.001         No Limit           EN2307465-002         EP331X: Perfluorobalino acid (PFEA)         375-67         0.002         mgkg         -0.0002         -0.0002         -0.000         No Limit           EP321X: Perfluorobalino acid (PFEA)         375-67         0.0002         mgkg         -0.0002         -0.0002         -0.0002         -0.0002         No Limit           EP321X: Perfluorobalino acid (PFEA)         375-67         0.0002         mgkg         -0.0002         -0.0002         -0.0002         -0.0002         -0.0002         -0.0002         -0.0002         -0.0002         -0.0002         -0.0002	Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EM2307374-003         Anonymous         EP231X: Enditurationational (FFTDA)         72829-44         00002         (mpsg)         -0.0005         -0.0005         0.0005         No.Limit           EM230746-002         Anonymous         EP231X: Enditurationational cald (FFTDA)         376-67         0.0002         mpsg)         -0.0002         -0.0002         0.0002         Mol NUM           EM2307465-002         Anonymous         EP231X: Enditurationational cald (FFTDA)         377545         0.0002         mpsg)         -0.0002         -0.0	EP231B: Perfluoroal	kyl Carboxylic Acids (QC	Lot: 5019562) - continued							
EP231X Perturbational add (PF1eA)         374-02         0.005         mg/kg         40.005         40.005         40.005         0.0         No.1mit           EM2307463-002         Anonymous         EP231X Perturbational add (PF1eA)         2706-60         0.0002         mg/kg         40.0002 </td <td>EM2307374-003</td> <td>Anonymous</td> <td>EP231X: Perfluorotridecanoic acid (PFTrDA)</td> <td>72629-94-8</td> <td>0.0002</td> <td>mg/kg</td> <td>&lt;0.0002</td> <td>&lt; 0.0002</td> <td>0.0</td> <td>No Limit</td>	EM2307374-003	Anonymous	EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	< 0.0002	0.0	No Limit
end         EP231X Perhuopolytanole add (PFDA)         37524         0.01         mg/kg         40.01         40.01         0.0         No.Limit           EM337463-002         Anonymous         EP231X Perhuopolytanolo add (PF1A)         307644         0.002         mg/kg         40.002         40.002         0.0         No.Limit           EP231X Perhuopolytanolo add (PF1A)         375645         0.002         mg/kg         40.002         40.002         0.0         No.Limit           EP231X Perhuopolytanolo add (PF0A)         335671         0.0002         mg/kg         40.002         40.002         0.0         No.Limit           EP231X Perhuopolytanolo add (PF0A)         335671         0.0002         mg/kg         40.002         40.002         0.0         No.Limit           EP231X Perhuopolytanolecanic add (PF0A)         335671         0.0002         mg/kg         40.002         40.002         0.0         No.Limit           EP231X Perhuopolytanolecanic add (PF0A)         37524         0.001         mg/kg         40.002         40.002         0.00         No.Limit           EP231X Perhuopolytanole add (PF0A)         375491         0.002         mg/kg         40.002         40.002         0.00         No.Limit           EP231X Perhuopolytanole add (PF0A)			EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EM2307483-002         Anonymous         EP231X: Perfuturonetamonic and (PFEA)         270-900         0.0002         mg/kg         -0.0002         0.000         No Limit           EM2307483-002         Anonymous         EP231X: Perfuturonetamonic and (PFA)         377-244         0.0002         mg/kg         -0.0002         -0.0002         0.0         No Limit           EP231X: Perfuturonetamonic and (PFA)         375-851         0.0002         mg/kg         -0.0002         -0.0002         0.0         No Limit           EP231X: Perfuturonetamolic and (PFA)         375-851         0.0002         mg/kg         -0.0002         -0.0002         0.0         No Limit           EP231X: Perfuturonetamolic and (PFDA)         335-751         0.0002         mg/kg         -0.0002         -0.0002         0.0         No Limit           EP231X: Perfuturonetamolic and (PFDA)         337-651         0.0002         mg/kg         -0.0002         -0.0002         0.0         No Limit           EP231X: Perfuturonetamolic and (PFDA)         376-247         0.0002         mg/kg         -0.0002         0.0         No Limit           EP231X: Perfuturonetame sufficianmide (POSA)         764-047         0.0005         mg/kg         -0.0002         0.0         No Limit           EP231X: Perfuturonetame sufficia			EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EP231: Perfluorobane and get (PFIAA)         307.44         0.002         mg/hg         0.0002         -0.0002         0.0         No Limit           EP231: Perfluorobane and get (PFIAA)         375.459         0.002         mg/hg         -0.0002         -0.0002         0.0         No Limit           EP231: Perfluorobane and get (PFIAA)         375.451         0.0002         mg/hg         -0.0002         -0.0002         0.0         No Limit           EP231: Perfluorobane and get (PFIAA)         375.451         0.0002         mg/hg         -0.0002         -0.0002         0.0         No Limit           EP231: Perfluorobane and get (PFIAA)         375.451         0.0002         mg/hg         -0.0002         -0.0002         0.0         No Limit           EP231: Perfluorobane and get (PFIDA)         375.451         0.0002         mg/hg         -0.0002         -0.0002         0.0         No Limit           EP231: Perfluorobane and get (PFIDA)         375.451         0.0002         mg/hg         -0.0002         -0.0002         0.00         No Limit           EP231: Perfluorobane and get (PFIDA)         376.421         0.000         mg/hg         -0.0002         -0.0002         0.00         No Limit           EP231: Perfluorobane ande get (PFIA)         376.431         0.0002	EM2307463-002	Anonymous	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	aboratory Duplicate (DUP) Report           al Result         Duplicate Result         RPD (%)         Acceptable           0002         <0.0002		No Limit
EP231C: Perfluoronational add (PFIpA)         375-951         0.002         mg/g         40.002         40.002         0.0         No Limit           EP231X: Perfluoronanoic add (PFNA)         335-971         0.002         mg/g         40.002         40.002         0.0         No Limit           EP231X: Perfluoronanoic add (PFNA)         335-971         0.002         mg/g         40.002         40.002         0.0         No Limit           EP231X: Perfluoronatesanic add (PFNA)         335-971         0.002         mg/g         40.002         40.002         0.0         No Limit           EP231X: Perfluoronatesanic add (PFDA)         3375-92         0.002         mg/g         40.002         40.002         0.0         No Limit           EP231X: Perfluoronatesanic add (PFDA)         3776-97         0.002         mg/g         40.002         40.002         0.0         No Limit           EP231X: Perfluoronatesanic add (PFDA)         378-62         0.001         mg/g         40.002         40.002         0.0         No Limit           EP231X: Perfluoronatesanic add (PFDA)         378-62         0.000         mg/g         40.002         40.001         0.0         No Limit           EP231X: Nethyl perfluoroatene add (PFDA)         754-91         0.000         mg/g			EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	0.0002	<0.0002	0.0	No Limit
EP231X:         Perfluorocanoic add (PFOA)         3378-71         0.0002         mg/kg         40.0002         40.0002         0.0         No Limit           EP231X:         Perfluorocanoic add (PFOA)         3378-71         0.0002         mg/kg         40.0002         40.0001         40.001         40.001         40.001         40.001         40.001         40.001         40.001         40.001         40.001         40.001         40.001         40.001         40.001         40.001         40.0002         40.0002         40.0002         40.0002         40.0002         40.0002         40.0002         40.0002         40.0002         40.0002         40.0002         40.0002         40.0002			EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231X: Perfluoronancia add (PFNA)         337.95-91         0.0002         w0.0002         -0.0002         0.000         No Limit           EP231X: Perfluoronancia add (PFDA)         335.75-92         0.0002         w0.0002         -0.0002         0.000         No Limit           EP231X: Perfluoronanceanoia add (PFDA)         2058.94-80         0.0002         mg/kg         -0.0002         -0.0002         0.0         No Limit           EP231X: Perfluoronanceanoia add (PFDA)         7282.94-80         0.0002         -0.0002         -0.0002         0.0         No Limit           EP231X: Perfluoronanceanoia add (PFDA)         7282.94-80         0.0005         mg/kg         -0.0002         -0.0002         0.0         No Limit           EP231X: Perfluoronanceanoia add (PFDA)         376-06-7         0.0005         mg/kg         -0.0002         -0.0002         0.0         No Limit           EP231X: Perfluoronanceanoi add (PFDA)         376-06-7         0.0005         mg/kg         -0.0002			EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231X: Perfluorodacanole add (PFDA)         3337-52         0.0002         mg/kg         <0.0002			EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231X: Perfluorondecenoic acid (PFUnDA)         2088-94-8         0.0002         mg/kg         <0.0002			EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231X: Perfluoroddecanoic add (PFDDA)         307-55-1         0.0002         mg/kg         <0.0002         <0.0002         <0.0002         0.0         No Limit           EP231X: Perfluoroddecanoic add (PFDDA)         376-05-7         0.0005         mg/kg         <0.0005			EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
Endpande         EP231X: Perfluorotidecanoic acid (PFTDA)         72629-48.0         0.0002         mg/kg         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0005         <0.0005         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0001         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002         <0.0002			EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231X: Perfluorotetradecanoic acid (PFTeDA)         376-06-7         0.0005         mg/kg         <0.0005         <0.0005         0.0         No Limit           EP231X: Perfluorobulancia acid (PFBA)         375-224         0.001         mg/kg         <0.001			EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231X: Perfluorobutanoic acid (PFBA)         375-224         0.01         mg/kg         <0.01         <0.01         0.0         No Limit           EP231C: Perfluoroalty Sulfonamides (QC Lot: 5019562)         5019562)			EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231C: Porfluoroalkyl Sulfonamides (QC Lot: 5019562)         EP231X: Perfluoroactane sulfonamide (FOSA)         754-91-6         0.0002         mg/kg         <0.0002         0.0005         0.0002         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005         0.0005			EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.0	No Limit
EM2307374-003         Anonymous         EP231X: Perfluorooctane sulfonamide (FOSA)         754-91-6         0.0002         mg/kg         <0.0002         <0.0002         0.0         No Limit           EP231X: NMethyl perfluorooctane         2355-31-9         0.0002         mg/kg         <0.0002	EP231C: Perfluoroal	kyl Sulfonamides (QC Lot:	5019562)							
EP231X: N-Methyl perfluorooctane         2355-31-9 sutfonamidoacetic acid (MeFOSA)         0.0002         mg/kg         <0.0002         <0.0002         0.0         No Limit           EP231X: N-Ethyl perfluorooctane sutfonamidoacetic acid (MeFOSA)         2991-50-6         0.0002         mg/kg         <0.0002	EM2307374-003	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	< 0.0002	0.0	No Limit
Image: substance is a substa	2007074 000		EP231X: N-Methyl perfluorooctane	2355-31-9	0.0002	mg/kg	<0.0002	< 0.0002	0.0	No Limit
EP231X: N-Ethyl perfluorooctane         2991-50-6         0.0002         mg/kg         <0.0002			sulfonamidoacetic acid (MeFOSAA)							
Image: substance is s			EP231X: N-Ethyl perfluorooctane	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231X: N-Methyl perfluorooctane sulfonamide         31506-32-8         0.005         mg/kg         <0.0005         <0.0005         0.0         No Limit           EP231X: N-Ethyl perfluorooctane sulfonamide (HEFOSA)         4151-50-2         0.0005         mg/kg         <0.0005			sulfonamidoacetic acid (EtFOSAA)							
Image: series of the			EP231X: N-Methyl perfluorooctane sulfonamide	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231X: N-Ethyl perfluorooctane sulfonamide         4151-50-2 (EFOSA)         0.0005 N         mg/kg         <0.0005 N         <0.0005         0.0         No Limit           EP231X: N-Methyl perfluorooctane         24448-09-7 Sulfonamidoethanol (MeFOSE)         0.0005         N0005         0.00         0.0         No Limit           EP231X: N-Methyl perfluorooctane         1691-99-2 Sulfonamidoethanol (EFOSE)         0.0005         mg/kg         <0.0005			(MeFOSA)							
Image: constraint of the			EP231X: N-Ethyl perfluorooctane sulfonamide	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231X: N-Methyl perfluorooctane         24448-09-7 sulfonamidoethanol (MeFOSE)         mg/kg         <0.0005         <0.005         0.0         No Limit           EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (MeFOSE)         1691-99-2         0.0005         mg/kg         <0.0005			(EtFOSA)							
Image: sulformal doethanol (MeFOSE)         Image: sulformal doethanol (MeFOSE)         Image: sulformal doethanol (EFOSE)         Image: sulformal doethanol (EFOSA)         Total doethanol (EFOSA)         Total doethanol (EFOSA)         Image: sulformal doethanol (EFOSA)         Total doethanol (EFOSA)         Image: sulformal doethanol			EP231X: N-Methyl perfluorooctane	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231X: N-Ethyl perfluorooctane         1691-99-2         0.0005         mg/kg         <0.0005         <0.0005         0.0         No Limit           EM2307463-002         Anonymous         EP231X: Perfluorooctane sulfonamide (FOSA)         754-91-6         0.0002         mg/kg         <0.0002			sulfonamidoethanol (MeFOSE)							
EM2307463-002         Anonymous         EP231X: Perfluorooctane sulfonamide (FOSA)         754-91-6         0.0002         mg/kg         <0.0002         <0.0002         0.0005         0.0005         0.0005			EP231X: N-Ethyl perfluorooctane	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EM2307463-002         Anonymous         EP231X: Perfluorooctane sulfonamide (FOSA)         754-91-6         0.0002         mg/kg         <0.0002         <0.0002         0.0002			sulfonamidoethanol (EtFOSE)							
EP231X: N-Methyl perfluorooctane       2355-31-9       0.0002       mg/kg       <0.0002	EM2307463-002	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	<0.0002	No Limit	
Sulfonamidoacetic acid (MeFOSAA)       Image: Sulfonamidoacetic acid (MeFOSAA)       Image: Sulfonamidoacetic acid (MeFOSAA)       Image: Sulfonamidoacetic acid (EFOSAA)       Sulfonamidoacetic acid (EFOSAA)       Sulfonamidoacetic acid (EFOSAA)       Image: Sulfonamidoacetic acid (EFOSAA)       Sulfonamidoacetic acid (EFOSA)       Sulfonamidoacetic acid (EFOSA) </td <td></td> <td></td> <td>EP231X: N-Methyl perfluorooctane</td> <td>2355-31-9</td> <td>0.0002</td> <td>mg/kg</td> <td>&lt;0.0002</td> <td>&lt;0.0002</td> <td>0.0</td> <td>No Limit</td>			EP231X: N-Methyl perfluorooctane	2355-31-9	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
EP231X: N-Ethyl perfluorooctane       2991-50-6       0.0002       mg/kg       <0.0002			sulfonamidoacetic acid (MeFOSAA)	2004 50 6	0.0000		-0.0000	-0.0000	0.0	Nie Liesti
Suifonamidoacetic acid (Etr-OSAA)         Image: Comparison of the com			EP231X: N-Ethyl perfluorooctane	2991-50-6	0.0002	mg/kg	<0.0002	<0.0002	0.0	NO LIMIT
EP231X: N-Methyl perfluorooctane sulfonamide         31300-32-8         0.0005         Hig/kg         <0.0005         0.00         No Linit           (MeFOSA)         EP231X: N-Ethyl perfluorooctane sulfonamide         4151-50-2         0.0005         mg/kg         <0.0005			sulfonamidoacetic acid (EtFUSAA)	21506 22 9	0.0005	ma/ka	<0.0005	<0.0005	0.0	No Limit
EP231X: N-Ethyl perfluorooctane sulfonamide         4151-50-2         0.0005         mg/kg         <0.0005         0.0         No Limit			EP231X: N-Metnyl periluorooctane sulfonamide	31500-52-6	0.0005	Пуку	<0.0005	<0.0005	0.0	NO LITTIC
			(MerOSA)	4151-50-2	0.0005	ma/ka	<0.0005	<0.0005	0.0	No Limit
			(EFEOSA)	4101-00-2	0.0005	ilig/kg	-0.0000	-0.0000	0.0	NO LITIR
EP231X: N-Methyl perfluorooctape 24448-09-7 0 0005 mg/kg <0 0005 <0 0005 0 0 No Limit			EP231X: N-Methyl perfluorooctane	24448-09-7	0 0005	ma/ka	<0.0005	<0.0005	0.0	No Limit
sulfonamidoethanol (MeFOSE)			sulfonamidoethanol (MeEOSE)	21110 00 /	0.0000		0.0000	0.0000	0.0	
EP231X: N-Ethyl perfluorooctane 1691-99-2 0.0005 ma/kg <0.0005 <0.0005 0.0 No Limit			EP231X: N-Ethyl perfluorooctane	1691-99-2	0.0005	mg/kg	<0.0005	< 0.0005	0.0	No Limit
sulfonamidettagol (EtEOSE)			sulfonamidoethanol (EtFOSE)			5.5			-	

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Sub-Matrix: SOIL						Laboratory	Duplicate (DUP) Report		
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	r LOR Unit Original Result Duplicate Result RPD (					Acceptable RPD (%)
EP231D: (n:2) Fluor	otelomer Sulfonic Aci	ds (QC Lot: 5019562)							
Sub-Matrix: SOIL Laboratory sample ID Sar EP231D: (n:2) Fluorotelo EM2307374-003 And EM2307463-002 And EM2307463-002 And EP231P: PFAS Sums (QC EM2307374-003 And	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EM2307463-002	FTS)           2307463-002         Anonymous         EP231X: 4:2 Fluc           FTS)         EP231X: 6:2 Fluc           FTS)         FTS)	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.0	No Limit
EP231P: PFAS Sums	s (QC Lot: 5019562)								
EM2307374-003	Anonymous	EP231X: Sum of PFAS		0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763- 23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFAS (WA DER List)		0.0002	mg/kg	<0.0002	uit         Duplicate Result         RPD (%)         Acceptable RPD (%)           <0.0005		
EM2307463-002	Anonymous	EP231X: Sum of PFAS		0.0002	mg/kg	0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PFHxS and PFOS	355-46-4/1763- 23-1	0.0002	mg/kg	<0.0002	<0.0002	0.0	No Limit
		EP231X: Sum of PEAS (WA DER List)		0.0002	mg/kg	0.0002	< 0.0002	0.0	No Limit



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

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

Sub-Matrix: SOIL				Method Blank (MB)	Laboratory Control Spike (LCS) Report				
			Report	Spike	Spike Recovery (%) Accepta		ble Limits (%)		
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 501956	2)								
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00111 mg/kg	83.4	72.0	128	
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00118 mg/kg	85.8	73.0	123	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00114 mg/kg	85.5	67.0	130	
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00119 mg/kg	95.4	70.0	132	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00116 mg/kg	89.2	68.0	136	
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00121 mg/kg	92.2	59.0	134	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5019	9562)								
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	112	71.0	135	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.2	69.0	132	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.7	70.0	132	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	81.2	71.0	131	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.0	69.0	133	
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	91.4	72.0	129	
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	78.0	69.0	133	
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.3	64.0	136	
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	87.1	69.0	135	
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	73.8	66.0	139	
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	106	69.0	133	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5019562	2)								
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	86.1	67.0	137	
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	87.9	70.0	130	
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.8	70.0	130	
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	84.0	70.0	130	
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	85.0	70.0	130	
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	85.0	63.0	144	
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	79.5	61.0	139	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5	019562)								

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Sub-Matrix: SOIL	Method Blank (MB)	Laboratory Control Spike (LCS) Report							
	Report	Spike	Spike Recovery (%)	Acceptable	) Limits (%)				
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 5019562) - continued									
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00117 mg/kg	85.5	62.0	145	
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00119 mg/kg	90.9	64.0	140	
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.0012 mg/kg	86.2	65.0	137	
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00121 mg/kg	84.1	70.0	130	
EP231P: PFAS Sums (QCLot: 5019562)									
EP231X: Sum of PFAS		0.0002	mg/kg	<0.0002					
EP231X: Sum of PFHxS and PFOS	355-46-4/17	0.0002	mg/kg	<0.0002					
	63-23-1								
EP231X: Sum of PFAS (WA DER List)		0.0002	mg/kg	<0.0002					

#### Matrix Spike (MS) Report

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

Sub-Matrix: SOIL		Ма	trix Spike (MS) Report	t			
				Spike	SpikeRecovery(%)	Acceptable	Limits (%)
Laboratory sample ID	Sample ID	Method: Compound	Concentration	MS	Low	High	
EP231A: Perfluoro	alkyl Sulfonic Acids (QCLot: 5019562)						
EM2307374-005	Anonymous	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00111 mg/kg	80.2	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00118 mg/kg	80.5	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00114 mg/kg	80.7	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00119 mg/kg	84.7	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00116 mg/kg	83.8	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS) 335-77-3		0.00121 mg/kg	90.7	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 5019562)							
EM2307374-005	Anonymous	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	111	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	81.4	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	85.0	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	83.8	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	91.8	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	88.0	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	77.6	69.0	133
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	79.2	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	88.8	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	75.2	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	112	69.0	133
EP231C: Perfluoro	alkyl Sulfonamides (QCLot: 5019562)						

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Sub-Matrix: SOIL			M	atrix Spike (MS) Repor	t		
				Spike	SpikeRecovery(%)	Acceptable	Limits (%)
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 5019562) - continued							
EM2307374-005	Anonymous	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	83.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	97.1	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	82.9	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	87.1	70.0	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	86.4	70.0	130
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	94.2	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	76.4	61.0	139
EP231D: (n:2) Flu	orotelomer Sulfonic Acids (QCLot: 5019562)						
EM2307374-005	Anonymous	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00117 mg/kg	84.0	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00119 mg/kg	87.2	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0012 mg/kg	81.9	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00121 mg/kg	71.7	70.0	130



QA/QC Compliance Assessment to assist with Quality Review						
Work Order	: EM2307461	Page	: 1 of 4			
Client	: GHD PTY LTD	Laboratory	: Environmental Division Melbourne			
Contact	: VERA BIERMANN	Telephone	: +6138549 9645			
Project	: 12611012	Date Samples Received	: 28-Apr-2023			
Site	:	Issue Date	: 01-May-2023			
Sampler	: Ally Kirkman	No. of samples received	: 3			
Order number	:	No. of samples analysed	: 3			

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

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

#### **Summary of Outliers**

#### **Outliers : Quality Control Samples**

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

- <u>NO</u> Method Blank value outliers occur.
- <u>NO</u> Duplicate outliers occur.
- <u>NO</u> Laboratory Control outliers occur.
- <u>NO</u> Matrix Spike outliers occur.
- For all regular sample matrices, <u>NO</u> surrogate recovery outliers occur.

#### **Outliers : Analysis Holding Time Compliance**

• <u>NO</u> Analysis Holding Time Outliers exist.

#### **Outliers : Frequency of Quality Control Samples**

• <u>NO</u> Quality Control Sample Frequency Outliers exist.



#### Analysis Holding Time Compliance

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

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

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

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

Evaluation:	x	= Holding	time	breach	٠,	/ =	Within	holding	time
		- Holding	unic	Dicacii	, '		VVILIIIII	noiung	ume.

Matrix: SOIL					Evaluation	: × = Holding time	breach ; ✓ = With	in holding time.
Method	Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-11	10°C)							
HDPE Soil Jar (EA055) MountBarker_SS1, FD01	MountBarker_SS2,	27-Apr-2023				29-Apr-2023	11-May-2023	~
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X) MountBarker_SS1, FD01	MountBarker_SS2,	27-Apr-2023	01-May-2023	24-Oct-2023	~	01-May-2023	10-Jun-2023	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X) MountBarker_SS1, FD01	MountBarker_SS2,	27-Apr-2023	01-May-2023	24-Oct-2023	~	01-May-2023	10-Jun-2023	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE Soil Jar (EP231X) MountBarker_SS1, FD01	MountBarker_SS2,	27-Apr-2023	01-May-2023	24-Oct-2023	1	01-May-2023	10-Jun-2023	<b>~</b>
EP231D: (n:2) Fluorotelomer Sulfonic Ac	ids							
HDPE Soil Jar (EP231X) MountBarker_SS1, FD01	MountBarker_SS2,	27-Apr-2023	01-May-2023	24-Oct-2023	1	01-May-2023	10-Jun-2023	<b>~</b>
EP231P: PFAS Sums								
HDPE Soil Jar (EP231X) MountBarker_SS1, FD01	MountBarker_SS2,	27-Apr-2023	01-May-2023	24-Oct-2023	1	01-May-2023	10-Jun-2023	✓

Page	: 3 of 4
Work Order	EM2307461
Client	: GHD PTY LTD
Project	: 12611012



# **Quality Control Parameter Frequency Compliance**

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

Matrix: SOIL Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification ;							
Quality Control Sample Type		Co	unt	Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Reaular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	2	12	16.67	10.00	~	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	12	8.33	5.00	1	NEPM 2013 B3 & ALS QC Standard

Page	: 4 of 4
Work Order	EM2307461
Client	: GHD PTY LTD
Project	: 12611012



#### **Brief Method Summaries**

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

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

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CLIENT:	GHD Pty Ltd		TURNAR	OUND REQUIREMENTS :	Standa	rd TAT (Lis	due date):					FORL	BORATORY USI	ONLY (Circle)
OFFICE:	211 Victoria Square, Level 4, Adelaide SA	5000	(Standard T/ Ultra Trace (	AT may be longer for some tests e.g Organics	" 🛛 Non St	andard or ur	gent TAT (List	t due da	ite):	<u></u>		Custody	Seal Intact?	Yes No N/A
			ALS QUO	TE:			· · ·		coc	SEQUENCE NUM	BER (Circle)	Free ice receipt?	/ frozen ice bricks pr	sent upon (Yes) N/A
PROJECT	: 12611012		ORDER N	0.: 12611012				- C	oc: 1	2 3 4	56	7 Random	Sample Temperatur	on Receipt: 11-2 °C.
ROJECT	MANAGER: Vera Biermann	CONTACT	PH: 0435981	783	·			Ċ	DF: 1	2 3 4	5 6	7 Other co	mment:	
SAMPLER	R: Ally Kirkman	SAMPLER	MOBILE: 041	12625108	RELINQUE	HED BY:		R	ECEIVED	BY:	R	ELINQUISH	ED BY:	RECEIVED BY:
OC ema	lied to ALS? YES	EDD FORM	AT (or defau	ult):	EN				R	/		A	$\supset$	Americ and
mail Inv	bins to: Usra bismosn@shd sam				DATE/TIME		22	ď.	ATE/TIME	E:	6	ATE/TIME:		DATE/TIME:
	Dice to: vera.blennann@gnd.com					1.5	.0)	2	17-4-27	10 1330	2	14-230	1500	25kg 11.25
OMMEN	TS/SPECIAL HANDLING/STORAGE OR DIS	SPOSAL:												
ALS USE	SAMPLE DET MATRIX: SOLID (S)	FAILS WATER (W)		CONTAINER INFO	RMATION		ANALY: Where Me	SIS REQ atals are	UIRED inc required, s	Iuding SUITES (Ni pecify Total (unfilte rec	3. Suite Codes mus ared bottle required quired).	st be listed to ) or <b>Dissolve</b>	attract suite price) d (field filtered bottle	Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATI (refer to codes below)	VE )	TOTAL CONTAINERS	FAS - Full suite (28 nalytes), standard LOR	*						Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc. HAMMS 62)
	MountBarker_SS1	27/04/2023	S	Plastic PFAS jar		1	X X		_					Math
	MountBarker_SS2	27/04/2023	s	Plastic PFAS jar		1	x							100-
	FD01 .	27/04/2023	S	Plastic PFAS jar		1	x							2/5/2
	FS01	27/04/2023	S	Plastic PFAS jar		1	x							Please forward to Eurofins
	DATE: 2/5													
	COUBIER:												7	
	ATTEMP TO GHILL :	YEB NO	>	۵				_				Car A	22	
	Sealed 5.0	3					~							8
					* TOTAL	4				-				

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#### Eurofins Environment Testing Australia Pty Ltd

ABN: 50 005 085 521					
Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
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Tel: +61 3 8564 5000	Tel: +61 3 8564 5000	Tel: +61 2 9900 8400	Tel: +61 2 6113 8091	Tel: +61 7 3902 4600	NATA# 1261
NATA# 1261 Site# 1254	NATA# 1261 Site# 25403	NATA# 1261 Site# 18217	NATA# 1261 Site# 25466	NATA# 1261 Site# 20794	Site# 25079 & 25289

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EnviroSales@eurofins.com

# Eurofins ARL Pty Ltd Eurofins Environment Testing NZ Ltd ABN: 91 05 0159 898 NZBN: 9429046024954

	ABN: 91 05 0159 898	NZBN: 9429046024954	
	Perth	Auckland	Christchurch
	46-48 Banksia Road	35 O'Rorke Road	43 Detroit Drive
304	Welshpool	Penrose,	Rolleston,
	WA 6106	Auckland 1061	Christchurch 7675
	Tel: +61 8 6253 4444	Tel: +64 9 526 45 51	Tel: 0800 856 450
	NATA# 2377 Site# 2370	IANZ# 1327	IANZ# 1290

#### **Sample Receipt Advice**

Company name:	GHD Pty Ltd SA
Contact name:	Vera Biermann
Project name:	Not provided
Project ID:	12611012
Turnaround time:	5 Day
Date/Time received	May 2, 2023 9:00 AM
Eurofins reference	985621

#### **Sample Information**

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- Appropriate sample containers have been used.
- ✓ Sample containers for volatile analysis received with zero headspace.
- X Split sample sent to requested external lab.
- X Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

#### **Notes**

#### Contact

If you have any questions with respect to these samples, please contact your Analytical Services Manager: Amy Meunier on phone : or by email: AmyMeunier@eurofins.com

Results will be delivered electronically via email to Vera Biermann - vera.biermann@ghd.com.

Note: A copy of these results will also be delivered to the general GHD Pty Ltd SA email address.

# Global Leader - Results you can trust



GHD Pty Ltd **GPO Box 2052** Adelaide SA 5001

Attention:

Vera Biermann

Report Project name Project ID

**Received Date** 

985621-S

12611012 May 02, 2023

Client Sample ID			FS01
Sample Matrix			Soil
			M23-
Eurofins Sample No.			My0004052
Date Sampled			Apr 27, 2023
Test/Reference	LOR	Unit	
Sample Properties		-	
% Moisture	1	%	18
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA) <sup>N11</sup>	5	ug/kg	< 5
Perfluoropentanoic acid (PFPeA) <sup>N11</sup>	5	ug/kg	< 5
Perfluorohexanoic acid (PFHxA) <sup>N11</sup>	5	ug/kg	< 5
Perfluoroheptanoic acid (PFHpA) <sup>N11</sup>	5	ug/kg	< 5
Perfluorooctanoic acid (PFOA) <sup>N11</sup>	5	ug/kg	< 5
Perfluorononanoic acid (PFNA) <sup>N11</sup>	5	ug/kg	< 5
Perfluorodecanoic acid (PFDA) <sup>N11</sup>	5	ug/kg	< 5
Perfluoroundecanoic acid (PFUnDA) <sup>N11</sup>	5	ug/kg	< 5
Perfluorododecanoic acid (PFDoDA) <sup>N11</sup>	5	ug/kg	< 5
Perfluorotridecanoic acid (PFTrDA) <sup>N15</sup>	5	ug/kg	< 5
Perfluorotetradecanoic acid (PFTeDA) <sup>N11</sup>	5	ug/kg	< 5
13C4-PFBA (surr.)	1	%	85
13C5-PFPeA (surr.)	1	%	83
13C5-PFHxA (surr.)	1	%	103
13C4-PFHpA (surr.)	1	%	95
13C8-PFOA (surr.)	1	%	98
13C5-PFNA (surr.)	1	%	99
13C6-PFDA (surr.)	1	%	99
13C2-PFUnDA (surr.)	1	%	77
13C2-PFDoDA (surr.)	1	%	78
13C2-PFTeDA (surr.)	1	%	66
Perfluoroalkyl sulfonamido substances		-	
Perfluorooctane sulfonamide (FOSA) <sup>N11</sup>	5	ug/kg	< 5
N-methylperfluoro-1-octane sulfonamide (N- MeFOSA) <sup>N11</sup>	5	ug/kg	< 5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) <sup>N11</sup>	5	ug/kg	< 5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) <sup>N11</sup>	5	ug/kg	< 5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N- EtFOSE) <sup>N11</sup>	5	ug/kg	< 5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N- EtFOSAA) <sup>N11</sup>	10	ug/kg	< 10
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)^{N11}	10	ug/kg	< 10





NATA Accredited Accreditation Number 1261 Site Number 1254

Accredited for compliance with ISO/IEC 17025 – Testing NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration, inspection, proficiency testing scheme providers and reference materials producers reports and certificates.



· · · · · · · · · · · · · · · · · · ·			
Client Sample ID			FS01
Sample Matrix			Soil
			M23-
Eurofins Sample No.			My0004052
Date Sampled			Apr 27, 2023
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances	-		
13C8-FOSA (surr.)	1	%	86
D3-N-MeFOSA (surr.)	1	%	111
D5-N-EtFOSA (surr.)	1	%	120
D7-N-MeFOSE (surr.)	1	%	72
D9-N-EtFOSE (surr.)	1	%	53
D5-N-EtFOSAA (surr.)	1	%	63
D3-N-MeFOSAA (surr.)	1	%	57
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS) <sup>N11</sup>	5	ug/kg	< 5
Perfluorononanesulfonic acid (PFNS) <sup>N15</sup>	5	ug/kg	< 5
Perfluoropropanesulfonic acid (PFPrS) <sup>N15</sup>	5	ug/kg	< 5
Perfluoropentanesulfonic acid (PFPeS) <sup>N15</sup>	5	ug/kg	< 5
Perfluorohexanesulfonic acid (PFHxS) <sup>N11</sup>	5	ug/kg	< 5
Perfluoroheptanesulfonic acid (PFHpS) <sup>N15</sup>	5	ug/kg	< 5
Perfluorooctanesulfonic acid (PFOS) <sup>N11</sup>	5	ug/kg	< 5
Perfluorodecanesulfonic acid (PFDS) <sup>N15</sup>	5	ug/kg	< 5
13C3-PFBS (surr.)	1	%	104
18O2-PFHxS (surr.)	1	%	99
13C8-PFOS (surr.)	1	%	87
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) <sup>N11</sup>	5	ug/kg	< 5
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) <sup>N11</sup>	10	ug/kg	< 10
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) <sup>N11</sup>	5	ug/kg	< 5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) <sup>N11</sup>	5	ug/kg	< 5
13C2-4:2 FTSA (surr.)	1	%	117
13C2-6:2 FTSA (surr.)	1	%	102
13C2-8:2 FTSA (surr.)	1	%	91
13C2-10:2 FTSA (surr.)	1	%	87
PFASs Summations	1	1	
Sum (PFHxS + PFOS)*	5	ug/kg	< 5
Sum of US EPA PFAS (PFOS + PFOA)*	5	ug/kg	< 5
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	5	ug/kg	< 5
Sum of WA DWER PFAS (n=10)*	10	ug/kg	< 10
Sum of PFASs (n=30)*	50	ug/kg	< 50



#### Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

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

Description	Testing Site	Extracted	Holding Time
% Moisture	Melbourne	May 02, 2023	14 Days
Method: LTM-GEN-7080 Moisture			
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Melbourne	May 02, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Melbourne	May 02, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Melbourne	May 02, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Melbourne	May 02, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
PFASs Summations	Melbourne	May 02, 2023	

- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)

			Eurofins Env	ironment Testin	g Australia Pty Ltd						Eurofins ARL Pty Ltd	Eurofins Environm	ent Testing NZ Ltd
	Auro	Fine	ABN: 50 005 08	5 521							ABN: 91 05 0159 898	NZBN: 9429046024954	L
web: w email: E	ww.eurofins.com.au	com	Melbourne 6 Monterey Roa Dandenong Sou VIC 3175 Tel: +61 3 8564 NATA# 1261 Sit	Geelong           d         19/8 Lewa           th         Grovedale           VIC 3216           5000         Tel: +61 3           e# 1254         NATA# 12	Sydne           alan Street         179 Ma           e         Girraw           NSW 2           8564 5000         Tel: +6           261 Site# 25403 NATA#	/ gowar R een 145 1 2 9900 1261 Sit	oad 8400 te# 18	Canberra Unit 1,2 Dacre Stree Mitchell ACT 2911 ) Tel: +61 2 6113 805 8217 NATA# 1261 Site# 3	Brisbane           at         1/21 Smallwood Place           Murarrie         QLD 4172           01         Tel: +61 7 3902 4600           25466         NATA# 1261 Site# 2079	Newcastle           1/2 Frost Drive           Mayfield West NSW 2304           Tel: +61 2 4968 8448           NATA# 1261           YAite# 25079 & 25289	Perth 46-48 Banksia Road Welshpool WA 6106 Tel: +61 8 6253 4444 NATA# 2377 Site# 2370	Auckland 35 O'Rorke Road Penrose, Auckland 1061 Tel: +64 9 526 45 51 IANZ# 1327	Christchurch 43 Detroit Drive Rolleston, Christchurch 7675 Tel: 0800 856 450 IANZ# 1290
Co Ad	mpany Name: dress:	GHD Pty Lto GPO Box 20 Adelaide SA 5001	d SA 052					Order No.: Report #: Phone: Fax:	12611012 985621 08 8111 6600 08 8111 6699		Received: Due: Priority: Contact Name:	May 2, 2023 9:00 A May 9, 2023 5 Day Vera Biermann	M
Pro Pro	oject Name: oject ID:	12611012								E	Eurofins Analytical Se	rvices Manager : A	my Meunier
		Sa	ample Detail			Moisture Set	Per- and Polyfluoroalkyl Substances (PFASs)						
Melb	ourne Laborato	ry - NATA # 12	261 Site # 12	54		X	X	<u>&lt;</u>					
Exte	rnal Laboratory						$\perp$						
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
1	FS01	Apr 27, 2023		Soil	M23-My000405	2 X	X	<u>&lt;</u>					
Test	Counts					1	1	1					



#### Internal Quality Control Review and Glossary

#### General

- 1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
- 2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- 3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- 4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- 5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds
- 6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 7. Samples were analysed on an 'as received' basis.
- 8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
- 9. This report replaces any interim results previously issued.

#### **Holding Times**

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

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA. If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

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

#### Units

mg/kg: milligrams per kilogram	mg/L: milligrams per litre	μg/L: micrograms per litre
ppm: parts per million	ppb: parts per billion	%: Percentage
org/100 mL: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units	MPN/100 mL: Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

#### Terms

АРНА	American Public Health Association
сос	Chain of Custody
СР	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
ТВТО	Tributyltin oxide ( <i>bis</i> -tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

#### **QC** - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

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

Results <10 times the LOR: No Limit

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

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

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

#### **QC Data General Comments**

- 1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- 2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- 3. pH and Free Chlorine analysed in the laboratory Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- 4. Recovery Data (Spikes & Surrogates) where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
- 5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
- 6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.



#### **Quality Control Results**

Test	Units	Result 1	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank					
Perfluoroalkyl carboxylic acids (PFCAs)					
Perfluorobutanoic acid (PFBA)	ug/kg	< 5	5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 5	5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 5	5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 5	5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 5	5	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 5	5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 5	5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 5	5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 5	5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 5	5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 5	5	Pass	
Method Blank					
Perfluoroalkyl sulfonamido substances					
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 5	5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 5	5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 5	5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N- MeFOSE)	ug/kg	< 5	5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/kg	< 5	5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ua/ka	< 10	10	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ua/ka	< 10	10	Pass	
Method Blank		, <u>-</u>	1 -		
Perfluoroalkyl sulfonic acids (PFSAs)					
Perfluorobutanesulfonic acid (PFBS)	ua/ka	< 5	5	Pass	
Perfluorononanesulfonic acid (PENS)	ua/ka	< 5	5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 5	5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ua/ka	< 5	5	Pass	
Perfluorohexanesulfonic acid (PEHxS)	ua/ka	< 5	5	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ua/ka	< 5	5	Pass	
Perfluorooctanesulfonic acid (PEOS)	ug/ka	< 5	5	Pass	
Perfluorodecanesulfonic acid (PEDS)	ug/ka	< 5	5	Pass	
Method Blank	uging			1 400	
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)					
1H 1H 2H 2H-perfluorobexanesulfonic acid (4:2 FTSA)	ua/ka	< 5	5	Pass	
1H 1H 2H 2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/ka	< 10	10	Pass	
1H 1H 2H 2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/ka	< 5	5	Pass	
1H 1H 2H 2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 5	5	Pass	
I CS - % Recovery	ug/itg			1 400	
Perfluoroalkyl carboxylic acids (PECAs)		[			
Perfluorobutanoic acid (PEBA)	%	87	50-150	Pass	
Perfluoropentanoic acid (PEPeA)	%	78	50-150	Pass	
Perfluoropexanoic acid (PEHxA)	%	89	50-150	Pass	
Perfluorohentanoic acid (PFHpA)	%	88	50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	89	50-150	Pass	
Perfluorononanoic acid (PENA)	%	94	50-150	Pass	
Perfluorodecanoic acid (PEDA)	%	92	50-150	Pass	
Perfluoroundecanoic acid (PEUnDA)	%	98	50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	86	50-150	Pass	
Perfluorotridecanoic acid (PETrDA)	%	95	50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	84	50-150	Pass	



Test			Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery				I	1 1	1		
Perfluoroalkyl sulfonamido substa	nces							
Perfluorooctane sulfonamide (FOSA	.)		%	86		50-150	Pass	
N-methylperfluoro-1-octane sulfonar	mide (N-MeFOSA)		%	94		50-150	Pass	
N-ethylperfluoro-1-octane sulfonami	de (N-EtFOSA)		%	87		50-150	Pass	
2-(N-methylperfluoro-1-octane sulfor MeFOSE)	namido)-ethanol(N-		%	89		50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfona	mido)-ethanol(N-E	tFOSE)	%	84		50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoa	acetic acid (N-EtFC	ISAA)	%	90		50-150	Pass	
N-methyl-perfluorooctanesulfonamic	loacetic acid (N-Me	FOSAA)	%	89		50-150	Pass	
LCS - % Recovery								
Perfluoroalkyl sulfonic acids (PFS)	As)							
Perfluorobutanesulfonic acid (PFBS)	)		%	76		50-150	Pass	
Perfluorononanesulfonic acid (PFNS	6)		%	98		50-150	Pass	
Perfluoropropanesulfonic acid (PFP)	rS)		%	75		50-150	Pass	
Perfluoropentanesulfonic acid (PFPe	eS)		%	69		50-150	Pass	
Perfluorohexanesulfonic acid (PFHx	S)		%	82		50-150	Pass	
Perfluoroheptanesulfonic acid (PFH	oS)		%	90		50-150	Pass	
Perfluorooctanesulfonic acid (PFOS	)		%	87		50-150	Pass	
Perfluorodecanesulfonic acid (PFDS	5)		%	91		50-150	Pass	
LCS - % Recovery	,			•				
n:2 Fluorotelomer sulfonic acids (r	n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfor	nic acid (4:2 FTSA)		%	82		50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfon	ic acid(6:2 FTSA)		%	88		50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfor	nic acid (8:2 FTSA)		%	87		50-150	Pass	
1H.1H.2H.2H-perfluorododecanesul	fonic acid (10:2 FT	SA)	%	87		50-150	Pass	
Test Lab Sample ID QA Source								
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Test Spike - % Recovery	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF	Lab Sample ID CAs)	QA Source	Units	Result 1 Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA)	Lab Sample ID CAs) M23-Ap0062211	QA Source	Units %	Result 1 Result 1 92		Acceptance Limits 50-150	Pass Limits Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluoropentanoic acid (PFPeA)	Lab Sample ID 	QA Source NCP NCP	Units	Result 1 Result 1 92 82		Acceptance Limits 50-150 50-150	Pass Limits Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluoropentanoic acid (PFPeA) Perfluorohexanoic acid (PFHxA)	Lab Sample ID -CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source	Units % % %	Result 1 Result 1 92 82 89		Acceptance Limits 50-150 50-150 50-150	Pass Limits Pass Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluorobexanoic acid (PFHxA) Perfluoroheptanoic acid (PFHpA)	Lab Sample ID -CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source NCP NCP NCP NCP	Units % % % %	Result 1 Result 1 92 82 89 88		Acceptance Limits 50-150 50-150 50-150 50-150	Pass Pass Pass Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluoropentanoic acid (PFPeA) Perfluoroheptanoic acid (PFHxA) Perfluoroheptanoic acid (PFHpA) Perfluorooctanoic acid (PFOA)	Lab Sample ID CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source NCP NCP NCP NCP NCP	Units % % % % % % % % % % % % % % % % % % %	Result 1 Result 1 92 82 89 88 88 87		Acceptance Limits 50-150 50-150 50-150 50-150 50-150	Pass Pass Pass Pass Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluorohexanoic acid (PFPeA) Perfluoroheptanoic acid (PFHxA) Perfluorooctanoic acid (PFHpA) Perfluorononanoic acid (PFOA) Perfluorononanoic acid (PFNA)	Lab Sample ID CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source	Units % % % % % % % % % % % % % % % % % % %	Result 1 92 82 89 88 87 97		Acceptance Limits 50-150 50-150 50-150 50-150 50-150 50-150	Pass Pass Pass Pass Pass Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluoropentanoic acid (PFPeA) Perfluorohexanoic acid (PFHxA) Perfluorooctanoic acid (PFHA) Perfluorononanoic acid (PFNA) Perfluorodecanoic acid (PFDA)	Lab Sample ID CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source	Units % % % % % % %	Result 1 92 82 89 88 87 97 97		Acceptance Limits 50-150 50-150 50-150 50-150 50-150 50-150 50-150	Pass Pass Pass Pass Pass Pass Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluorohexanoic acid (PFPeA) Perfluorohexanoic acid (PFHxA) Perfluoroheptanoic acid (PFHA) Perfluorooctanoic acid (PFOA) Perfluorononanoic acid (PFDA) Perfluoroundecanoic acid (PFUnDA)	Lab Sample ID CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source	Units % % % % % % % % % % % % % % % % % % %	Result 1 92 82 89 88 87 97 97 97		Acceptance Limits 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150	Pass Pass Pass Pass Pass Pass Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluorohexanoic acid (PFPeA) Perfluorohexanoic acid (PFHxA) Perfluoroheptanoic acid (PFHA) Perfluorooctanoic acid (PFOA) Perfluorononanoic acid (PFDA) Perfluoroundecanoic acid (PFUnDA) Perfluorododecanoic acid (PFDoDA)	Lab Sample ID CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source	Units % % % % % % % % % % % % % % % % % % %	Result 1 Result 1 92 82 89 88 87 97 97 102 92		Acceptance Limits 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150	Pass Pass Pass Pass Pass Pass Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluorohexanoic acid (PFPeA) Perfluorohexanoic acid (PFHxA) Perfluoroheptanoic acid (PFHpA) Perfluorooctanoic acid (PFDA) Perfluorononanoic acid (PFDA) Perfluoroundecanoic acid (PFUnDA) Perfluorododecanoic acid (PFDoDA) Perfluorotridecanoic acid (PFTrDA)	Lab Sample ID CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source	Units % % % % % % % % % % % % % % % % % % %	Result 1 92 82 89 88 87 97 97 97 102 92 109		Acceptance Limits 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150	Pass Pass Pass Pass Pass Pass Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluorobexanoic acid (PFPeA) Perfluorohexanoic acid (PFHxA) Perfluoroheptanoic acid (PFHA) Perfluorooctanoic acid (PFOA) Perfluoroonanoic acid (PFDA) Perfluoroundecanoic acid (PFDA) Perfluorododecanoic acid (PFUnDA) Perfluorotridecanoic acid (PFTrDA) Perfluorotetradecanoic acid (PFTeDA)	Lab Sample ID CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source	Units % % % % % % % % % % % % % % % % % % %	Result 1 Result 1 92 82 89 88 87 97 97 102 92 109 90		Acceptance Limits 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150	Pass Pass Pass Pass Pass Pass Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluoropentanoic acid (PFPeA) Perfluorohexanoic acid (PFHxA) Perfluoroheptanoic acid (PFHpA) Perfluorooctanoic acid (PFOA) Perfluorononanoic acid (PFDA) Perfluorodecanoic acid (PFDA) Perfluoroundecanoic acid (PFUnDA) Perfluorotridecanoic acid (PFToDA) Perfluorotetradecanoic acid (PFTeDA) Spike - % Recovery	Lab Sample ID CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source	Units % % % % % % % % % % % % % % % % % % %	Result 1 92 82 89 88 87 97 97 102 92 109 90		Acceptance Limits 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150	Pass Pass Pass Pass Pass Pass Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluoropentanoic acid (PFPeA) Perfluoroheptanoic acid (PFHxA) Perfluoroheptanoic acid (PFHpA) Perfluorooctanoic acid (PFOA) Perfluoroonanoic acid (PFDA) Perfluorodecanoic acid (PFDA) Perfluorodecanoic acid (PFDA) Perfluorodecanoic acid (PFDA) Perfluorodecanoic acid (PFTDA) Perfluorotridecanoic acid (PFTrDA) Perfluorotetradecanoic acid (PFTeDA) Spike - % Recovery Perfluoroalkyl sulfonamido substa	Lab Sample ID CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source	Units % % % % % % % % % % % % % % % % % % %	Result 1 Result 1 92 82 89 88 87 97 97 102 92 109 90 Result 1		Acceptance Limits 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150	Pass Pass Pass Pass Pass Pass Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluoropentanoic acid (PFPeA) Perfluorohexanoic acid (PFHxA) Perfluorohexanoic acid (PFHpA) Perfluorooctanoic acid (PFOA) Perfluorooctanoic acid (PFOA) Perfluoroundecanoic acid (PFDA) Perfluoroundecanoic acid (PFDA) Perfluorododecanoic acid (PFUnDA) Perfluorotridecanoic acid (PFToDA) Perfluorotridecanoic acid (PFTeDA) Spike - % Recovery Perfluorooctane sulfonamide (FOSA)	Lab Sample ID CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source	Units % % % % % % % % % % % % % % % % % % %	Result 1 Result 1 92 82 89 88 87 97 97 102 92 109 90 Result 1 88		Acceptance Limits 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150	Pass Pass Pass Pass Pass Pass Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluoropentanoic acid (PFPeA) Perfluorohexanoic acid (PFHxA) Perfluorohexanoic acid (PFHpA) Perfluorooctanoic acid (PFOA) Perfluorooctanoic acid (PFOA) Perfluorononanoic acid (PFDA) Perfluoroundecanoic acid (PFDA) Perfluoroundecanoic acid (PFUnDA) Perfluorododecanoic acid (PFToDA) Perfluorotetradecanoic acid (PFTeDA) Spike - % Recovery Perfluorooctane sulfonamide (FOSA) N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	Lab Sample ID CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source	Units % % % % % % % % % % % % % % % % % % %	Result 1 Result 1 92 82 89 88 87 97 97 102 92 109 90 Result 1 88 94		Acceptance Limits 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150	Pass Pass Pass Pass Pass Pass Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluorobexanoic acid (PFPeA) Perfluorohexanoic acid (PFHxA) Perfluorohexanoic acid (PFHpA) Perfluorooctanoic acid (PFDA) Perfluorooctanoic acid (PFDA) Perfluoroundecanoic acid (PFDA) Perfluoroundecanoic acid (PFDA) Perfluorododecanoic acid (PFUnDA) Perfluorododecanoic acid (PFDoDA) Perfluorotridecanoic acid (PFTrDA) Perfluorotetradecanoic acid (PFTeDA) Spike - % Recovery Perfluorootane sulfonamido substa Perfluorootane sulfonamide (FOSA) N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	Lab Sample ID CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source	Units % % % % % % % % % % % % % % % % % % %	Result 1 92 82 89 88 87 97 97 97 102 92 109 90 Result 1 88 94 88		Acceptance Limits 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150	Pass Pass Pass Pass Pass Pass Pass Pass	Qualifying Code
Test Spike - % Recovery Perfluoroalkyl carboxylic acids (PF Perfluorobutanoic acid (PFBA) Perfluorobexanoic acid (PFPeA) Perfluorohexanoic acid (PFHxA) Perfluorohexanoic acid (PFHpA) Perfluorooctanoic acid (PFDA) Perfluoroonanoic acid (PFDA) Perfluoroundecanoic acid (PFDA) Perfluoroundecanoic acid (PFDA) Perfluorododecanoic acid (PFDA) Perfluorododecanoic acid (PFTDA) Perfluorotridecanoic acid (PFTrDA) Perfluorotridecanoic acid (PFTrDA) Perfluoroalkyl sulfonamido substa Perfluorooctane sulfonamide (FOSA) N-methylperfluoro-1-octane sulfonamide (N-EFOSA) 2-(N-methylperfluoro-1-octane sulfonamide)-ethanol(N-MeFOSE)	Lab Sample ID CAs) M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211 M23-Ap0062211	QA Source	Units % % % % % % % % % % % % % % % % % % %	Result 1 92 82 89 88 87 97 97 97 102 92 109 90 Result 1 88 94 88 94 88		Acceptance Limits 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150 50-150	Pass Pass Pass Pass Pass Pass Pass Pass	Qualifying Code



Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-									
acid (N-EtFOSAA)	M23-Ap0062211	NCP	%	95			50-150	Pass	
N-methyl- perfluorooctanesulfonamidoacetic acid (N-MeEOSAA)	M23-Ap0062211	NCP	%	89			50-150	Pass	
					<u> </u>		00 100	1 400	
Perfluoroalkyl sulfonic acids (PFS	As)			Result 1					
Perfluorobutanesulfonic acid (PFBS)	M23-Ap0062211	NCP	%	71			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M23-Ap0062211	NCP	%	96			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M23-Ap0062211	NCP	%	74			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M23-Ap0062211	NCP	%	70			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M23-Ap0062211	NCP	%	86			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M23-Ap0062211	NCP	%	85			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M23-Ap0062211	NCP	%	84			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M23-Ap0062211	NCP	%	93			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (	n:2 FTSAs)			Result 1					
1H.1H.2H.2H- perfluorohexanesulfonic acid (4:2 FTSA)	M23-Ap0062211	NCP	%	79			50-150	Pass	
1H.1H.2H.2H- perfluorooctanesulfonic acid(6:2 FTSA)	M23-Ap0062211	NCP	%	90			50-150	Pass	
1H.1H.2H.2H- perfluorodecanesulfonic acid (8:2	M23-Ap0062211	NCP	%	86			50-150	Pass	
1H.1H.2H.2H- perfluorododecanesulfonic acid	M23 Ap0062211	NCP	9/	97			50 150	Pass	
Tost			/0	Bosult 1			Acceptance	Pass	Qualifying
1631	Lab Sample ID	Source	Units	Result I			Limits	Limits	Code
Duplicate				D 14	D #0				
% Mointure	M22 My0004012	NCD	0/			6 2	209/	Booo	
	10123-10190004013	NOF	/0	7.0	0.5	0.2	3078	газэ	
Duplicate Perflueroalkyl carboxylic acids (PECAs)					Result 2	RPD			
Perfluorobutanoic acid (PEBA)	M23-Ap0062209	NCP	ua/ka	< 5	< 5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M23-Ap0062209	NCP	ua/ka	< 5	< 5	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	



Duplicate									
Perfluoroalkyl sulfonamido substances					Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
N-ethyl- perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M23-Ap0062209	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
N-methyl- perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M23-Ap0062209	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
Duplicate								_	
Perfluoroalkyl sulfonic acids (PFS	As)			Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			Result 1	Result 2	RPD				
1H.1H.2H.2H- perfluorohexanesulfonic acid (4:2 FTSA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H- perfluorooctanesulfonic acid(6:2 FTSA)	M23-Ap0062209	NCP	ug/kg	< 10	< 10	<1	30%	Pass	
1H.1H.2H.2H- perfluorodecanesulfonic acid (8:2 FTSA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	
1H.1H.2H.2H- perfluorododecanesulfonic acid (10:2 FTSA)	M23-Ap0062209	NCP	ug/kg	< 5	< 5	<1	30%	Pass	



#### Comments

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

#### **Qualifier Codes/Comments**

- Code Description
- N11 Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled nalogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.

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 N15 to the analyte and no recovery correction has been made (Internal Standard Quantitation).

#### Authorised by:

Amy Meunier Joseph Edouard Mary Makarios Analytical Services Manager Senior Analyst-PFAS Senior Analyst-Sample Properties

Glenn Jackson General Manager

Final Report - this report replaces any previously issued Report

- Indicates Not Requested

Measurement uncertainty of test data is available on request or please click here.

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<sup>\*</sup> Indicates NATA accreditation does not cover the performance of this service

Project na	ame	MFS Mt Barker PFAS Investigation									
Document title Report   MFS Mt Barker Fire Station PFAS Assessment in Surface Soils											
Project n	umber	12611012	12611012								
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Status	Revision	Author	Reviewer		Approved for issue						
Code			Name	Signature	Name	Signature	Date				
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