10 February 2020

Krystle Mitchell
Senior Scientific and Environmental Officer
South Australian Metropolitan Fire Service
99 Wakefield Street
Adelaide SA 5000

Our ref: 3319080
Your ref:

Dear Sir/Madam

Largs North Station and Gallantry PFAS testing
Resident Fruit Testing

1 Introduction

The South Australia Metropolitan Fire Service (MFS) operates the Largs North Fire Station on Willochra Street in Largs North (the site). Historically the MFS used firefighting foam containing per- and polyfluorinated alkyl substances (PFAS) at the site during testing of delivery systems on firefighting appliances. PFAS foam has not been used at Largs North since 2016.

The MFS has also supported a PFAS monitoring program allowing its staff to have voluntary blood tests of PFAS. Several firefighters stationed at Largs North made the MFS aware of elevated levels of PFAS in blood samples in December 2018.

GHD was commissioned by the MFS on the 4 December 2019 to assess PFAS levels in fruit trees grown by residents off site.

This report documents the scope of work, methodology and findings of the environmental investigation which was undertaken between the 13 and 15 of January 2020.

This report is subject to, and must be read in conjunction with, the limitations set out in Appendix A.

2 Objectives

The objective of this investigation was to determine if fruit trees grown on residential properties down gradient from the site, present a potential linkage between the PFAS source zone and human receptors.

3 Scope of Work

The environmental investigation was undertaken by GHD Environmental Scientist, Mei lyn Herbertt and involved the following scope of work:

- Liaison with property owners to:
    - Confirm selected properties had fruit appropriate for sampling (grown in the ground and fruit was mature)
    - Gain consent to sample and analyse fruit grown on their property

    - Arrange a time to attend the property to conduct sampling
- Collection of one (1) primary fruit sample from each tree at each property as outlined in Table 3-1 below
- Collection of one (1) duplicate pair sample from each tree
- Analysis of a selection of samples for PFAS Short Suite
- Interpretation of analytical results against the Food Standard Australia New Zealand Fruit (all) Trigger Point (2017) (FSANZ).

Table 3-1 – Summary of fruit trees sampled at each property location

Property	Fruit Tree Sampled	Approximate Height of Tree (m)
13 Rankin Drive	Dwarf Peach	2.0
	Dwarf Nectarine	1.0
16 Collins Street	Peach	3.0
	Sweet Lemon	3.0
9 Riverina Street	Lemon	3.0

4 Assessment Guidelines

The contaminant of concern for this investigation is PFAS chemicals. The fruit tree analytical results were compared to the Food Standards Australia New Zealand (FSANZ), 2017. Perfluorinated Chemical In Food, February 2017.

5 Field Methodology

The following field methodology was conducted from the 13 to 15 January 2020:

- Fruit samples were collected by hand using a new pair of nitrile gloves for the collection of each sample.
- Samples were places in zip lock bags and labelled appropriately.
- Nitrile gloves were changed between trees.
- Samples were delivered to the laboratory by GHD Field Staff under Chain of Custody (COC) Documentation. COC Documentation is presented in Appendix E.
- Quality control samples were collected at a minimum rate of one replicate pair per 20 samples. The replicate pair included one intra-laboratory and one inter-laboratory sample.

6 Laboratory Analysis Program

GHD consigned all primary, intra-laboratory field duplicate (blind) and inter-laboratory duplicate (split) samples to Envirolab Group, and MTG Eurofins.

Envirolab Group and MTG Eurofins are National Association of Testing Authorities (NATA) registered for the analytical program undertaken.

Certified laboratory documentation including chain of custody records, sample receipt notifications, certificates of analysis and laboratory QA / QC reports are provided in Appendix E.

GHD field scientist submitted a total of five (5) primary samples and two (2) QA/QC duplicate samples to the selected laboratories for testing.

All samples collected as part of this environmental investigation were analysed for PFAS (Short Suite).

7 Results

Analytical results tables are presented in Appendix C at the end of this report.

No exceedances of the selected criteria were detected. All results reported values below the limit of reporting (LOR).

8 Quality Assurance and Quality Control

Two (2) duplicate samples were corrected as part of this environmental investigation. No rinsate samples were collected as no sampling tools were used and the fruit samples were collected by hand using fresh powder free nitrile gloves directly into the zip lock bags.

An evaluation of the field and laboratory data quality was undertaken in accordance with the NEPM – Schedule B2: Assessment of data quality. Tabulated Quality Assurance / Quality Control (QA/QC) and calculated relative percent differences (RPDs) between the primary and duplicate results are provided in tables in Appendix C. QA/QC procedures and results interpretation are provided in Appendix D.

Based on the quality assurance procedures implemented and the acceptability of the quality control data, GHD consider the data collected is adequate for the purpose of this assessment.

9 Conclusions and Recommendations

Based on the findings of this investigation, the following conclusions were made:

- The properties selected for fruit sampling were considered to provide a representative cross section of the plume and allowed for assessment of PFAS concentrations in groundwater extending beneath residential properties to the north of the site.
- The assessment included both citrus and stone fruit trees. Nut, apple, pear and/or fig trees were not available for sampling and have not been identified within the assessment area.
- PFAS was not identified in any of the fruit sampled at the selected properties.
- No exceedances of the selected criteria were detected.

- The fruit trees present on residential properties located down hydraulic gradient from the site are not considered to represent a complete pathway between the impacted groundwater and residents.

Sincerely
GHD

Julian Howard
Manager - Environmental and Planning
+61 8 81116672

Appendix A

References and Statement of Limitations

Statement of Limitations

This letter report ("report") has been prepared by GHD for South Australian Metropolitan Fire Service and may only be used and relied on by South Australian Metropolitan Fire Service for the purpose agreed between GHD and South Australian Metropolitan Fire Service as set out in the report. The report is not to be re-supplied to any other person without the prior written consent of GHD. Use by, or reliance upon this report by any other person is not authorised and GHD, any of their respective employees or any person purporting to act on behalf of them, are not liable for any loss or damage of any kind whatsoever arising from such unauthorised use or reliance.

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

The services undertaken by GHD in connection with preparing the report are 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 the 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 the report to account for events or changes occurring subsequent to the date that the report is prepared.

The opinions, conclusions and any recommendations in the report are based on assumptions made by GHD. GHD disclaims liability arising from any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in any intrusive site investigation report will be based on information obtained from, and testing, if 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 may be 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 be identified in the report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of the Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible under this agreement for updating the report if the site conditions change.

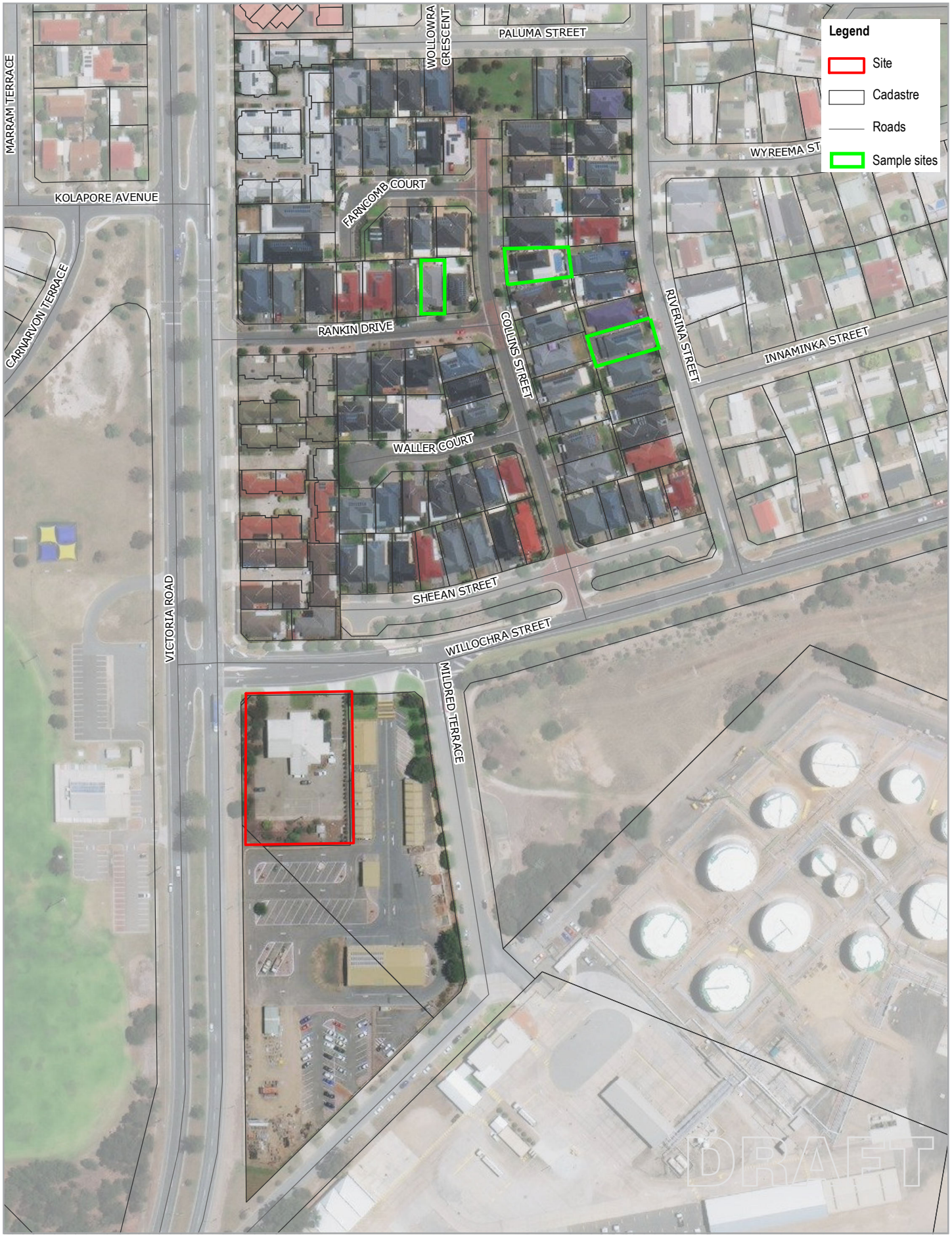
Where GHD prepares elements of the report on the basis of information provided by South Australian Metropolitan Fire Service and others (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work, GHD will not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

References

Food Standards Australia New Zealand (FSANZ), 2017. Perfluorinated Chemical In Food, February 2017

Appendix B

Site Location Plan



Paper Size ISO A4

0 20 40 60 80

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 54

N

South Australian Metropolitan Fire Service
Largs North Station Off - Site Residential Fruit Testing

Project No. **33-19080**
Revision No. **A**
Date **13 Jan 2020**

Investigation Area

FIGURE 1

N:\AU\Adelaide\Projects\33\19080\GIS\Maps\Deliverables\33-19080_Z015_InvestigationArea_RevA.mxd
Print date: 10 May 2019 - 11:43

Data source: GHD: Site, Survey Area, Wells (2019). Satellite Imagery - Esri Imagery Basemap (Extracted 08 May 2019) Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: dbbanatin

Appendix C

Analytical Results Tables

				PFAS						
				Perfluorohexane sulfonate	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	Sum of PFHxS and PFOS	Sum of US EPA PFAS (PFOS + PFOA)*
				µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
EQL				0.5	0.5	1	1	1	0.5	0.5
FSANZ 2017 Fruit (all) Trigger Point						5.1			0.6	
Location Code	**Date/Time**	**Field ID**	**Matrix Type**							
13 Rankin Drive	15 January 2020	D_NECTARIN_1	Biota	<0.5	<0.5	<1	<1	<1	<0.5	<0.5
13 Rankin Drive	15 January 2020	D_PEACH_1	Biota	<0.5	<0.5	<1	<1	<1	<0.5	<0.5

				PFAS						
				Perfluorohexane sulfonate	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	Sum of PFHxS and PFOS	Sum of US EPA PFAS (PFOS + PFOA)*
				µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
EQL				0.5	0.5	1	1	1	0.5	0.5
FSANZ 2017 Fruit (all) Trigger Point						5.1			0.6	
Location Code	**Date/Time**	**Field ID**	**Matrix Type**							
9 Riverina Street	13 January 2020	LEMON_1	Biota	<0.5	<0.5	<1	<1	<1	<0.5	<0.5

				PFAS						
				Perfluorohexane sulfonate	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	Sum of PFHxS and PFOS	Sum of US EPA PFAS (PFOS + PFOA)*
				µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
EQL				0.5	0.5	1	1	1	0.5	0.5
FSANZ 2017 Fruit (all) Trigger Point						5.1			0.6	
Location Code	**Date/Time**	**Field ID**	**Matrix Type**							
16 Collins Street	15 January 2020	PEACH_1	Biota	<0.5	<0.5	<1	<1	<1	<0.5	<0.5
16 Collins Street	15 January 2020	S_LEMON_1	Biota	<0.5	<0.5	<1	<1	<1	<0.5	<0.5

			PFAS							
			Perfluorohexane sulfonate	Perfluorohexane sulfonic acid (PFHxS)	Perfluorooctane sulfonic acid (PFOS)	Perfluorooctanoic acid (PFOA)	6:2 Fluorotelomer Sulfonate (6:2 FTS)	8:2 Fluorotelomer sulfonic acid (8:2 FTS)	Sum of PFHxS and PFOS	Sum of US EPA PFAS (PFOS + PFOA)*
			µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
EQL			0.5	0.3	0.3	0.3	0.5	0.5	0.5	0.5
Date	**Field ID**	**Matrix Type**								
15/01/2020	D_PEACH_1	Biota	<0.5		<0.5	<1	<1	<1	<0.5	<0.5
15/01/2020	QA03	Biota	<0.5		<0.5	<1	<1	<1	<0.5	<0.5
RPD			0		0	0	0	0	0	0
15/01/2020	D_PEACH_1	Biota	<0.5		<0.5	<1	<1	<1	<0.5	<0.5
15/01/2020	QA04	Biota		<0.3	<0.3	<0.3	<0.5	<0.5		
RPD					0	0	0	0		

***RPDs have only been considered where a concentration is greater than 1 times the EQL.**
****Elevated RPDs are highlighted as per QAQC Profile settings (Acceptable RPDs for each EQL multiplier range are: 81 (1 - 10 x EQL); 50 (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**

Appendix D

Quality Assurance and Quality Control

H. Data quality objectives and quality assurance / quality control

H.1 Data quality objectives

The data quality objectives (DQOs) and investigation strategy have been developed using the methodology discussed in NEPM Schedule B (2) *Guideline on Data Collection, Sample Design and Reporting.* The guideline nominates the implementation of the DQO process in Section 5 of AS4482.1-2005. The purpose of the DQO process is to ensure that the data collection activities are focused on collecting the information needed to make decisions, and answering the relevant questions leading up to such decisions.

The Data Quality Objectives (DQOs) establish a framework for contamination investigations which incorporates a seven stepped continuum that defines the problem at the site. A series of stages then optimises the design of the investigation. The seven steps are outlined below:

- Step 1: State the Problem
- Step 2: Identify the Principal Study Question
- Step 3: Inputs to the Decision
- Step 4: Boundaries of the Study
- Step 5: Decision Rules
- Step 6: Tolerable Limits on Decision Errors
- Step 7: Optimisation of the Data Collection Process

An overview of the DQOs for the investigation is presented below.

H.1.1 Step 1: state the problem

The South Australia Metropolitan Fire Service (MFS) operates the Largs North Fire Station on Willochra Street in Largs North (the site). Historically the MFS used firefighting foam containing per- and polyfluorinated alkyl substances (PFAS) at the site during testing of delivery systems on firefighting appliances. PFAS foam has not been used at Largs North since 2016.

The MFS has also supported a PFAS monitoring program allowing its staff to have voluntary blood tests of PFAS. Several firefighters stationed at Largs North have made the MFS aware of elevated levels of PFAS in blood samples, which has caused concern.

GHD was commissioned by the MFS on the 4 December 2019 to assess PFAS levels in fruit trees grown by residents off site.

H.1.2 Step 2: Identify the principal study question

The Environmental Investigation was based on the objectives listed in Section 2.

H.1.3 Step 3: Inputs to the decision

The following inputs are required for the decision:

- Information provided by the client from previous investigations

- Quantitative and qualitative data gained through intrusive sampling, analytical works and observations during intrusive investigations.

H.1.4 Step 4: Boundaries of the study

Spatial boundaries for the site are identified in Figure 1 at the end of this report.

H.1.5 Step 5: Decision rules

Biota analytical data will be assessed against the criteria adopted from relevant guidance as discussed in Section 4.

H.1.6 Step 6: Tolerable limits on decision errors

Data generated as part of the Environmental Investigation must be appropriate to allow decisions to be made with confidence. Specific limits have been adopted in accordance with the appropriate guidance from the AS4482.1 which includes appropriate indicators of data quality [data quality indicators (DQIs) used to assess QA/QC and GHD's Standard Field Operating Procedures].

To assess the usability of the data prior to making decisions, the data will be assessed against pre-determined DQIs. The DQIs including precision, accuracy, representativeness, comparability and completeness, will be reviewed at the completion of the Environmental Investigation to assess for the presence of decision errors.

The pre-determined DQIs established for the investigation are discussed below and shown in Table H-1.

- Precision - measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percentage Difference (RPD) of duplicate samples
- Accuracy - measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this investigation is a measure of the closeness of the analytical results obtained by a method to the 'true' (or standard) value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards
- Representativeness - expresses the degree to which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy
- Comparability - expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods
- Completeness - is defined as the percentage of measurements made which are judged to be valid measurements.

Table H-1 Summary of quality assurance / quality control criteria

Data quality indicator	Frequency	Data quality acceptance criteria
Precision		

Data quality indicator	Frequency	Data quality acceptance criteria
Duplicates (Intra-Laboratory) Duplicates (Inter-Laboratory)	1 / 20 samples 1 / 20 samples	30% - 50% of mean concentration of analyte, however, this variation can be expected to be higher for organic analyses than for inorganics, and for low concentrations of analytes.
Accuracy		
Laboratory (Method) Blank	One sample per batch of 20 samples or fewer	Less than detection limit or limit of reporting (LOR) of the method used.
Laboratory Control Spike		Dynamic Limits varying on previous laboratory data.
Laboratory Spike (Surrogate and Matrix)		Percent recovery is used to assess spiked samples and surrogate standards. Percent recovery is dependent on the type of analyte tested, the concentrations of analytes, and the sample matrix. For matrix spikes Eurofins adopts a matrix spike recovery range of 70-130%. For surrogate spikes Eurofins adopts static limits that vary dependant on matrix and surrogate compounds.
Laboratory Duplicates	One sample per batch of 10 samples or fewer	Laboratory duplicate samples should have RPD's within the NEPM acceptance criteria of ±30%. The laboratory RPDs have been assessed using the following ranges: Results <10 times LOR: no limits. Results between 10 and 20 times LOR 0% - 50%. Results >20 times LOR: 0-20%.
Representativeness		
Sampling appropriate for media and analytes Samples extracted and analysed within holding times	All samples All samples	- Organics (14 days) Inorganics (6 months)
LORs appropriate and consistent	All samples	All samples
Comparability		
Consistent field conditions, sampling staff and laboratory analysis	All samples	All samples
Standard operating procedures for sample collection & handling	All samples	All samples
Standard analytical methods used for all analyses	All samples	All samples
Completeness		
Sample description and COCs completed and appropriate	All Samples	All Samples

Data quality indicator	Frequency	Data quality acceptance criteria
Appropriate documentation	All Samples	All Samples
Satisfactory frequency and result for QA/QC samples	All QA/QC samples	-
Data from critical samples is considered valid	-	Critical samples valid
Notes: COC: Chain of Custody LOR: Limit of Reporting QA/QC: Quality assurance / quality control		

H.1.7 Step 7: Optimisation of the data collection process

To optimise the design of the Environmental Investigation, a sampling and analytical program was undertaken. Results (including QA/QC results) were reviewed as they were received from the laboratory and any inconsistencies or unexpected data were further investigated with the laboratory. Corrective actions were implemented as required.

H.2 Field QA/QC

A series of QA/QC procedures were implemented for the field investigation works, which included:

- Collection of QC Samples
- Use of standard sampling procedures
- Use of standard field sampling forms, including Chain of Custodies (COCs)
- Documenting the calibration and use of field equipment.

All field works were conducted by a GHD environmental scientist in accordance with GHD's *Standard Field Operating Procedures* (SFOP).

H.2.1 QA/QC sampling

Field QA/QC samples were collected and analysed. Field QC sampling was conducted in reference to AS 4482.1: 2005 and NEPM 2013 Schedule B (3) requirements and included the analyses of the following types of samples in Table H-2.

Table H-2 Field QA/QC sample details

Field QA/QC sample type	Details
Intra-Laboratory Duplicate (Blind)	Comprise a single sample that is divided into two separate sampling containers. Both samples are sent anonymously to the primary project laboratory. Blind duplicates provide an indication of the analytical precision of the laboratory, but are inherently influenced by other factors such as sampling techniques and sample media heterogeneity.
Rinsate	A sample of analyte free water poured over or through decontaminated field sampling equipment prior to the collection of environmental samples to assess the adequacy of the decontamination process.

GHD adopts the AS4482.1 acceptance criteria of 30% and 50% RPD for field duplicates of inorganics and organics, respectively. Blind duplicate and split samples should have RPDs less than the criteria in each instance. However it is noted that the criteria will not always be achieved, particularly in heterogeneous materials, or at low analyte concentrations.

In the instance where samples and their corresponding duplicates have concentrations of target analytes less than the laboratory LOR, no quantitative comparison can be carried out and therefore the RPD is undefined. This is also the case for situations where the sample result is less than ten times the laboratory LOR.

Duplicate, split and rinsate sample results and Relative Percentage Difference (RPD) calculations are presented in Appendix C.

H.2.2 Sample handling and preservation

Biota samples were collected using disposable equipment (nitrile gloves) and transferred to the zip lock bags. The samples were immediately placed in an insulated cooler for storage and were delivered by GHD Field Staff to the laboratory upon the completion of field work on a daily basis.

All samples were received intact as per the Laboratory Reports (included in Appendix E).

H.2.3 Chain of custody

Unique Chain of Custody documentation and distinct batch numbers accompany all sample batches. This documentation is included in Appendix E.

H.3 Laboratory QA/QC

The laboratories subcontracted by GHD to analyse samples (NMI and ALS) are certified by the NATA for the required analysis. NATA certification provides for laboratory QA procedures to be in place and to be carried out on an on-going basis.

As part of the NATA requirements, the laboratories carried out and reported analysis of laboratory quality control samples, such as:

- Duplicate samples (the same sample analysed more than once)
- Blanks (containing none of the analytes to be analysed)
- Spiked samples (containing known additions of the analytes to appropriate matrices)
- Standard samples (samples containing known concentrations of the analytes - also known as reference standards).

H.3.1 Laboratory QA/QC procedures

As part of NATA requirements, the laboratories incorporated a range of QA methods to ensure accuracy of data. This includes the analyses of internal laboratory QC samples, details of which have been provided in Table H-3.

Table H-3 Laboratory QC sample details

Laboratory QA/QC sample	Details
Laboratory (Method) Blank	Usually an organic or aqueous solution that is as free as possible of analytes of interest to which is added all the reagents, in the same volume, as used in the preparation and subsequent analysis of the samples. The reagent blank is carried through the complete sample preparation procedure and contains the same reagent concentrations in the final solution as in the sample solution used for analysis. The reagent blank is used to correct for possible contamination resulting from the preparation or processing of the sample.

Laboratory Control Sample	A reference standard of known concentration is analysed along with a batch of samples. The Laboratory Control Sample provides an indication of the analytical accuracy and the precision of the test method and is used for inorganic analyses.
Laboratory Spike	An authentic field sample is 'spiked' by adding an aliquot of known concentration of the target analyte(s) prior to sample extraction and analysis. A spike documents the effect of the sample matrix on the extraction and analytical techniques. Spiked samples will be analysed for each batch where samples are analysed for organic chemicals of concern.
Surrogate Samples	These are organic compounds which are similar to the analyte of interest in terms of chemical composition, extractability, and chromatographic conditions (retention time), but which are not normally found in environmental samples. These surrogate compounds are 'spiked' into blanks, standards and samples submitted for organic analyses by gas-chromatographic techniques prior to sample extraction. Surrogate Standard / Spikes provide a means of checking that no gross errors have occurred during any stage of the test method leading to significant analyte loss.
Laboratory Duplicates	The analytical laboratory collects duplicate sub samples from one sample submitted for analytical testing at a rate equivalent to one in twenty samples per analytical batch, or one sample per batch if less than twenty samples are analysed in a batch. A laboratory duplicate provides data on the analytical precision and reproducibility of the test result. The precision of analysis performed by the laboratory is determined by the calculation of the relative percent difference (RPD). The RPD is calculated based on a comparison of an intra-laboratory split of the sample material with results representing the percent difference between the two sample concentrations for a specific contaminant. The RPD is calculated using the following formula: $RPD(\%) = \frac{\lvert C_o - C_d \rvert}{C_o + C_d} \times 200$ Where Co = Analyte concentration of the original sample Cd = Analyte concentration of the duplicate sample

The laboratory is required to provide this information to GHD. The individual analytical laboratories conduct an assessment of the laboratory QC program internally; however the results are also reviewed and assessed by GHD.

H.4 Field QC Results

The field QC results analysis below considers biota samples collected as part of the environmental investigation.

H.4.1 Biota

A total of five (5) primary biota samples and two (2) duplicate samples were collected, submitted and analysed as part of the environmental investigation. The target frequency for analysis of field QC samples is 1 in 10 (10%). In this instance, this frequency was achieved.

No RPD exceedances were recorded.

H.4.3 Rinsate

No rinsate samples were collected as no reusable equipment was used as part of this environmental investigation.

H.5 Laboratory program

The laboratories utilised for this assessment (Envirolab Group and Eurofins) undertook their own internal quality assurance and quality control procedures for sample analysis. GHD has reviewed the internal laboratory control data provided within the laboratory reports, which are provided in Appendix E.

All of the internal laboratory QA QC analysis, including laboratory duplicates (DUP), method blanks (MB), laboratory control spikes (LCS), matrix spikes (MS) and surrogates spikes were within the data quality criteria.

H.6 Overall Assessment of Data Quality

The GHD QAQC parameters were within the specified requirements, therefore the data is considered to be valid and of sufficient quality for the purposes of this Environmental Investigation.

Appendix E

Laboratory Reports and Chain of Custody Documentation

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 234692

Client Details

Client	GHD Pty Ltd
Attention	Dilara Valiff
Address	GPO Box 2052, Adelaide, SA, 5001

Sample Details

Your Reference	**3319080**
Number of Samples	15 Biota
Date samples received	17/01/2020
Date completed instructions received	17/01/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	24/01/2020
Date of Issue	24/01/2020
Reissue Details	This report replaces R00 created on 23/01/2020 due to: extra information requested

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Fiona Tan, LC Supervisor

Authorised By

Nancy Zhang, Laboratory Manager

PFAS in Biota Extended						
Our Reference		234692-1	234692-4	234692-5	234692-7	234692-10
Your Reference	UNITS	LEMON_1	D_PEACH_1	QA03	D_NECTARIN_1	S_LEMON_1
Date Sampled		13/01/2020	15/01/2020	15/01/2020	15/01/2020	15/01/2020
Type of sample		Biota	Biota	Biota	Biota	Biota
Date prepared	-	22/01/2020	22/01/2020	22/01/2020	22/01/2020	22/01/2020
Date analysed	-	22/01/2020	22/01/2020	22/01/2020	22/01/2020	22/01/2020
Perfluorohexanesulfonic acid - PFHxS	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanesulfonic acid PFOS	µg/kg	<1	<1	<1	<1	<1
Perfluorooctanoic acid PFOA	µg/kg	<1	<1	<1	<1	<1
6:2 FTS	µg/kg	<1	<1	<1	<1	<1
8:2 FTS	µg/kg	<1	<1	<1	<1	<1
Surrogate $^{13}C_8$ *PFOS*	%	102	92	101	100	105
Surrogate $^{13}C_2$ *PFOA*	%	94	98	94	95	96
Extracted ISTD $^{18}O_2$ *PFHxS*	%	85	85	88	83	83
Extracted ISTD $^{13}C_4$ *PFOS*	%	96	99	94	95	94
Extracted ISTD $^{13}C_4$ *PFOA*	%	96	93	90	91	94
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	101	94	90	95	105
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	106	91	97	93	92
Total Positive PFHxS & PFOS	µg/kg	<1	<1	<1	<1	<1
Total Positive PFOS & PFOA	µg/kg	<1	<1	<1	<1	<1

PFAS in Biota Extended		
Our Reference		234692-13
Your Reference	UNITS	PEACH_1
Date Sampled		15/01/2020
Type of sample		Biota
Date prepared	-	22/01/2020
Date analysed	-	22/01/2020
Perfluorohexanesulfonic acid - PFHxS	µg/kg	<1
Perfluorooctanesulfonic acid PFOS	µg/kg	<1
Perfluorooctanoic acid PFOA	µg/kg	<1
6:2 FTS	µg/kg	<1
8:2 FTS	µg/kg	<1
Surrogate $^{13}C_8$ *PFOS*	%	102
Surrogate $^{13}C_2$ *PFOA*	%	90
Extracted ISTD $^{18}O_2$ *PFHxS*	%	82
Extracted ISTD $^{13}C_4$ *PFOS*	%	95
Extracted ISTD $^{13}C_4$ *PFOA*	%	92
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	90
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	83
Total Positive PFHxS & PFOS	µg/kg	<1
Total Positive PFOS & PFOA	µg/kg	<1

Method ID	Methodology Summary
Org-035	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.3 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER.
Org-035	Biota are homogenised and extracted with basified Methanol followed by SPE and/or Activated Charcoal clean-up, prior to analysis with LC-MS/MS. Samples analysed and reported on an as received basis and are therefore not corrected for moisture content. Preparation details are included in the Comments Section as required. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.3 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction).

QUALITY CONTROL: PFAS in Biota Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	234692-4
Date prepared	-			22/01/2020	1	22/01/2020	22/01/2020		22/01/2020	22/01/2020
Date analysed	-			22/01/2020	1	22/01/2020	22/01/2020		22/01/2020	22/01/2020
Perfluorohexanesulfonic acid - PFHxS	µg/kg	1	Org-035	<1	1	<1	<1	0	107	109
Perfluorooctanesulfonic acid PFOS	µg/kg	1	Org-035	<1	1	<1	<1	0	105	106
Perfluorooctanoic acid PFOA	µg/kg	1	Org-035	<1	1	<1	<1	0	100	104
6:2 FTS	µg/kg	1	Org-035	<1	1	<1	<1	0	113	106
8:2 FTS	µg/kg	1	Org-035	<1	1	<1	<1	0	103	109
Surrogate $^{13}C_8$ *PFOS*	%		Org-035	102	1	102	100	2	100	97
Surrogate $^{13}C_2$ *PFOA*	%		Org-035	99	1	94	96	2	96	96
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-035	85	1	85	81	5	91	79
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-035	94	1	96	95	1	95	89
Extracted ISTD $^{13}C_4$ *PFOA*	%		Org-035	97	1	96	91	5	97	86
Extracted ISTD $^{13}C_2$ *6:2FTS*	%		Org-035	114	1	101	98	3	107	86
Extracted ISTD $^{13}C_2$ *8:2FTS*	%		Org-035	136	1	106	100	6	132	83

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
customerservice@envirolab.com.au
www.envirolab.com.au

CERTIFICATE OF ANALYSIS 234692

Client Details

Client	GHD Pty Ltd
Attention	Dilara Valiff
Address	GPO Box 2052, Adelaide, SA, 5001

Sample Details

Your Reference	**3319080**
Number of Samples	15 Biota
Date samples received	17/01/2020
Date completed instructions received	17/01/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	24/01/2020
Date of Issue	30/01/2020
Reissue Details	This report replaces R01 created on 24/01/2020 due to: registration issue in set up of reporting units. (client request)

Results Approved By
Alexander Mitchell Maclean, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

PFAS in Biota Extended						
Our Reference		234692-1	234692-4	234692-5	234692-7	234692-10
Your Reference	UNITS	LEMON_1	D_PEACH_1	QA03	D_NECTARIN_1	S_LEMON_1
Date Sampled		13/01/2020	15/01/2020	15/01/2020	15/01/2020	15/01/2020
Type of sample		Biota	Biota	Biota	Biota	Biota
Date prepared	-	22/01/2020	22/01/2020	22/01/2020	22/01/2020	22/01/2020
Date analysed	-	22/01/2020	22/01/2020	22/01/2020	22/01/2020	22/01/2020
Perfluorohexanesulfonic acid - PFHxS	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorooctanesulfonic acid PFOS	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Perfluorooctanoic acid PFOA	µg/kg	<1	<1	<1	<1	<1
6:2 FTS	µg/kg	<1	<1	<1	<1	<1
8:2 FTS	µg/kg	<1	<1	<1	<1	<1
Surrogate $^{13}C_8$ *PFOS*	%	102	92	101	100	105
Surrogate $^{13}C_2$ *PFOA*	%	94	98	94	95	96
Extracted ISTD $^{18}O_2$ *PFHxS*	%	85	85	88	83	83
Extracted ISTD $^{13}C_4$ *PFOS*	%	96	99	94	95	94
Extracted ISTD $^{13}C_4$ *PFOA*	%	96	93	90	91	94
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	101	94	90	95	105
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	106	91	97	93	92
Total Positive PFHxS & PFOS	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Total Positive PFOS & PFOA	µg/kg	<0.5	<0.5	<0.5	<0.5	<0.5

PFAS in Biota Extended		
Our Reference		234692-13
Your Reference	UNITS	PEACH_1
Date Sampled		15/01/2020
Type of sample		Biota
Date prepared	-	22/01/2020
Date analysed	-	22/01/2020
Perfluorohexanesulfonic acid - PFHxS	µg/kg	<0.5
Perfluorooctanesulfonic acid PFOS	µg/kg	<0.5
Perfluorooctanoic acid PFOA	µg/kg	<1
6:2 FTS	µg/kg	<1
8:2 FTS	µg/kg	<1
Surrogate $^{13}C_8$ *PFOS*	%	102
Surrogate $^{13}C_2$ *PFOA*	%	90
Extracted ISTD $^{18}O_2$ *PFHxS*	%	82
Extracted ISTD $^{13}C_4$ *PFOS*	%	95
Extracted ISTD $^{13}C_4$ *PFOA*	%	92
Extracted ISTD $^{13}C_2$ *6:2FTS*	%	90
Extracted ISTD $^{13}C_2$ *8:2FTS*	%	83
Total Positive PFHxS & PFOS	µg/kg	<0.5
Total Positive PFOS & PFOA	µg/kg	<0.5

Method ID	Methodology Summary
Org-035	Soil samples are extracted with basified Methanol. Waters and soil extracts are directly injected and/or concentrated/extracted using SPE. Analysis is undertaken with LC-MS/MS. PFAS results include the sum of branched and linear isomers where applicable. Please note that PFAS results are corrected for Extracted Internal Standards (QSM 5.3 Table B-15 terminology), which are mass labelled analytes added prior to sample preparation to assess matrix effects and verify processing of the sample. PFAS analytes without a commercially available mass labelled analogue are corrected vs a closely eluting mass labelled PFAS compound. Surrogates are also reported, in this context they are mass labelled PFAS compounds added prior to extraction but are used as monitoring compounds only (not used for result correction). Envicarb (or similar) is used discretionally to remove interfering matrix components. Please contact the laboratory if estimates of Measurement Uncertainty are required as per WA DER.
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QUALITY CONTROL: PFAS in Biota Extended						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	234692-4
Date prepared	-			22/01/2020	1	22/01/2020	22/01/2020		22/01/2020	22/01/2020
Date analysed	-			22/01/2020	1	22/01/2020	22/01/2020		22/01/2020	22/01/2020
Perfluorohexanesulfonic acid - PFHxS	µg/kg	0.5	Org-035	<0.5	1	<0.5	<0.5	0	107	109
Perfluorooctanesulfonic acid PFOS	µg/kg	0.5	Org-035	<0.5	1	<0.5	<0.5	0	105	106
Perfluorooctanoic acid PFOA	µg/kg	1	Org-035	<1	1	<1	<1	0	100	104
6:2 FTS	µg/kg	1	Org-035	<1	1	<1	<1	0	113	106
8:2 FTS	µg/kg	1	Org-035	<1	1	<1	<1	0	103	109
Surrogate $^{13}C_8$ *PFOS*	%		Org-035	102	1	102	100	2	100	97
Surrogate $^{13}C_2$ *PFOA*	%		Org-035	99	1	94	96	2	96	96
Extracted ISTD $^{18}O_2$ *PFHxS*	%		Org-035	85	1	85	81	5	91	79
Extracted ISTD $^{13}C_4$ *PFOS*	%		Org-035	94	1	96	95	1	95	89
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Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
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LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
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Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

CHAIN OF CUSTODY RECORD

GHD

GHD Adelaide
211 Victoria Square, Adelaide SA 5000
Telephone 618 8111 6600 Facsimile 618 8111 6699
Email adimail@ghd.com.au

GHD Mt Gambier
2A Helen St, Mt Gambier SA 5290
Telephone 618 8721 0800 Facsimile 618 8721 0899

GHD Roxby Downs
1/14 Tutop St, Roxby Downs SA
Telephone 618 8671 4000 Facsimile 618 8671 4099

Turnaround Requirement
☐ STANDARD
☐ NON-STANDARD

Job Number	GHD Office	Relinquished By:	Received By:	Relinquished By:	Received By:
3319080	Adelaide	Meilyn Herbertt			K.Close ELS
Project		Date/Time:	Date/Time:	Date/Time:	Date/Time:
MFS Largs North Fruit Testing		16-01-2019 9am			17-01-2020 1037
GHD Project Manager	GHD Contact				
Dilara Valiff	Dilara Valiff				
Email Reports to: dilara.valiff@ghd.com julian.howard@ghd.com meilyn.herbertt@ghd.com	Quote				

SEND TO:

☐ ALS Laboratories
2-4 Westall Rd, SPRINGVALE, VIC 3171
Ph 03 8549 9600
Contact

☐ MGT LabMark
2-5 Kingston Town Close, OAKLEIGH VIC 3166
Ph 03 9564 7055
Contact

☐ SGS
16/33 Maddox St, ALEXANDRIA NSW 2015
Ph 02 8594 0400
Contact

☐ BUREAU VERITAS AMDEL
2/35 Cormack Rd, WINGFIELD SA 5013
Ph 08 8440 7100
Contact

	Sample I.D.	Date	Time	Sample Matrix S: Soil SL: Sludge W: Water A: Air	Container Type J: Jar; B: Bag; V: Vial; G: Glass bottle; P: Plastic bottle	PFAS SHORT SUITE	Remarks
1	LEMON-1	13-01-20		FRUIT	BAG	X	
2	QA01	13-01-20		"	"		On hold
3	QA02	13-01-20		"	"		On hold
	~~D-LEM~~						
4	D-PEACH-1	15-01-20		"	"	X	
5	QA03	"		"	"	X	
6	QA04	"		"	"	X	Forward to MTG Eurofins
7	D-NECTARINE-1	"		"	"	X	
8	QA05	"		"	"		On hold
9	QA06	"		"	"		On hold
10	S-LEMON-1	"		"	"	X	
11	QA07	"		"	"		On hold
12	QA08	"		"	"		On hold
13	PEACH-1	"		"	"	X	
14	QA09	"		"	"		On hold
15	QA10	"		"	"		On hold

ENVIROLAB Services
Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 234692
Date Received: 17/01/2020
Time Received: 1037
Received by: KC
Temp: Cool/Ambient
Cooling: Ice/Icepack 15.7
Security: Intact/Broken/None

Remarks:

CHAIN OF CUSTODY RECORD

GHD

GHD Adelaide
211 Victoria Square, Adelaide SA 5000
Telephone: 618 8111 6600 Facsimile: 618 8111 6699
Email: adlmail@ghd.com.au

GHD Mt Gambier
2A Helen St, Mt Gambier SA 5290
Telephone: 618 8721 0800 Facsimile: 618 8721 0899

GHD Roxby Downs
1/14 Tutop St, Roxby Downs SA
Telephone: 618 8671 4000 Facsimile: 618 8671 4099

Turnaround Requirement
☐ STANDARD
☐ NON-STANDARD

Page ____ of ____

SEND TO: # 697337

Job Number	GHD Office	Relinquished By:	Received By:	Relinquished By:	Received By:
3319080	Adelaide	Meilyn Herbertt		K.Core ELS	K.Core ELS
Project		Date/Time:	Date/Time:	Date/Time:	Date/Time:
MFS Largs North Fruit Testing		16-01-2019 9am		17-01-2020 12:47	17-01-2020 1037

GHD Project Manager	GHD Contact
Dilara Valiff	Dilara Valiff
Email Reports to: dilara.valiff@ghd.com julian.howard@ghd.com meilyn.herbertt@ghd.com	Quote

	Sample I.D.	Date	Time	Sample Matrix S: Soil SL: Sludge W: Water A: Air	Container Type J: Jar; B: Bag; V: Vial; G: Glass bottle; P: Plastic bottle	PFAS SHORT SUITE	Analyses Required	Remarks
1	LEMON-1	13-01-20		FRUIT	BAG	X		
2	QA01	13-01-20		"	"			On hold
3	QA02	13-01-20		"	"			On hold
	~~D-LEM~~							
4	D-PEACH-1	15-01-20		"	"	X		
5	QA03	"		"	"	X		
6	QA04	"		"	"	X		
7	D-NECTARINE-1	"		"	"	X		Forward to MTG Eurofins
8	QA05	"		"	"			
9	QA06	"		"	"			On hold
10	S-LEMON-1	"		"	"	X		On hold
11	QA07	"		"	"			
12	QA08	"		"	"			On hold
13	PEACH-1	"		"	"	X		On hold
14	QA09	"		"	"			
15	QA10	"		"	"			On hold
								On hold

Remarks:

ENVIROLAB

Envirolab Services
12 Ashley St
Chatswood NSW 2067
Ph: (02) 9910 6200

Job No: 234692

Date Received: 17/01/2020
Time Received: 1037
Received by: KG
Temp: Cool/Ambient
Cooling: Ice/Icepack 15-7
Security: Intact/Broken/None

Lupan 17/01/20 5:24 PM

GHD Pty Ltd
GPO Box 2052
Adelaide
SA 5001

NATA Accredited
Accreditation Number 1261
Site Number 18217

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

Attention: **Dilara Valiff**

Report **697337-S**
Project name MFS LARGS NORTH FRUIT TESTING
Received Date Jan 17, 2020

Client Sample ID			**QA04**
Sample Matrix			**Plant Material**
Eurofins Sample No.			**S20-Ja14393**
Date Sampled			**Jan 15, 2020**
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs)			
Perfluorobutanoic acid (PFBA)[N11]	0.5	ug/kg	< 0.5
Perfluoropentanoic acid (PFPeA)[N11]	0.5	ug/kg	0.9
Perfluorohexanoic acid (PFHxA)[N11]	0.5	ug/kg	< 0.5
Perfluoroheptanoic acid (PFHpA)[N11]	0.5	ug/kg	< 0.5
Perfluorooctanoic acid (PFOA)[N11]	0.3	ug/kg	< 0.3
Perfluorononanoic acid (PFNA)[N11]	0.5	ug/kg	< 0.5
Perfluorodecanoic acid (PFDA)[N11]	0.5	ug/kg	< 0.5
Perfluoroundecanoic acid (PFUnDA)[N11]	0.5	ug/kg	< 0.5
Perfluorododecanoic acid (PFDoDA)[N11]	0.5	ug/kg	< 0.5
Perfluorotridecanoic acid (PFTrDA)[N15]	0.5	ug/kg	< 0.5
Perfluorotetradecanoic acid (PFTeDA)[N11]	0.5	ug/kg	< 0.5
13C4-PFBA (surr.)	1	%	32
13C5-PFPeA (surr.)	1	%	116
13C5-PFHxA (surr.)	1	%	84
13C4-PFHpA (surr.)	1	%	87
13C8-PFOA (surr.)	1	%	95
13C5-PFNA (surr.)	1	%	85
13C6-PFDA (surr.)	1	%	90
13C2-PFUnDA (surr.)	1	%	78
13C2-PFDoDA (surr.)	1	%	72
13C2-PFTeDA (surr.)	1	%	53
Perfluoroalkyl sulfonamido substances			
Perfluorooctane sulfonamide (FOSA)[N11]	0.5	ug/kg	< 0.5
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)[N11]	0.5	ug/kg	< 0.5
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)[N11]	0.5	ug/kg	< 0.5
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)[N11]	0.5	ug/kg	< 0.5
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)[N11]	0.5	ug/kg	< 0.5
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)[N11]	0.5	ug/kg	< 0.5
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)[N11]	0.5	ug/kg	< 0.5
13C8-FOSA (surr.)	1	%	56
D3-N-MeFOSA (surr.)	1	%	89
D5-N-EtFOSA (surr.)	1	%	74
D7-N-MeFOSE (surr.)	1	%	96

Client Sample ID			QA04
Sample Matrix			Plant Material
Eurofins Sample No.			S20-Ja14393
Date Sampled			Jan 15, 2020
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances			
D9-N-EtFOSE (surr.)	1	%	94
D5-N-EtFOSAA (surr.)	1	%	18
D3-N-MeFOSAA (surr.)	1	%	16
Perfluoroalkyl sulfonic acids (PFSAs)			
Perfluorobutanesulfonic acid (PFBS)[N11]	0.5	ug/kg	< 0.5
Perfluorononanesulfonic acid (PFNS)[N15]	0.5	ug/kg	< 0.5
Perfluoropropanesulfonic acid (PFPrS)[N15]	0.5	ug/kg	< 0.5
Perfluoropentanesulfonic acid (PFPeS)[N15]	0.5	ug/kg	< 0.5
Perfluorohexanesulfonic acid (PFHxS)[N11]	0.3	ug/kg	< 0.3
Perfluoroheptanesulfonic acid (PFHpS)[N15]	0.5	ug/kg	< 0.5
Perfluorooctanesulfonic acid (PFOS)[N11]	0.3	ug/kg	< 0.3
Perfluorodecanesulfonic acid (PFDS)[N15]	0.5	ug/kg	< 0.5
13C3-PFBS (surr.)	1	%	85
18O2-PFHxS (surr.)	1	%	82
13C8-PFOS (surr.)	1	%	68
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)			
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)[N11]	0.5	ug/kg	< 0.5
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)[N11]	0.5	ug/kg	< 0.5
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)[N11]	0.5	ug/kg	< 0.5
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)[N15]	0.5	ug/kg	< 0.5
13C2-4:2 FTSA (surr.)	1	%	113
13C2-6:2 FTSA (surr.)	1	%	108
13C2-8:2 FTSA (surr.)	1	%	85

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Jan 17, 2020	180 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Jan 17, 2020	180 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Jan 21, 2020	180 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Jan 21, 2020	180 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			

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IANZ # 1290

Company Name: GHD Pty Ltd SA
Address: GPO Box 2052
Adelaide
SA 5001

Project Name: MFS LARGS NORTH FRUIT TESTING

Order No.:
Report #: 697337
Phone: 08 8111 6600
Fax: 08 8111 6699

Received: Jan 17, 2020 5:24 PM
Due: Jan 24, 2020
Priority: 5 Day
Contact Name: Dilara Valiff

Eurofins Analytical Services Manager : Michael Cassidy

Sample Detail						Per- and Polyfluoroalkyl Substances (PFASs)
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						X
Perth Laboratory - NATA Site # 23736						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	QA04	Jan 15, 2020		Plant Material	S20-Ja14393	X
Test Counts						1

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Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

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

Units

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

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

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

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/kg	< 0.5			0.5	Pass	
Perfluoropentanoic acid (PFPeA)	ug/kg	< 0.5			0.5	Pass	
Perfluorohexanoic acid (PFHxA)	ug/kg	< 0.5			0.5	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/kg	< 0.5			0.5	Pass	
Perfluorooctanoic acid (PFOA)	ug/kg	< 0.3			0.3	Pass	
Perfluorononanoic acid (PFNA)	ug/kg	< 0.5			0.5	Pass	
Perfluorodecanoic acid (PFDA)	ug/kg	< 0.5			0.5	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/kg	< 0.5			0.5	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/kg	< 0.5			0.5	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/kg	< 0.5			0.5	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/kg	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/kg	< 0.5			0.5	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/kg	< 0.5			0.5	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/kg	< 0.5			0.5	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/kg	< 0.5			0.5	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/kg	< 0.5			0.5	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/kg	< 0.5			0.5	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/kg	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	ug/kg	< 0.5			0.5	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/kg	< 0.5			0.5	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/kg	< 0.5			0.5	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/kg	< 0.5			0.5	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/kg	< 0.3			0.3	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/kg	< 0.5			0.5	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/kg	< 0.3			0.3	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/kg	< 0.5			0.5	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/kg	< 0.5			0.5	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/kg	< 0.5			0.5	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/kg	< 0.5			0.5	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/kg	< 0.5			0.5	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	100			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	110			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	110			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	100			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	99			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	104			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	110			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	103			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	104			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	146			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	57			50-150	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	%	105			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	105			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	110			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	98			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	101			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	80			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	121			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSAs)							
Perfluorobutanesulfonic acid (PFBS)	%	89			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	84			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	84			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	105			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	106			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	92			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	127			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	51			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	112			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	%	105			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	%	108			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	111			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1					
Perfluorobutanoic acid (PFBA)	S20-Ja14393	CP	%	104			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S20-Ja14393	CP	%	80			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S20-Ja14393	CP	%	103			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S20-Ja14393	CP	%	99			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S20-Ja14393	CP	%	100			50-150	Pass	
Perfluorononanoic acid (PFNA)	S20-Ja14393	CP	%	103			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S20-Ja14393	CP	%	108			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	S20-Ja14393	CP	%	110			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	S20-Ja14393	CP	%	105			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	S20-Ja14393	CP	%	139			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S20-Ja14393	CP	%	98			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances				Result 1					
Perfluorooctane sulfonamide (FOSA)	S20-Ja14393	CP	%	107			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S20-Ja14393	CP	%	106			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S20-Ja14393	CP	%	110			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S20-Ja14393	CP	%	112			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S20-Ja14393	CP	%	113			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S20-Ja14393	CP	%	100			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S20-Ja14393	CP	%	90			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S20-Ja14393	CP	%	91			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	S20-Ja14393	CP	%	71			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S20-Ja14393	CP	%	93			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S20-Ja14393	CP	%	109			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S20-Ja14393	CP	%	99			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S20-Ja14393	CP	%	99			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S20-Ja14393	CP	%	104			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S20-Ja14393	CP	%	56			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S20-Ja14393	CP	%	115			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S20-Ja14393	CP	%	102			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S20-Ja14393	CP	%	110			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S20-Ja14393	CP	%	120			50-150	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	S20-Ja14393	CP	ug/kg	0.9	1.0	11	30%	Pass	
Perfluorohexanoic acid (PFHxA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	S20-Ja14393	CP	ug/kg	< 0.3	< 0.3	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	

Duplicate									
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S20-Ja14393	CP	ug/kg	< 0.3	< 0.3	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	S20-Ja14393	CP	ug/kg	< 0.3	< 0.3	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<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)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S20-Ja14393	CP	ug/kg	< 0.5	< 0.5	<1	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	No
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 analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised By

Michael Cassidy	Analytical Services Manager
Sarah McCallion	Senior Analyst-PFAS (QLD)

Glenn Jackson
General Manager

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

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

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