



REPORT

Western Ridge – Afghan Springs Baseline Assessment

PFAS and TRH Groundwater Baseline Assessment

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1.0 INTRODUCTION

BHP Billiton Iron Ore Pty Ltd (BHP) engaged Golder Associates Pty Ltd (Golder) to conduct a groundwater baseline assessment of per- and poly- fluoroalkyl substances (PFAS) and total recoverable hydrocarbons (TRH) at the Western Ridge exploration area (the site). For the purpose of this baseline assessment, Western Ridge site is divided into three zones: the Western Ridge Crusher Study (WRCS), the Eastern Syncline, and Afghan Springs. This report presents the baseline findings for the Afghan Springs area (the study area) conducted in April 2021. The baseline assessment for the WRCS and the Eastern Syncline areas are provided under separate covers.

The location plan is presented in Figure 1 and a site plan is presented in Figure 2.

2.0 BACKGROUND

BHP intends to develop the Western Ridge for active mining. The site is located west of the Mount Whaleback mine site where PFAS and TRH contamination have been identified within the groundwater. Therefore, BHP requires a baseline assessment of PFAS and TRH concentrations in the groundwater at the Western Ridge prior to development for mining.

3.0 OBJECTIVES

The objective of the baseline assessment was as follows:

To evaluate the concentrations of PFAS and TRH in the groundwater at the site to establish a baseline, using the existing bores at the site.

This baseline assessment is not to meet environmental assessment requirements as set out in the Department of Water and Environmental Regulation (DWER) Contaminated Sites Guidelines and the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended 2013 (ASC NEPM). However, the methodologies applied for this assessment are generally consistent with the above guidelines.

This report presents the findings of the baseline assessment for the Afghan Springs area only.

4.0 SCOPE OF WORKS

The scope of works conducted at the study area included the following:

- Obtain groundwater samples using Hydrasleeve® from three existing groundwater monitoring wells:
 - HXAN0004M
 - HXAN0007M
 - M8000NAXH
- Submit groundwater samples to NATA-accredited environmental testing laboratories for PFAS (to meet the 99% species protection criteria) and TRH analyses.
- Preparation of a factual report (this report) to present baseline PFAS and TRH contamination at the Afghan Springs area.

5.0 SITE OVERVIEW

The site overview information below has been obtained through a desktop review, including from the BHP 'Western Ridge and OB29/30/35 Detailed Hydrogeological Assessment' (BHP, 2020). Additional information obtained during the site visit has also been included. This section covers the bigger Western Ridge exploration area and not specifically focus on the Afghan Springs area.



5.1 Site Identification

The Western Ridge exploration area is located approximately 2 km southwest of the Mount Whaleback mine site, both of which are owned and operated by BHP. These mine sites are located approximately 5 to 7 km west of the Newman Township and approximately 1,200 km north-east of Perth, in the Pilbara region of Western Australia. The Afghan Springs area is located in the northern portion of the Western Ridge exploration area, as presented in Figure 1 and displayed in more detail on Figure 2.

The site identification details are summarised in Table 1 below.

Table 1: Site Identification

Item		Description											
Site Location	Approximately 5 to 7 km	Approximately 5 to 7 km west of Newman											
Allotment/DP	Crown Land	Crown Land											
Local Government Authority	Shire of East Pilbara	Shire of East Pilbara											
Zoning	Rural												
Previous Land Use	Rural	Rural											
Proposed Land Use	Mining tenement												
	Easting (m)	Northing (m)											
	768825.6139	7410727.382											
Afghan Springs Boundary	766194.0077	7410788.439											
Coordinates	766300.5441	7412151.856											
	766350.0494	7											
	768269.4791	7412224.126											

5.2 Site Description

The topography of the Western Ridge is undulating with raised elevation to the north (Bill's Hill and Mount Helen) running east to west and raised elevation to the south (Silver Knight) as displayed in Figure 1.

The Afghan Springs area is predominantly covered by native vegetation with unsealed roads and drill pads from exploration activities throughout the area. A valley is present within the Afghan springs area which runs south-north. The valley was observed to contain pooled water at six locations along the valley floor with water seeping from the rock walls at several of these locations. Some observed access tracks and areas of drill related clearing have been rehabilitated.

It is important to note that the Western Ridge site is located within a Priority 1 drinking water catchment area (DoW, 2014), which has the fundamental water quality objective of risk avoidance to protect the drinking water source.

5.3 Climate

The Newman Airport weather station (007176) is the nearest weather station to the site and is located approximately 12 km away from the site. The data indicated the mean maximum temperature range is from 22.9°C (July) to 39.1°C (December) and the mean minimum temperature range is from 6.4°C (July) to 25.0°C (January). The mean annual rainfall is 332.6 mm, with the highest mean rainfall during February (71.0 mm) and the lowest during September (3.9 mm). January and February were recorded as the wettest months, with higher mean rainfall data than the remaining months.

The Pilbara climate and subsequent rainfall is typically dominated by the influence of subtropical highs located to the south of the Pilbara. During summer (November to April) the high-pressure cell moves further south, resulting in the Pilbara receiving approximately 70% of its annual precipitation during these summer months. Annual precipitation figures for these zones are much less than the annual potential evaporation (BHP, 2020).



The Pilbara is characterised by high local evaporation rates and a generally low soil infiltration capacity. This results in recharge occurring exclusively during major rainfall events (15-25 mm/d). The closest station that records evaporation is the Wittenoom BoM station, located approximately 190 km north-west of Newman. Annual average evaporation for Wittenoom is 3,142 mm/year, which exceeds annual rainfall by as much as 2,800 mm/year.

5.4 Hydrogeological Setting

5.4.1 Geology

The geological conditions in the region can be summarised as:

- The Silver Knight and Eastern Syncline are mainly hosted by the upper Marra Mamba members, however mineralisation of the overlying Wittenoom and underlying Jeerinah formations can also be seen in the orebodies.
- Bill's Hill and Mount Helen orebodies are hosted in the mineralised Brockman iron formation. The orebody aquifer is usually well delineated by the extent of the high-grade ore (assumed high permeability), with a halo of lower grade ore (assumed moderate permeability) around it.

5.4.2 Topography and Surface Water Drainage

The site is located within the Whaleback Creek catchment. The main drainage features are the Whaleback Creek, and its southern tributary which drains the Western Ridge area (referred to as Southern Creek). The Whaleback Creek drains into the Fortescue River, upstream of Ethel Gorge. The Gorge is located downstream (north) of Ophthalmia Dam at the confluence of Homestead, Shovelanna, and Warrawandu Creeks, which merge within the Fortescue River and flow through the Ophthalmia Range in a northerly direction (BHP, 2020).

5.4.3 Aquifer

There are two main aquifer types (BHP, 2020):

- 1) The regional aquifers; which generally comprise weathered dolomite of the Paraburdoo Member of the Wittenoom Formation which occurs in sub-crop along the Whaleback and Southern Creek valleys.
- 2) The orebody aquifers; which comprise the mineralised Brockman Iron Formation that make up the Bill's Hill and Mount Helen orebodies and the mineralised Marra Mamba that make up Silver Knight and Eastern Syncline orebodies.

5.5 Groundwater Abstraction

Groundwater abstraction at the Western Ridge is currently regulated through the RiWI Act 5C License to Take Water GWL170659(3), which allows the annual abstraction of 45,000 kL/a to be used for exploration drilling operations as well as dust suppression for earthworks and construction purposes only (BHP, 2020).

In order to achieve progressive dewatering to allow mining below the water table, BHP is seeking to amend the 5C licence in the near future.

6.0 PREVIOUS LAND USE

Golder is of the understanding that the area has no known previous land use except for exploration activities and hydrogeological drilling purposes. This is supported by the available historical aerial photographs of the site (see Figures 3A - 3D), which did not indicate any major historical activities or infrastructures at the site.



Based on *pers comm. Andrew Cottrell (BHP hydrogeologist), April 2021*, the Afghan Springs pools were historically used for stock water purposes. There were previously some infrastructures in the area for keeping cattle, i.e., water tanks. Andrew also indicated that there has been a creek diversion, approximately 12 to 24 months ago, which can also be seen on the historical aerial photographs. He indicated that there is no known potentially contaminating activities or events reported at the Western Ridge site.

Golder considers that exploration and hydrogeological assessment activities have the potential to introduce contamination. However, the impacts are likely to be minimal and with groundwater levels considerably deep, contamination impacts to groundwater from site activities on and above ground are considered to be unlikely. It is important to note that the use of additives during drilling (i.e., drilling muds and/or glue for the PVC casing installation of the bores) may result in cross-contamination to the groundwater samples collected and give false positives with regards to PFAS and TRH in groundwater.

7.0 ANALYTICAL SCHEDULE

Groundwater samples collected were analysed for PFAS, which comprised the 28 PFAS suite with appropriate limit of reporting (LOR) for comparison against the 99% species protection level. In addition, groundwater samples were also analysed for TRH and benzene, toluene, ethylbenzene, xylenes, and naphthalene (BTEXN) analyses.

8.0 ASSESSMENT CRITERIA

A summary of the relevant groundwater assessment criteria is provided in Table 2.

Table 2: Groundwater Assessment Criteria

Potential Receptor	TRH, BTEXN	PFAS/PFOA
Human Health	ASC NEPM HSL-D*	PFAS National Environmental Management Plan (NEMP) 2.0 (2020) Human Health guideline
	DER (2014) Drinking Water Health Value**	values: - Drinking water quality guideline value**, and - Recreational water quality guideline value*
Ecological	ANZG (2018) Fresh Water 95%*	PFAS NEMP 2.0 (2020) Ecological water quality guideline values: - Freshwater 99% species protection – high conservation value system*, and - Freshwater 95% species protection – slightly to moderately disturbed system*

Note:

9.0 GROUNDWATER SAMPLING METHODOLOGY

The groundwater sampling was undertaken between 15 and 16 April 2021 by two Golder field personnel.

Groundwater samples were collected from three out of the six existing groundwater wells within the Afghan Springs area. These three wells, HXAN0004M, HXAN0007M, and HXAN0008M, were selected to assess the area laterally. While this baseline assessment is limited by the availability of existing bores, Golder considers that the locations of the bores selected are sufficient to provide a 'snapshot' of PFAS and TRH concentrations in groundwater at the site, which is the intention of this baseline assessment. Groundwater well construction logs are provided in Appendix A.

The groundwater monitoring wells were sampled using HDPE Hydrasleeves® (Super/SkinnySleeve). Prior to sampling, an electronic water level meter (BHP supplied 1550T2 BHP 200 m) was used to assess the standing water level (SWL). The SWL measurements are included in Appendix B.



^{*} Assessment criteria was selected based on the current and the intent future land use for the site. 99% species protection level for PFAS has also been adopted to account for potential bioaccumulation.

^{**} Assessment criteria was selected as the site is located within a Priority 1 drinking water catchment area.

In general, the HDPE Hydrasleeves® were set to target the well screen, at approximately 3 to 5 m below the groundwater level. For monitoring wells with well screen deeper than the groundwater level, the HDPE Hydrasleeves® were set at approximately 1 m below the top of the screen level. The HDPE Hydrasleeves® were then left for at least a 24-hour period where possible to allow the groundwater, within the well column, to stabilise. The HDPE Hydrasleeves® were then retrieved and the groundwater transferred directly into laboratory supplied bottles using Hydrasleeves® straws.

Groundwater field parameters (pH, reduction-oxygen potential (redox), conductivity, temperature, and dissolved oxygen (DO)) were measured using a calibrated YSI water quality meter (19L1002399) by placing the probes into a small aliquot of retrieved groundwater which was poured from the Hydrasleeves® into a container for measurement. Field groundwater monitoring sheets are provided in Appendix B. The YSI calibration certificate and daily bump checks are provided in Appendix C.

New nitrile gloves were worn while preparing the HDPE Hydrasleeves® for deployment and during retrieval. Samples were placed in laboratory supplied eskies and cooled with bags of ice (ice bricks were not used). Between each location, the water level meter was decontaminated with a Liquinox/water solution and deionised water, to reduce the potential of cross contamination.

Groundwater samples were dispatched under chain-of custody (CoC) procedures to ALS (primary laboratory) and Eurofins (secondary laboratory) which are both NATA-accredited laboratories. The CoCs and laboratory certificates are included in Appendix D.

9.1 Sampling Quality Assurance and Quality Control (QA/QC)

The following quality assurance control measures were undertaken during the sampling program:

- Field duplicate or triplicate samples were collected at a minimum rate of 20% (10% duplicates and 10% triplicates).
- Primary and duplicate samples were submitted to NATA-accredited laboratory ALS Environmental.
 Triplicate samples collected were submitted to an alternate NATA-accredited laboratory, Eurofins.
- Water samples were collected whilst wearing a new pair of disposable nitrile gloves for each sample.
- Samples collected were placed in laboratory-supplied bottles appropriate for the relevant analyte.
- No rinsate samples were collected as no non-dedicated sampling equipment was used.
- Trip blanks were submitted for analysis at a rate of one per esky.
- Samples collected in the field were placed in an esky with ice in bags (no ice bricks were used) and delivered to the NATA-accredited laboratories for analysis.

9.2 PFAS Sampling Considerations

Due to the widespread use of PFAS compounds in everyday items, the following considerations were implemented by field staff prior and during the collection of samples as per guidance provided by Department of Water and Environmental Regulation (DWER) *Interim Guideline on the Assessment and Management of Perfluoroalkyl and Polyfluoroalkyl Substances* (2017):

- 1) No new clothing, or clothing with rain or waterproof coatings/treated fabric.
- 2) No food or snack containers wrapped with non-compliant materials.
- 3) No Teflon® containing or coated field equipment.
- 4) No Teflon[®] lined lids on the laboratory supplied sample bottle.



5) No Decon or detergent decontamination solutions. Liquinox® was used for decontaminating equipment.

- 6) No ice bricks for sample storage.
- 7) No PFAS containing sun cream.

10.0 RESULTS

10.1 Groundwater Levels and Field Parameters

Groundwater monitoring wells were gauged using an electronic water level meter prior to sampling and groundwater parameters obtained from a sample aliquot using a YSI water quality meter. The depth to groundwater and bore installation details are summarised in Table 3 and the groundwater field parameters recorded of the sampled wells are presented in Table 4.

Table 3: Summary of Groundwater Levels (April 2021) and Borehole Details

Well ID	Depth to Groundwater (m btoc)	Top of PVC Pipe Survey Level (m AHD)	Groundwater Level (m AHD)	Top of Screened Interval (m AHD)	Base of Screened Interval (m AHD)	Drilled/ Installation Date
HXAN0003M	78.14	685.73	607.59	508.84	484.84	February 2021
HXAN0004M	48.85	685.72	636.87	624.86	612.86	February 2021
HXAN0005M	131.83	699.67	567.84	536.79	512.79	February 2021
HXAN0006M	83.86	699.83	615.97	632.79	614.79	February 2021
HXAN0007M	46.46	687.63	641.17	572.73	548.73	February 2021
HXAN0008M	44.62	687.54	642.92	632.73	614.73	February 2021

Notes: m btoc = metre below top of casing m bgl = metre below ground level

It is noted that the water level is above the screen interval for multiple wells. While having the well screen lower than the groundwater level is not ideal, given there is no known previous land use with the exception for exploration and hydrogeological assessment activities, light non-aqueous phase liquid (LNAPL) impacts in groundwater are not expected. Additionally, groundwater level is considerably deep and subsequently contamination impacts in groundwater from the minimalistic nature of the site activities are unlikely. Therefore, these selected wells are considered to be suitable for the baseline assessment purposes; however, for future environmental and contaminated sites assessment works, Golder recommends the installation of groundwater monitoring wells that meet the requirements as set out in the DWER and NEPM guidelines.

Table 4: Summary of Groundwater Field Parameters - April 2021

Well ID	рН	Temperature (°C)	Redox (mV)	DO (%)	Specific Conductivity (µS/cm at 25°C)	Notes
HXAN0004M	7.51	25.9	-119.9	1.43	1432	Sample was clear, no odour/sheen, low turbidity.
HXAN0007M	6.93	29.8	28.7	0.96	520	Sample was light brown, no odour/sheen, medium to high turbidity.
HXAN0008M	6.91	28.2	-104.7	1.85	604	Sample was cloudy pale grey, no odour/sheen, low turbidity.

10.2 Analytical Results

The following section summaries the laboratory analytical results. The results are presented in Tables A and B at the end of this report and the laboratory reports are displayed in Appendix D.



10.2.1 PFAS

PFAS was detected above laboratory LOR in one groundwater well, HXAN0008M. At the other locations sampled, PFAS was not detected above the LOR.

Concentrations above laboratory LORs are summarised in Table 5 below. No exceedance of adopted assessment criteria (where available) was reported.

Table 5: PFAS Concentrations above LOR

Analytes	Concentrations (μg/L)
HXAN0008M	
Perfluorooctanoic acid (PFOA)	0.0005
Perfluorodecanoic acid (PFDA)	0.0007
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	0.002
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	0.007
Sum of PFAS	0.0102

10.2.2 TRH

TRH was detected above laboratory LOR within samples obtained from two locations HXAN0007M and HXAN0008M. Toluene was also reported at HXAN0008M. TRH C₆-C₁₀ F1 was reported at HWSR0007M, but from the presence of compounds other than BTEX. Reported concentrations did not exceed relevant screening criteria and are summarised in Table 6.

Table 6: TRH Concentrations above LOR (mg/L)

Well ID	TRH C ₆ -C ₁₀ F1	TRH >C ₁₀ -C ₁₆ F2	TRH >C ₁₆ -C ₃₄ F3	TRH >C ₃₄ -C ₄₀ F4	Toluene
HXAN0007M	0.04	< 0.1	0.16	< 0.1	< 0.001
HXAN0008M	0.14	<0.1	<0.1	<0.1	0.007

10.2.3 Summary

While there is no known previous land use (except for exploration activities and hydrogeological drilling purposes), the results from this groundwater baseline assessment indicated that there are detections of PFAS, TRH, and toluene in groundwater at the site. It is noted that PFAS and TRH contamination have been reported within the groundwater at the Mount Whaleback mine site, located 2 km east of the site; however, Golder does not consider for these reported concentrations at the Western Ridge site to be related to those contaminations at the Mount Whaleback mine site.

It is considered likely that the reported PFAS, TRH and toluene concentrations are related to the drilling additives that were used during drilling and installation of the groundwater wells (i.e., drilling muds and/or glue for the PVC casing installation). This consideration is supported by the following:

- Sarah Stegena (BHP) indicated that the groundwater wells recently installed have not been developed. Given the low yield of the groundwater wells, it is likely that the additives used during drilling and installation are still present within the groundwater. These wells were drilled using reverse circulation (RC) drilling methodology and PVC casing were glued and screwed and were hung from the top of the bore to the correct depth in the drill hole with no annulus backfill.
- The reported contamination appeared only at the recently installed groundwater wells, as also shown in the results from the WRCS area within the Western Ridge site (Golder, 2021). Groundwater wells that were installed over a year ago did not report any detectable concentrations of PFAS, TRH, and toluene above laboratory LOR.



The chromatographs did not show the typical unresolved complex mixture (UCM) associated with refined petroleum hydrocarbon (diesel, petrol) impacts, which are the typical hydrocarbon contamination identified at a mine site, including at Mount Whaleback. Chromatographs are included as Appendix E.

■ Given the depth to groundwater at the site is relatively deep (>40 m bgl), it is unlikely for volatile compounds (i.e., toluene and TRH C₆-C₁₀) to leach to the groundwater from contamination events at surface.

Nevertheless, no exceedance of adopted assessment criteria was reported for any contaminants analysed as part of this groundwater baseline assessment.

11.0 QUALITY ASSURANCE/QUALITY CONTROL EVALUATION

The quality assurance/quality control (QA/QC) procedures adopted during this project are based on the ASC NEPM, DER 2014 guidelines (DER 2014), AS 4482.1 – 2005 (Standards Australia 2005), AS 4482.2 – 1999 (Standards Australia 1999), and PFAS NEMP (HEPA, 2020).

QA involves all the actions, procedures, checks, and decisions undertaken to ensure the representativeness and integrity of samples and accuracy and reliability of analytical results (ASC NEPM). QC involves protocols to monitor and measure the effectiveness of QA procedures.

The precision of the results for each analyte between the primary sample and the field duplicate/triplicate is determined by calculating the RPD. A quantitative measure of the accuracy of the analytical results reported is made by calculating the RPDs in accordance with the procedure described in AS 4482.1 – 2005 using the below calculation.

$$\% RPD = \left| \frac{A - B}{A + B} \right| \times 200$$

For the purposes of this assessment and in accordance with guidance in the NEPM 2013, an RPD less than or equal to 30% represents good correlation between laboratory results. Where the RPD is greater than 30% and the analytical results are less than five times the LOR, the precision and accuracy are also considered acceptable because the accuracy of laboratory analyses decreases as concentrations approach the LOR.

11.1 Fieldwork Program

RPD results are presented in Table C and trip blank results are presented in Table D at the end of this report. Field QA/QC procedures and compliance during the assessment are summarised in Table 7.

Table 7: Summary of Field QA/QC Compliance

QA/QC Element	Requirement	Requirement Adhered to?	Information/ Data Acceptable?
Equipment calibration	Where relevant, all field equipment is to be calibrated by the equipment supplier and certification provided	Yes (Appendix C)	Yes
Sampling methods	All sampling methods outlined in the methodology must be adhered to.	Yes	Yes
Record keeping	Detailed records of field activities were maintained with the use of daily record sheets, and quality control sample registers.	Yes	Yes
Chain of custody documentation	The CoC documentation was completed for each batch of samples, identifying the names of the samplers, the type of sample, the collection date and the analyses performed.	Yes	Yes
Sample labelling	Samples were properly labelled, showing reference number, sample ID, date of collection and sampler.	Yes	Yes



Requirement	Requirement Adhered to?	Information/ Data Acceptable?
Samples were collected in appropriate laboratory-supplied containers with suitable preservation methods (where required).	Yes	Yes
Samples were stored in a chilled, insulated container immediately after sampling and delivered to the laboratory with CoC documentation.	Yes	Yes (See Note 1)
No contamination of trip blanks reported.	Yes	Yes
Reusable field equipment (i.e. water level meter) were appropriately decontaminated using potable water and Liquinox® solution between each sampling location.	Yes	Yes
Duplicate and triplicate samples were collected for analysis by the primary and secondary laboratories, respectively (at a frequency of at least one pair per 10 samples).	Yes	Yes
Relative percent difference (RPD) assessment to adhere to the following protocols: 1-5 × laboratory LOR: no limit;	Yes	Yes
	Samples were collected in appropriate laboratory-supplied containers with suitable preservation methods (where required). Samples were stored in a chilled, insulated container immediately after sampling and delivered to the laboratory with CoC documentation. No contamination of trip blanks reported. Reusable field equipment (i.e. water level meter) were appropriately decontaminated using potable water and Liquinox® solution between each sampling location. Duplicate and triplicate samples were collected for analysis by the primary and secondary laboratories, respectively (at a frequency of at least one pair per 10 samples). Relative percent difference (RPD) assessment to adhere to the following protocols:	Samples were collected in appropriate laboratory-supplied containers with suitable preservation methods (where required). Samples were stored in a chilled, insulated container immediately after sampling and delivered to the laboratory with CoC documentation. No contamination of trip blanks reported. Reusable field equipment (i.e. water level meter) were appropriately decontaminated using potable water and Liquinox® solution between each sampling location. Duplicate and triplicate samples were collected for analysis by the primary and secondary laboratories, respectively (at a frequency of at least one pair per 10 samples). Relative percent difference (RPD) assessment to adhere to the following protocols: 1-5 × laboratory LOR: no limit;

Note 1: Samples were all sent in an insulated container (esky) on ice. However, the ideal temperature could not be maintained throughout transport and elevated temperature inside the esky was noted upon receipt by the laboratory. The temperature of samples on arrival at the laboratory was reported at 21.9°C. This elevated temperature was associated with the remote nature of the site and the heat experienced by the site conditions in the Pilbara which may affect the results.

11.2 Laboratory Quality Data Assessment

All samples were submitted to NATA-accredited laboratories in Perth for laboratory analysis. Laboratory QA/QC analysis were reviewed to assess data integrity and confirm reliability of the analytical data. Laboratory QA/QC analysis results were compared to laboratory acceptance criteria.

11.2.1 Holding Time

No analysis holding time outliers were reported.

11.2.2 Laboratory Control Spike

No laboratory control outliers were reported.

11.2.3 Surrogates

No surrogate recovery outliers were reported.

11.2.4 Matrix Spikes

No matrix spike outliers were reported.

11.2.5 Duplicates

No duplicate outliers were reported.

11.2.6 Method Blanks

No method blank value outliers were reported.

11.2.7 Laboratory QC Sample Frequency

Laboratory QC samples frequency outliers were reported for laboratory duplicates for PFAS analysis. Only one laboratory duplicate sample was analysed out of 13 primary samples (7.69%), which did not meet the 10% target. Note that samples not collected by Golder were included in the frequency rate calculation. The one laboratory duplicate analysed was collected by Golder and the 10% target criteria would have been met if no other non-Golder samples included in the frequency rate calculation.



As stated in Section 11.2.5, no duplicate outliers were reported in this duplicate sample; therefore, these laboratory QC sample frequency outliers are not considered to have significant impact on the overall data quality or outcome of the investigation.

11.3 Summary

A review of the field and laboratory QA/QC data and procedures confirms an acceptable level of compliance with the general requirements and DQOs. As such, there is an acceptable level of confidence in the data upon which the conclusions in this report have been made.

12.0 CONCLUSIONS AND RECOMMENDATIONS

12.1 Conclusions

The following conclusions are drawn from the data obtained during the baseline assessment:

- The results from this groundwater baseline assessment indicated that there are detections of PFAS, TRH, and toluene in groundwater at the site. It is considered likely that the reported PFAS, TRH, and toluene concentrations are related to the drilling additives that were used during drilling and installation of the groundwater wells (i.e., drilling muds and/or glue for the PVC casing installation).
- The reported contamination appeared only at the recently installed groundwater wells. Groundwater wells that were installed over a year ago were not reported with any detectable concentrations of PFAS, TRH, and toluene above laboratory LOR.
- No exceedance of adopted assessment criteria was reported for any contaminants analysed as part of this groundwater baseline assessment.

12.2 Recommendations

It is considered that the site is suitable to be developed for active mining from contaminated sites perspective.

It is recommended to develop and resample groundwater wells with PFAS, TRH, and toluene detections to confirm the presence of these contaminants prior to development.

13.0 IMPORTANT INFORMATION

Your attention is drawn to the document titled – "Important Information Relating to this Report", which is included in Appendix F of this report. The statements presented in that document are intended to inform a reader of the report about its proper use. There are important limitations as to who can use the report and how it can be used. It is important that a reader of the report understands and has realistic expectations about those matters. The Important Information document does not alter the obligations Golder has under the contract between it and its client.

14.0 CLOSING

Should you have any queries concerning this report, please do not hesitate to contact the under-signed.

15.0 REFERENCES

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Signature Page

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Table A: Western Ridge – Afghan Springs Groundwater PFAS Analytical Results

														Per- and p	olvfluoroa	lkvl substa	ances (PFA	(S)													
	চিণীuorodecane sulfonic acid (PFDS)	는 N-Methyl PFO sulfonamidoethanol (MeFOSE)	N-methyl-PFO sulfonamidoacetic acid (MeFOSAA)	호 Perfluorooctanoic Acid (PFOA)	는 Perfluorooctane sulfonic acid (PFOS)	E Perfluorohexane sulfonic acid (PFHxS)	Sum of PFHxS and PFOS (lab reported)	를 Sum of WA DER PFAS (n=10)	5 Sum of PFASs (n=28 - Lab Reported)	호 Perfluorobutanoic acid (PFBA)	는 Perfluorohexanoic acid (PFHxA)	र्के Perfluoroheptanoic acid (PFHpA)	କୁ Perfluorodecanoic acid (PFDA)	는 Perfluoropentanoic acid (PFPeA)	호 Perfluorononanoic acid (PFNA)	는 Perfluorotetradecanoic acid (PFTeDA)	E Perfluorotridecanoic acid (PFTrDA)	☐ ☐ Perfluorododecanoic acid (PFDoDA)	E Perfluoroundecanoic acid (PFUnDA)	후 Perfluoroheptane sulfonic acid (PFHpS)	후 Perfluoropentane sulfonic acid (PFPeS)	돌 Perfluorobutane sulfonic acid (PFBS)	돌 4:2 Fluorotelomer sulfonic acid (4:2 FTSA)	6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	© 8.2 Fluorotelomer sulfonic acid (8:2 FTSA)	के 10:2 Fluorotelomer sulfonic acid (10:2 FTSA)	हें N-Ethyl PFO sulfonamide (EtFOSA)	ને N-Ethyl PFO sulfonamidoethanol (EtFOSE)	n-Methyl PFO sulfonamide (MeFOSA)	कि Perfluorooctane sulfonamide (FOSA)	스 N-ethyl-PFO sulfonamidoacetic acid (EtFOSAA)
LOR	0.0005	0.001	0.0005	0.0005		0.0005	0.0002	0.0002	0.0002	0.002	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0005	0.0005
PFAS NEMP 2.0 2020 95% Eco Fresh Water				220	0.13																										
PFAS NEMP 2.0 2020 99% Eco Fresh Water					0.00023																										
PFAS NEMP 2.0 2020 Drinking Water				0.56	0.07	0.07	0.07																								
PEAS NEMP 2 0 2020 Recreational Water				10	2	2	2																								

Site ID	Location	Sampled Date	Lab Report																															
Afghan Springs	HXAN0004M	16/04/2021	EP2104242	<0.0005	<0.001	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005
Afghan Springs	HXAN0007M	16/04/2021	EP2104242	<0.0005	<0.001	<0.0005	<0.0005	<0.0002	<0.0005	<0.0002	<0.0002	<0.0002	<0.002	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0005 <	<0.0005
Afghan Springs	HXAN0008M	16/04/2021	EP2104242	<0.0005	<0.001	<0.0005	0.0005	<0.0002	<0.0005	<0.0002	0.0095	0.0102	<0.002	<0.0005	<0.0005	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.001	0.002	0.007	<0.001	<0.001	<0.001	<0.001	<0.0005	<0.0005



Table B: Western Ridge – Afghan Springs Groundwater Organic Analytical Results

		MAH						PAH	Total Recoverable Hydrocarbons											
	Вептепе	Toluene	Ethylbenzene	Xylenes (m & p)	Xylene (o)	Xylenes (Sum of total) (Lab Reported)	Total BTEX	Naphthalene	TRH C ₆ -C ₉ Fraction	TRH C ₁₀ -C ₁₄ Fraction	TRH C ₁₆ -C ₂₈ Fraction	TRH C ₂₉ -C ₃₆ Fraction	TRH+C ₁₀ ·C ₃₆ (Sum of total) (Lab Reported)	TRH+C ₁₀ -C ₄₀ (Sum of total) (Lab Reported)	TRH C ₆ -C ₁₀ Fraction F1	TRH C _e -C ₁₀ Fraction Less BTEX F1	TRH >C, ₁₀ -C, ₁₆ Fraction F2	TRH >C ₁₀ -C ₁₆ Fraction Less Naphthalene F2	TRH >C ₁₆ -C ₃₄ Fraction F3	TRH >C ₃₄ -C ₄₀ Fraction F4
LOD	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR	0.0010		0.002	0.002	0.002	0.002	0.001	0.005	0.02	0.05	0.1	0.05	0.05	0.1	0.02	0.02	0.1	0.1	0.1	0.1
DER (2014) Drinking Water Health Value	0.001	0.8	0.3		0.35	0.6		0.016												
ANZG (2018) Freshwater 95%	0.95				0.35			0.016												
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand																				
2-4m	5	NL	NL			NL		NL								6		NL		
4-8m	5	NL	NL			NL		NL								6		NL		
>8m	5	NL	NL			NL		NL								7		NL		

Site ID	Location	Sampled Date	Lab Report																				
Afghan Springs -21464272	HXAN0004M	16/04/2021	EP2104242	< 0.001	<0.002	< 0.002	<0.002	< 0.002	<0.002	<0.001	<0.005	<0.02	<0.05	<0.1	<0.05	< 0.05	<0.1	< 0.02	< 0.02	< 0.1	< 0.1	<0.1	<0.1
Afghan Springs -21464272	HXAN0007M	16/04/2021	EP2104242	< 0.001	<0.002	< 0.002	<0.002	<0.002	<0.002	<0.001	<0.005	0.04	<0.05	<0.1	0.1	0.1	0.16	0.04	0.04	<0.1	< 0.1	0.16	<0.1
Afghan Springs -21464272	HXAN0008M	16/04/2021	EP2104242	< 0.001	0.007	< 0.002	< 0.002	< 0.002	<0.002	0.007	< 0.005	0.15	< 0.05	< 0.1	< 0.05	< 0.05	< 0.1	0.14	0.13	< 0.1	< 0.1	<0.1	<0.1

Note: NL indicates the HSL is not limiting



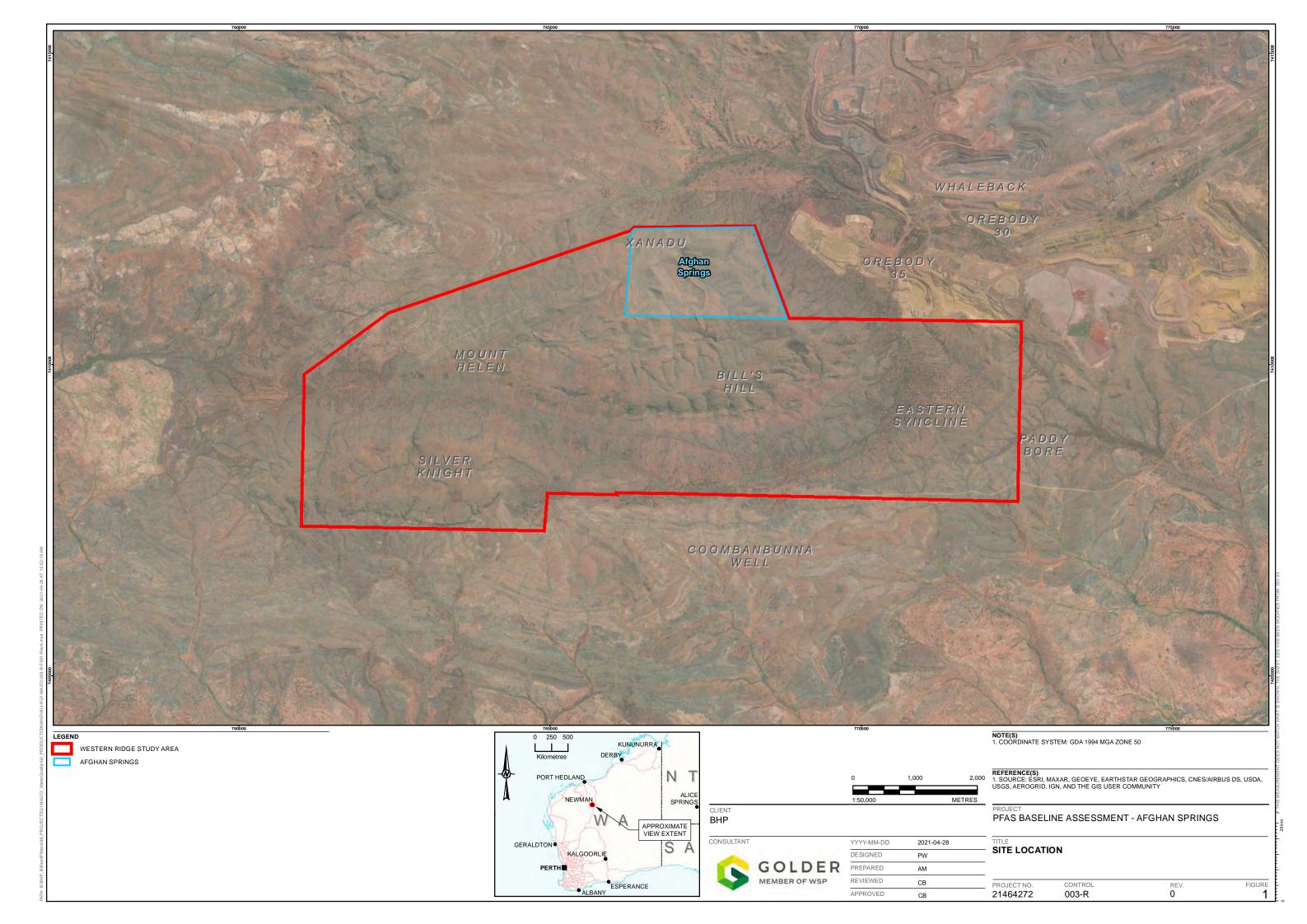
	≥30% and one or more values ≥5 × LOR RPD ≥30% and both values <5 × LOR RPD ≥30% due to differing LORs		Lab Report Number Field ID Sample Type Sampled Date/Time	EP2104242 HXAN0004M Primary	EP2104242 FD02 Duplicate	RPD	EP2104242 HXAN0007M Primary	789501 HYAN0007M/59160421 Triplicate 4/16/2021 11:30	RPD
Chemical Group	Chemical Name	Units	LOR						Т
	Perfluorodecane sulfonic acid (PFDS)	μg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	<0.001	<30
	N-Methyl PFO sulfonamidoethanol (MeFOSE)	μg/L	0.001 : 0.005 (Interlab)	< 0.001	< 0.001	<30	< 0.001	< 0.005	<30
	N-methyl-PFO sulfonamidoacetic acid (MeFOSAA)	μg/L	0.0005 : 0.005 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.005	<30
	Perfluorooctanoic Acid (PFOA)	μg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.001	<30
	Perfluorooctane sulfonic acid (PFOS)	μg/L	0.0002 : 0.001 (Interlab)	< 0.0002	< 0.0002	<30	< 0.0002	< 0.001	<30
	Perfluorohexane sulfonic acid (PFHxS)	μg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.001	<30
	Sum of PFHxS and PFOS (lab reported)	μg/L	0.0002 : 0.001 (Interlab)	< 0.0002	< 0.0002	<30	< 0.0002	< 0.001	<30
	Sum of WA DER PFAS (n=10)	μg/L	0.0002 : 0.005 (Interlab)	< 0.0002	< 0.0002	<30	< 0.0002	< 0.005	<30
	Sum of PFASs (n=28 - Lab Reported)	μg/L	0.0002 : 0.005 (Interlab)	< 0.0002	< 0.0002	<30	< 0.0002	< 0.005	<30
	Perfluorobutanoic acid (PFBA)	μg/L	0.002 : 0.005 (Interlab)	< 0.002	< 0.002	<30	< 0.002	< 0.005	<30
	Perfluorohexanoic acid (PFHxA)	μg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.001	<30
	Perfluoroheptanoic acid (PFHpA)	μg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.001	<30
	Perfluorodecanoic acid (PFDA)	μg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.001	<30
	Perfluoropentanoic acid (PFPeA)	μg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.001	<30
Per- and	Perfluorononanoic acid (PFNA)	μg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.001	<30
polyfluoroalkyl	Perfluorotetradecanoic acid (PFTeDA)	μg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.001	<30
substances (PFAS)	Perfluorotridecanoic acid (PFTrDA)	μg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.001	<30
	Perfluorododecanoic acid (PFDoDA)	μg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.001	<30
	Perfluoroundecanoic acid (PFUnDA)	μg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.001	<30
	Perfluoroheptane sulfonic acid (PFHpS)	μg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.001	<30
	Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.001	<30
	Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005 : 0.001 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.001	<30
	4:2 Fluorotelomer sulfonic acid (4:2 FTSA)	µg/L	0.001	< 0.001	< 0.001	<30	< 0.001	< 0.001	<30
	6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	μg/L	0.001 : 0.005 (Interlab)	< 0.001	< 0.001	<30	< 0.001	< 0.005	<30
	8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	μg/L	0.001	< 0.001	< 0.001	<30	< 0.001	< 0.001	<30
	10:2 Fluorotelomer sulfonic acid (10:2 FTSA)	μg/L	0.001	< 0.001	< 0.001	<30	< 0.001	< 0.001	<30
	N-Ethyl PFO sulfonamide (EtFOSA)	µg/L	0.001 : 0.005 (Interlab)	< 0.001	< 0.001	<30	< 0.001	< 0.005	<30
	N-Ethyl PFO sulfonamidoethanol (EtFOSE)	µg/L	0.001 : 0.005 (Interlab)	< 0.001	< 0.001	<30	< 0.001	< 0.005	<30
	N-Methyl PFO sulfonamide (MeFOSA)	µg/L	0.001 : 0.005 (Interlab)	< 0.001	< 0.001	<30	< 0.001	< 0.005	<30
	Perfluorooctane sulfonamide (FOSA)	μg/L	0.0005 : 0.005 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.005	<30
	N-ethyl-PFO sulfonamidoacetic acid (EtFOSAA)	μg/L	0.0005 : 0.005 (Interlab)	< 0.0005	< 0.0005	<30	< 0.0005	< 0.005	<30
	Benzene	mg/l	0.001	< 0.001	< 0.001	<30	< 0.001	N/A	-
	Toluene	mg/l	0.002	<0.002	<0.002	<30	<0.002	N/A	_
	Ethylbenzene	mg/l	0.002	<0.002	<0.002	<30	<0.002	N/A	_
MAH	Xylenes (m & p)	mg/l	0.002	<0.002	<0.002	<30	<0.002	N/A	-
	Xylene (o)	mg/l	0.002	<0.002	<0.002	<30	<0.002	N/A	-
	Xylenes (Sum of total) (Lab Reported)	mg/l	0.002	<0.002	<0.002	<30	<0.002	N/A	T -
	Total BTEX	mg/l	0.001	<0.001	< 0.001	<30	<0.001	N/A	-
PAH	Naphthalene	mg/l	0.005 : 0.01 (Interlab)	<0.005	< 0.005	<30	<0.005	<0.01	<30
	TRH C6 - C9 Fraction	mg/l	0.02	<0.02	<0.02	<30	0.04	0.06	40
	TRH C10 - C14 Fraction	mg/l	0.05	< 0.05	< 0.05	<30	<0.05	<0.05	<30
	TRH C15 - C28 Fraction	mg/l	0.1	<0.1	< 0.1	<30	<0.1	0.3	143
	TRH C29 - C36 Fraction	mg/l	0.05 : 0.1 (Interlab)	<0.05	<0.05	<30	0.1	<0.1	67
	TRH+C10 - C36 (Sum of total) (Lab Reported)	mg/l	0.05 : 0.1 (Interlab)	< 0.05	<0.05	<30	0.1	0.25	86
Total Recoverable	TRH+C10 - C40 (Sum of total) (Lab Reported)	mg/l	0.1 (internal)	<0.1	<0.1	<30	0.16	0.36	77
Hydrocarbons	TRH C6 - C10 Fraction F1	mg/l	0.02	<0.02	<0.02	<30	0.04	0.06	40
,	TRH C6 - C10 Fraction Less BTEX F1	mg/l	0.02	<0.02	<0.02	<30	0.04	0.06	40
	TRH >C10 - C16 Fraction F2	mg/l	0.1 : 0.05 (Interlab)	<0.1	<0.02	<30	<0.1	0.06	18
	TRH >C10 - C16 Fraction F2 TRH >C10 - C16 Fraction Less Naphthalene F2	mg/l	0.1 : 0.05 (Interlab)	<0.1	<0.1	<30	<0.1	0.06	18
	TRH >C16 - C34 Fraction F3	mg/l	0.1 . 0.05 (Interiab)	<0.1	<0.1	<30	0.16	0.3	61
	TRH >C34 - C40 Fraction F4	mg/l	0.1	<0.1	<0.1	<30	<0.1	<0.1	<30

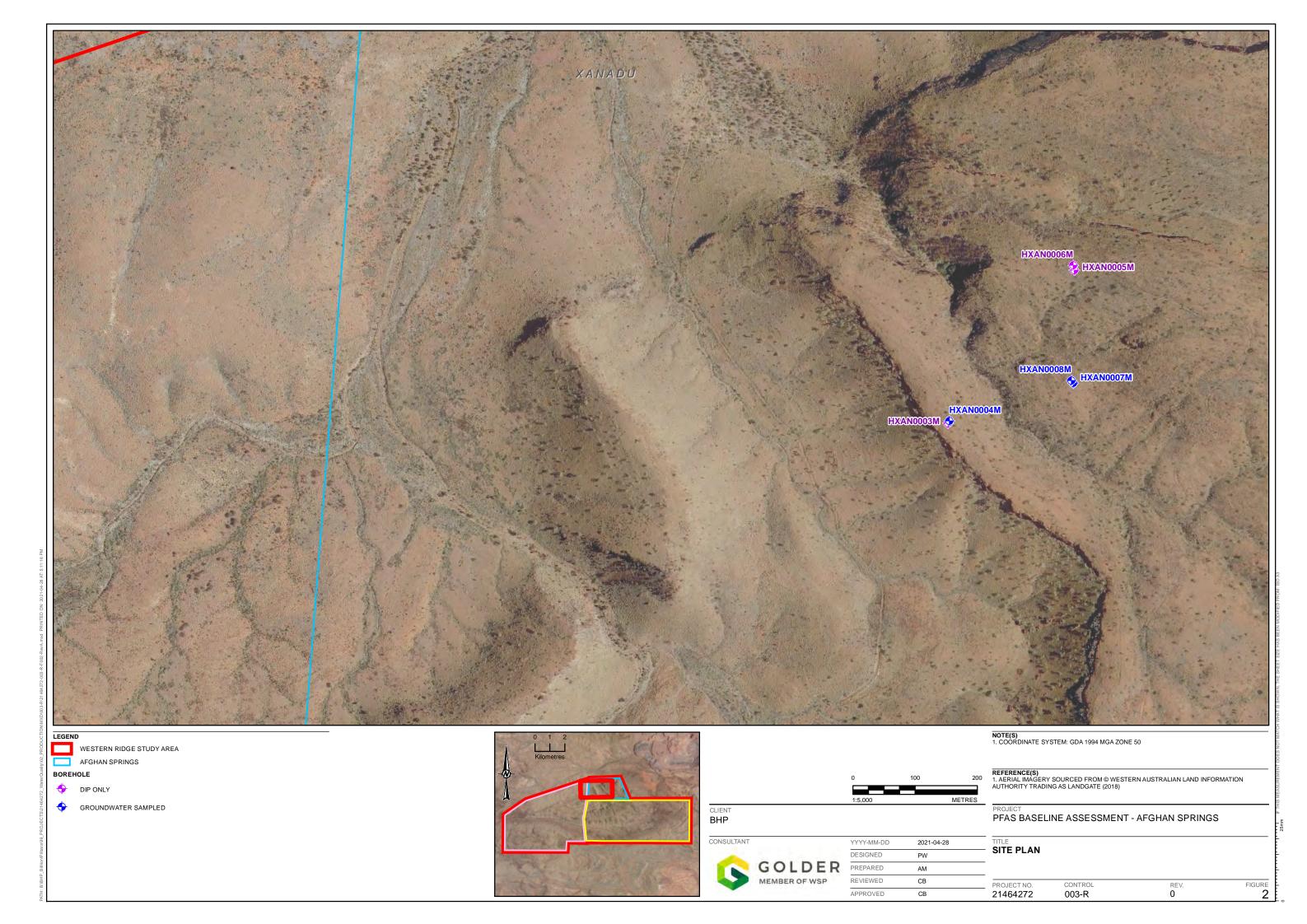
Note: N/A = not analysed

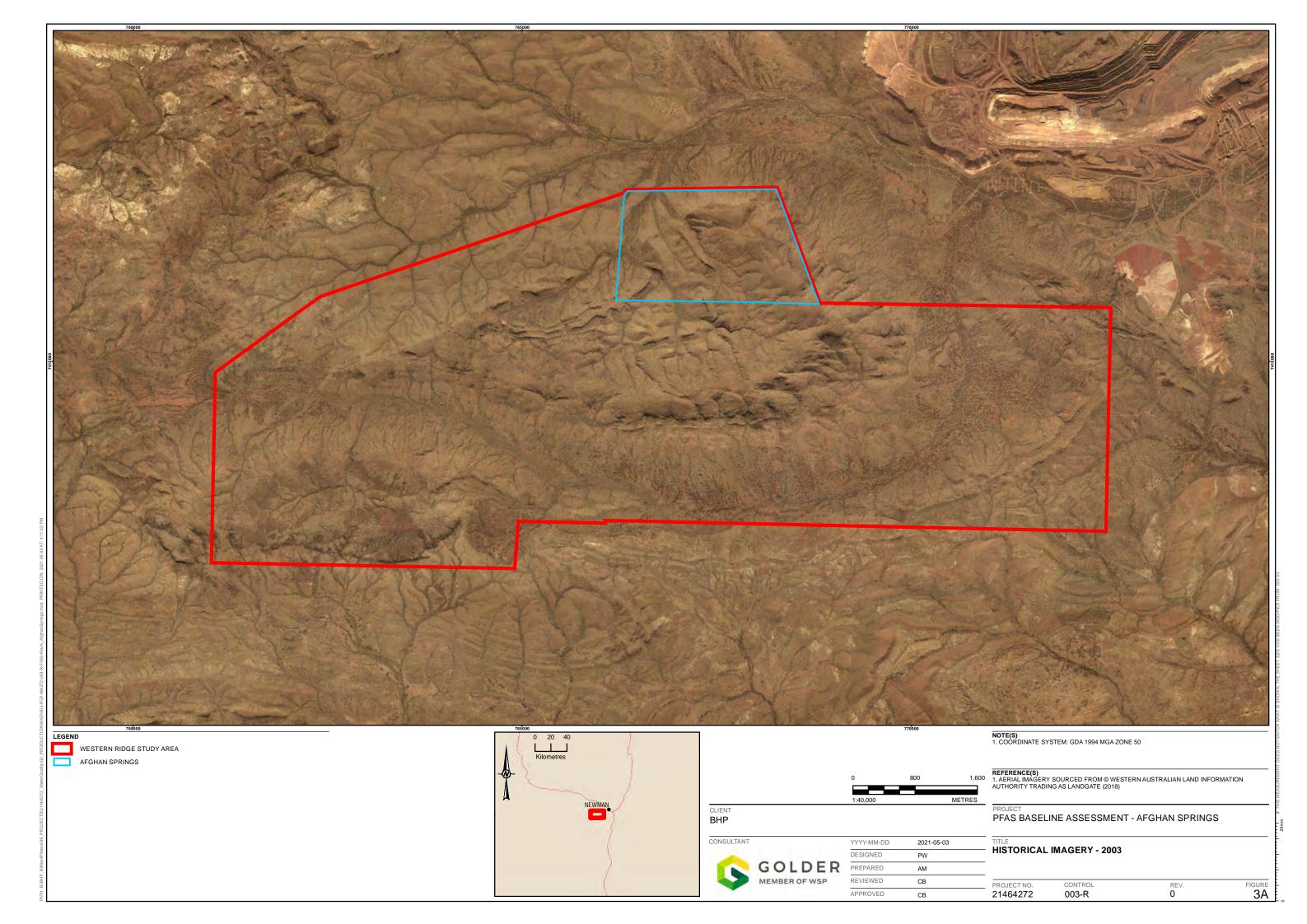


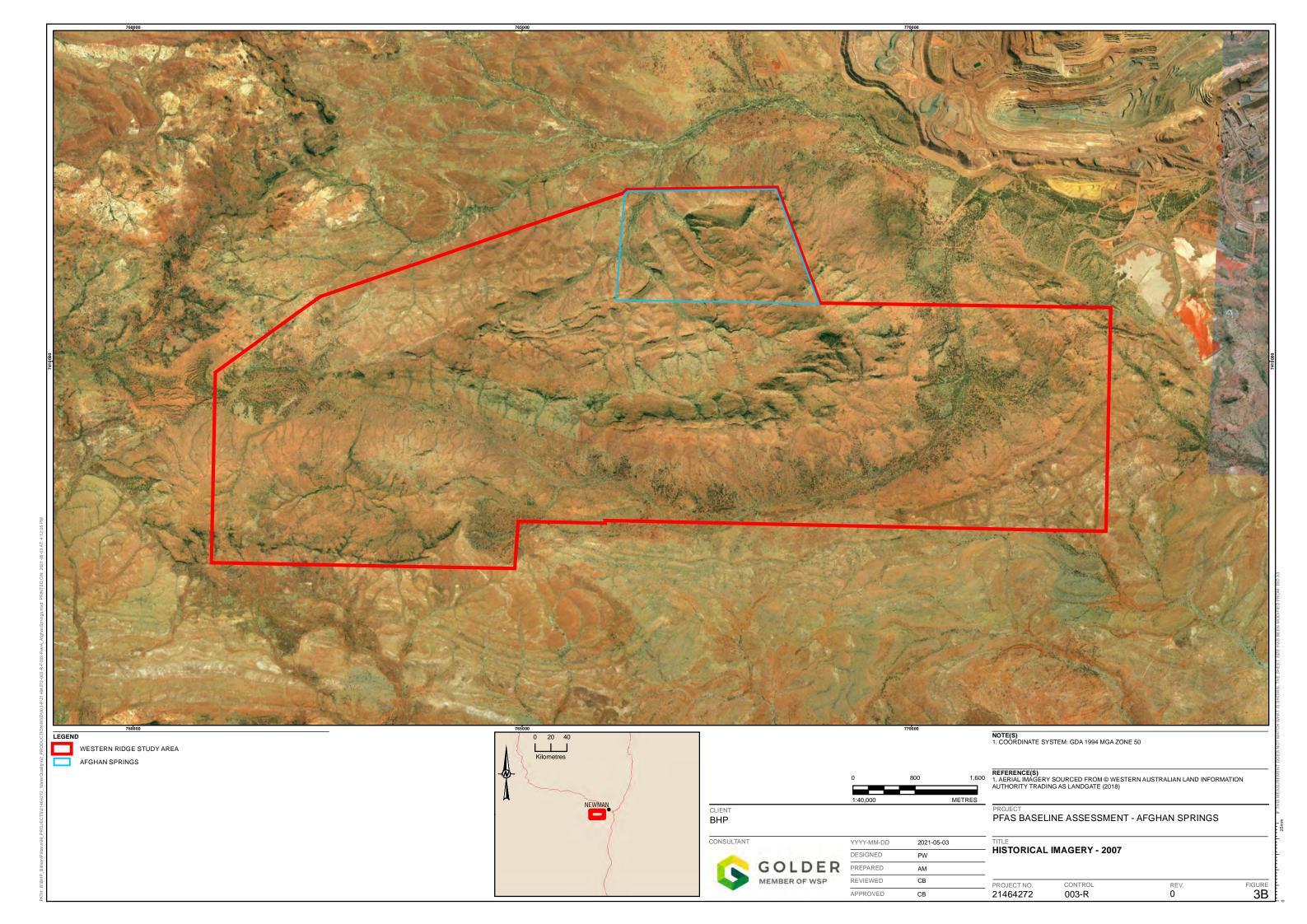
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Field ID	TB320	TBW325
Sampled Date/Time	#######################################	##################
Sample Type	Trip Blank	Trip Blank

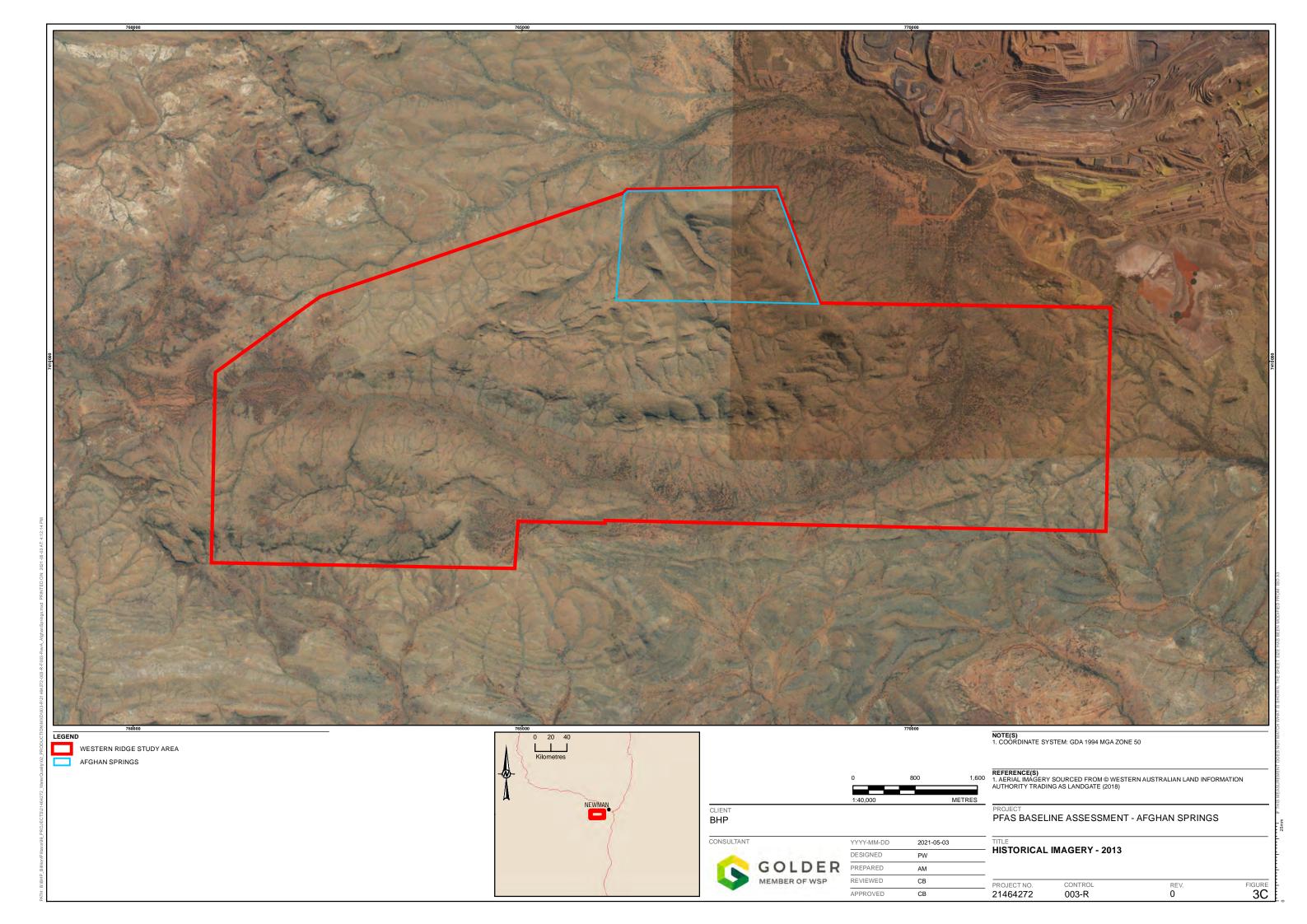
Chemical Group	Chemical Name	Units	LOR		
	Benzene	mg/L	0.001	< 0.001	
	Toluene	mg/L	0.002	< 0.002	
	Ethylbenzene	mg/L	0.002	< 0.002	
MAH	Xylenes (m & p)	mg/L	0.002	< 0.002	
	Xylene (o)	mg/L	0.002	< 0.002	
	Xylenes (Sum of total) (Lab Reported)	mg/L	0.002	< 0.002	
	Total BTEX	mg/L	0.001	< 0.001	
PAH	Naphthalene	mg/L	0.005	< 0.005	
	TRH C ₆ -C ₉ Fraction	mg/L	0.02	< 0.02	
Total Recoverable Hydrocarbons	TRH C ₆ -C ₁₀ Fraction F1	mg/L	0.02	< 0.02	
nyurocarbons	TRH C ₆ -C ₁₀ Fraction Less BTEX F1	mg/L	0.02	< 0.02	
	Perfluorodecane sulfonic acid (PFDS)	μg/L	0.0005		< 0.0005
	N-Methyl PFO sulfonamidoethanol (MeFOSE)	μg/L	0.001		< 0.001
	N-methyl-PFO sulfonamidoacetic acid (MeFOSAA)	μg/L	0.0005		< 0.0005
	Perfluorooctanoic Acid (PFOA)	μg/L	0.0005		< 0.0005
	Perfluorooctane sulfonic acid (PFOS)	ua/L	0.0002		< 0.0002
	Perfluorohexane sulfonic acid (PFHxS)	μg/L	0.0005		< 0.0005
	Sum of PFHxS and PFOS (lab reported)	μg/L	0.0002		< 0.0002
	Sum of WA DER PFAS (n=10)	μg/L	0.0002		< 0.0002
	Sum of PFASs (n=28 - Lab Reported)	μg/L	0.0002		< 0.0002
	Perfluorobutanoic acid (PFBA)	μg/L	0.002		< 0.002
	Perfluorohexanoic acid (PFHxA)	μg/L	0.0005		< 0.0005
	Perfluoroheptanoic acid (PFHpA)	μg/L	0.0005		< 0.0005
	Perfluorodecanoic acid (PFDA)	μg/L	0.0005		< 0.0005
	Perfluoropentanoic acid (PFPeA)	μg/L	0.0005		< 0.0005
Per- and	Perfluorononanoic acid (PFNA)	μg/L	0.0005		< 0.0005
polyfluoroalkyl	Perfluorotetradecanoic acid (PFTeDA)	ua/L	0.0005		< 0.0005
substances (PFAS)	Perfluorotridecanoic acid (PFTrDA)	μg/L	0.0005		< 0.0005
,	Perfluorododecanoic acid (PFDoDA)	μg/L	0.0005		< 0.0005
	Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005		< 0.0005
	Perfluoroheptane sulfonic acid (PFHpS)	μg/L	0.0005		< 0.0005
	Perfluoropentane sulfonic acid (PFPeS)	μg/L	0.0005		< 0.0005
	Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005		<0.0005
	4:2 Fluorotelomer sulfonic acid (4:2 FTSA)	ua/L	0.001		< 0.001
	6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	μg/L	0.001		< 0.001
	8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	ua/L	0.001	İ	<0.001
	10:2 Fluorotelomer sulfonic acid (10:2 FTSA)	ua/L	0.001		<0.001
	N-Ethyl PFO sulfonamide (EtFOSA)	µg/L	0.001	İ	<0.001
	N-Ethyl PFO sulfonamidoethanol (EtFOSE)	μg/L	0.001	İ	<0.001
	N-Methyl PFO sulfonamide (MeFOSA)	µg/L	0.001		<0.001
	Perfluorooctane sulfonamide (FOSA)	μg/L	0.0005	İ	<0.0005
	N-ethyl-PFO sulfonamidoacetic acid (EtFOSAA)	μg/L	0.0005		<0.0005

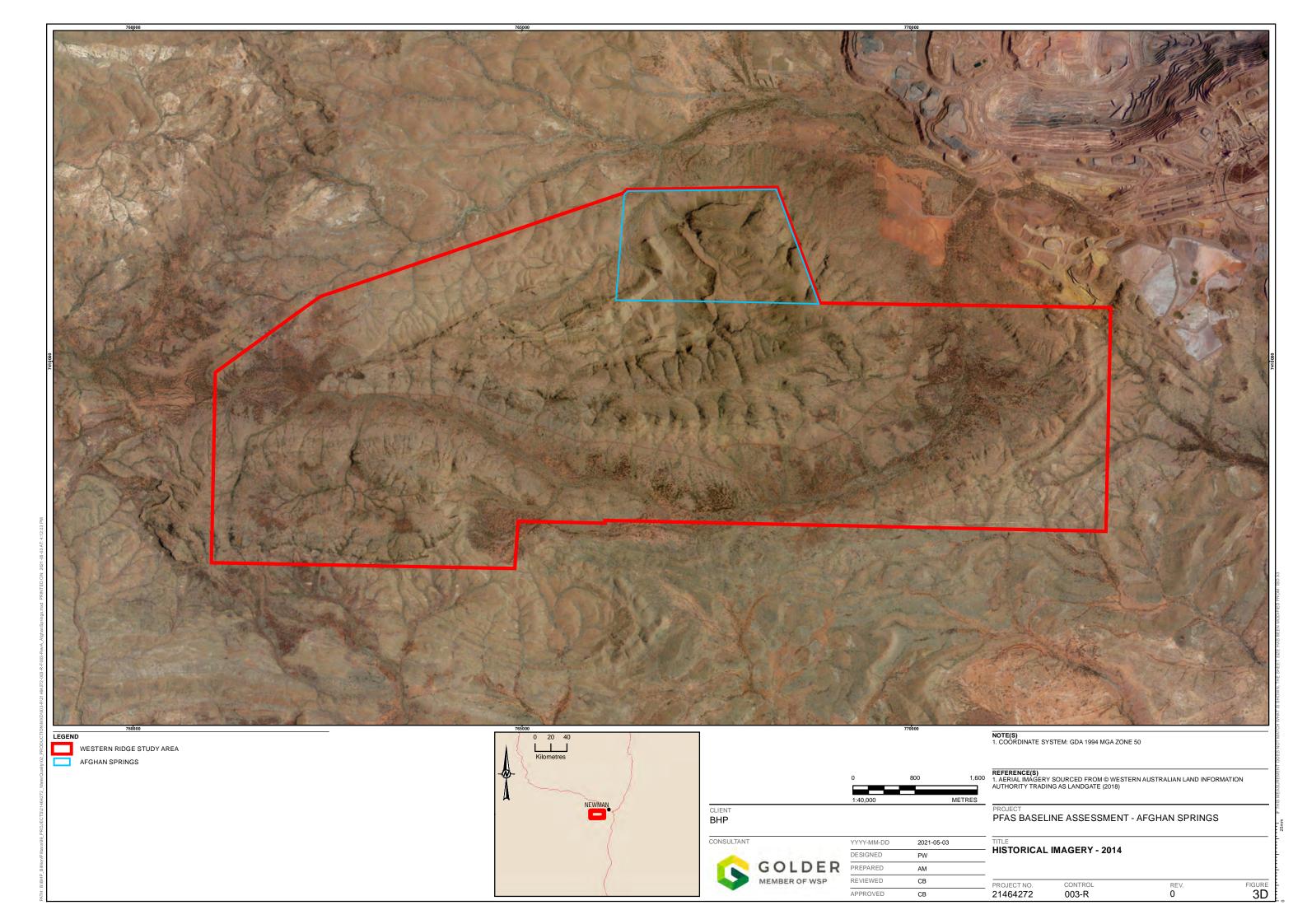












APPENDIX A

Well Construction Logs



BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: **HXAN0003** Hole Length: 200.00 Depth Drill Rig Fluid Drilled By Logged By 767237.14 Type Size Easting: 0.0 - 200.0 WLSRC50 WLS СН 150 VL2 7411402.89 Northing: Surface RL: 684.84 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 23 Feb 21 - 23 Feb 21 Comments: Frontier piezo 99.82 MBTOC TOC RL: 685.73 (Stickup 0.89m) (drilled) (24 Feb 21) Final pH: SWL: Dev: Ν TOC RL: 685.73 (Stickup 0.89m) (current) Final EC: Is Live: Υ (-) Date: mgbl Gamma Hydrogeological Major EC Yield рΗ Diagram Notes Scaled to 400mm CPS API Description Casing size as ID us/cm L/s SC AB FOAM (0.00-2.00) SHALE, (J6), Greyish Yellow, J Moderately Weathered, Medium 51mm BLANK PVC Strong Rock. Brown chert and (0.00-2.40)51mm BLANK PVC shales, some micro banded unmineralised BIF, minor white (0.00-176.00)shale and clays at 10m, heavily weathered/leached 10 SHALE, (J6), Brownish Red, SJ CK Slightly Weathered, Medium Strong Rock. Reddish brown shale and BIF with minor chert, larger chips with red staining on 20 fracture planes, broken ground. Κ UNMINERALISED BIF, (J6), Brownish Red, Moderately Weathered, Strong Rock. Reddish brown BIF with micro bands Minor shales and trace clay. 9 larger chips with brown staining and clay on fracture planes, broken ground. potential flow zone UNMINERALISED BIF, (J6), SNJ QC Greyish Dark or Black, Fresh, 30 Strong Rock. Dark grey/blue magnetite with minor red BIF bands at 98m and dark grey crystalline chert band at 104m trace quartz, hard competent ground, poor aquifer zone. Manganese leaching 40 0-5000 0-14 0-40 100 200 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0003 Page: 1

BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: **HXAN0003** Hole Length: 200.00 Fluid Depth Drill Rig Size Drilled By Logged By 767237.14 Type Easting: 0.0 - 200.0 WLSRC50 150 WLS VL2 СН Northing: 7411402.89 Surface RL: 684.84 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 23 Feb 21 - 23 Feb 21 Comments: Frontier piezo (24 Feb 21) TOC RL: 685.73 (Stickup 0.89m) (drilled) SWL: 99.82 MBTOC Dev: Ν Final pH: TOC RL: 685.73 (Stickup 0.89m) (current) Date: Final EC: Is Live: Y (-) mgbl Gamma Hydrogeological Major EC Yield Diagram рΗ Notes Scaled to 400mm CPS API Casing size as ID Description us/cm L/s 51mm BLANK PVC UNMINERALISED BIF, (J6), Μ SNJ QC Greyish Dark or Black, Fresh, (0.00-176.00)Strong Rock. Dark grey/blue magnetite with minor red BIF bands at 98m and dark grey crystalline chert band at 104m trace quartz, hard competent ground, poor aquifer zone. Manganese leaching 60 70 96 80 90 0-5000 0-14 0-40 100 200 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0003 Page: 2

BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: **HXAN0003** Hole Length: 200.00 Drill Rig Depth Size Fluid Drilled By Logged By 767237.14 Type Easting: 0.0 - 200.0 WLSRC50 150 WLS VL2 СН Northing: 7411402.89 Surface RL: 684.84 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 23 Feb 21 - 23 Feb 21 Comments: Frontier piezo TOC RL: 685.73 (Stickup 0.89m) (drilled) SWL: 99.82 MBTOC (24 Feb 21) Final pH: Dev: Ν TOC RL: 685.73 (Stickup 0.89m) (current) Final EC: Is Live: Υ (-) Date: Idgm Hydrogeological Gamma Major EC Yield Diagram рΗ Notes Scaled to 400mm CPS API Casing size as ID Description us/cm L/s 100 Μ SNJ QC UNMINERALISED BIF, (J6), 51mm BLANK PVC Greyish Dark or Black, Fresh, (0.00-176.00)Strong Rock. Dark grey/blue magnetite with minor red BIF bands at 98m and dark grey crystalline chert band at 104m trace quartz, hard competent ground, poor aquifer zone. Manganese leaching 110 120 9 130 М Ν UNMINERALISED BIF, (J6), Greyish Dark or Black, Fresh, Medium Strong Rock. Dark grey/ blue magnetite with minor red BIF/chert bands and quartz 140 veining below 154m, minor carbonate material. Fresh, hard rock wihth smaller consistant chips, poor aquifer zone. 0-5000 0-14 0-40 100 200 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0003 Page: 3

BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: **HXAN0003** Hole Length: 200.00 Depth Drill Rig Size Fluid Drilled By Logged By 767237.14 Type Easting: 0.0 - 200.0 WLSRC50 WLS СН 150 VL2 7411402.89 Northing: Surface RL: 684.84 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 23 Feb 21 - 23 Feb 21 Comments: Frontier piezo 99.82 MBTOC TOC RL: 685.73 (Stickup 0.89m) (drilled) SWL: (24 Feb 21) Final pH: Dev: Ν TOC RL: 685.73 (Stickup 0.89m) (current) Final EC: Is Live: Υ (-) Date: Depth mgbl Hydrogeological Gamma Strat Major EC Yield Diagram рΗ Notes Scaled to 400mm CPS API Casing size as ID Description us/cm L/s 150 UNMINERALISED BIF, (J6), 51mm BLANK PVC Μ Ν J Greyish Dark or Black, Fresh, (0.00-176.00)9 Medium Strong Rock. Dark grey/ blue magnetite with minor red Μ J Ν BIF/chert bands and quartz veining below 154m, minor carbonate material. Fresh, hard rock wihth smaller consistant chips, poor aquifer zone UNMINERALISED BIF, (J5), Greyish Dark or Black, Fresh, Medium Strong Rock. Dark grey/ 160 blue magnetite with minor red 5 BIF/chert bands and quartz veining below 154m, minor carbonate material. Fresh, hard rock wihth smaller consistant chips, poor aquifer zone. UNMINERALISED BIF, (J4), М N 170 Grevish Dark or Black, Fresh. Medium Strong Rock. Dark grey/ 4 blue magnetite with minor red BIF/chert bands and quartz veining below 154m, minor carbonate material. Fresh, hard М J N rock wihth smaller consistant chips, poor aquifer zone. UNMINERALISED BIF, (J3), 51mm SLOTTED PVC (176.00-200.00)Grevish Dark or Black, Fresh, Medium Strong Rock. Dark grey/ blue magnetite with minor red 180 BIF/chert bands and quartz veining below 154m, minor 33 carbonate material. Fresh, hard rock wihth smaller consistant chips, poor aquifer zone. UNMINERALISED BIF, (J2), Ν J Grevish Dark or Black, Fresh. 190 Medium Strong Rock. Dark grey/ blue magnetite with minor red BIF/chert bands and quartz veining below 154m, minor carbonate material. Fresh, hard 7 rock wihth smaller consistant chips, poor aquifer zone. END CAP (200.00) 0-5000 0-14 0-40 100 200 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0003 Page: 4

BHPIO - Hydrogeology Log WHALEBACK Project: Hole Name: **HXAN0003** Hole Length: 200.00 Drill Rig Fluid Depth Туре Size Drilled By Logged By Easting: 767237.14 0.0 - 200.0 WLSRC50 СН 150 WLS VL2 Northing: 7411402.89 Surface RL: 684.84 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 23 Feb 21 - 23 Feb 21 Comments: Frontier piezo 685.73 TOC RL: (Stickup 0.89m) (drilled) SWL: 99.82 MBTOC (24 Feb 21) Dev: Ν Final pH: 685.73 TOC RL: (Stickup 0.89m) (current) Is Live: Y Date: Final EC: (-) mgbl Gamma Hydrogeological Strat Major EC Yield рΗ Diagram Notes Scaled to 400mm CPS API Casing size as ID Description us/cm L/s 200 END CAP (200.00) 210 220 230 240

Program: FY21 Afghan Spring ENV Phase 1

100 200

0-5000 0-14 0-40

Planned Hole: HXAN0003

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BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: HXAN0004 Hole Length: 72.00 Depth Drill Rig Fluid Drilled By Logged By 767238.92 Туре Size Easting: 0.0 - 72.0 WLSRC50 СН 150 WLS VL2 Northing: 7411406.60 Surface RL: 684.86 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 21 Feb 21 - 21 Feb 21 Comments: Frontier piezo TOC RL: 685.72 (Stickup 0.87m) (drilled) 66.13 MBTOC Final pH: SWL: (24 Feb 21) Dev: Ν 685.72 TOC RL: (Stickup 0.87m) (current) Final EC: Is Live: Υ (-) Date: mgbl Gamma Hydrogeological Major EC Yield рΗ Diagram Notes Scaled to 400mm CPS API Casing size as ID Description us/cm L/s SC SHALE, (J6), Yellowish Light or AB FOAM (0.00-2.00) White, Slightly Weathered, 51mm BLANK PVC Medium Strong Rock. Khaki (0.00-2.50)51mm BLANK PVC yellow to brown, shale and chert, heavily weathered and leached. (0.00-60.00)Broken ground 10 С SHALE, (J6), Brownish Red, Slightly Weathered, Weak Rock. Reddish brown shale and chert S with minor clay, storng red staining, heavily weathered, broken ground CHERT, (J6), Brownish Grey, 20 Highly Weathered, Strong Rock. JS С Κ Brown chert and un-mineralised BIF with micro banding heavily weathered, larger chips, broken ground. SHALE, (J6), Brownish Yellow, 9 Slightly Weathered, Weak Rock. Brown to grey BIF and shale, М SN Q moderately weathered, BIF partially magnetic. Minor brown staining smaller chips, more competent ground. 30 UNMINERALISED BIF, (J6), Yellowish Dark or Black, Slightly Weathered, Medium Strong Rock. Dark grey magnetite with minor shale and trace quartz, manganese leaching, becoming fresh at depth. Competant ground 40 UNMINERALISED BIF, (J6), Yellowish Dark or Black, Slightly Weathered, Medium Strong Rock. dark grey/blue magnetite with minor red chert bands and trace М CN QK quartz. Possible aquifer material. Manganese leaching and manganese clay zone at 74-80m 0-14 0-40 100 200 0-5000 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0004 Page: 1

BHPIO - Hydrogeology Log WHALEBACK HXAN0004 Project: Hole Name: Hole Length: 72.00 Fluid Depth Drill Rig Туре Size Drilled By Logged By 767238.92 Easting: 0.0 - 72.0 WLSRC50 150 WLS VL2 СН Northing: 7411406.60 Surface RL: 684.86 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 21 Feb 21 - 21 Feb 21 Comments: Frontier piezo (24 Feb 21) TOC RL: 685.72 (Stickup 0.87m) (drilled) SWL: 66.13 MBTOC Dev: Ν Final pH: TOC RL: 685.72 (Stickup 0.87m) (current) Is Live: Date: Final EC: Υ (-) Idgm Gamma Hydrogeological Major EC Yield Diagram рΗ Notes Scaled to 400mm CPS API Casing size as ID Description us/cm L/s UNMINERALISED BIF, (J6), Μ QK 51mm BLANK PVC CN Yellowish Dark or Black, Slightly (0.00-60.00)Weathered, Medium Strong Rock. dark grey/blue magnetite with minor red chert bands and trace quartz. Possible aquifer material. Manganese leaching and manganese clay zone at 74-80m. 60 51mm SLOTTED PVC 9 (60.00-72.00) 70 END CAP (72.00) 80 LEVELTROLL(83.00) ID: 90 0-5000 0-14 0-40 100 200 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0004 Page: 2

BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: **HXAN0005** Hole Length: 186.00 Depth Drill Rig Fluid Drilled By Logged By 767439.99 Type Size Easting: 0.0 - 186.0 WLSRC50 WLS СН 150 VL2 Northing: 7411649.01 Surface RL: 698.79 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 16 Feb 21 - 18 Feb 21 Comments: Frontier piezo 149.74 MBTOC TOC RL: 699.67 (Stickup 0.89m) (drilled) (20 Feb 21) Final pH: SWL: Dev: Ν TOC RL: 699.67 (Stickup 0.89m) (current) Final EC: Is Live: Υ (-) Date: mgbl Gamma Hydrogeological Major EC Yield Minor рΗ Diagram Notes Scaled to 400mm CPS API Description Casing size as ID us/cm L/s UNMINERALISED BIF, (J2), AB FOAM (0.00-2.00) Blackish Brown, Moderately 51mm BLANK PVC Weathered, Medium Strong Rock. (0.00 - 3.20)51mm BLANK PVC Dark brown bif with minor shale, minor magnetic (0.00-162.00)UNMINERALISED BIF, (J2), QLG S Grey, Slightly Weathered, Medium Strong Rock. Grey bif with minor brown shale and trace quartz, limonite, geothite. highly 10 magnetic upto 14.8*10^-3 si 20 7 UNMINERALISED BIF, (J2), S QLG Yellowish Grey, Slightly Weathered, Medium Strong Rock. 30 Grey bif with minor chert shale with trace, limonite and goethite. aquifer zone. Highly magnetic. fault zone/broken ground with quartz between 32-34 m. Weathered with staining UNMINERALISED BIF, (J2), Reddish Brown, Slightly Weathered, Medium Strong Rock. JC S L Brown Biff with chert, minor shale and trace limonite 40 UNMINERALISED BIF, (J1), Reddish Brown, Slightly Weathered, Medium Strong Rock S Brown Biff with chert, minor shale and trace limonite. SJM Κ SHALE, (J1), Yellowish Grey, Slightly Weathered, Medium \subseteq Strong Rock. Shales and magnetic BIF with minor gluggy clays(hard to wash out). Aguitard material. Moderately weathered, broken ground 0-5000 0-14 0-40 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0005 Page: 1

BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: **HXAN0005** Hole Length: 186.00 Depth Drill Rig Fluid Drilled By Logged By Туре Size Easting: 767439.99 0.0 - 186.0 WLSRC50 СН 150 WLS VL2 Northing: 7411649.01 Surface RL: 698.79 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 16 Feb 21 - 18 Feb 21 Comments: Frontier piezo 149.74 MBTOC TOC RL: 699.67 (Stickup 0.89m) (drilled) (20 Feb 21) Final pH: SWL: Dev: Ν 699.67 TOC RL: (Stickup 0.89m) (current) Final EC: Is Live: Υ (-) Date: mgbl Gamma Hydrogeological Major EC Yield рΗ Diagram Notes Scaled to 400mm CPS API Casing size as ID Description us/cm L/s 51mm BLANK PVC SJM SHALE, (J1), Yellowish Grey, Slightly Weathered, Medium (0.00-162.00)Strong Rock. Shales and magnetic BIF with minor gluggy clays(hard to wash out). Aquitard material. Moderately weathered, broken ground 5 SHALE, (J1), Yellowish Brown, SC QK Moderately Weathered, Medium Strong Rock. Yellowish brown 60 shale with minor BIF and trace quartz and clays. Weathered with brown staining S QK SHALE, (W), Blackish Yellow, Slightly Weathered, Medium Strong Rock. Black shales and chert with trace quartz and yellow clays, potential flow zone. SC 0 Manganese staining. SHALE, (W), Reddish Yellow, Slightly Weathered, Medium Strong Rock. Red and yellow 70 shales with dark grey chert and trace quartz. potential flow zone, weathered broken ground SHALE, (W), Greyish Yellow, ≥ Slightly Weathered, Medium Strong Rock. Yellowish grey S QK shales with trace quartz and clays. Potential flow zone SHALE, (W), Dark or Black Fresh, Medium Strong Rock. black shales, aquitard material. manganese leaching 80 SHALE, (W), Yellowish Grey, N Slightly Weathered, Medium Strong Rock. Yellow to greenish shales, brown chert and grey BIF JC Q S with trace quartz. Moderatly weathered, broken ground UNMINERALISED BIF, (D4), Blackish Grey, Fresh, Medium JM S Strong Rock, grey fresh, magnetic BIF with minor shale from 90-92m. Minor chlorite alteration from 92-98m. 90 Competent rock SHALE, (D4), Yellowish Grey, Slightly Weathered, Medium Strong Rock. Yellow shale with 7 minor magnetic bif and trace quartz. Broken ground, potential flow zone UNMINERALISED BIF, (D4), Blackish Grey, Slightly Weathered, Medium Strong Rock. Dark grey magnetite with minor JM Q red chert bands. Fresh, partialy JM broken ground, 0-5000 0-14 0-40 100 200 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0005 Page: 2

BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: **HXAN0005** Hole Length: 186.00 Depth Drill Rig Fluid Drilled By Logged By 767439.99 Type Size Easting: 0.0 - 186.0 WLSRC50 WLS СН 150 VL2 Northing: 7411649.01 Surface RL: 698.79 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 16 Feb 21 - 18 Feb 21 Comments: Frontier piezo 149.74 MBTOC TOC RL: 699.67 (Stickup 0.89m) (drilled) (20 Feb 21) Final pH: SWL: Dev: Ν TOC RL: 699.67 (Stickup 0.89m) (current) Final EC: Is Live: Υ (-) Date: mgbl Gamma Hydrogeological Strat Major EC Yield рΗ Diagram Notes Scaled to 400mm CPS API Casing size as ID Description us/cm L/s 100 51mm BLANK PVC JM UNMINERALISED BIF, (D4), С Blackish Grey, Slightly (0.00-162.00)Weathered, Medium Strong Rock. Dark grey magnetite with minor red chert bands. Fresh, partialy HS М broken ground, UNMINERALISED BIF, (D4), Greyish Red, Fresh, Medium Strong Rock. Dark grey magnetite with minor red BIF, red shale band at 114m. Fresh with minor chlorite alteration. 110 Potential fractured rock aquifer **D**4 Р UNMINERALISED BIF, (D4), М JC Blue, Fresh, Medium Strong 120 Rock. Dark grey to blue magnetite and red BIF, minor dark grey to pale green chert with pyrite inclusions. Fresh broken ground. aquifer zone. highly magnetic М JQ Р UNMINERALISED BIF, (D3), Greenish Red, Fresh, Medium Strong Rock. Green magnetite with minor BIF and quartz. Pyrite from 130-134m 130 CM CHERT, (D3), Greenish Blue, Fresh, Medium Strong Rock. Green magnetite and chert. Hard D3 stable formation, chips ground very fine by RC М S UNMINERALISED BIF, (D3), Greyish Brown, Fresh, Medium 140 Strong Rock. Brown magnetite with minor red BIF, shales Highly magnetic, fresh rock, unmineralised. Chert layers between 142-146m. Interbedded fractured and stable ground, flow 0-5000 0-14 0-40 100 200 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0005 Page: 3

BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: **HXAN0005** Hole Length: 186.00 Depth Drill Rig Fluid Drilled By Logged By 767439.99 Type Size Easting: 0.0 - 186.0 WLSRC50 WLS VL2 СН 150 Northing: 7411649.01 Surface RL: 698.79 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 16 Feb 21 - 18 Feb 21 Comments: Frontier piezo TOC RL: 699.67 (Stickup 0.89m) (drilled) 149.74 MBTOC (20 Feb 21) Final pH: SWL: Dev: Ν TOC RL: 699.67 (Stickup 0.89m) (current) Final EC: Is Live: Υ (-) Date: mgbl Major Gamma Hydrogeological Strat EC Yield рΗ Diagram Notes Scaled to 400mm CPS API Description Casing size as ID us/cm L/s 150 51mm BLANK PVC UNMINERALISED BIF, (D3), Μ S Greyish Brown, Fresh, Medium (0.00-162.00)D3 Strong Rock. Brown magnetite MC with minor red BIF, shales Highly magnetic, fresh rock, un-Q LEVELTROLL(154.00) JC M mineralised. Chert layers ID: 2703 between 142-146m. Interbedded 902 fractured and stable ground, flow 8.5 1 CHERT, (D3), Greenish Light or White, Fresh, Medium Strong Rock. Light green chert and dart 160 blue/green magnetite, fresh hard competent ground. UNMINERALISED BIF, (D2), 882 8.3 51mm SLOTTED PVC Greyish Brown, Fresh, Medium (162.00-186.00) Strong Rock. Magnetite with minor red biff and chert increasing below 172m, trace quartz. Chert bands 160-162,170-172, 176-178m. Moderately competent ground with some broken zones, 688 8.5 fresh rock with minor red staining. 170 D2 889 8.5 895 180 8.3 END CAP (186.00) 190 0-5000 0-14 0-40 100 200 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0005 Page: 4

BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: HXAN0006 Hole Length: 84.00 Depth Drill Rig Fluid Drilled By Logged By Туре Size Easting: 767438.05 0.0 - 84.0 WLSRC50 СН 150 WLS VL2 Northing: 7411656.59 Surface RL: 698.79 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 13 Feb 21 - 13 Feb 21 Comments: Frontier piezo 83.09 MBTOC 699.83 (Stickup 1.04m) (drilled) (20 Feb 21) Final pH: TOC RL: SWL: Dev: Ν 699.83 TOC RL: Final EC: (Stickup 1.04m) (current) Is Live: Υ (-) Date: mgbl Gamma Hydrogeological Major EC Yield Minor рΗ Diagram Notes Scaled to 400mm CPS API Casing size as ID Description us/cm L/s UNMINERALISED BIF, (J2), AB FOAM (0.00-2.00) SC Blackish Brown, Moderately 51mm BLANK PVC Weathered, Medium Strong Rock. (0.00-2.00)51mm BLANK PVC Dark brown bif with minor shale and chert. trace quartz (2-3m and (0.00-66.00)6-7 m) С UNMINERALISED BIF, (J2), S Brown, Moderately Weathered Medium Strong Rock. Brown BIF with minor yellow shale and chert. Heavily weathered and 10 SC J SC leached UNMINERALISED BIF, (J2), Greyish Brown, Moderately S J Weathered, Medium Strong Rock Brownish grey bif with minor shale and chert. Broken ground with larger chips around 2cm UNMINERALISED BIF, (J2), SC Q Yellowish Brown, Moderately Weathered, Medium Strong Rock. Brown BIF with minor yellow 20 shale and chert, broken ground, 7 large chips SHALE, (J2), Greyish Yellow, Moderately Weathered, Medium Strong Rock. yellow shale with minor bif (trace quartz 14-15m), aquitard material UNMINERALISED BIF, (J2), Greyish Brown, Slightly Weathered, Medium Strong Rock. Greyish brown bif with minor shale and chert. trace quartz 19-30 20m & 21-22 m & 32-33 fault zone SHALE, (J2), Yellowish Red, Moderately Weathered, Medium Strong Rock. Yellowish red shale with minor bif, UNMINERALISED BIF, (J2), Greyish Yellow, Moderately Weathered, Medium Strong Rock. Grey BIF with yellow shale, S J Broken ground UNMINERALISED BIF, (J1), 40 Greyish Yellow, Moderately Weathered, Medium Strong Rock. Grey BIF with yellow shale, S Broken ground SHALE, (J1), Yellow, Moderately Weathered, Medium Strong Rock. Yellow shale with minor BIF, \subseteq UNMINERALISED BIF, (J1), Reddish Grey, Slightly Weathered, Medium Strong Rock. reddish S grey bif with minor shale, aquifer material 0-14 0-5000 0-40Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0006 Page: 1

BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: HXAN0006 Hole Length: 84.00 Depth Drill Rig Fluid Drilled By Logged By 767438.05 Туре Size Easting: 0.0 - 84.0 WLSRC50 СН 150 WLS VL2 Northing: 7411656.59 Surface RL: 698.79 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 13 Feb 21 - 13 Feb 21 Comments: Frontier piezo 83.09 MBTOC TOC RL: 699.83 (Stickup 1.04m) (drilled) (20 Feb 21) Final pH: SWL: Dev: Ν TOC RL: 699.83 Final EC: (Stickup 1.04m) (current) Is Live: Υ (-) Date: mgbl Hydrogeological Gamma Major EC Yield Minor рΗ Diagram Notes Scaled to 400mm CPS API Casing size as ID Description us/cm L/s 51mm BLANK PVC UNMINERALISED BIF, (J1), Reddish Grey, Slightly Weathered, (0.00-66.00)Medium Strong Rock. reddish grey bif with minor shale, aquifer material S Q SHALE, (J1), Yellow, Slightly Weathered, Medium Strong Rock. Yellow shale with minor mineralised BIF and trace quartz, aquitard material CS KN SHALE, (J1), Blackish Brown-60 green, Fresh, Extremely Weak CS KN Rock. Dark brown chert and shale, manganeese clay, aquitard S С material SHALE, (W), Blackish Browngreen, Fresh, Extremely Weak Rock. Dark brown chert and shale, S С manganeese clay, aquitard 51mm SLOTTED PVC material (66.00-84.00)SHALE, (W), Reddish Yellow, Slightly Weathered, Medium Strong Rock, yellow and red SI 0 70 shale with minor chert. SHALE, (W), Red, Slightly Weathered, Medium Strong Rock. ≥ red shale with minor chert, S Q heavily weathered with stong red staining SHALE, (W), Reddish Grey, Slightly Weathered, Medium SN Strong Rock. Reddish grey shale and BIF with trace quartz, broken ground with staining and fault gouge infill material, potential 80 flow zone S CJ Q SHALE, (W), Yellowish Red, Slightly Weathered, Medium Strong Rock. Yellowish red shale with trace quartz. Broken ground S CJ with fault gouge material, END CAP (84.00) potential flow zone SHALE, (W), Dark or Black, Fresh, Medium Strong Rock. black shale, possible manganese rich SHALE, (W), Yellowish Red, 90 Slightly Weathered, Medium Strong Rock. Yellowish red shale with minor cherty bif and trace quartz. aquitard material SHALE, (W), Blackish Brown, Slightly Weathered, Medium Strong Rock. Dark brown shale with minor cherty bif 0-5000 0-14 100 200 0-40Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0006 Page: 2

BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: HXAN0007 Hole Length: 138.00 Depth Drill Rig Size Fluid Drilled By Logged By 767437.93 Туре Easting: 0.0 - 138.0 WLSRC50 WLS СН 150 VL2 Northing: 7411467.15 Surface RL: 686.73 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 20 Feb 21 - 20 Feb 21 Comments: Frontier piezo 69.86 MBTOC TOC RL: 687.63 (Stickup 0.90m) (drilled) (21 Feb 21) Final pH: SWL: Dev: Ν TOC RL: 687.63 (Stickup 0.90m) (current) Final EC: Is Live: Υ (-) Date: mgbl Hydrogeological Gamma Major EC Yield рΗ Diagram Notes Scaled to 400mm CPS API Description Casing size as ID us/cm L/s UNMINERALISED BIF, (J6) AB FOAM (0.00-2.00) Q Greyish Yellow, Moderately 51mm BLANK PVC Weathered, Medium Strong Rock. (0.00-3.00)51mm BLANK PVC Grey BIF and shales. Trace quartz (18-20,24-26,28-30, 38-(0.00-114.00)40m). weathered, broken ground with strong staining 10 9 20 UNMINERALISED BIF, (J5), Greyish Yellow, Moderately Weathered, Medium Strong Rock. 30 Grey BIF and shales. Trace quartz (18-20,24-26,28-30, 38-40m). weathered, broken ground with strong staining SHALE, (J5), Brownish Red, Moderately Weathered, Medium Strong Rock. Reddish brown shale and chert, minor micro banding. Strongly weathered, J S Q Large blocky chips with staining on fracture planes, broken ground. UNMINERALISED BIF, (J5), Greyish Yellow, Moderately 40 С Q Weathered, Medium Strong Rock. Grey BIF with minor shale and orange non plastic clays, broken 5 ground, weathered, becoming more magnetic towards base. UNMINERALISED BIF, (J4), Greyish Dark or Black, Fresh, SK Q Strong Rock. dark grey magnetite with minor chert and manganese, some glassy black magnetic CN SQ chips. Fresh, broken ground 0-5000 0-14 0-40 100 200 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0007 Page: 1

BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: HXAN0007 Hole Length: 138.00 Depth Drill Rig Size Fluid Drilled By Logged By 767437.93 Type Easting: 0.0 - 138.0 WLSRC50 WLS VL2 СН 150 7411467.15 Northing: Surface RL: 686.73 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 20 Feb 21 - 20 Feb 21 Comments: Frontier piezo TOC RL: 687.63 (Stickup 0.90m) (drilled) 69.86 MBTOC (21 Feb 21) Final pH: SWL: Dev: Ν TOC RL: 687.63 (Stickup 0.90m) (current) Final EC: Is Live: Υ (-) Date: mgbl Hydrogeological Gamma Strat Major EC Yield рΗ Diagram Notes Scaled to 400mm CPS API Casing size as ID Description us/cm L/s UNMINERALISED BIF, (J4) 51mm BLANK PVC М CN SQ Greyish Dark or Black, Fresh, (0.00-114.00)Strong Rock. dark grey magnetite with minor chert and manganese, 7 some glassy black magnetic chips. Fresh, broken ground UNMINERALISED BIF, (J3), М CN SQ Greyish Dark or Black, Fresh, Strong Rock. dark grey magnetite with minor chert and manganese, 60 М NJ CQ some glassy black magnetic 33 chips. Fresh, broken ground UNMINERALISED BIF, (J3), Greyish Dark or Black, Fresh, Medium Strong Rock. Dark blue grey magnetite with minor red LEVELTROLL(65.00) ID: biff and trace chert and quartz М N.J CQ manganese leaching. Fresh hard chips with broken ground 98-106m. Manganese clay present (124-128m) UNMINERALISED BIF, (J2), 70 Greyish Dark or Black, Fresh, Medium Strong Rock. Dark blue grey magnetite with minor red biff and trace chert and quartz manganese leaching. Fresh hard chips with broken ground 98-106m. Manganese clay present (124-128m) 80 7 90 0-5000 0-14 0-40 100 200 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0007 Page: 2

BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: HXAN0007 Hole Length: 138.00 Depth Drill Rig Size Fluid Drilled By Logged By 767437.93 Type Easting: 0.0 - 138.0 WLSRC50 WLS VL2 СН 150 7411467.15 Northing: Surface RL: 686.73 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 20 Feb 21 - 20 Feb 21 Comments: Frontier piezo TOC RL: 687.63 (Stickup 0.90m) (drilled) SWL: 69.86 MBTOC (21 Feb 21) Final pH: Dev: Ν TOC RL: 687.63 (Stickup 0.90m) (current) Final EC: Is Live: Υ (-) Date: mgbl Gamma Hydrogeological Strat Major EC Yield рΗ Diagram Notes Scaled to 400mm CPS API Casing size as ID Description us/cm L/s 100 Μ UNMINERALISED BIF, (J2), 51mm BLANK PVC NJ CQ Greyish Dark or Black, Fresh, (0.00-114.00)Medium Strong Rock. Dark blue grey magnetite with minor red biff and trace chert and quartz manganese leaching. Fresh hard chips with broken ground 98-106m. Manganese clay present (124-128m) 110 5 751 8.2 LEVELTROLL(65.00) ID: 2704 51mm SLOTTED PVC (114.00-138.00) 661 8.2 120 CQ UNMINERALISED BIF, (J1), М NJ Greyish Dark or Black, Fresh, Medium Strong Rock. Dark blue grey magnetite with minor red biff and trace chert and quartz 712 8.2 manganese leaching. Fresh hard chips with broken ground 98-106m. Manganese clay present (124-128m) 130 662 8.2 END CAP (138.00) 140 0-5000 0-14 0-40 100 200 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0007 Page: 3

BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: HXAN0008 Hole Length: 72.00 Depth Drill Rig Fluid Drilled By Logged By Туре Size Easting: 767435.16 0.0 - 72.0 WLSRC50 СН 150 WLS VL2 Northing: 7411471.60 Surface RL: 686.73 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 20 Feb 21 - 20 Feb 21 Comments: Frontier piezo TOC RL: 687.54 (Stickup 0.81m) (drilled) 44.36 MBTOC Final pH: SWL: (21 Feb 21) Dev: Ν TOC RL: 687.54 (Stickup 0.81m) (current) Final EC: Is Live: Υ (-) Date: mgbl Gamma Hydrogeological Major EC Yield рΗ Diagram Notes Scaled to 400mm CPS API Description Casing size as ID us/cm L/s SJ AB FOAM (0.00-2.00) С SHALE, (J6), Brownish Yellow, Moderately Weathered, Medium 51mm BLANK PVC Strong Rock. Brownish yellow (0.00-2.50)51mm BLANK PVC sBIF and shale with minor chert and BIF. Weathered, broken (0.00-54.00)ground 10 CJ UNMINERALISED BIF, (J6), Brownish Yellow, Moderately Weathered, Medium Strong Rock. QC SJ Brownish yellow shale and with minor chert and BIF. Strongly Weathered 9 UNMINERALISED BIF, (J6), 20 Brownish Yellow, Moderately Weathered, Medium Strong Rock. Brown to yellow shale and BIF SC Κ with minor chert and quartz. Strong weathering and staining, broken ground J S Q SHALE, (J6), Reddish Yellow, Highly Weathered, Medium Strong Rock. Red, brown and yellow shale and chert with pink clay UNMINERALISED BIF, (J6), 30 Brown, Moderately Weathered Medium Strong Rock. Brown BIF with minor shale and trace quartz. Smaller, consistent chips with strong orange staining UNMINERALISED BIF, (J5), Brown, Moderately Weathered, Medium Strong Rock. Brown BIF with minor shale and trace quartz. Smaller, consistent chips with Q S strong orange staining SHALE, (J5), Brownish Yellow, Slightly Weathered, Medium 40 Strong Rock. brown to yellow shale and BIF. Strongly weathered, staining and broken ground 5 S UNMINERALISED BIF, (J4), Grevish Dark or Black, Fresh. Medium Strong Rock. dark blue grey magnetite with minor shale rich band 58 to 60m and chert band 62-68m, fresh, hard rock N with minor broken ground 0-5000 0-14 0-40 100 200 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0008 Page: 1

BHPIO - Hydrogeology Log Project: WHALEBACK Hole Name: HXAN0008 Hole Length: 72.00 Depth Drill Rig Size Fluid Drilled By Logged By 767435.16 Type Easting: 0.0 - 72.0 WLSRC50 WLS VL2 СН 150 Northing: 7411471.60 Surface RL: 686.73 Grid Name: MGA94_50 Incl / Azm: -90-->0 Construct: 20 Feb 21 - 20 Feb 21 Comments: Frontier piezo TOC RL: 687.54 (Stickup 0.81m) (drilled) SWL: 44.36 MBTOC (21 Feb 21) Final pH: Dev: Ν TOC RL: 687.54 (Stickup 0.81m) (current) Final EC: Is Live: Υ (-) Date: mgbl Hydrogeological Gamma Strat Major EC Yield Diagram рΗ Notes Scaled to 400mm CPS API Description Casing size as ID us/cm L/s 51mm BLANK PVC UNMINERALISED BIF, (J4), Μ N Greyish Dark or Black, Fresh, (0.00-54.00)Medium Strong Rock. dark blue grey magnetite with minor shale 4 rich band 58 to 60m and chert 51mm SLOTTED PVC band 62-68m, fresh, hard rock (54.00-72.00) with minor broken ground UNMINERALISED BIF, (J3), М N Grevish Dark or Black, Fresh. Medium Strong Rock. dark blue grey magnetite with minor shale 60 rich band 58 to 60m and chert 73 band 62-68m, fresh, hard rock with minor broken ground LEVELTROLL(65.00) ID: UNMINERALISED BIF, (J2), 2654 М Ν Greyish Dark or Black, Fresh, Medium Strong Rock. dark blue grey magnetite with minor shale 72 rich band 58 to 60m and chert 70 band 62-68m, fresh, hard rock with minor broken ground END CAP (72.00) 80 90 0-5000 0-14 0-40 100 200 Program: FY21 Afghan Spring ENV Phase 1 Planned Hole: HXAN0008 Page: 2

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APPENDIX B

Field Sheets



Well Gauging - Affer Springs.
Weather: Dy Overest. Mild



Project No: CX 214 642

Golder Staff: Strange / PURPS
Dipper/ IP: 155072 BMP 200m WZ meter

Well ID	Date	Time (hrs)	DTP (mbtoc)	DTW (mbtoc)	DTB (mbtoc)	Comment (colour/ odour)
H XANOO071		07:55		46.46		Hydrooleeve deployed
1XANODOS F		08:00		44.62		Hydroslee deployed
HXAN OUBS	M 15/04/21	08:55		78:14	-	Hed Done do
HXAN DOOU M	4 16/04/21	10:30		48.85	_	Partylere Chied
HXAN 0002 M		05:30		76.70		0.9
HRAN 0005 N	16/04/21	12:30	_	131.83		
HXAN 0006 M	16/04/21	12:35	_	83.86		
W/X						
		g.				

Notes to table:

DTP = depth to product mbtoc = metres below top of casing DTW = depth to water DTB = depth to base IP = interface probe NM = not measured



	SAMPLING RECORD FORM						GOL	DER		VIGIL OF SHEATON
LOW PLOW PURC	GING and SAMPLING (Incl. Id	ow yielaing wells)				-			Diameter of standpipe (mm)	
	}	Drainet	Number 250	6112	A = 0= - to 1	Plate	. (1.1	1-	Standpipe stick up (m)	
		Froject	Number: CX214 Client: 3HP	04 676-	- A spring	Campled Bu	16/04/	121	Surveyed reference point	
WELL ID:	AXANODO	YM Site I	Location:	M MACE	E	Janupled By	I DI TO	ISPRINCE	Depth to top of filter pack (from Depth to bottom of filter pack (
					4				Depth of well (from log)	(iroin tog)
Weather Conditions	(Temperature, Precipitation, Wir	od)	D-	g. h	المحاد	, Mal	J .		mbRP - metres below top of re	eference point
Well Maintenance R	equired? YES / NO) Detail							Hose volume - 0,12 L/m of 1/2 Hose volume - 0.07 L/m of 3/8 Hose volume - 0,03 L/m of 1/4	inch diameter hose inch diameter hose
		(e/lign	NE INFORMATION		174			1		Controller settings
	Presidential Information			Pergina and	Хепунод Естина	ettivi .		1	СРМ	/
Interface probe used?		YES (NO	Depth of pump intake	(mbRP)		61	1-		Refill	/
Initial depth to water (r	nbRP)		Length of hose (m)			-	1		Discharge	
Depth to product (mbF	RP)		Volume in hose (L)					1	Throttle	/
Thickness of product (m)		Depth to water after pla	acement of pump (mbRP)			1		
		-	Depth to water at end			-/		1		VII
Bailed product thickne Total depth of well (mb			_			-/-			WQM Model	YJI
			Depth to water after co		(mbRP)	1 1	^			191 100
Thickness of sediment	t on base of well (m)		Purging and Sampling	Method		Hydu	bler	6	WQM Calibration Certificate	191 102
				All Parliages	pan=all-acuts	SULDANIEM N	OSOWIE DOS	G180)	H MAN DESCRIPTION	
				±0.1	±5%	±10	±10%	±0.5°C		
Time	Cumulative Volume Purged (L)	Flow Rate (L/min)	Depth to Water (mbRP)	pН	Conductivity (µS/cm)	Redox (mV)	Dissolved Oxygen (ppm)	Temperature (°C)	Appearar	nce (Colour, Turbidity, Odour, etc)
10:30		4	48.65	7.51	1432	-119.9	143	15.9	Clear, no o	xlow how to
	-			J.,		-				
Ton Commit !					EASING	Kill Reserving		and the second	The fact that the same	
Time Sampled:	05:01	Sample ID	rs F-1	KANOO	34113	0160+5	1		Preservation (F=Filtered; UF=Unfilt	ered; P=Preserved; UP=Unpreserve
Colour:	- CICAT/MONE	Primary D	uplicate:	MAN OCO	4M/58/6	0421			Vials (P/UP)	
Odour:	No	Secondary	Duplicate;					2 2	12 Amber	
Turbidity:	L Medium High	Trip Blank							1L Plastic	8
Hydrocarbon Sheen ?	Yes No	Rinsate:								
-			-				1		Phenois/COD/NH3 (F/UF; P/UP)	
	he No	Field Blant	kc				I .		Ferrous/Ferric Iron (F/UF; P/UP)	LaCAS C
Di Water Lab Certificat							1			

GAP FORM 60-1 / RL 1

'FEBRUARY 2018

Hydrasteeve deployed @ 10:30 at 61m depth 1 Extern TRH bottle for Lab 94QC

1/2

Interface probe used? Initial depth to water (mt Depth to product (mbRP Thickness of product (mbRP Taickness of product (mbRP Total depth of well (mbRP	(Temperature, Precipitation, Wesquired? YES / No	nind) Detail	Client: ISMP reation: Proof	Paratru ent		Sampled By: Time:	15/04 Punni 04:13	315 PIRINGLE	Surveyed reference. Depth to top of filte Depth to bottom of Depth of well (from mbRP - metres bel Hose volume - 0.12 Hose volume - 0.03	r pack (from log) filter pack (from l log) ow top of referen 2 L/m of 1/2 inch 7 L/m of 3/8 inch	log) ce point diameter hose diameter hose	
Interface probe used? Initial depth to water (mt Depth to product (mbRP Thickness of product (mbRP Taickness of product (mbRP Total depth of well (mbRP	nbRP) mbRP) mbRP)	YES/160	Depth of pump intake (Paratru ent	wind	of or			mbRP - metres bel Hose volume - 0,12 Hose volume - 0,07	ow top of reference 2 L/m of 1/2 inch 7 L/m of 3/8 inch	diameter hose diameter hose	
Interface probe used? Initial depth to water (mt Depth to product (mbRP Thickness of product (m Bailed product thickness Total depth of well (mbR	nbRP) IP) III) III) III) III) III) III) II	YES 160 YES 160 HC	Depth of pump intake ((mbRP)	Samulaig Milioma	War			Hose volume - 0,12 Hose volume - 0,07	2 L/m of 1/2 inch 7 L/m of 3/8 inch	diameter hose diameter hose	
Initial depth to water (mt Depth to product (mbRP Thickness of product (m Bailed product thickness Total depth of well (mbR	RP) m) ss (m) RP)	17-17-17-16-16-16-16-16-16-16-16-16-16-16-16-16-	Depth of pump intake ((mbRP)	Sampling Adminis	titing.					Controller sering	
Initial depth to water (mt Depth to product (mbRP Thickness of product (m Bailed product thickness Total depth of well (mbR	RP) m) ss (m) RP)	45.46 46.40	Lengar or nose (m)	(mbRP)	Kanyilàng kiluma	it an	() () () () () () () () () ()					
Initial depth to water (mt Depth to product (mbRP Thickness of product (m Bailed product thickness Total depth of well (mbR	RP) m) ss (m) RP)	45.46 46.40	Lengar or nose (m)	(mbRP)					СРМ			/
Depth to product (mbRP Thickness of product (m Bailed product thickness Total depth of well (mbR	RP) m) ss (m) RP)	45.46 46.40	Lengar or nose (m)			115	m		Refill			
Thickness of product (m Bailed product thickness Total depth of well (mbR	m) ss (m) IRP)		Volume in hose (L)			1			Discharge			
Bailed product thickness Total depth of well (mbR	ss (m) RP)	all the same of th				/			Throttle			
Total depth of well (mbR	RP)		Depth to water after pla	acement of pump (1	nbRP)						A . W .	
Total depth of well (mbR	RP)		Depth to water at end	of purging (mbRP)					WQM Model		YJI	
			Depth to water after co	llection of samples	(mbRP)	/						
Thickness of sediment of	on base of well (m)	_	Purging and Sampling	Method		Hydro	Leev	-	WQM Calibration C	ertificate	191	102 3001
				Arrest Sine		U	VIII - 12					
	T		T	±0.1	±5%	±10	±10%	±0.5°C				
Time	Cumulative Volume Purged (L)	Flow Rate (Umin)	Depth to Water (mbRP)	pH	Conductivity (µS/cm)	Redox (mV)	Dissolved Oxygen (ppm)	Temperature (°C)		Appearance (C	Colour, Turbidity, Oc	dour, etc)
11:30	_		46.40	6.93	520	28.7	0.96	298	Light be	own to	brown.	Very harbid.
									0			0
						1						
			-					-				
Time Sampled:	11:30	Sample IDs	Com	201 HX	AN 000	7ML50160	9471 5	Sample Containers/Pr	reservation (F=Filtered	: UF=Unfiltared: 1	PaPreservad: IID-III-	noreserved)
Colour:	Prown	Primary Dup		110		1,130,00	1 - 1 - 3	1.1	ls (P/⊌P)	.,		Metals (F/UF;P/UP)
	00			10007/5	-6 1/0km		-	- Via				
Odour:		Secondary I	suplicate: TIXAI	المحساب	110045	-		2 46	Amber			Cyanide
Turbidity:	Low Medium High	Trip Blank:		- 20			-	1L	Plastic			Sulphide
Hydrocarbon Sheen ?	Yes No	Rinsate:						Phe	enois/COD/NH3 (F/UF;	P/UP)		Arsenic
Di Water Lab Certificate	te No.	Field Blank:						Fer	rous/Ferric Iron (F/UF;	P/UP)	2×P	FA3 Other
Notes:							_		• •	•		
=						0	1		2 1			
=			Hydra	100:0	depla	V	at	08:10 15	105/21	1	5m.60.	

FEBRUARY 2018

1/2

	FLOW PORGING and SAMPLING that, low vielding wells						GOL	LDER Diameter of standpipe (mm)			
WELL ID:	HXAN OOD	Project N		ERN RIG		Date Sampled By Time	15/04 Pwano 03:00	121 12021NV2	Depth to bottom of filter pack (fro	log)	
Weather Conditions	(Temperature, Precipitation, W	find)	In . It	Cot.	Wied	1			Depth of well (from log)		
Well Maintenance Re	equired? YES /NO		0						mbRP - metres below top of refe Hose volume - 0.12 L/m of 1/2 in Hose volume - 0.07 L/m of 3/8 in Hose volume - 0.03 L/m of 1/4 in	nch diameter hose nch diameter hose	
		Collec	DESTANATION	150000	72 - 12 - 12	A BIT S			СРМ	Gont/Hiller as minds	
Interface probe used?		YES/(O)	Depth of pump intake	(mbRP)	ELIPSIN EGVINS		5-22	1	Refill		
Initial depth to water (m	nbRP)	3/04/5 1/16/04/5	Length of hose (m)	,		1	1		Discharge		
Depth to product (mbR	P)	44.66144.60	Volume in hose (L)				/		Throttle		
Thickness of product (r	m)	_	Depth to water after pl	acement of pump	(mbRP)		/	1			
Bailed product thickness	ss (m)		Depth to water at end	of purging (mbRP)		/		1	WQM Model	401	
Total depth of well (mb	RP)	_	Depth to water after co	ollection of sample	s (mbRP)	1		1			
Thickness of sediment	on base of well (m)		Purging and Sampling	Method		Irlad	moleur	ł	WQM Calibration Certificate	19L 102 399	
				Contract to	nedtechelene	STEEL STREET	dicordad (dec	U (0)			
Time	Cumulative Volume Purged (L)	Flow Rate (L/min)	Depth to Water (mbRP)	±0.1	±5% Conductivity (µS/cm)	£10 Redox (mV)	±10% Dissolved Oxygen (ppm)	±0.5°C Temperature (°C)	Appearanc	e (Colour, Turbidity, Odour, etc)	
12:00		-	44.60	6.91	604	-104-7	1.85	28.2	Cloudy no	odocr, pale grey	
			11100	10 11	0-7		1.00	00.2	- /-	Pare grey	
							 				
				+	_	+	_				
					-	-	-				
					 	-	-				
					-	-	-				
					-						
					1						
			1116. 1116.		31.5	orionament.		-1			
Time Sampled:	12:00	Sample IDs	HX	OGONA	8m/5016	0421		Sample Containers	s/Preservation (F=Filtered; UF=Unfilter	ed; P=Preserved; UP=Unpreserved)	
Colour:	Cloudy Pale	Primary Dup	licate;		1.12		1		Vials (P/UP)	Metals (F/UF;P/UP)	
Odour:	No	Secondary I	luplicate:				1		4½ Amber	Cyanide	
Turbidity:	(Low Medium High	Trip Blank;					1		1L Plastic	Sulphide	
Hydrocarbon Sheen ?	Yes No	Rinsate:					1				
Di Water Lab Certificat		Field Blank:					1		Phenois/COD/NH3 (F/UF; P/UP) Ferrous/Ferric Iron (F/UF; P/UP)	Arsenic Hx PFAS Other	
Notes:		reid Dalk.					7		remous/remacifon (F/OF; P/OF)	4 x 1 P 73 Other	
GAP FORM 60-1 / RL 'FEBRUARY 2018	1		Hydr 2x E 1x E	steen kha P	e d'irro l	of la	ed as c	RA QC RAQC	15/04/21 08:1	55m bg.	

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APPENDIX C

Calibration Certificates





Calibration Report

Multi-Parameter Water Quality Instrument

Customer: Golder

Manufacturer: YSI

Contact: Phil/Syke

Instrument: Professional Plus with Quatro cable

Serial #: 19L102399

Cable length: 1m

Item	Test	Pass	Comments
Battery	2 x Alkaline C-cells	1	Voltage reading above 2.9V
	Battery Saver	/	Automatically turns off after 30 minutes if not used
Connections	Condition	1	Good, clean
Cable	Condition	1	Clean, no tears
Display	Operation	1	
Firmware	Version	1	4.0.0
Keypad	Operational	1	
Display	Screen	1	
Unit	Condition, seals and O-rings	1	
Monitor housing	Condition	1	
pH: White the second		aufilia.	
Condition		/	Good, clean
pH millivolts for pH7 calibration range 0 mV ± 50 mV		1	
pH 4 mV range + 165 to + 180 from 7 buffer mV value		1	173.90 mV
oH slope		1	55 to 60 mV/pH, ideal 59mV 58.14
Response time < 90 seconds		1	55.14 55.114 55.114 55.114
alibrated and conforms to manufacturer's specifications		1	
ORP			
Condition		1	Good, clean
Response time < 90 seconds		1	3554/4/6411
vithin ± 80mv of reference Zo	bell Reading	1	
Calibrated and conforms to m		1	variance range ± 20mV -2 mV
Conductivity			variance range ± 20111V -2 mV
Condition		✓	Good, clean
emperature		1	°C
Conductivity cell constant 5.0	± 1.0 in GLP file	1	, C
lean sensor reads less than 3	uS/cm in dry air	V	
Calibrated and conforms to m			μs/cm
Dissolved Oxygen			μεγειτι
ondition		4	Good, clean
O sensor in use			Galvanic
.25 mil PE membrane (yellow	/ membrane):		Galvariic
O Sensor Value			(min 4.31 uA - max 8.00 uA) Avg 6.15 uA
	anufacturer's specifications		I/IIIII 4.51 UA - MAX 8.00 UA] AVg 6.15 UA

This is to certify that the above instrument has been calibrated to the following specifications:

Parameter						Instrument Readings		
	Standards	Reference	Calibration Point	Span	Units	Before	After	Units
Temperature		Room Temp	23.5	0	°C	NA	23.5	°C
рН	pH 7.00	356684	7.01	-28.50	mV	7.02	7.01	На
рН	pH 4.00	355385	4.00	145.40	mV	4.03	4.00	
Conductivity	2764 μs/cm at 25°C	20/1007	2764	GLP	5.21	2719		pH
ORP (Reference check only)	Zobell A & B	20/0506	232	232	+		2764	μs/cm
Zero Dissolved Oxygen	NaSO3 in distilled water	10175	0.0		mV	234.6	233.9	mV
100% Dissolved Oxygen	100% Air Saturation	COLUMN TO STATE OF THE STATE OF		NA	NA	-0.2	0.0	%
- Aller Control	20070 All Daturation	Air	100.0	5.94	uA	100.9	100.0	%

Calibrated by: Gaurav Kanwar

Calibration Date: 08-Apr-21 Next Due: 05-Oct-21



Job:	Western Pridge	Phase/Task Number:	<u> </u>
Date and time:	15/04/2021	WQ meter make/model:	
Name:	Skye Pringle	WQ meter serial number:	191102399

Signature:

		* use unique identifier (e.g YYYYMMDD_"technician's initials")						
Parameter	Standard Solution	Pre-callbration- reading	Acceptable range	Calibration Required (Y/N)	Post Calibration Reading			
Temperature	°C	20.3	± 0.5 °C	7	15.8			
	4	4.10	3.9 - 4.1	7	4.10			
рН	7	7.10	6.9 - 7.1	7	7.10			
	10	,	9.9 – 10.1					
	0		0.0 - 0.1 mS/cm	gallatamorel				
Conductivity	2760 yiS/cm @ 25 °C	2.85 ms	± 5%	7	2.75			
		///	★ 5%		<u> </u>			
Dissolved	0% Saturation Solution	0.15	± 0.1 ppm	arevibr	0.03			
Oxygen	Ambient Air	8.22	± 0.5 ppm of value on Table A overleaf	t	9.50			
Redox		231.1	± 10 MV	N	235 8			

Comments (including any additional repairs or services performed)



Job:	Western Ridge	Phase/Task Number:	
Date and time:	16/04/2021 07:40	WQ meter make/model:	Pro Plus YSI
Name:	Sleye Pringle	WQ meter serial number:	194102399

Signature: Certificate

Certificate Number*:

Section of day and a second of day the second of day of day and the second of day of day and the second of day of

		J. u	se unique identifier (e.g YYYYMMDD_"technician's ini	tials")	End of any
Parameter	Standard Solution	Pre-calibration reading	Acceptable range	Galibration Required (Y/N)	Post Calibration Reading
Temperature	°C	15.8	± 0.5 °C	N	18.2
ļ	4	4-10	3.9 - 4.1	N	4.10
pН	7	7-10	6.9 - 7.1	2	7.10
			9.9 10.1		
	0		0.0 - 0.1 mS/cm		
Conductivity	2760 hS/cm @ 25 °C	2754	± 5%	2	2833
	mS/cm@°C		± 5%		
Dissolved	0% Saturation Solution	0.03	± 0.1 ppm	7	0.04
Oxygen	Ambient Air	9.50	± 0.5 ppm of value on Table A overleaf	N)	9.23
Redox	229 mV@ 250°C	235.6	± 10 MV	2	229.9

Comments (including any additional repairs or services performed)



Job:	Western Ridge - BHP	Phase/Task Number:	
Date and time:	17/04/2021	WQ meter make/model:	
Name:	Stope Pringle	WQ meter serial number:	196102399
Signature:	As .	Certificate Number*:	

			se unique identifier (e.g YYYYMMDD "technician's ini	tials")	
Parameter	Standard Solution	Pre-calibration reading	Acceptable range	Calibration Required (Y/N)	Post Calibration Reading
Temperature	°C	18.2	± 0.5 °C	N	22.5
	4	4.10	3.9 - 4.1	13	4.10
рН	7	7.10	6.9 - 7.1	7	7.09
	10	L	9.9 – 10.1	***************************************	
	0		0.0 - 0.1 mS/cm		-
Conductivity	2760 mS/cm@_25_°C	2833	± 5%	7	2844
	mS/cm @°C	9.9 – 10.1 0.0 - 0.1 mS/c 2833 ±5% ±5% 0.04 ±0.1 ppm 4.23 ±0.5 ppm of value of	± 5%		
Dissolved	0% Saturation Solution	0.04	± 0.1 ppm	N	0.05
Oxygen	Ambient Air	9.23	± 0.5 ppm of value on Table A overleaf	jý.dv.	9.68
Redox	229 mV@ 25 °C	229.9	± 10 MV	7	222.5

Comments (including any additional repairs or services performed)



20.0

225.6

N

Job:	Western Ridge - 13MP	Phase/Task Number:
Date and time:	18/04/2021 08:30	WQ meter make/model:
Name:	Slage Pringle	WQ meter serial number: (9L102399
Cianatura		O de de la lacation de lacation de la lacation de la lacation de la lacation de la lacation de la lacation de lacation d

4-1 pН 7 7.00 6.9 - 7.1 7-00 10 9.9 - 10.10 0.0 - 0.1 mS/cm 2866 2760 mS/cm@_25 °C Conductivity N 2866 ± 5% ± 5% mS/cm@ N 0% Saturation Solution 0.05 ± 0.1 ppm 0.05 Dissolved Oxygen ± 0.5 ppm of value on Table A 10.63 N Ambient Air 10.63 overleaf

Comments (including any additional repairs or services performed)

± 10 MV

225.6

25

_mV @

Redox

229

May 2021 21464272-003-R-Rev0

APPENDIX D

Laboratory Certificates





CERTIFICATE OF ANALYSIS

Work Order : **EP2104242**

: GOLDER ASSOCIATES

Contact : CHRISTIAN BUDIMULJONO

Address : PO BOX 1914

WEST PERTH WA 6872

Telephone : +61 08 9213 7600

Project : 21464272 - Western Ridge - Afghan Spring

Order number : 21464272

C-O-C number : ----

Client

Sampler : Philip Ward, SKYE PRINGLE

Site : MWB

Quote number : EN/002/20

No. of samples received : 6
No. of samples analysed : 6

Page : 1 of 8

Laboratory : Environmental Division Perth

Contact : Lauren Biagioni

Address : 26 Rigali Way Wangara WA Australia 6065

Telephone : 08 9406 1307
Date Samples Received : 19-Apr-2021 14:40

Date Analysis Commenced : 22-Apr-2021

Issue Date : 29-Apr-2021 16:21



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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories Position Accreditation Category

Franco Lentini LCMS Coordinator Sydney Organics, Smithfield, NSW Vanessa Nguyen Organic Chemist Perth Organics, Wangara, WA

Page : 2 of 8 Work Order : EP2104242

Client : GOLDER ASSOCIATES

Project · 21464272 - Western Ridge - Afghan Spring



General Comments

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

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

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

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

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

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

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

LOR = Limit of reporting

- ^ = This result is computed from individual analyte detections at or above the level of reporting
- ø = ALS is not NATA accredited for these tests.
- ~ = Indicates an estimated value.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP080: Sample EP2104242-002 is positive for TRH C6-C9/10 fractions due to the presence of compounds other than BTEX.
- EP231X-SUT: PFAS results for sample #3 confirmed by QC duplicate analysis.
- 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 : EP2104242

Client : GOLDER ASSOCIATES

Project : 21464272 - Western Ridge - Afghan Spring

ALS

Sub-Matrix: PFAS (Matrix: WATER)			Sample ID	HXAN0004M	HXAN0007M	HXAN0008M	FD02	TB320
		Samplii	ng date / time	16-Apr-2021 10:30	16-Apr-2021 11:30	16-Apr-2021 12:00	16-Apr-2021 10:30	16-Apr-2021 00:00
Compound	CAS Number	LOR	Unit	EP2104242-001	EP2104242-002	EP2104242-003	EP2104242-004	EP2104242-005
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocar	bons							
C6 - C9 Fraction		20	μg/L	<20	40	150	<20	<20
C10 - C14 Fraction		50	μg/L	<50	<50	<50	<50	
C15 - C28 Fraction		100	μg/L	<100	<100	<100	<100	
C29 - C36 Fraction		50	μg/L	<50	100	<50	<50	
^ C10 - C36 Fraction (sum)		50	μg/L	<50	100	<50	<50	
EP080/071: Total Recoverable Hydrod	arbons - NEPM 201	I3 Fraction	าร					
C6 - C10 Fraction	C6_C10		μg/L	<20	40	140	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	μg/L	<20	40	130	<20	<20
>C10 - C16 Fraction		100	μg/L	<100	<100	<100	<100	
>C16 - C34 Fraction		100	μg/L	<100	160	<100	<100	
>C34 - C40 Fraction		100	μg/L	<100	<100	<100	<100	
^ >C10 - C40 Fraction (sum)		100	μg/L	<100	160	<100	<100	
^ >C10 - C16 Fraction minus Naphthalene		100	μg/L	<100	<100	<100	<100	
(F2)								
EP080: BTEXN								
Benzene	71-43-2	1	μg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	μg/L	<2	<2	7	<2	<2
Ethylbenzene	100-41-4	2	μg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	μg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	μg/L	<2	<2	<2	<2	<2
^ Total Xylenes		2	μg/L	<2	<2	<2	<2	<2
^ Sum of BTEX		1	μg/L	<1	<1	7	<1	<1
Naphthalene	91-20-3	5	μg/L	<5	<5	<5	<5	<5
EP231A: Perfluoroalkyl Sulfonic Acid	s							
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	μg/L	<0.0002	<0.0002	<0.0002	<0.0002	

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Work Order : EP2104242

Client : GOLDER ASSOCIATES

Project : 21464272 - Western Ridge - Afghan Spring

ALS

Sub-Matrix: PFAS (Matrix: WATER)			Sample ID	HXAN0004M	HXAN0007M	M8000MXH	FD02	TB320
		Samplir	ng date / time	16-Apr-2021 10:30	16-Apr-2021 11:30	16-Apr-2021 12:00	16-Apr-2021 10:30	16-Apr-2021 00:00
Compound	CAS Number	LOR	Unit	EP2104242-001	EP2104242-002	EP2104242-003	EP2104242-004	EP2104242-005
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids	s - Continued							
Perfluorodecane sulfonic acid	335-77-3	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
(PFDS)								
EP231B: Perfluoroalkyl Carboxylic Ac	cids							
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	μg/L	<0.0020	<0.0020	<0.0020	<0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	μg/L	<0.0005	<0.0005	0.0005	<0.0005	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	μg/L	<0.0005	<0.0005	0.0007	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	μg/L	<0.001	<0.001	<0.001	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	μg/L	<0.001	<0.001	<0.001	<0.001	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	μg/L	<0.001	<0.001	<0.001	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	μg/L	<0.001	<0.001	<0.001	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	μg/L	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic	Acids							

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Client : GOLDER ASSOCIATES

Project : 21464272 - Western Ridge - Afghan Spring

ALS

Sub-Matrix: PFAS (Matrix: WATER)			Sample ID	HXAN0004M	HXAN0007M	HXAN0008M	FD02	TB320
		Sampli	ng date / time	16-Apr-2021 10:30	16-Apr-2021 11:30	16-Apr-2021 12:00	16-Apr-2021 10:30	16-Apr-2021 00:00
Compound	CAS Number	LOR	Unit	EP2104242-001	EP2104242-002	EP2104242-003	EP2104242-004	EP2104242-005
				Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfor	nic Acids - Continued							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	μg/L	<0.001	<0.001	<0.001	<0.001	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	μg/L	<0.001	<0.001	0.002	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	μg/L	<0.001	<0.001	0.007	<0.001	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	μg/L	<0.001	<0.001	<0.001	<0.001	
EP231P: PFAS Sums								
^ Sum of PFHxS and PFOS	355-46-4/1763-23- 1	0.0002	μg/L	<0.0002	<0.0002	<0.0002	<0.0002	
^ Sum of PFAS (WA DER List)		0.0002	μg/L	<0.0002	<0.0002	0.0095	<0.0002	
^ Sum of PFAS		0.0002	μg/L	<0.0002	<0.0002	0.0102	<0.0002	
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	2	%	96.6	98.1	104	97.2	94.6
Toluene-D8	2037-26-5	2	%	101	101	101	102	103
4-Bromofluorobenzene	460-00-4	2	%	116	110	114	112	113
EP231S: PFAS Surrogate								
13C4-PFOS		0.0005	%	118	112	112	102	
13C8-PFOA		0.0005	%	91.2	99.6	99.0	97.1	

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Work Order : EP2104242

Client : GOLDER ASSOCIATES

Project : 21464272 - Western Ridge - Afghan Spring

ALS

Sub-Matrix: PFAS (Matrix: WATER)			Sample ID	TBW325	 	
		Sampli	ng date / time	16-Apr-2021 00:00	 	
Compound	CAS Number	LOR	Unit	EP2104242-006	 	
				Result	 	
EP231A: Perfluoroalkyl Sulfonic Acids						
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	μg/L	<0.0005	 	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	μg/L	<0.0005	 	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	μg/L	<0.0005	 	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	μg/L	<0.0005	 	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	μg/L	<0.0002	 	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	μg/L	<0.0005	 	
EP231B: Perfluoroalkyl Carboxylic Acids						
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	μg/L	<0.0020	 	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	μg/L	<0.0005	 	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	μg/L	<0.0005	 	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	μg/L	<0.0005	 	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	μg/L	<0.0005	 	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	μg/L	<0.0005	 	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	μg/L	<0.0005	 	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	μg/L	<0.0005	 	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	μg/L	<0.0005	 	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	μg/L	<0.0005	 	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	μg/L	<0.0005	 	
EP231C: Perfluoroalkyl Sulfonamides						
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	μg/L	<0.0005	 	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	μg/L	<0.001	 	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	μg/L	<0.001	 	

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Client : GOLDER ASSOCIATES

Project : 21464272 - Western Ridge - Afghan Spring

ALS

Sub-Matrix: PFAS (Matrix: WATER)			Sample ID	TBW325	 	
		Samplii	ng date / time	16-Apr-2021 00:00	 	
Compound	CAS Number	LOR	Unit	EP2104242-006	 	
				Result	 	
EP231C: Perfluoroalkyl Sulfonamides	- Continued					
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	μg/L	<0.001	 	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	μg/L	<0.001	 	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	μg/L	<0.0005	 	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	μg/L	<0.0005	 	
EP231D: (n:2) Fluorotelomer Sulfonio	c Acids					
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	μg/L	<0.001	 	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	μg/L	<0.001	 	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	μg/L	<0.001	 	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	μg/L	<0.001	 	
EP231P: PFAS Sums						
^ Sum of PFHxS and PFOS	355-46-4/1763-23- 1	0.0002	μg/L	<0.0002	 	
^ Sum of PFAS (WA DER List)		0.0002	μg/L	<0.0002	 	
^ Sum of PFAS		0.0002	μg/L	<0.0002	 	
EP231S: PFAS Surrogate						
13C4-PFOS		0.0005	%	108	 	
13C8-PFOA		0.0005	%	108	 	

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Client : GOLDER ASSOCIATES

Project : 21464272 - Western Ridge - Afghan Spring

Surrogate Control Limits

Sub-Matrix: PFAS		Recovery Limits (%)			
Compound	CAS Number	Low	High		
EP080S: TPH(V)/BTEX Surrogates					
1.2-Dichloroethane-D4	17060-07-0	61	141		
Toluene-D8	2037-26-5	73	126		
4-Bromofluorobenzene	460-00-4	60	125		
EP231S: PFAS Surrogate					
13C4-PFOS		60	120		
13C8-PFOA		60	120		

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

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

(WATER) EP231C: Perfluoroalkyl Sulfonamides (WATER) EP231A: Perfluoroalkyl Sulfonic Acids (WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231P: PFAS Sums (WATER) EP231S: PFAS Surrogate





QUALITY CONTROL REPORT

Work Order : EP2104242

: GOLDER ASSOCIATES

Contact : CHRISTIAN BUDIMULJONO

Address : PO BOX 1914

WEST PERTH WA 6872

Telephone : +61 08 9213 7600

Project : 21464272 - Western Ridge - Afghan Spring

Order number : 21464272

C-O-C number : ---

Sampler : Philip Ward, SKYE PRINGLE

Site : MWB

Quote number : EN/002/20

No. of samples received : 6
No. of samples analysed : 6

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Laboratory : Environmental Division Perth

Contact : Lauren Biagioni

Address : 26 Rigali Way Wangara WA Australia 6065

Telephone : 08 9406 1307
Date Samples Received : 19-Apr-2021
Date Analysis Commenced : 22-Apr-2021
Issue Date : 29-Apr-2021



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

Client

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

Signatories Position Accreditation Category

Franco Lentini LCMS Coordinator Sydney Organics, Smithfield, NSW Vanessa Nguyen Organic Chemist Perth Organics, Wangara, WA

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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

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

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

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: WATER						Laboratory I	Ouplicate (DUP) Report		
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Pe	troleum Hydrocarbo	ns (QC Lot: 3633187)							
EP2104239-001	Anonymous	EP071: C15 - C28 Fraction		100	μg/L	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction		50	μg/L	<50	<50	0.00	No Limit
		EP071: C29 - C36 Fraction		50	μg/L	<50	<50	0.00	No Limit
EP080/071: Total Pe	troleum Hydrocarbo	ns (QC Lot: 3638776)							
EP2104202-001	Anonymous	EP080: C6 - C9 Fraction		20	μg/L	<20	<20	0.00	No Limit
EP2104239-005	Anonymous	EP080: C6 - C9 Fraction		20	μg/L	<20	<20	0.00	No Limit
EP080/071: Total Re	coverable Hydrocark	oons - NEPM 2013 Fractions (QC Lot: 3633187)							
EP2104239-001	Anonymous	EP071: >C10 - C16 Fraction		100	μg/L	<100	<100	0.00	No Limit
		EP071: >C16 - C34 Fraction		100	μg/L	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction		100	μg/L	<100	<100	0.00	No Limit
EP080/071: Total Re	coverable Hydrocark	oons - NEPM 2013 Fractions (QC Lot: 3638776)							
EP2104202-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	μg/L	<20	<20	0.00	No Limit
EP2104239-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	μg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC	Lot: 3638776)								
EP2104202-001	Anonymous	EP080: Benzene	71-43-2	1	μg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	μg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	μg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	μg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	μg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	μg/L	<5	<5	0.00	No Limit
EP2104239-005	Anonymous	EP080: Benzene	71-43-2	1	μg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	μg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	μg/L	<2	<2	0.00	No Limit

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Sub-Matrix: WATER						Laboratory	Duplicate (DUP) Report		
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080: BTEXN (QC	Lot: 3638776) - conti	nued							
EP2104239-005	Anonymous	EP080: meta- & para-Xylene	108-38-3 106-42-3	2	μg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	μg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	μg/L	<5	<5	0.00	No Limit
EP231A: Perfluoroa	lkyl Sulfonic Acids (C	QC Lot: 3644919)							
EP2104242-003	HXAN0008M	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	μg/L	<0.0002	<0.0002	0.00	No Limit
		EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
EP231B: Perfluoroa	alkyl Carboxylic Acids	(QC Lot: 3644919)							
EP2104242-003	HXAN0008M	EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	μg/L	0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	μg/L	0.0007	0.0006	0.00	No Limit
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	μg/L	<0.0020	<0.0020	0.00	No Limit
EP231C: Perfluoroa	lkyl Sulfonamides (Q	C Lot: 3644919)							
EP2104242-003	HXAN0008M	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	μg/L	<0.0005	<0.0005	0.00	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	μg/L	<0.001	<0.001	0.00	No Limit

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Sub-Matrix: WATER						Laboratory	Duplicate (DUP) Report	•	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231C: Perfluoroal	lkyl Sulfonamides (QC Lot	: 3644919) - continued							
EP2104242-003	HXAN0008M	EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	μg/L	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	μg/L	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	μg/L	<0.001	<0.001	0.00	No Limit
EP231D: (n:2) Fluor	otelomer Sulfonic Acids(QC Lot: 3644919)							
EP2104242-003	HXAN0008M	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	μg/L	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	μg/L	0.002	0.002	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	μg/L	0.007	0.007	0.00	No Limit
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	μg/L	<0.001	<0.001	0.00	No Limit
EP231P: PFAS Sum	s (QC Lot: 3644919)								
EP2104242-003	HXAN0008M	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763- 23-1	0.0002	μg/L	<0.0002	<0.0002	0.00	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)		0.0002	μg/L	0.0095	0.0090	5.40	0% - 20%
		EP231X-SUT: Sum of PFAS		0.0002	μg/L	0.0102	0.0096	6.06	0% - 20%

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

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

Sub-Matrix: WATER				Method Blank (MB)		Laboratory Control Spike (LC	S) Report	
				Report	Spike	Spike Recovery (%)	Acceptable	Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 30	633187)							
EP071: C10 - C14 Fraction		50	μg/L	<50	378 μg/L	66.7	39.3	103
EP071: C15 - C28 Fraction		100	μg/L	<100	359 μg/L	77.4	47.2	122
EP071: C29 - C36 Fraction		50	μg/L	<50	269 μg/L	75.3	42.5	119
EP080/071: Total Petroleum Hydrocarbons (QCLot: 30	638776)							
EP080: C6 - C9 Fraction		20	μg/L	<20	320 μg/L	107	73.6	113
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	2013 Fractions (QCL	ot: 3633187)						
EP071: >C10 - C16 Fraction		100	μg/L	<100	372 μg/L	69.2	42.0	104
EP071: >C16 - C34 Fraction		100	μg/L	<100	446 μg/L	70.5	46.2	116
EP071: >C34 - C40 Fraction		100	μg/L	<100	271 μg/L	44.2	24.7	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	2013 Fractions (QCL	ot: 3638776)						
EP080: C6 - C10 Fraction	C6_C10	20	μg/L	<20	370 μg/L	107	73.9	115
EP080: BTEXN (QCLot: 3638776)								
EP080: Benzene	71-43-2	1	μg/L	<1	20 μg/L	89.0	84.1	114
EP080: Toluene	108-88-3	2	μg/L	<2	20 μg/L	105	81.0	115
EP080: Ethylbenzene	100-41-4	2	μg/L	<2	20 μg/L	96.9	84.4	113
EP080: meta- & para-Xylene	108-38-3	2	μg/L	<2	40 μg/L	113	84.3	114
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	μg/L	<2	20 μg/L	101	86.5	111
EP080: Naphthalene	91-20-3	5	μg/L	<5	5 μg/L	96.1	77.0	118
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 36449	19)							
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	μg/L	<0.0005	0.004 µg/L	76.8	72.0	130
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	μg/L	<0.0005	0.004 µg/L	78.0	71.0	127
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	μg/L	<0.0005	0.004 µg/L	77.6	68.0	131
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	μg/L	<0.0005	0.004 μg/L	97.6	69.0	134
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	μg/L	<0.0002	0.004 μg/L	104	65.0	140
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	μg/L	<0.0005	0.004 μg/L	69.2	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 36	44919)							
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	μg/L	<0.0020	0.02 μg/L	79.1	73.0	129
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	μg/L	<0.0005	0.004 μg/L	82.0	72.0	129
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	μg/L	<0.0005	0.004 μg/L	85.6	72.0	129
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	μg/L	<0.0005	0.004 μg/L	80.0	72.0	130
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	μg/L	<0.0005	0.004 μg/L	82.8	71.0	133
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	μg/L	<0.0005	0.004 μg/L	76.8	69.0	130
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	μg/L	<0.0005	0.004 μg/L	76.8	71.0	129

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Sub-Matrix: WATER				Method Blank (MB)		Laboratory Control Spike (LC	S) Report	
				Report	Spike	Spike Recovery (%)	Acceptable	e Limits (%)
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3644	919) - continued							
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	μg/L	<0.0005	0.004 µg/L	80.8	69.0	133
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	μg/L	<0.0005	0.004 μg/L	90.0	72.0	134
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	μg/L	<0.0005	0.004 μg/L	84.0	65.0	144
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	μg/L	<0.0005	0.01 μg/L	82.4	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3644919)								
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	μg/L	<0.0005	0.004 µg/L	84.0	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	μg/L	<0.001	0.01 μg/L	87.4	68.0	141
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	μg/L	<0.001	0.01 μg/L	70.6	56.6	136
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	μg/L	<0.001	0.01 μg/L	88.8	61.9	129
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	μg/L	<0.001	0.01 μg/L	82.9	52.8	135
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	μg/L	<0.0005	0.004 μg/L	77.6	65.0	136
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	μg/L	<0.0005	0.004 μg/L	71.6	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 36	44919)							
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	μg/L	<0.001	0.004 μg/L	77.6	63.0	143
EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	μg/L	<0.001	0.004 µg/L	77.6	64.0	140
EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	μg/L	<0.001	0.004 µg/L	87.6	67.0	138
EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	μg/L	<0.001	0.004 μg/L	68.4	60.9	136
EP231P: PFAS Sums (QCLot: 3644919)								
EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	μg/L	<0.0002				
EP231X-SUT: Sum of PFAS (WA DER List)		0.0002	μg/L	<0.0002				
EP231X-SUT: Sum of PFAS		0.0002	μg/L	<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: WATER				Matrix Spike (MS) Report			
			Spike	SpikeRecovery(%)	Acceptable Limits (%)		
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3633187)							
EP2104242-003	HXAN0008M	EP071: C10 - C14 Fraction		378 μg/L	104	44.5	122
		EP071: C15 - C28 Fraction		359 µg/L	112	55.1	143

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ub-Matrix: WATER				Spike	atrix Spike (MS) Report SpikeRecovery(%)		
						Acceptable	Limits (%)
boratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
P080/071: Total P	etroleum Hydrocarbons (QCLot: 3633187) -	continued					
P2104242-003	HXAN0008M	EP071: C29 - C36 Fraction		269 μg/L	107	53.6	128
P080/071: Total P	etroleum Hydrocarbons (QCLot: 3638776)						
EP2104202-002	Anonymous	EP080: C6 - C9 Fraction		240 μg/L	116	77.0	137
P080/071: Total R	ecoverable Hydrocarbons - NEPM 2013 Frac	tions (QCLot: 3633187)					
EP2104242-003	HXAN0008M	EP071: >C10 - C16 Fraction		372 μg/L	101	44.5	122
		EP071: >C16 - C34 Fraction		446 µg/L	104	55.1	143
		EP071: >C34 - C40 Fraction		271 µg/L	56.9	53.6	128
P080/071: Total R	ecoverable Hydrocarbons - NEPM 2013 Frac			1.0			
P2104202-002	Anonymous	EP080: C6 - C10 Fraction	C6 C10	290 μg/L	100	77.0	137
P080: BTEXN (Q	,		_				
P2104202-002	Anonymous	EP080: Benzene	71-43-2	20 μg/L	115	77.0	122
	,,	EP080: Toluene	108-88-3	20 μg/L	123	73.5	126
P231A: Perfluoro	alkyl Sulfonic Acids (QCLot: 3644919)			1.0			
P2104239-002	Anonymous	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 μg/L	110	72.0	130
7 monymous	,,	EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	74.4	71.0	127
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	78.0	68.0	131
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	100	69.0	134
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	97.6	65.0	140
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	68.8	53.0	142
P231B: Perfluoro	palkyl Carboxylic Acids (QCLot: 3644919)						
P2104239-002	Anonymous	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	84.7	73.0	129
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	76.4	72.0	129
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	84.4	72.0	129
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 μg/L	78.0	72.0	130
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 μg/L	80.4	71.0	133
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 μg/L	74.4	69.0	130
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 μg/L	72.8	71.0	129
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	79.6	69.0	133
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	85.2	72.0	134
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.004 µg/L	88.4	65.0	144
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 μg/L	75.4	71.0	132
P231C: Perfluoro	alkyl Sulfonamides (QCLot: 3644919)						
P2104239-002	Anonymous	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	79.6	67.0	137
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.01 μg/L	81.9	68.0	141
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide	4151-50-2	0.01 μg/L	65.4	56.6	136

Page : 8 of 8 Work Order : EP2104242

Client : GOLDER ASSOCIATES

Project : 21464272 - Western Ridge - Afghan Spring



Sub-Matrix: WATER					Matrix Spike (MS) Report				
				Spike	SpikeRecovery(%)	Acceptable i	Limits (%)		
Laboratory sample ID	Sample ID	Method: Compound CAS Number		Concentration	MS	Low	High		
EP231C: Perfluoro	alkyl Sulfonamides (QCLot: 3644919) - continued								
EP2104239-002	Anonymous	EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.01 μg/L	79.8	61.9	129		
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 μg/L	82.1	52.8	135		
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 μg/L	68.8	65.0	136		
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 μg/L	73.6	61.0	135		
EP231D: (n:2) Flu	protelomer Sulfonic Acids (QCLot: 3644919)								
EP2104239-002	Anonymous	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	74.0	63.0	143		
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 μg/L	76.0	64.0	140		
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 μg/L	76.8	67.0	138		
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 μg/L	70.8	60.9	136		



QA/QC Compliance Assessment to assist with Quality Review

Work Order : **EP2104242** Page : 1 of 5

Client : GOLDER ASSOCIATES Laboratory : Environmental Division Perth

Contact: CHRISTIAN BUDIMULJONOTelephone: 08 9406 1307Project: 21464272 - Western Ridge - Afghan SpringDate Samples Received: 19-Apr-2021Site: MWBIssue Date: 29-Apr-2021

Sampler : Philip Ward, SKYE PRINGLE No. of samples received : 6
Order number : 21464272 No. of samples analysed : 6

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

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

report contribute to the overall DQO assessment and reporting for guideline compliance.

Summary of Outliers

Outliers: Quality Control Samples

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

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

Outliers: Analysis Holding Time Compliance

NO Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

Quality Control Sample Frequency Outliers exist - please see following pages for full details.

Page : 2 of 5 Work Order : EP2104242

Client : GOLDER ASSOCIATES

Project : 21464272 - Western Ridge - Afghan Spring



Outliers: Frequency of Quality Control Samples

Matrix: WATER

Quality Control Sample Type	Co	unt	Rate	: (%)	Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	1	13	7.69	10.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: WATER

Evaluation: **x** = Holding time breach : \checkmark = Within holding time.

Matrix: WATER					Evaluation	i: × = Holding time	breach ; ✓ = Withi	n holding time
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071)								
HXAN0004M,	HXAN0007M,	16-Apr-2021	22-Apr-2021	23-Apr-2021	✓	23-Apr-2021	01-Jun-2021	✓
HXAN0008M,	FD02							
Amber VOC Vial - Sulfuric Acid (EP080)								
HXAN0004M,	HXAN0007M,	16-Apr-2021	23-Apr-2021	30-Apr-2021	✓	23-Apr-2021	30-Apr-2021	✓
HXAN0008M,	FD02,							
TB320								
EP080/071: Total Recoverable Hydrocarbons - NE	PM 2013 Fractions							
Amber Glass Bottle - Unpreserved (EP071)								
HXAN0004M,	HXAN0007M,	16-Apr-2021	22-Apr-2021	23-Apr-2021	✓	23-Apr-2021	01-Jun-2021	✓
HXAN0008M,	FD02							
Amber VOC Vial - Sulfuric Acid (EP080)								
HXAN0004M,	HXAN0007M,	16-Apr-2021	23-Apr-2021	30-Apr-2021	✓	23-Apr-2021	30-Apr-2021	✓
HXAN0008M,	FD02,							
TB320								
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
HXAN0004M,	HXAN0007M,	16-Apr-2021	23-Apr-2021	30-Apr-2021	✓	23-Apr-2021	30-Apr-2021	✓
HXAN0008M,	FD02,							
TB320								

Page : 3 of 5
Work Order : EP2104242

Client : GOLDER ASSOCIATES

Project : 21464272 - Western Ridge - Afghan Spring



Matrix: WATER					Evaluation	ı: x = Holding time	breach ; ✓ = Withi	n holding time
Method		Sample Date	Ex	traction / Preparation			Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT) HXAN0004M, HXAN0008M.	HXAN0007M, FD02	16-Apr-2021	28-Apr-2021	13-Oct-2021	✓	28-Apr-2021	13-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) TBW325	. 50-	16-Apr-2021	28-Apr-2021	13-Oct-2021	1	29-Apr-2021	13-Oct-2021	√
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X-SUT) HXAN0004M, HXAN0008M,	HXAN0007M, FD02	16-Apr-2021	28-Apr-2021	13-Oct-2021	✓	28-Apr-2021	13-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) TBW325		16-Apr-2021	28-Apr-2021	13-Oct-2021	1	29-Apr-2021	13-Oct-2021	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X-SUT) HXAN0004M, HXAN0008M.	HXAN0007M, FD02	16-Apr-2021	28-Apr-2021	13-Oct-2021	1	28-Apr-2021	13-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) TBW325		16-Apr-2021	28-Apr-2021	13-Oct-2021	1	29-Apr-2021	13-Oct-2021	√
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT) HXAN0004M, HXAN0008M,	HXAN0007M, FD02	16-Apr-2021	28-Apr-2021	13-Oct-2021	✓	28-Apr-2021	13-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) TBW325		16-Apr-2021	28-Apr-2021	13-Oct-2021	1	29-Apr-2021	13-Oct-2021	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X-SUT) HXAN0004M, HXAN0008M,	HXAN0007M, FD02	16-Apr-2021	28-Apr-2021	13-Oct-2021	✓	28-Apr-2021	13-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) TBW325		16-Apr-2021	28-Apr-2021	13-Oct-2021	✓	29-Apr-2021	13-Oct-2021	√

Page : 4 of 5 Work Order : EP2104242

Client : GOLDER ASSOCIATES

Project : 21464272 - Western Ridge - Afghan Spring



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.

the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: WATER

Evaluation: * = Quality Control frequency not within specification: * = Quality Control frequency within specification.

Matrix: WATER	Evaluation: × = Quality Control frequency not within specification; ✓ = Quality Control frequency within specification						
Quality Control Sample Type		Count			Rate (%)		Quality Control Specification
Analytical Methods	Method	ОC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	13	7.69	10.00	.sc	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Page : 5 of 5 Work Order : EP2104242

Client : GOLDER ASSOCIATES

Project : 21464272 - Western Ridge - Afghan Spring



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
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	WATER	In-house: Analysis of fresh and saline waters by Solid Phase Extraction (SPE) followed by LC-Electrospray-MS-MS, Negative Mode using MRM and internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is concentrated, combined with an equal volume of 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
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3). ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to the sample container. The entire contents are transferred to a solid phase extraction (SPE) cartridge. The sample container is successively rinsed with aliquots of the elution solvent. The eluted extract is combined with an equal volume of reagent water and a portion is filtered for analysis. Method procedures conform to US DoD QSM 5.3, table B-15 requirements.



WEST PERTH WA 6872

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2104242

Client : GOLDER ASSOCIATES Laboratory : Environmental Division Perth

Contact : CHRISTIAN BUDIMULJONO Contact : Lauren Biagioni

Address : PO BOX 1914 Address : 26 Rigali Way Wangara WA Australia

6065

Telephone : +61 08 9213 7600 Telephone : 08 9406 1307
Facsimile : +61 08 9427 7611 Facsimile : +61-8-9406 1399

Project : 21464272 - Western Ridge - Afghan Page : 1 of 2

Spring

 Order number
 : 21464272
 Quote number
 : EP2020GOLASSWA0058 (EN/002/20)

 C-O-C number
 : --- QC Level
 : NEPM 2013 B3 & ALS QC Standard

Site : ----

Sampler : Philip Ward, SKYE PRINGLE

Dates

Date

Delivery Details

Mode of Delivery : Carrier Security Seal : Intact.

No. of coolers/boxes : 2 Temperature : 21.9 - Ice present

Receipt Detail : No. of samples received / analysed : 6 / 6

General Comments

• This report contains the following information:

- Sample Container(s)/Preservation Non-Compliances
- Summary of Sample(s) and Requested Analysis
- Proactive Holding Time Report
- Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples, samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- pH analysis should be conducted within 6 hours of sampling.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical
 analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this
 temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS
 recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

: 20-Apr-2021 Issue Date

Page

2 of 2 EP2104242 Amendment 0 Work Order Client : GOLDER ASSOCIATES



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

• No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

process necessal tasks. Packages as the determinatasks, that are included in the sampling default 00:00 on is provided, the	ry for the executi may contain ad ation of moisture uded in the package. time is provided, the date of samplin		WATER - EP231X-SUT PFAS - Super Ultra Trace Waters Long Suite (29	WATER - W-04 TRH/BTEXN	WATER - W-18 TRH(C6 - C9)/BTEXN
EP2104242-001	16-Apr-2021 10:30	HXAN0004M/50160421	✓	1	
EP2104242-002	16-Apr-2021 11:30	HXAN0007M/50160421	✓	✓	
ED0404040.000					
EP2104242-003	16-Apr-2021 12:00	HXAN0008M/50160421	✓	✓	
EP2104242-003 EP2104242-004	16-Apr-2021 12:00 16-Apr-2021 10:30	HXAN0008M/50160421 HXAN0004M/58160421	√	√	
	·		-		✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL	INVO	ICES

- A4 - AU Tax Invoice (INV)	Email	auaccountspayable@golder.com.au
AUS ACCOUNTS		
- A4 - AU Tax Invoice (INV)	Email	auaccounts@golder.com.au
CHRISTIAN BUDIMULJONO		
 *AU Certificate of Analysis - NATA (COA) 	Email	cbudimuljono@golder.com.au
 *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) 	Email	cbudimuljono@golder.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	cbudimuljono@golder.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	cbudimuljono@golder.com.au
- Chain of Custody (CoC) (COC)	Email	cbudimuljono@golder.com.au
- EDI Format - ESDAT (ESDAT)	Email	cbudimuljono@golder.com.au
- EDI Format - XTab (XTAB)	Email	cbudimuljono@golder.com.au



SAMPLE RECEIPT NOTIFICATION (SRN)

: EP2104242 Work Order

: GOLDER ASSOCIATES Client Laboratory : Environmental Division Perth

Contact : CHRISTIAN BUDIMULJONO Contact : Lauren Biagioni

Address : PO BOX 1914 Address : 26 Rigali Way Wangara WA Australia WEST PERTH WA 6872

: Lauren.biagioni@alsglobal.com E-mail F-mail : cbudimuljono@golder.com.au

Telephone : +61 08 9213 7600 Telephone : 08 9406 1307 Facsimile Facsimile : +61 08 9427 7611 : +61-8-9406 1399

Project Page : 21464272 - Western Ridge - Afghan · 1 of 2

Spring

Order number : 21464272 Quote number : EP2020GOLASSWA0058 (EN/002/20) C-O-C number QC Level : NEPM 2013 B3 & ALS QC Standard

Site : MWB

Sampler : Philip Ward, SKYE PRINGLE

Dates

Date Samples Received : 19-Apr-2021 14:40 Issue Date : 22-Apr-2021 Scheduled Reporting Date : 29-Apr-2021 Client Requested Due 29-Apr-2021

Date

Delivery Details

Mode of Delivery Security Seal : Carrier Intact.

No. of coolers/boxes : 2 Temperature : 21.9 - Ice present

Receipt Detail No. of samples received / analysed : 6/6

General Comments

This report contains the following information:

- Sample Container(s)/Preservation Non-Compliances
- Summary of Sample(s) and Requested Analysis
- Proactive Holding Time Report
- Requested Deliverables
- Please see scanned COC for sample discrepencies: extra samples , samples not received etc.
- Please direct any queries related to sample condition / numbering / breakages to Sample Receipt (Samples.Perth@alsglobal.com)
- Analytical work for this work order will be conducted at ALS Environmental Perth.
- Please direct any turnaround / technical queries to the laboratory contact designated above.
- Sample Disposal Aqueous (3 weeks), Solid (2 months) from receipt of samples.
- pH analysis should be conducted within 6 hours of sampling.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.

Issue Date : 22-Apr-2021
Page : 2 of 2

 Page
 : 2 of 2

 Work Order
 : EP2104242 Amendment 0

 Client
 : GOLDER ASSOCIATES



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

• No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

tasks. Packages as the determin tasks, that are incl. If no sampling default 00:00 on is provided, the	may contain ad ation of moisture uded in the package. time is provided, the date of samplin		WATER - EP231X-SUT PFAS - Super Ultra Trace Waters Long Suite (29	WATER - W-04 TRH/BTEXN	WATER - W-18 TRH(C6 - C9)/BTEXN
EP2104242-001	16-Apr-2021 10:30	HXAN0004M	/	/	
LI 2104242-001	10 / tp1 2021 10:00	1170 (14000-101			
EP2104242-002	16-Apr-2021 11:30	HXAN0007M	√	✓	
	·		<u> </u>	√ ✓	
EP2104242-002	16-Apr-2021 11:30	HXAN0007M	✓	_	
EP2104242-002 EP2104242-003	16-Apr-2021 11:30 16-Apr-2021 12:00	HXAN0007M HXAN0008M	✓ ✓	✓	√

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Requested Deliverables

ALL	INVOICES

- A4 - AU Tax Invoice (INV)	Email	auaccountspayable@golder.com.au
AUS ACCOUNTS		
- A4 - AU Tax Invoice (INV)	Email	auaccounts@golder.com.au
CHRISTIAN BUDIMULJONO		
 *AU Certificate of Analysis - NATA (COA) 	Email	cbudimuljono@golder.com.au
 *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) 	Email	cbudimuljono@golder.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	cbudimuljono@golder.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	cbudimuljono@golder.com.au
- Chain of Custody (CoC) (COC)	Email	cbudimuljono@golder.com.au
- EDI Format - ESDAT (ESDAT)	Email	cbudimuljono@golder.com.au
- EDI Format - XTab (XTAB)	Email	cbudimuljono@golder.com.au

Λ	CHAIN OF CUSTODY	JAUELAIDE 21 Burma Road Fooraka SA Ph: 08 8350 0800 F; adelaide@aterpoliel.co	ont	JAMA, AAY 78 estimatir No tri B Ph; 07 4944 0177 €; natickey@s		Fh: 92	4068 0433	: samples	s.Hewcastle	alwork NSW Talsglobal.c	COPT						Vooriperk Road Sc samples sydney@					
	ALS Laboratory: please tick →	⊒RRISBANE 32 Shani Street Stafford OU Ph: 07 0243 7222 F; samples brishons@al ⊒GLADSTONE 40 Callearondah Deva Clir	don OLD 4680	LMJ. J.BOJ.RNC 2-4 Westall Road 8 Ph. 03 8549 9800 E; snoples,melho LMUDGEE 27 Sydnov Roa Ph. 02 0372 6736 F. make			4423 2063 [H 26 Resol	E: nowrad Way, Wa	(Palsoloha) ngara W∧ 6	056	11				i	_work	E 14-15 Desma C 000 E: Francosko o DNGONG 00 Kene	v Street Wolfe	room: NSW 2509			
ENT: Golder Assoc	iates	Ph: 07 7474 5500 E: dististens #alsolobal	ļ	ND REQUIREMENTS:	e mail@alsqiobal. ☐ Standa		9409 1391	h: samples	s.oerth@als	global.com			EOR 14	ABORAT	ORVIIS	Pie 02 4	Circle	onegrabalah	ni som			
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	Christian Budimuljono	CONTACT PH: 08						OI	6: . 1 °	2 2	3 4	5	Other co	mment.								
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CHAIN OF CUSTODY

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der Contact Email:		Christian Budimuljono				PFAS (99% protection	H,RT.	TRH (C6-																		
SAMPLE NUMBER		DATE	TIME	SAMPLE MATRIX	NUMBER OF BOTTLES																					
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Correction: Final Temp:



ABN: 50 005 085 521

www.eurofins.com.au

EnviroSales@eurofins.com

Australia

Melbourne 6 Monterey Road Dandenong South VIC 3175
Phone: +61 3 8564 5000

Child Special Control of the Con Site # 1254 & 14271

Sydney Unit F3. Building F

NATA # 1261 Site # 18217

NATA # 1261 Site # 4001 1/21 Smallwood Place NATA # 1261 Site # 20794

46-48 Banksia Road Welshpool WA 6106 Phone: +61 8 9251 9600 Site # 23736

Newcastle 4/52 Industrial Drive Mayfield East NSW 2304 PO Box 60 Wickham 2293 Phone: +61 2 4968 8448 NATA # 1261 Site # 25079 Auckland 35 O'Rorke Road Penrose, Auckland 1061 Phone: +64 9 526 45 51 IANZ # 1327

New Zealand

Christchurch 43 Detroit Drive Rolleston, Christchurch 7675 Phone: 0800 856 450 IANZ # 1290

Sample Receipt Advice

Company name:

Golder Associates Pty Ltd (WA)

Contact name:

Christian Budimuljono

Project name:

WESTERN RIDGE-AFGHAN SPRINGS

Project ID: Turnaround time: 21464272 5 Day

Date/Time received

Apr 19, 2021 10:40 AM

Eurofins reference 789501

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.

Split sample sent to requested external lab.

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:

Rhys Thomas on phone: (+61) 8 9251 9602 or by email: RhysThomas@eurofins.com

Results will be delivered electronically via email to Christian Budimuljono - cbudimuljono@golder.com.au.

Note: A copy of these results will also be delivered to the general Golder Associates Pty Ltd (WA) email address.





Australia

Melbourne 6 Monterey Road Dandenong South VIC 3175 16 Mars Road Phone: +61 3 8564 5000 NATA # 1261

Site # 1254 & 14271

Brisbane Unit F3, Building F 1/21 Smallwood Place Murarrie QLD 4172 Lane Cove West NSW 2066 Phone: +61 7 3902 4600 Phone: +61 2 9900 8400 NATA # 1261 Site # 20794 NATA # 1261 Site # 18217

Perth 46-48 Banksia Road Welshpool WA 6106 Phone: +61 8 9251 9600 NATA # 1261 Site # 23736

Newcastle 4/52 Industrial Drive Mayfield East NSW 2304 PO Box 60 Wickham 2293 Phone: +61 2 4968 8448 NATA # 1261 Site # 25079

Contact Name:

Received:

Priority:

Due:

Auckland 35 O'Rorke Road Penrose, Auckland 1061 Phone: +64 9 526 45 51 IANZ # 1327

Apr 26, 2021

Apr 19, 2021 10:40 AM

Christian Budimuljono

New Zealand

Christchurch 43 Detroit Drive Rolleston, Christchurch 7675 Phone: 0800 856 450 IANZ # 1290

ABN: 50 005 085 521 web; www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name: Golder Associates Pty Ltd (WA)

> Level 3, 1 Havelock Street West Perth

WA 6005

Project Name: Project ID:

Address:

WESTERN RIDGE-AFGHAN SPRINGS

21464272

Order No.: Report #:

Sydney

789501

Phone: 08 9213 7600 03 8862 3501 Fax:

Eurofins Analytical Services Manager: Rhys Thomas

5 Day

		Sa	mple Detail			Total Recoverable Hydrocarbons	Per- and Polyfluoroalkyl Substances (PFASs)	
Melb	ourne Laborato	ry - NATA Site	# 1254 & 142	71		Х	Х	
Sydr	ey Laboratory	- NATA Site # 1	8217					
Brisk	oane Laboratory	/ - NATA Site #	20794					
Perth	Laboratory - N	IATA Site # 237	36					
Mayf	ield Laboratory	- NATA Site #	25079					
Exte	rnal Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID			
1	HYAN0007M/5 9160421	Apr 16, 2021	11:30AM	Water	M21-Ap39158	Х	Х	
Test	Counts					1	1	



Golder Associates Pty Ltd (WA) Level 3, 1 Havelock Street West Perth WA 6005





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 and proficiency testing scheme providers reports.

Attention: Christian Budimuljono

Report 789501-W

Project name WESTERN RIDGE-AFGHAN SPRINGS

Project ID 21464272
Received Date Apr 19, 2021

Client Sample ID			HYAN0007M/5 9160421
Sample Matrix			Water
Eurofins Sample No.			M21-Ap39158
Date Sampled			Apr 16, 2021
Test/Reference	LOR	Unit	
Total Recoverable Hydrocarbons - 2013 NEPM Fract	ions		
Naphthalene ^{N02}	0.01	mg/L	< 0.01
TRH C6-C10	0.02	mg/L	0.06
TRH C6-C10 less BTEX (F1)N04	0.02	mg/L	0.06
TRH >C10-C16	0.05	mg/L	0.06
TRH >C10-C16 less Naphthalene (F2) ^{N01}	0.05	mg/L	0.06
TRH >C16-C34	0.1	mg/L	0.3
TRH >C34-C40	0.1	mg/L	< 0.1
TRH >C10-C40 (total)*	0.1	mg/L	0.36
Total Recoverable Hydrocarbons			
TRH C6-C9	0.02	mg/L	0.06
Total Recoverable Hydrocarbons - 1999 NEPM Fract	ions		
TRH C10-C14	0.05	mg/L	< 0.05
TRH C15-C28	0.1	mg/L	0.3
TRH C29-C36	0.1	mg/L	< 0.1
TRH C10-C36 (Total)	0.1	mg/L	0.25
PFASs Summations			
Sum (PFHxS + PFOS)*	0.001	ug/L	< 0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.001	ug/L	< 0.001
Sum of PFASs (n=30)*	0.005	ug/L	< 0.005
Sum of US EPA PFAS (PFOS + PFOA)*	0.001	ug/L	< 0.001
Sum of WA DWER PFAS (n=10)*	0.005	ug/L	< 0.005
Perfluoroalkyl sulfonamido substances- Trace			
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.005	ug/L	< 0.005
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.005	ug/L	< 0.005
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.005	ug/L	< 0.005
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.005	ug/L	< 0.005
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.005	ug/L	< 0.005
N-ethyl-perfluorooctanesulfonamidoacetic acid (N- EtFOSAA) ^{N11}	0.005	ug/L	< 0.005
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.005	ug/L	< 0.005
13C8-FOSA (surr.)	1	%	58
D3-N-MeFOSA (surr.)	1	%	73



Client Sample ID			HYAN0007M/5 9160421
Sample Matrix			Water
Eurofins Sample No.			M21-Ap39158
Date Sampled			Apr 16, 2021
•	LOB	Linit	Apr 10, 2021
Test/Reference Perfluoroalkyl sulfonamido substances- Trace	LOR	Unit	
-		0/	00
D5-N-EtFOSA (surr.)	1	%	83
D7-N-MeFOSE (surr.)	1	%	64
D9-N-EtFOSE (surr.)	1	%	64
D5-N-EtFOSAA (surr.)	1	%	80
D3-N-MeFOSAA (surr.)	1	%	90
Perfluoroalkyl carboxylic acids (PFCAs) - Trace	T		
Perfluorobutanoic acid (PFBA) ^{N11}	0.005	ug/L	< 0.005
Perfluoropentanoic acid (PFPeA) ^{N11}	0.001	ug/L	< 0.001
Perfluorohexanoic acid (PFHxA) ^{N11}	0.001	ug/L	< 0.001
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.001	ug/L	< 0.001
Perfluorooctanoic acid (PFOA) ^{N11}	0.001	ug/L	< 0.001
Perfluorononanoic acid (PFNA) ^{N11}	0.001	ug/L	< 0.001
Perfluorodecanoic acid (PFDA) ^{N11}	0.001	ug/L	< 0.001
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.001	ug/L	< 0.001
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.001	ug/L	< 0.001
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.001	ug/L	< 0.001
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.001	ug/L	< 0.001
13C4-PFBA (surr.)	1	%	76
13C5-PFPeA (surr.)	1	%	84
13C5-PFHxA (surr.)	1	%	86
13C4-PFHpA (surr.)	1	%	113
13C8-PFOA (surr.)	1	%	93
13C5-PFNA (surr.)	1	%	104
13C6-PFDA (surr.)	1	%	83
13C2-PFUnDA (surr.)	1	%	50
13C2-PFDoDA (surr.)	1	%	61
13C2-PFTeDA (surr.)	1	%	76
Perfluoroalkyl sulfonic acids (PFSAs)- Trace			
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.001	ug/L	< 0.001
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.001	ug/L	< 0.001
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.001	ug/L	< 0.001
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.001	ug/L	< 0.001
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.001	ug/L	< 0.001
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.001	ug/L	< 0.001
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.001	ug/L	< 0.001
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.001	ug/L	< 0.001
13C3-PFBS (surr.)	1	%	80
18O2-PFHxS (surr.)	1	%	87
13C8-PFOS (surr.)	1	%	58
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace	—		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.001	ug/L	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.005	ug/L	< 0.005
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.001	ug/L	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	0.001	ug/L	< 0.001
13C2-4:2 FTS (surr.)	1	%	115
13C2-6:2 FTSA (surr.)	1	%	84



Client Sample ID			HYAN0007M/5 9160421
Sample Matrix			Water
Eurofins Sample No.			M21-Ap39158
Date Sampled			Apr 16, 2021
Test/Reference	LOR	Unit	
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace	!		
13C2-8:2 FTSA (surr.)	1	%	138
13C2-10:2 FTSA (surr.)	1	%	74



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
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Apr 23, 2021	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 2013 NEPM Fractions	Melbourne	Apr 23, 2021	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons	Melbourne	Apr 23, 2021	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Total Recoverable Hydrocarbons - 1999 NEPM Fractions	Melbourne	Apr 23, 2021	7 Days
- Method: LTM-ORG-2010 TRH C6-C40			
Per- and Polyfluoroalkyl Substances (PFASs) - Trace			
PFASs Summations	Melbourne	Apr 27, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances- Trace	Melbourne	Apr 27, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl carboxylic acids (PFCAs) - Trace	Melbourne	Apr 27, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)- Trace	Melbourne	Apr 27, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace	Melbourne	Apr 27, 2021	14 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level			



Company Name:

Address:

Environment Testing

Australia

Melbourne 6 Monterey Road Dandenong South VIC 3175 16 Mars Road Phone: +61 3 8564 5000 NATA # 1261

Site # 1254 & 14271

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Golder Associates Pty Ltd (WA)

Level 3, 1 Havelock Street West Perth

WA 6005

WESTERN RIDGE-AFGHAN SPRINGS

Project Name: Project ID: 21464272 Order No.: Report #:

Fax:

789501

Brisbane

Phone: 08 9213 7600 03 8862 3501

Received: Apr 19, 2021 10:40 AM

Due: Apr 26, 2021 **Priority:** 5 Day

Contact Name: Christian Budimuljono

Eurofins Analytical Services Manager: Rhys Thomas

		Sa	mple Detail			Total Recoverable Hydrocarbons	Per- and Polyfluoroalkyl Substances (PFASs)
Melb	ourne Laborato	ry - NATA Site	# 1254 & 142	71		Х	Х
Sydr	ey Laboratory -	NATA Site # 1	8217				
Brisk	oane Laboratory	/ - NATA Site #	20794				
Perth	Laboratory - N	ATA Site # 237	36				
Mayf	ield Laboratory	- NATA Site # :	25079				
Exte	rnal Laboratory		·				
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	HYAN0007M/5 9160421	Apr 16, 2021	11:30AM	Water	M21-Ap39158	Х	Х
Test	Counts					1	1



Internal Quality Control Review and Glossary

General

- 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 ug/L: micrograms per litre ug/L: micrograms per litre

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.

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

QC Data General Comments

- 1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- 2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- 3. Organochlorine Pesticide analysis where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- 4. Organochlorine Pesticide analysis where reporting Spike data, Toxaphene is not added to the Spike.
- 5. Total Recoverable Hydrocarbons where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
- 6. pH and Free Chlorine analysed in the laboratory Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time.

 Analysis will begin as soon as possible after sample receipt.
- 7. Recovery Data (Spikes & Surrogates) where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- 8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- 9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.

10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.



Quality Control Results

Test	Units	Result 1	Acceptance Limits	Pass Limits	Qualifying Code
Method Blank					
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene	mg/L	< 0.01	0.01	Pass	
TRH C6-C10	mg/L	< 0.02	0.02	Pass	
TRH >C10-C16	mg/L	< 0.05	0.05	Pass	
TRH >C16-C34	mg/L	< 0.1	0.1	Pass	
TRH >C34-C40	mg/L	< 0.1	0.1	Pass	
Method Blank	J			•	
Total Recoverable Hydrocarbons					
TRH C6-C9	mg/L	< 0.02	0.02	Pass	
Method Blank	<u> </u>				
Total Recoverable Hydrocarbons - 1999 NEPM Fractions				T .	
TRH C10-C14	mg/L	< 0.05	0.05	Pass	
TRH C15-C28	mg/L	< 0.1	0.1	Pass	
TRH C29-C36	mg/L	< 0.1	0.1	Pass	
Method Blank	IIIg/L	V 0.1	0.1	1 433	
Perfluoroalkyl sulfonamido substances- Trace		T T			
Perfluorocatane sulfonamide (FOSA)	ug/L	< 0.005	0.005	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.005	0.005	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.005	0.005	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.005	0.005	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.005	0.005	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.005	0.005	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)		< 0.005	0.005	Pass	
Method Blank	ug/L	< 0.005	0.005	Fass	
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Τ	
` , , ,	/I	+ O OOF	0.005	Door	
Perfluorobutanoic acid (PFBA)	ug/L	< 0.005	0.005	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.001	0.001	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.001	0.001	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.001	0.001	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.001	0.001	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.001	0.001	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.001	0.001	Pass	
Perfluorotridecanoic acid (PFTrDA)	ug/L	< 0.001	0.001	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.001	0.001	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.001	0.001	Pass	
Perfluorotetradecanoic acid (PFTeDA)	ug/L	< 0.001	0.001	Pass	
Method Blank				T	
Perfluoroalkyl sulfonic acids (PFSAs)- Trace				<u> </u>	
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.001	0.001	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.001	0.001	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.001	0.001	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.001	0.001	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.001	0.001	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.001	0.001	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.001	0.001	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.001	0.001	Pass	
Method Blank					
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.001	0.001	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	ug/L	< 0.005	0.005	Pass	



Test	Units	Result 1	Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.001	0.001	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.001	0.001	Pass	
LCS - % Recovery					
Total Recoverable Hydrocarbons - 2013 NEPM Fractions					
Naphthalene	%	108	70-130	Pass	
TRH C6-C10	%	121	70-130	Pass	
TRH >C10-C16	%	70	70-130	Pass	
LCS - % Recovery					
Total Recoverable Hydrocarbons					
TRH C6-C9	%	123	70-130	Pass	
LCS - % Recovery					
Total Recoverable Hydrocarbons - 1999 NEPM Fractions					
TRH C10-C14	%	71	70-130	Pass	
LCS - % Recovery					
Perfluoroalkyl sulfonamido substances- Trace					
Perfluorooctane sulfonamide (FOSA)	%	111	50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	148	50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	147	50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	123	50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	126	50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	123	50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	136	50-150	Pass	
LCS - % Recovery					
Perfluoroalkyl carboxylic acids (PFCAs) - Trace					
Perfluorobutanoic acid (PFBA)	%	106	50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	142	50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	118	50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	89	50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	111	50-150	Pass	
Perfluorononanoic acid (PFNA)	%	106	50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	121	50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	133	50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	127	50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	115	50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	108	50-150	Pass	
LCS - % Recovery					
Perfluoroalkyl sulfonic acids (PFSAs)- Trace					
Perfluorobutanesulfonic acid (PFBS)	%	112	50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	128	50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	121	50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	110	50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	109	50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	109	50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	139	50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	101	50-150	Pass	
LCS - % Recovery			, , , , , , , , , , , , , , , , , , , ,		
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace					
1H.1H.2H.perfluorohexanesulfonic acid (4:2 FTSA)	%	117	50-150	Pass	
1H.1H.2H.perfluorooctanesulfonic acid (6:2 FTSA)	%	121	50-150	Pass	
1H.1H.2H.perfluorodecanesulfonic acid (8:2 FTSA)	%	149	50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	%	73	50-150	Pass	



Test	Lab Sample ID	QA Source	Units	Result 1	Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery							
Total Recoverable Hydrocarbons -	2013 NEPM Fract	ions		Result 1			
TRH >C10-C16	M21-Ap30738	NCP	%	117	70-130	Pass	
Spike - % Recovery							
Total Recoverable Hydrocarbons -	1999 NEPM Fract	ions		Result 1			
TRH C10-C14	M21-Ap30738	NCP	%	120	70-130	Pass	
Spike - % Recovery							
Perfluoroalkyl sulfonamido substa	nces- Trace			Result 1			
Perfluorooctane sulfonamide (FOSA)	M21-Ap42492	NCP	%	107	50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M21-Ap42492	NCP	%	122	50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M21-Ap42492	NCP	%	116	50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M21-Ap42492	NCP	%	110	50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M21-Ap42492	NCP	%	142	50-150	Pass	
N-ethyl- perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M21-Ap42492	NCP	%	97	50-150	Pass	
N-methyl- perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M21-Ap42492	NCP	%	92	50-150	Pass	
Spike - % Recovery							
Perfluoroalkyl carboxylic acids (Pf	CAs) - Trace			Result 1			
Perfluorobutanoic acid (PFBA)	M21-Ap42492	NCP	%	125	50-150	Pass	
Perfluoropentanoic acid (PFPeA)	M21-Ap42492	NCP	%	138	50-150	Pass	
Perfluorohexanoic acid (PFHxA)	M21-Ap42492	NCP	%	124	50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	M21-Ap42492	NCP	%	90	50-150	Pass	
Perfluorooctanoic acid (PFOA)	M21-Ap42492	NCP	%	103	50-150	Pass	
Perfluorononanoic acid (PFNA)	M21-Ap42492	NCP	%	114	50-150	Pass	
Perfluorodecanoic acid (PFDA)	M21-Ap42492	NCP	%	114	50-150	Pass	
Perfluorotridecanoic acid (PFTrDA) Perfluoroundecanoic acid	M21-Ap42492	NCP	%	134	50-150	Pass	
(PFUnDA)	M21-Ap42492	NCP	%	126	50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	M21-Ap42492	NCP	%	129	50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M21-Ap42492	NCP	%	77	50-150	Pass	
Spike - % Recovery	<u> </u>						
Perfluoroalkyl sulfonic acids (PFS	As)- Trace			Result 1			
Perfluorobutanesulfonic acid (PFBS)	M21-Ap42492	NCP	%	118	50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	M21-Ap42492	NCP	%	88	50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M21-Ap42492	NCP	%	106	50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M21-Ap42492	NCP	%	107	50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M21-Ap42492	NCP	%	107	50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M21-Ap42492	NCP	%	105	50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	M21-Ap42492	NCP	%	122	50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	M21-Ap42492	NCP	%	50	50-150	Pass	
Spike - % Recovery	:						
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace			Result 1			<u> </u>



Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H-2H- perfluorohexanesulfonic acid (4:2 FTSA)	M21-Ap42492	NCP	%	110			50-150	Pass	
1H.1H.2H.2H- perfluorooctanesulfonic acid (6:2 FTSA)	M21-Ap42492	NCP	%	117			50-150	Pass	
1H.1H.2H.2H- perfluorodecanesulfonic acid (8:2 FTSA)	M21-Ap42492	NCP	%	136			50-150	Pass	
1H.1H.2H.2H- perfluorododecanesulfonic acid (10:2 FTSA)	M21-Ap42492	NCP	%	115			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate					<u> </u>				
Total Recoverable Hydrocarbons -	2013 NEPM Fract	ions		Result 1	Result 2	RPD			
Naphthalene	M21-Ap42824	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
TRH C6-C10	M21-Ap42824	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
TRH >C10-C16	S21-Ap33235	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH >C16-C34	S21-Ap33235	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
TRH >C34-C40	S21-Ap33235	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate	,		g/ =						
Total Recoverable Hydrocarbons				Result 1	Result 2	RPD	Τ		
TRH C6-C9	M21-Ap42824	NCP	mg/L	< 0.02	< 0.02	<1	30%	Pass	
Duplicate	I WILL TOTALOUT	1401	mg/L	1 0.02	\ 0.02		0070	1 455	
Total Recoverable Hydrocarbons -	1999 NEPM Fract	ions		Result 1	Result 2	RPD			
TRH C10-C14	S21-Ap33235	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
TRH C15-C28	S21-Ap33235	NCP	mg/L	< 0.03	< 0.03	<1	30%	Pass	
TRH C29-C36	S21-Ap33235	NCP	mg/L	< 0.1	< 0.1	<1	30%	Pass	
Duplicate	021-Ap33233	INCI	IIIg/L	<u> </u>	<u> </u>		3078	1 033	
Perfluoroalkyl sulfonamido substa	inces- Trace			Result 1	Result 2	RPD			
Perfluorooctane sulfonamide	Trace			TCSuit 1	TCSuit 2	IXI D			
(FOSA)	M21-Ap42491	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	M21-Ap42491	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	M21-Ap42491	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	M21-Ap42491	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	M21-Ap42491	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-ethyl- perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	M21-Ap42491	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
N-methyl- perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	M21-Ap42491	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (Pl	CAs) - Trace			Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	M21-Ap42491	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
Perfluoropentanoic acid (PFPeA)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorohexanoic acid (PFHxA)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorooctanoic acid (PFOA)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorononanoic acid (PFNA)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	



Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs) - Trace				Result 1	Result 2	RPD			
Perfluorododecanoic acid (PFDoDA)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonic acids (PFSAs)- Trace				Result 1	Result 2	RPD			
Perfluorobutanesulfonic acid (PFBS)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorononanesulfonic acid (PFNS)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluoropropanesulfonic acid (PFPrS)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluoropentanesulfonic acid (PFPeS)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorooctanesulfonic acid (PFOS)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Perfluorodecanesulfonic acid (PFDS)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
Duplicate									
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Trace				Result 1	Result 2	RPD			
1H.1H.2H.2H- perfluorohexanesulfonic acid (4:2 FTSA)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
1H.1H.2H.2H- perfluorooctanesulfonic acid (6:2 FTSA)	M21-Ap42491	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
1H.1H.2H.2H- perfluorodecanesulfonic acid (8:2 FTSA)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<1	30%	Pass	
1H.1H.2H.2H- perfluorododecanesulfonic acid (10:2 FTSA)	M21-Ap42491	NCP	ug/L	< 0.001	< 0.001	<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

F2 is determined by arithmetically subtracting the "naphthalene" value from the ">C10-C16" value. The naphthalene value used in this calculation is obtained from volatiles (Purge & Trap analysis).

N01

Where we have reported both volatile (P&T GCMS) and semivolatile (GCMS) naphthalene data, results may not be identical. Provided correct sample handling protocols have been followed, any observed differences in results are likely to be due to procedural differences within each methodology. Results determined by both techniques have passed all QAQC acceptance criteria, and are entirely technically valid.

N02

F1 is determined by arithmetically subtracting the "Total BTEX" value from the "C6-C10" value. The "Total BTEX" value is obtained by summing the concentrations of BTEX analytes. The "C6-C10" value is obtained by quantitating against a standard of mixed aromatic/aliphatic analytes. N04

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.

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). N15

Authorised by:

N11

Rhys Thomas Analytical Services Manager Joseph Edouard Senior Analyst-Organic (VIC) Joseph Edouard Senior Analyst-PFAS (VIC) Vivian Wang Senior Analyst-Volatile (VIC)

Glenn Jackson **General Manager**

Final Report - this report replaces any previously issued Report

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

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

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May 2021 21464272-003-R-Rev0

APPENDIX E

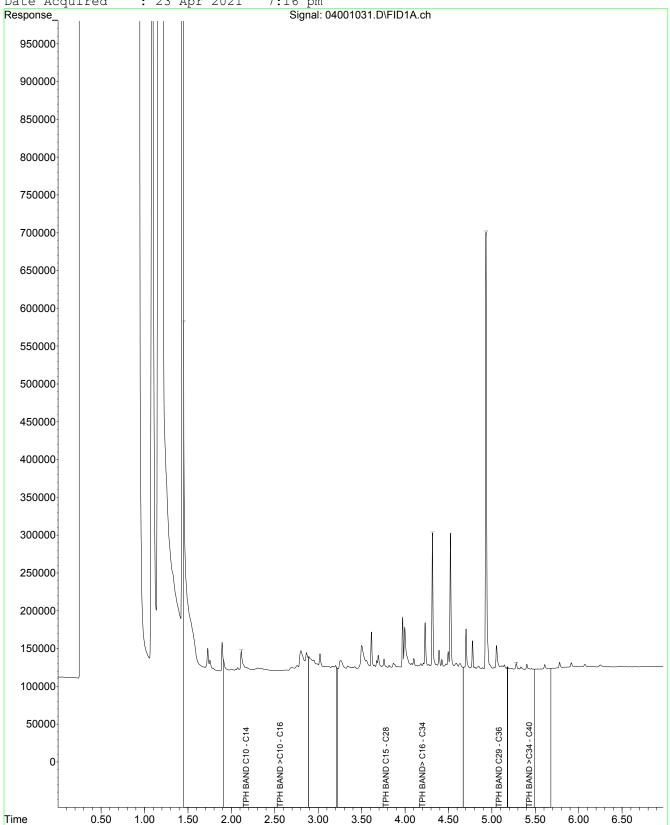
Chromatographs



Fraction Scheme :

Data File : 04001031.D Laboratory Number: EP2104242-003 Sample ID : HXAN0008M

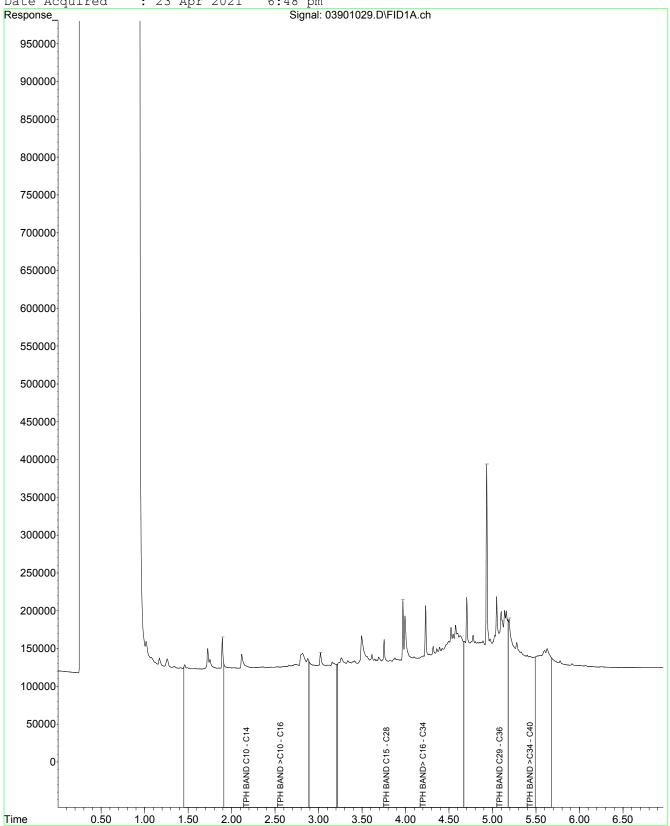
Date Acquired : 23 Apr 2021 7:16 pm



Fraction Scheme :

Data File : 03901029.D Laboratory Number: EP2104242-002 Sample ID : HXAN0007M

Date Acquired : 23 Apr 2021 6:48 pm



May 2021 21464272-003-R-Rev0

APPENDIX F

Important Information





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The scope of Golder's Services and the period of time they relate to are determined by the Contract and are subject to restrictions and limitations set out in the Contract. If a service or other work is not expressly referred to in this Report, do not assume that it has been provided or performed. If a matter is not addressed in this Report, do not assume that any determination has been made by Golder in regards to it.

At any location relevant to the Services conditions may exist which were not detected by Golder, in particular due to the specific scope of the investigation Golder has been engaged to undertake. Conditions can only be verified at the exact location of any tests undertaken. Variations in conditions may occur between tested locations and there may be conditions which have not been revealed by the investigation and which have not therefore been taken into account in this Report.

Golder accepts no responsibility for and makes no representation as to the accuracy or completeness of the information provided to it by or on behalf of the Client or sourced from any third party. Golder has assumed that such information is correct unless otherwise stated and no responsibility is accepted by Golder for incomplete or inaccurate data supplied by its Client or any other person for whom Golder is not responsible. Golder has not taken account of matters that may have existed when the Report was prepared but which were only later disclosed to Golder.

Having regard to the matters referred to in the previous paragraphs on this page in particular, carrying out the Services has allowed Golder to form no more than an opinion as to the actual conditions at any relevant location. That opinion is necessarily constrained by the extent of the information collected by Golder or otherwise made available to Golder. Further, the passage of time may affect the accuracy, applicability or usefulness of the opinions, assessments or other information in this Report. This Report is based upon the information and other circumstances that existed and were known to Golder when the Services were performed and this Report was prepared. Golder has not considered the effect of any possible future developments including physical changes to any relevant location or changes to any laws or regulations relevant to such location.

Where permitted by the Contract, Golder may have retained subconsultants affiliated with Golder to provide some or all of the Services. However, it is Golder which remains solely responsible for the Services and there is no legal recourse against any of Golder's affiliated companies or the employees, officers or directors of any of them.

By date, or revision, the Report supersedes any prior report or other document issued by Golder dealing with any matter that is addressed in the Report.

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