

Eastern Ridge Mine Site

Limited Site Investigation for Per- and Polyfluoroalkyl Substances

BHP Iron Ore Pty Ltd



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EASTERN RIDGE MINE SITE

Limited Site Investigation for Per- and Polyfluoroalkyl Substances

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EXECUTIVE SUMMARY

Tetra Tech Coffey Australia Pty Ltd (Tetra Tech) were commissioned by BHP Billiton Iron Ore Pty Ltd (BHPBIO) to undertake a per- and polyfluoroalkyl substances (PFAS) focused Limited Site Investigation (LSI) at the Eastern Ridge Mine Site (the 'site'). The site is located in the interior Pilbara region of Western Australia, immediately north of the town of Newman. A site location plan is included as Figure 1.

Following the initial and preliminary identification of PFAS in groundwater in the vicinity of BHP's Eastern Ridge Mine Site in November 2020, BHP initiated this Limited Site Investigation (LSI) to assess the nature and extent of PFAS in groundwater, with a focus on water which may be abstracted during pit dewatering activities and which may have pathways to sensitive receptors within or surrounding the Eastern Ridge Mine Site tenements. This preliminary assessment comprised of two data collection events which involved extensive desktop studies and sampling of groundwater, surface water and sediment; the results of which have been documented in factual memorandums following completion of each event. These first two data collection events have since been complemented by a third round of targeted sampling at selected locations at the site. This LSI report documents the works and findings of the assessment to date in its entirety.

OBJECTIVES

The overarching objective of the LSI is to provide an initial and holistic understanding of the magnitude and extent of PFAS impacts in groundwater across the site. This will be used to provide a preliminary understanding of risk and assess the likelihood that PFAS impacts could impact potential human or ecological receptors. Specific objectives of the following scope of work are:

- To broadly characterise and understand the distribution of PFAS impacts in groundwater and determine areas of the Eastern Ridge operations which may be contributing to any identified impacts.
- To provide an indication of potential sources associated with the presence of PFAS in groundwater.
- To provide an initial understanding of the migration of PFAS impacts in groundwater and an assessment of relevant source-pathway-receptor linkages in the context of abstraction of PFAS impacted groundwater via dewatering activities.
- To assess whether current dewatering activities are resulting in abstraction of PFAS impacted groundwater and if this presents an actual or perceived risk to relevant receptors.
- To assess the likelihood that PFAS impacted groundwater will be dewatered during future proposed dewatering at OB32.
- To measure PFAS concentrations in groundwater at the Ethel Gorge Threatened Ecological Community (TEC) to assist in understanding potential impact to endemic stygofauna in the region.

SCOPE OF WORKS

To satisfy the above objectives, Tetra Tech Coffey completed the following scope of works:

- A desktop review of the site's setting
- Development of a high-level sampling plan
- Completion of three rounds of sampling of the following:
 - Groundwater monitoring wells
 - Production bores
 - Surface water

ENVIRONMENTAL SETTING

The site lies within the Hamersley Basin, which is comprised primarily of strata of the Hamersley Group. The major aquifer units in the area comprise fractured rock aquifers of the Brockman and Marra Mamba Iron Formations (both Banded Iron Formation units) and the dolomite aquifer of the Wittenoom Formation (comprising the Bee Gorge and Paraburdoo Members). In addition, shallow groundwater resources are present within the calcrete which is present to the south and east of the investigation area. This calcrete has higher hydraulic conductivities than other formations present within the area of investigation.

Groundwater generally flows in an easterly direction beneath Eastern Ridge but is heavily influenced by dewatering and reinfiltration of dewatering effluent at the recharge ponds and Ophthalmia Dam. Additionally, the presence of the Homestead Fault serves to separate groundwater flows between OB32 and the rest of Eastern Ridge.

With the exception of Ophthalmia Dam, surface water bodies within the area of investigation are limited to ephemeral creeks. Ophthalmia Dam is an artificially formed surface water body located on the Upper Fortescue River approximately 100km upstream from Fortescue Marsh and 12km east of Newman. By slowing surface water runoff, the Dam replenishes the downstream alluvial and calcrete aquifers. These aquifers support the Ophthalmia Borefield which has supplied potable and process water to Newman. They are also home to the Ethel Gorge Threatened Ecological (stygo fauna) Community.

CONCLUSIONS

Based on the results of this LSI, Tetra Tech makes the following conclusions.

PFAS Source Zones and Activities

The following have been identified as likely sources of PFAS in groundwater at Eastern Ridge include:

- Historical testing of fire suppression systems on mobile plant which is understood to have occurred within the OB23 and OB25 pits.
- Discharge of PFAS containing effluent from Newman wastewater treatment plant (WWTP) which is operated by the Shire of East Pilbara and has resulted in sediment impacts within the downgradient drainage channels.
- Sediment within recharge ponds or which has recently been excavated from the ponds and is stockpiled nearby.
- PFAS-containing groundwater being abstracted from various locations and subsequently discharged to the recharge ponds or Ophthalmia Dam.

In addition to the above, the following have been identified as potentially being sources of PFAS in groundwater at Eastern Ridge:

- An unidentified source at OB32 which is located hydraulically cross- and up-gradient of likely and potential sources and where a shallow PFAS plume is present.
- Groundwater impacts resulting from historical activities at Mount Whaleback, located to the south-west of the site. Such impacts may migrate towards Eastern Ridge, particularly under hydraulic gradients created by dewatering.
- Newman airport where it is likely firefighting training exercises using PFAS containing AFFF have historically been undertaken.
- Newman townsite which may have a variety of activities which could lead to the discharge of PFAS.

Distribution of Groundwater Impacts

Based on the results of groundwater sampling, the following areas are underlain by PFAS containing groundwater :

- To the north, east and south of the recharge ponds, extending north beneath Ethel Gorge and the Fortescue River and to the south in the vicinity of Homestead Creek. This plume is likely to follow the

alignment of the shallow calcrete formation which will likely constitute a preferential pathway for PFAS migration.

- To the north, east and south of OB23, with the plume likely to comingle with the recharge ponds plume.
- Emanating from the Newman WWTP discharge location and extending across the OB25. This plume may also comingle with the plume emanating from Mount Whaleback.
- Within OB32 where a shallow plume is present within the centre of the ore body. Unlike elsewhere, this plume is dominated by PFBS and a range of carboxylic acids, with relatively minor concentrations of PFOS, albeit at concentrations exceeding the 99% FWG.

PFAS Transport

The following migration pathways have been identified as dominating the transport of PFAS at the site:

- Abstraction of PFAS containing groundwater and subsequent discharge and/or infiltration at the recharge ponds and Ophthalmia Dam.
- Lateral flow within groundwater, which generally flows in an easterly direction but is heavily influenced by hydraulic gradients resulting from dewatering activities.

The extent to which PFAS transport is influenced by surface flow, either during discharge of produced water/treated effluent or during flood events is not yet known.

Exposure Pathways

Based on the conceptual site model developed during the course of this investigation the following complete or potentially complete exposure pathways exist in relation to PFAS at the site.

- Complete – direct contact with, and uptake from, PFAS containing surface water and sediment by flora and fauna downgradient of the Newman WWTP.
- Complete – direct contact with, and uptake from, PFAS containing surface water and sediment by flora and fauna within Whaleback Creek or Homestead Creek downgradient of the Newman WWTP.
- Complete – direct contact with, and uptake from, PFAS containing surface water and sediment by flora and fauna within Ophthalmia Dam.
- Potentially complete - bioaccumulation and biomagnification through the food chain as a result of ingestion and uptake of PFAS at Ophthalmia Dam or near the WWTP.
- Potentially complete – direct contact with, and uptake of, PFAS in groundwater by deep rooted trees and riparian plants
- Potentially complete - direct contact with, and uptake of, PFAS in surface water by riparian plants following periods of high rainfall and subsequent overtopping of the recharge ponds.
- Potentially complete – Direct contact with, and ingestion of, PFAS containing groundwater by stygofauna following infiltration of water at either the recharge ponds or Ophthalmia Dam.
- Potentially complete – ingestion of PFAS containing water abstracted from Ophthalmia borefield. It is noted that current concentrations of PFAS in this area remain significantly below any published assessment criteria. However, future migration from the recharge ponds and/or OB23 may lead to increased presence of PFAS.

Data Gap Assessment

Five data gaps were identified during the development of this investigation. Their current status is set out below.

Data Gap 1 – What are the potential sources which may be contributing to the presence of PFAS in groundwater at Eastern Ridge?

Sources of PFAS beneath Eastern Ridge have broadly been characterised during this investigation but confirmation of the source at OB32 and comprehensive identification of off-site sources has not yet been achieved. As such this data gap is considered to be partially addressed.

Data Gap 2 - Is PFAS-containing groundwater currently present and being abstracted as part of operations at Eastern Ridge?

The results of production bore and recharge pond water confirm that PFAS containing groundwater is being abstracted from limited areas of Eastern Ridge. However, the concentrations observed in production bores have been shown to be significantly below those observed in samples taken from shallower depths in monitoring wells. This data gap is considered to be addressed.

Data Gap 3 - If PFAS-containing effluent currently, or has historically been, discharged at Eastern Ridge, has this resulted in the presence of PFAS in surface water or groundwater in the vicinity of the discharge points?

Concentrations of PFAS within and around the recharge ponds confirm that discharge of PFAS containing effluent has occurred and has resulted in the presence of PFAS in groundwater in this area. The presence of PFAS in surface water at Ophthalmia Dam cannot solely be attributed to Eastern Ridge as it currently and has historically accepted water from multiple locations. No investigation of surface water quality in Creeks around Eastern Ridge has been completed as part of this scope. This data gap is considered to be partially addressed.

Data Gap 4 - Are the potential risks to either human or ecological receptors understood?

Risks to human health are considered to be low, with no confirmed complete SPR linkages and the only potentially complete linkages relating to the Ophthalmia borefield. Potential risks to ecological receptors, whilst identified, are not fully understood and require further assessment in the form of an ecological risk assessment. This data gap is considered to be partially addressed.

Data Gap 5 – Is PFAS containing groundwater likely to be abstracted during planned dewatering at OB32?

An unknown source of PFAS is inferred to exist at OB32 and as such, the possibility of abstracting PFAS-containing groundwater cannot be discounted. However, the results of vertical delineation and production bore sampling show that PFAS concentrations decrease significantly with depth and as such any concentrations in dewatering effluent are likely to be extremely low. This data gap is considered to be partially addressed.

RECOMMENDATIONS

Based on the findings of this investigation, Tetra Tech makes the following recommendations:

1. Additional investigations should be undertaken to characterise PFAS downgradient of the Newman WWTP, which is owned and operated by the Shire of East Pilbara. This is required to address the following data gaps with respect to the CSM:

- The magnitude and extent of the PFAS source within this area which may contribute to groundwater impacts.
- Delineation of the PFAS groundwater plume so that the significance of this source in the context of dewatering and abstraction for other purposes may be understood.
- Surface water flow paths such that discharge locations to Creeks may be better understood.

- The risks to ecological receptors which may be present in this area or may associated via the food web.
2. Further source identification and subsequent characterisation should be undertaken in the following areas:
- OB25 to determine the source of PFAS in sumps
 - OB32 where there is an apparent source, noting that this ore body is located up-hydraulic gradient of identified potential sources.
 - The old fuel farm and fire training ground

In addition to assessing the sources of PFAS in groundwater, these investigations will quantify the contribution of PFAS at these primary source zones, provide an understanding of the presence of ongoing or residual secondary source contribution and allow the potential for risks to ecological or human health receptors to be further understood.

3. A surface water sampling programme should be undertaken at Ophthalmia Dam and other surface water bodies (ephemeral or permanent) to characterise the presence of PFAS in surface water. This should include assessment of the interactions between surface water, sediment and groundwater. It should also include assessment of other potential sources beyond those related to BHP's operations.

4. Further investigation is required to determine if the results observed at HNPIWR003 (the most easterly well sampled) are related to the recharge ponds as a source or if there another potential source in this area, which may require further investigation.

5. Site procedures should be reviewed to ensure that AFFF products are not discharged to ground during routine servicing and maintenance of mobile plant. This should occur even where AFFFs have been transitioned to fluorine-free products, unless it can be demonstrated that equipment has first been adequately decontaminated such that no residual PFAS remains.

6. A monitoring programme should be designed and implemented to confirm that no PFAS is present in bores supplying water to Newman. This programme should include appropriate sentinel wells to allow early identification of risks.

7. Where total PFAS concentrations have been recorded above or close to the DWG, total oxidisable precursor (TOP) assay analysis should be undertaken to understand the predicted concentrations of stable end-point compounds which may occur as a result of precursor transformation over time rather than just those which are measured as part of the standard PFAS analysis undertaken to date.

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
ACM	Asbestos Containing Material
AEC	Area of Environmental Concern
BHP	BHP Iron Ore Pty Ltd
BIF	Banded Iron Formation
CoC	Chain of Custody
CoPC	Contaminant of Potential Concern
DQO	Data Quality Objective
DWER	Department of Water and Environmental Regulation
DWG	Drinking Water Guideline
EPBC	Environment Protection and Biodiversity Conservation
ESWMS	Environmental Safe Work Method Statement
FWG	Freshwater Guideline
HDPE	High-Density Polyethylene
HEPA	Heads of EPA
HSSE	Health, Safety, Security and Environment
JHA	Job Hazard Analysis
LNAPL	Light Non-Aqueous Phase Liquid
LSI	Limited Site Investigation
mbgl	Metres Below Ground Level
NEMP	National Environmental Management Plan
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NR	Not Registered
N/A	Not Applicable
OB	Ore Body
PFAS	Per- and Polyfluoroalkyl Substances
PFBS	Perfluorobutane sulfonic acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonic Acid
QA/QC	Quality Assurance / Quality Control
SRN	Sample Receipt Notification
SWL	Standing Water Level
SWP	Safe Work Procedure
TEC	Threatened Ecological Community
Tetra Tech	Tetra Tech Coffey Pty Ltd

WRC	Water Resources Council
WWTP	Wastewater Treatment Plant

1. INTRODUCTION

Tetra Tech Coffey Australia Pty Ltd (Tetra Tech) were commissioned by BHP Iron Ore Pty Ltd (BHP) to undertake a per- and polyfluoroalkyl substances (PFAS) focused Limited Site Investigation (LSI) at the Eastern Ridge Mine Site (the 'site'). The site is located in the interior Pilbara region of Western Australia, immediately north of the town of Newman. A site location plan is included as Figure 1.

1.1 BACKGROUND

The Eastern Ridge (the 'site') mining operations are located between three and 13 kilometres north east of the Newman Township on Mineral Lease 244SA. The Eastern Ridge mining operations consists of a number of operations including Orebody 23, Orebody 24, Orebody 25, Orebody 32 and the new Orebody 25 West. Mining activities at the site are undertaken in accordance with the Eastern Ridge Ministerial Statement 1037 and it understood that the data collected and documented within this report may be used to support a proposed amendment to under Section 45 of Part IV of the Environmental Protection Act for future dewatering of Ore Body 32 (OB32) which is part of Eastern Ridge. A Site Location Plan is presented in Figure 1 and the area of investigation is shown of Figure 2.

Following the initial and preliminary identification of PFAS in groundwater in the vicinity of BHP's Eastern Ridge Mine Site in November 2020, BHP initiated this Limited Site Investigation (LSI) to assess the nature and extent of PFAS in groundwater, with a focus on water which may be abstracted during pit dewatering activities and which may have pathways to sensitive receptors within or surrounding the Eastern Ridge Mine Site tenements. This preliminary assessment comprised of two data collection events which involved extensive desktop studies and sampling of groundwater, surface water and sediment; the results of which have been documented in factual memorandums following completion of each event. These first two data collection events have since been complemented by a third round of targeted sampling at selected locations at the site. This LSI report documents the works and findings of the assessment to date in its entirety.

Whilst specific areas within Eastern Ridge have been subject to historical contaminated sites investigations relating to incidents or contaminating activities, it understood that the site has not been classified under the Contaminated Sites Act 2003.

1.2 OBJECTIVES

The overarching objective of the LSI is to provide an initial and holistic understanding of the magnitude and extent of PFAS impacts in groundwater across the site. This will be used to provide a preliminary understanding of risk and assess the likelihood that PFAS impacts could impact potential human or ecological receptors. Specific objectives of the following scope of work are:

- To broadly characterise and understand the distribution of PFAS impacts in groundwater and determine areas of the Eastern Ridge operations which may be contributing to any identified impacts.
- To provide an indication of potential off-site sources associated with the presence of PFAS in groundwater.
- To provide an initial understanding of the migration of PFAS impacts in groundwater and an assessment of relevant source-pathway-receptor linkages in the context of abstraction of PFAS impacted groundwater via dewatering activities.
- To assess whether current dewatering activities are resulting in abstraction of PFAS impacted groundwater and if this presents an actual or perceived risk to relevant receptors.
- To assess the likelihood that PFAS impacted groundwater will be dewatered during future proposed dewatering at OB32.

- To measure PFAS concentrations in groundwater at the Ethel Gorge Threatened Ecological Community (TEC) to assist in understanding potential impact to endemic stygofauna in the region.

1.3 SCOPE OF WORKS

To meet the above objectives, Tetra Tech completed the following scope of works which are documented in this LSI report. It should be noted that this investigation has been commissioned to solely assess PFAS as a contaminant of potential concern (COPC). As such, no other contaminants have been considered.

1.3.1 Desktop Review

Prior to mobilisation for round 1, the following desktop review items were undertaken:

- High-level review of potential sources of PFAS at Eastern Ridge
- Existing sampling data
- The suitability of the existing groundwater monitoring network
- Well construction details

This was used to prepare a high-level sampling plan for the round 1 of the field programme.

1.3.2 Round 1

As an initial phase of works (Round 1), the following scope of work was completed in November – December 2020.

- Development of a sampling plan based on the findings of an initial high-level desktop review of the following:
 - Potential sources of PFAS at Eastern Ridge;
 - The Eastern Ridge groundwater monitoring network, including well locations and construction details;
 - Production bore locations;
 - Discharge locations; and
 - Locations of potentially sensitive receptors.
- Collection of the following samples:
 - 37 from existing groundwater monitoring wells
 - 16 from operational production bores
 - Four surface water samples
 - Three from recharge ponds
 - One from Ophthalmia Dam.
- Laboratory analysis for a full suite of PFAS compounds to super ultra-trace detection limits,

1.3.3 Round 2

To validate the findings of the Round 1 sampling works, the following scope of work was completed during Round 2. Round 2 was largely completed in January – February 2021, with the exception of certain monitoring wells where sampling was undertaken in April due to flooding during the initial mobilisation.

- Collection of the following samples over a 12-day period:
 - 58 samples from 51 existing groundwater monitoring wells
 - 39 samples from 20 operational production bores
 - 10 surface water samples:

- One from Ophthalmia Dam
- One from the Newman wastewater treatment plant (WWTP) discharge point
- Four from sumps in Ore Body (OB) 25
- Four from recharge ponds
- Four sediment samples from the Newman WWTP
- Laboratory analysis for a full suite of PFAS compounds to super ultra-trace detection limits,

1.3.4 Round 3 – OB 32 Vertical Delineation and TEC Groundwater Sampling

The initial findings from Rounds 1 and 2 concluded that there appeared to be a broad distribution of trace-level PFAS in groundwater marginally exceeding the PFAS National Environmental Management Plan (NEMP) version 2.0 (HEPA, 2020) freshwater guideline (FWG) for 99% species protection (for PFOS) but below drinking water guidelines across a significant portion of Eastern Ridge. To progress the recommendations from Rounds 1 and 2, BHP commissioned Tetra Tech to complete the following additional works at OB32 and the TEC.

- Collection of groundwater samples from 17 locations at the threatened ecological community (TEC);
- Collection of groundwater samples from two production bores and six targeted groundwater monitoring wells at nominated depths to vertically delineate the PFAS distribution within OB32;
- Laboratory analysis for a full suite of PFAS compounds to super ultra-trace detection limits.

1.3.5 Reporting

This LSI report has been prepared in accordance with applicable regulations to document the investigation.

2. SITE IDENTIFICATION AND HISTORY

2.1 SITE INFORMATION

The site comprises Orebody (OB) 23, OB25W, OB25W Joffre, OB25P1, OB25P3, OB25P4, OB32E, OB33, Homestead West and Homestead East. The site also includes Ophthalmia Dam, with the wider area of investigation including Homestead Creek, Ethel Gorge and the Fortescue River immediately downgradient of Ophthalmia Dam. The site is located north of Newman, in the East Pilbara, WA. The site locality and site setting are illustrated in Figures 1 and 2. Certificates of title for the site do not exist as it is located on unallocated crown land as indicated by Landgate.

Site identification details are summarised in Table A.

Table A - Site Identification Details

Site Name	Eastern Ridge Mine Site
Site Address	Undefined – located north of Newman, WA
Mining Lease	Mining Lease 244 SA
Investigation Area	As depicted on Figure 2
Site Owner	Commonwealth of Australia
Site Occupier	BHP
Local Government Authority	Shire of East Pilbara
Zoning	The site is zoned as 'Rural' under the Shire of East Pilbara <i>Local Planning Scheme No. 4</i> .
Current Land Use	Iron ore mine site
Previous Land Use	Pastoral
Future Land Use	Continued iron ore mine site
DWER CS Act Classification	Possibly contaminated – investigation required

2.2 SURROUNDING LAND USES

The land uses directly surrounding the ER are presented in Figure 2 and include:

- The BHP Mt Whaleback mining operations to the southwest beyond which are OB29, OB30 and OB35;
- The town of Newman to the south;
- The Ophthalmia bore field to the east beyond which is the Ophthalmia Dam; and
- Unoccupied rural areas to the north and west.

2.3 CONTAMINATED SITES STATUS

2.3.1 On-site

Eastern Ridge was classified *possibly contaminated – investigation required* on 29 July 2020 following submission of a Form 1 notification by BHP. This classification was given as treated wastewater from the adjacent Newman WWTP has been discharging onto the site since approximately 2010. Wastewater has the potential to contain a range of contaminants, including PFAS.

The notice of classification requires soil, sediment, surface water and groundwater investigations to be undertaken to determine the contamination status of the site and to assess any potential risk to the Priority P1 Public Drinking Water Source Area within which the WWTP discharge point lies.

A copy of the notice of classification is included in Appendix A.

2.3.2 Off-site

A search of the Department of Water and Environmental (DWER) Contaminated Sites database indicates that there are no registered contaminated sites present within a 1km radius of the site. The closest registered sites are located to the south as detailed in Table B.

Table B - Summary of Classified Contaminated Sites

Address	ID No	Classification	Date of Classification	Nature and Extent of Contamination
<p>1328 Newman Drive Newman, WA, 6753 Lot 1328 On Plan 183375 Located approximately 13km southwest.</p>	2177	<i>Contaminated Restricted Use</i>	26/07/2013	<p>Hydrocarbons (such as from petrol) are present in groundwater as a plume in the southern portion of the site. Hydrocarbon-impacted soil remains in-situ beneath the location of former underground fuel storage tanks in the southern portion of the site at a depth of approximately 5 metres below the surface, and at a depth of approximately 1.2 metres below the surface along the site's southern boundary.</p>
<p>Unallocated Crown Land Newman, WA, 6753 Landgate Pin: 1121622 Located approximately 8km southwest.</p>	12297	<i>Contaminated - remediation required</i>	10/12/2020	<p>Soils and groundwater in the mine operations area are impacted by petroleum hydrocarbons (such as from diesel or oil), perfluoroalkyl and polyfluoroalkyl substances (PFAS) and asbestos.</p> <p>Petroleum hydrocarbons have been identified in surface and sub-surface soils to 45 meters below ground level, at the former power station site. Light non-aqueous phase liquid hydrocarbons (such as pure petrol or diesel) has been observed floating on the surface of the watertable beneath the former power station site.</p> <p>PFAS, associated with fire suppression foam application and disposal at the site, has been detected in groundwater beneath the site.</p> <p>Asbestos containing materials (ACM) are present in former and current asbestos waste disposal</p>

Address	ID No	Classification	Date of Classification	Nature and Extent of Contamination
				areas and in general landfill.
2339 Radio Hill Drive Newman, WA, 6753 Lot 2339 On Plan 218369 Located approximately 14km southwest.	20961	<i>Remediated for restricted use</i>	23/06/2011	Isolated areas of hydrocarbon-impacted soil (such as from diesel) remain on site following remediation.
1 Hilditch Avenue Newman, WA, 6753 Lot 18 On Plan 14767 Located approximately 13km southwest.	36079	<i>Remediated for restricted use</i>	05/04/2016	Uncontrolled fill material, potentially impacted with asbestos-contaminating materials (ACM), remains at depths greater than 0.3 metres at isolated locations across the site.
69 Newman Drive Newman, WA, 6753 Lot 21 On Plan 24130 Located approximately 13km southwest.	36080	<i>Remediated for restricted use</i>	05/04/2016	Uncontrolled fill material, potentially impacted with asbestos-contaminating materials (ACM), remains at depths greater than 0.3 metres at isolated locations across the site.
Mount Whaleback Mine Lot 19 On Plan 48921 Lot 555 On Plan 400578 Lot 556 On Plan 400578 Newman, WA, 6753 Located approximately 8km southwest.	75084 75087 75085 75086	<i>Contaminated - remediation required</i>	10/12/2020	Soils and groundwater in the mine operations area are impacted by petroleum hydrocarbons (such as from diesel or oil), perfluoroalkyl and polyfluoroalkyl substances (PFAS) and asbestos. Petroleum hydrocarbons have been identified in surface and sub-surface soils to 45 meters below ground level, at the former power station site. Light non-aqueous phase liquid hydrocarbons (LNAPL - such as pure petrol or diesel) has been observed floating on the surface of the water table beneath the former power station site. PFAS, associated with fire suppression foam application and disposal at the site, has been detected in groundwater beneath the site. ACM are present in former and current asbestos waste disposal areas and in general landfill.

Details relating to each site's classification is included as Appendix A. It should be noted that the sites not shown on DWER Contaminated Sites Database are those that:

- Are classified as Potentially Contaminated – Investigation Required”;
- Have been reported but not classified by DWER; and
- Have been classified by DWER but not yet registered in the online database.

2.4 HISTORICAL INVESTIGATIONS

Previous contaminated sites investigations at Eastern Ridge is listed below. A detailed summary of these investigations has been included as Appendix B.

- JBS&G (2014) Orebody 25 Former Fuel Farm Environmental Site Assessment: Stage 2 – Initial Groundwater Verification Sampling Program (ref: 43267-57631 Rev 1), August 2014, JBS&G (Australia) Pty Ltd;
- Coffey (2020) Eastern Ridge PFAS in Groundwater Investigation – Preliminary Findings (ref: 754-PEREN282113), December 2020, Coffey Services Australia Pty Ltd; and
- Coffey (2020) Eastern Ridge PFAS in Groundwater Investigation – Phase 2 Preliminary Findings (ref: 754-PEREN282113), February 2020, Coffey Services Australia Pty Ltd.

2.5 LICENCED ACTIVITIES

The mining operations at Eastern Ridge are licenced under Ministerial Statement Number 1037 published on 21 September 2016. The licence permits open-pit mining above the water table at Orebody 32 and below the water table at Orebody 24, Orebody 25, and Orebody 25 West. The licence permits BHP to conduct the following activities which are relevant to this investigation:

- Dewatering – Abstraction of up to 24 GL/annum of groundwater
- Surplus dewater management – Discharge of up to 19 GL/annum surplus dewater into Ophthalmia Dam
- Backfilling of mine pits – Orebody 25 Pit 1 and Pit 3 are to be backfilled to a level which will not allow the formation of permanent pit lakes
- Mine and associated infrastructure development (permitted to clear no more than 3,820 ha within the Eastern Ridge Development Envelope of 4,267 ha)
- Landfarming/bioremediation during Mine Closure Plan implementation
- Construction waste disposal
- Wastewater treatment and evaporation ponds
- Biosolids disposal/wastewater irrigation
- Vehicle and machinery maintenance

3. SITE ENVIRONMENTAL SETTING

3.1 TOPOGRAPHY

According to RPS (2015) the regional topography is marked by a series of east-west trending valleys and alluvial plains bounded by hills and low-lying ridges. The highest peaks are in excess of 1000mAHD (Mount Newman and high points within the Ophthalmia Range), while elevations of valley floors range between 700mAHD down to 475mAHD.

3.2 GEOLOGY

The site lies within the Hamersley Basin, which is comprised primarily of strata of the Hamersley Group. The stratigraphic sequence is summarised in Table C and maps of the regional surface and bedrock geology, are provided in Figures 5 and 6 respectively. Two NE-SW trending cross sections (from BHP, 2019) are also shown in Figure A and Figure B.

Table C - Geological Formations in the Homestead Area

Group	Formation	Member
Hamersley	Weeli Wolli Formation	-
	Brockman Iron Formation	-
	Mount McRae Formation	-
	Mount Sylvia Formation	-
	Wittenoom Formation	Bee Gorge
		Paraburdoo
		West Angela
	Marra Mamba Iron Formation	Mount Newman
		MacLeod
Nammuldi		
Fortescue Group	Jeerinah Formations	-

According to the OB32 East / OB25W Joffre Detailed Hydrogeological Conceptual Model (BHP, 2019), the area is structurally complex. The Wittenoom and Marra Mamba Iron Formations form part of an overturned anticlinal structure developed on the back of a deep-seated regional thrust fault system. The strike of the lithological units is approximately west-east. The southern limb of the anticline is approximately horizontal.

Locally drag-folds cause changes in dip angles below the alluvial cover of the Homestead Creek floodplain. The northern limb of the anticline dips approximately 60° to the south along the northern margin of the creek. This places the Paraburdoo Member below the West Angela Member and possibly also the Marra Mamba Formation at depth (RPS 2013b).

Although there are numerous structures in the area, one in particular appears to significantly affect the groundwater flow in the area. The Lone Ranger dyke is a SW-NE trending structure located in the central portion of the Homestead Borefield. It is inferred to be a low permeability feature as the regional groundwater level is 25 m lower on the down gradient (east) side of the dyke.

The OB32E orebody is characterised by east-west striking mineralisation within the Mount Newman Member of the Marra Mamba Iron Formation. The geomorphology is dominated by a South to North compressional

event which resulted in overturned folding and thrust faulting of the Mount Newman Member against the Wittenoom Formation dolomite. The Wittenoom Formation thus abuts the orebody to the north with the presence of fresh and weathered dolomite and dolomitic shales. Where karstic these will present a significant source of groundwater inflow to nearby dewatering. The southern boundary of the orebody consists of the Macleod and Nammuldi Members and the Jeerinah Formation, the latter two known to present a relatively low permeability in other areas. Other geological structures include regional North East to South West trending strike slip faults, and more localised East - West trending faults through the orebody. The orebody (high and low grade mineralisation) is confined to the Mount Newman Member which has been folded, overturned and thrust creating overlapping sequences of mineralisation striking east west with a sub vertical dip towards the south.

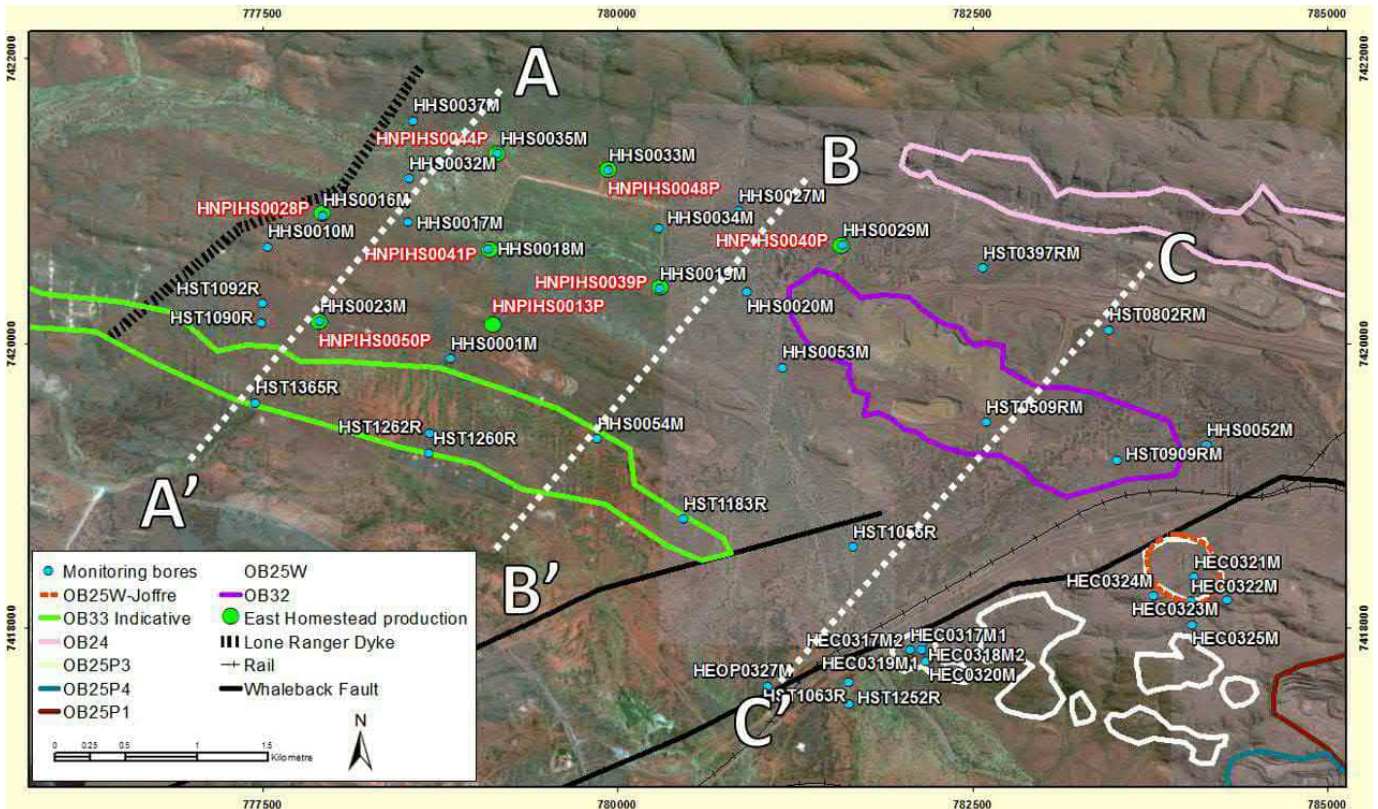


Figure A - Geological Cross Section Locations

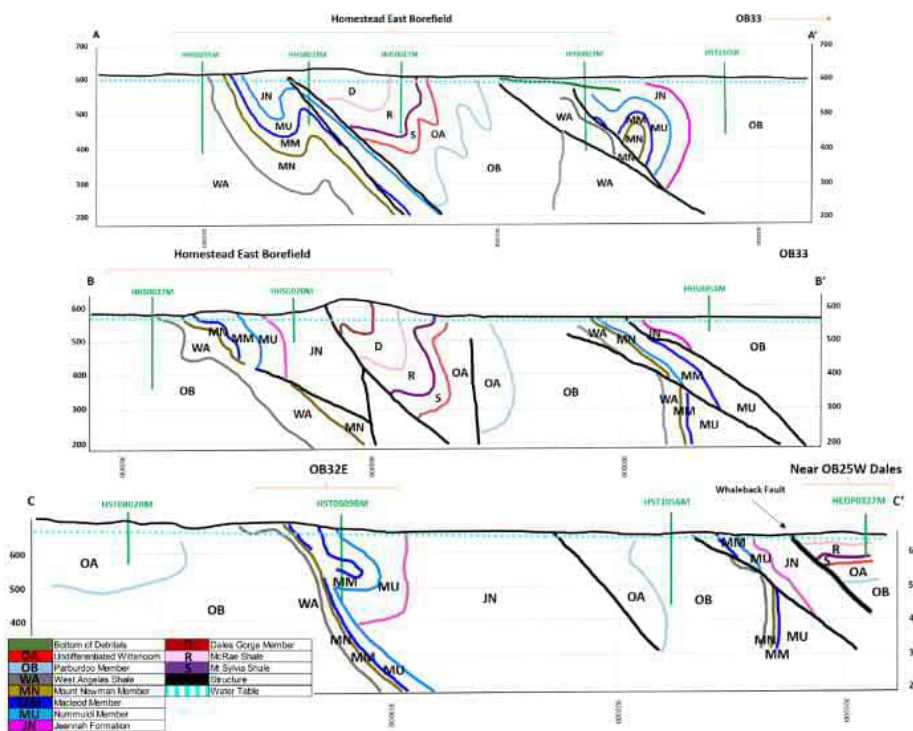


Figure B - Geological Cross Sections

The Hamersley Group rocks have been incised by shallow drainage systems of various minor tributaries of the Homestead Creek. The valleys are infilled with unconsolidated to semi-consolidated, Quaternary- to Tertiary-aged sediments including silty and sandy channel alluvium, clay and gravel. Localised areas of calcrete have been encountered near the surface between approximately 20 and 40 m below ground level (mbgl) (RPS, 2015). The extent of this calcrete is shown on Figure C.

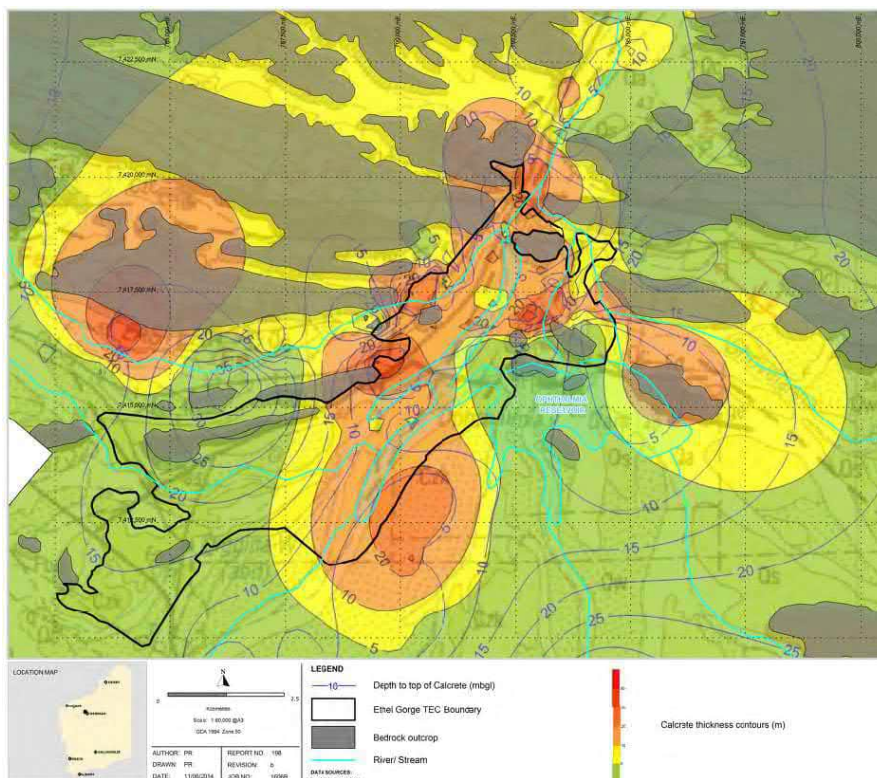


Figure C - Calcrete Extent at Eastern Ridge and Ophthalmia Dam (source: RPS, 2015).

3.3 HYDROGEOLOGY

The major aquifer units in the area comprise fractured rock aquifers of the Brockman and Marra Mamba Iron Formations (both Banded Iron Formation (BIF) units) and the dolomite aquifer of the Wittenoom Formation (comprising the Bee Gorge and Paraburdoo Members). Valley infill material (alluvium and colluvium) are of sufficient thickness and extent to potentially form local aquifers.

The Marra Mamba and Brockman Iron Formation aquifers are considered to form discreet localised aquifers, whereas the Paraburdoo dolomite of the Wittenoom Formation typically forms the most regionally significant aquifer unit in the Pilbara, especially if karstic features are present.

Regionally, the Eastern Pilbara is structural complex and is cross by a number of faults with a northeast/southwest orientation perpendicular to the regional strike. These structures are believed to act as hydraulic barriers with large falls in water level across them (RPS, 2015). Of these, the Homestead Fault falls within the area of investigation and is inferred to hydraulically separate OB32 from the active mining operations.

Groundwater level analysis was conducted in 2019 by BHP and documented the long history of water management practices in the area delivers a large groundwater level dataset. In the area around Ethel Gorge for example, monitoring has been roughly continuous since the late 1960's. However, within the wider investigation area, the dataset is somewhat fragmented with gaps in time and space. In general, groundwater levels and flow directions are dominated by the location, duration and pumping rates during dewatering and abstraction for water supply purposes.

Shallow groundwater resources are present within the calcrete (see Figure C) which is present to the south and east of the investigation area. This calcrete has higher hydraulic conductivities than other formations present within the area of investigation (RPS, 2015).

3.4 SURFACE WATER FEATURES

3.4.1 Creeks, Rivers and Dams

As shown on Figure 7, the main surface water drainage features in the Eastern Ridge mining area are Whaleback Creek and Homestead Creek. These creeks are ephemeral and flow generally eastwards through the mining area before discharging into Ophthalmia Dam (Whaleback Creek) and Fortescue River downstream of Ophthalmia Dam (Homestead Creek) (RPS, 2015).

3.4.2 Ethel Gorge

Ethel Gorge is located between Eastern Ridge and Ophthalmia Dam on the Fortescue River, 15km north-east of Newman (see Figure 7). It is downstream of the confluence of Homestead, Shovelanna and Warrawanda Creeks within the Fortescue River. It is formed where the Fortescue River flows through the Ophthalmia Range in a northerly direction. Downstream of The Gorge, the Fortescue River flows in a narrow channel to the north, then onto a broad floodplain and ultimately into the Fortescue Marsh.

Surface and groundwater flows from the entire upstream catchment area are focused into Ethel Gorge, resulting in relatively shallow groundwater levels typically less than 10 m below ground level (mbgl). This provides the basis for interactions between the groundwater system and the terrestrial environment (RPS, 2017).

3.4.3 Ophthalmia Dam

Ophthalmia Dam is an artificially formed surface water body located on the Upper Fortescue River approximately 100km upstream from Fortescue Marsh and 12km east of Newman. It was constructed in 1981, 4km upstream of the Fortescue River's entry to Ethel Gorge and captures runoff from the main Fortescue River and its tributaries Warrawanda and Whaleback Creeks. Only when full does it overtop the dam and discharge downstream through Ethel Gorge.

By slowing surface water runoff, the Dam replenishes the downstream alluvial and calcrete aquifers. These aquifers support the Ophthalmia Borefield which has supplied potable and process water to Newman. Historically, surplus water from OB25 has been discharged to the Dam and it forms part of an integrated water management system for the Eastern Ridge mine site (RPS, 2017). Other inputs (current and/or historical) include dewatering effluent from Mount Whaleback and Jimblebar.

3.4.4 In-Pit Water Bodies and Recharge Ponds

Surface water is present within OB23, OB25 and the recharge ponds. However, due to the temporary and man-made nature of these water bodies, they are not considered to constitute receptors. They may however be pathways for contaminant migration.

3.5 REGISTERED GROUNDWATER BORES AND LICENSES

Tetra Tech completed a search for licensed groundwater bores within a 50km radius from the Town of Newman using the DWER online Water Register database (<https://maps.water.wa.gov.au/#/webmap/register>). 72 licensed groundwater bores were identified as being present. These bores can generally be categorised as follows:

- Those owned by mining operations for the purposes of dewatering or for producing water for use within mining operations.
- Those operated by businesses in the town of Newman, likely for irrigation purposes.
- Those installed for the purpose of supplying water to the town of Newman, including for potable purposes.

Within the category of potable water supply bores are those present within the Homestead and Ophthalmia borefields. Due to the presence of these borefields, the southern half of Eastern Ridge is located within a Priority 1 area of the Newman Water Reserve.

3.6 BENEFICIAL USES OF GROUNDWATER

Table D below provides a summary of the potential beneficial uses of the aquifer(s) to be protected according to the Water Resources Council (WRC 2004) Draft Policy and Principles, Protection of Waters from Pollution in Western Australia. The potential beneficial uses of the aquifer on site and the surrounding Newman area are based on information presented in the Newman integrated water supply scheme schematic diagram shown in Appendix C.

Table D - Beneficial use of groundwater

Beneficial Uses	Likelihood of Groundwater Use	
	On Site	Off Site
Potable Water Supply	Confirmed – Groundwater pumped from the Homestead Bores are processed through the Newman water treatment plant to a potable level which then supplies the Eastern Ridge operations.	Confirmed –The Ophthalmia borefield, which is part of the Priority 1 Area of the Newman Water Reserve is present to the north of Ophthalmia Dam (DoW, 2014). Homestead borefield is located within OB32.
Aquatic Ecosystems (Freshwater)	Likely – Freshwater systems including Ophthalmia Dam and parts of Homestead Creek and Fortescue River are present on site.	Likely – Freshwater systems are present in the vicinity of the site and include the Fortescue River, Homestead Creek, and their tributaries beyond the site boundary.
Aquatic Ecosystems (Marine Water)	Unlikely – No marine systems present on site	Unlikely – No marine systems are present within 100km of the site.
Recreation and Aesthetics	Likely – Groundwater pumped from the Homestead Bores are processed through the Newman water treatment plant to a potable level which then supplies the Eastern Ridge operations for the irrigation of lawn and turf around site offices.	Confirmed – Groundwater pumped from Bore V18, Bores H7, H8, H10, the Homestead Bores, Bores E11, E12, E13, K21, K29, K30, K31, OB23 Bores, OB25 Pit 1 and 3 Bores are used for recreation and aesthetics activities around the Newman area which include residential activities such as gardening, the motocross facilities, gun club, cemetery, gold club, pony club, turf club, camel club, and the jet boat club .
Agriculture and Aquaculture	Unlikely – Based on current site mining activities.	Possible – Groundwater may be used for stock watering.
Industrial/Commercial Use	Confirmed – Groundwater is pumped from multiple bores (OB23 Bores, OB25 Pit and 3 Bores, and Homestead Bores) which is then used on site for purposes such as dust suppression	Confirmed – Groundwater pumped from the Whaleback Bores and OB29 Bores is used for mining activities on the Mt Whaleback operations. Groundwater pumped from the Whaleback Bores, OB29 Bores, Bores H7, H8, H10, and the Homestead Bores supply water to the Yarnima Power Station. Bore K21 supplies water to the Newman Airport.

3.7 SENSITIVE ECOLOGICAL RECEPTORS

To determine whether matters of national environmental significance or other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) are likely to occur within the investigation area, a search was conducted using the Protected Matters Search Tool (<http://www.environment.gov.au/epbc/pmst/index.html>). The search was conducted on 7th May 2021 and used search radius of 25 km, approximately centred on Ophthalmia Dam. The results are provided in Appendix D and briefly summarised below.

- For matter of national environmental significance, the search results indicated there are no World Heritage Properties, National Heritage Places, or Wetlands of International Importance within 25km of Ophthalmia Dam.
- There is no Listed Threatened Ecological Community, 11 Listed Threatened Species (5 birds, 4 mammals, 1 plant, 1 reptile), and 9 Listed Migratory Species (1 marine bird, 3 terrestrial species, 5 wetland species).
- Regarding other matters protected by the EPBC Act, the following results were provided: there were no Commonwealth Heritage Places, Critical Habitats, or Terrestrial Commonwealth Reserves. There are 13 Listed Marine Species (13 species of birds).

3.7.1 Ethel Gorge

According to RPS (2017) the ecology of the Ethel Gorge area is defined by surface and subsurface inflows and the presence of a shallow groundwater system associated with the Fortescue River and its floodplain. This supports riparian vegetation communities, permanent and persistent pools and a unique stygofauna community associated with calcrete habitat. The vegetation of the major channels includes some uncommon communities of dense riparian and woodland vegetation. The vegetation includes facultative (*E. camaldulensis*; *E. victrix*) phreatophytes that use the shallow groundwater and hence contribute to groundwater discharge. The proportion of vegetation water use contributed by groundwater, in comparison with surface inputs to the unsaturated profile (i.e. rainfall and runoff), is unknown. It is possible that in some areas groundwater is only accessed transiently, during prolonged dry periods where the unsaturated profile dries out.

3.7.2 Subterranean Fauna (Stygofauna)

The shallow groundwater systems within Ethel Gorge is host to the Ethel Gorge stygobiont threatened ecological community (TEC). The community was described by TEC Scientific Committee (2006) as inhabiting the "Ethel Gorge/Ophthalmia Basin alluvium calcrete aquifer". The nomination stated "there is no evidence that the habitat of the community is not the whole Ophthalmia Basin aquifer, but it may be restricted to the most permeable alluvial and calcrete formations within that aquifer" (RPS, 2017). The extent of this calcrete formation is shown earlier in Figure C.

4. SITE CONDITION AND OBSERVATIONS

4.1 SITE INSPECTION AND OBSERVATIONS

Site observations noted during the course of sampling between 06 April 2021 and 12 April 2021 are provided in Table E below and a photography log is presented in Appendix E.

Table E - Site Observations

Photo Log Reference	Observations and Comments
Photograph 1	Storage of fire extinguishers at the Infrastructure – OHP Maintenance Workshop
Photograph 2	Storage of chemicals in IBCs at the Infrastructure – OHP Maintenance Workshop. Chemicals include cleaning products, petroleum products such as oils and lubricants, and coolants
Photograph 3	Reclaimed effluent pond
Photograph 4	One of many redundant vehicle laydown areas
Photograph 5	Irrigation of lawn/turf around on-site offices
Photograph 6	Water processing system in front of OB24 OHP Workshop stores drop point
Photograph 7	Equipment cleaning area at the Infrastructure – OHP Maintenance Workshop
Photograph 8	Fuel farm with ASTs
Photograph 9	Redundant equipment and vehicle laydown area
Photograph 10	Unbundled Ansulite container located around redundant equipment
Photograph 11	Fuel farm with ASTs
Photograph 12	Mining plant and equipment washdown area
Photograph 13	Light vehicle washdown area
Photograph 14	RPSW02 recharge pond
Photograph 15	RPSW04 recharge pond

5. AREAS OF ENVIRONMENTAL CONCERN

5.1 ON-SITE

Based on information presented earlier in this LSI report and in consideration of the HEPA's 'PFAS National Environmental Management Plan V2.0: Appendix B – Activities associated with point sources of PFAS contamination (HEPA, 2020), the following onsite Areas of Environmental Concern (AECs) have been identified for the site.

Table F - Identified On-Site Areas of Environmental Concern

AEC #	Location Description	Area/Code	Activity/Potential Activity*	Potential source of PFAS*
72	Orebody 25 historical fuel farm (Eastern Ridge)	OB02	Fuel transport and storage	Firefighting and fire suppression systems associated with bulk fuel storage.
267	OB24 land farm	OB07	Waste processing and disposal	PFAS-containing solid and liquid waste and leachate in landfill.
250	Bioremediation land farm	OB04	Waste processing and disposal	PFAS-containing solid and liquid waste and leachate in landfill.
210	Orebody 25 maintenance workshops and associated facilities	OB01	General chemical storage	Firefighting and fire suppression systems associated with bulk fuel storage.
			Petroleum products other than fuels	On-site firefighting, potential use in processing.
			Automotive industry including retailing, detailing and car wash facilities	Surface treatments including polishing, cleaning, stain and water protection products, lubricants, hydraulic fluids, tubing, oil pan, head gaskets, sealants, wire and cabling, fire retardant and metal plating applications.
270	OB24 inert landfill and used tyre dump at former Dome facility	OB10	Waste processing and disposal	PFAS-containing solid and liquid waste and leachate in landfill.
290	OB24 Fire Training ground	OB11	On-site firefighting	On-site firefighting
211	Orebody 25 OHP bunded area (crusher area)	OB03	Mining	On-site firefighting
291	OB25 Fire Training ground	OB12	On-site firefighting	On-site firefighting
262	New OB25 Bioremediation land farm	OB05	Waste processing and disposal	PFAS-containing solid and liquid waste and leachate in landfill.
294	Eastern Ridge - OB25 Fuel Farm	OB13	Fuel transport and storage	Firefighting and fire suppression systems associated with bulk fuel storage.

AEC #	Location Description	Area/Code	Activity/Potential Activity*	Potential source of PFAS*
269	OB24 inert landfill and used tyre dump adjacent to Valley Haul Road	OB09	Waste processing and disposal	PFAS-containing solid and liquid waste and leachate in landfill.
NR	Newman WWTP	N/A	Wastewater treatment	Inputs from domestic sewage and commercial and industrial wastewater and outputs applied to land or discharged to the environment
NR	OB23 and OB25	N/A	In-pit testing and servicing of fire suppression systems on mobile plant	Fire suppression system maintenance
NR	Recharge Ponds	N/A	Discharge of dewatering effluent	PFAS present in abstracted groundwater

* As described in Appendix B of the NEMP (2020).

NR = not registered

N/A = not applicable

5.2 OFF-SITE

Whilst a detailed review of all potential off-site AECs has not been undertaken, a number have been identified during the course of preparing this LSI. These are detailed in Table G

Table G - Identified Off-Site Areas of Environmental Concern

Site Name	Proximity to Eastern Ridge	Activity/Potential Activity*	Potential source of PFAS*
Newman Airport	7km south-west	Fuel transport and storage	Firefighting and fire suppression systems associated with bulk fuel storage.
Newman including its landfill	6km south	Waste processing and disposal	Newman is a potential location of multiple PFAS sources. According to the Newman WWTP operating licence, solid waste is disposed of to Newman Landfill. PFAS-containing solid and liquid waste and leachate from other sources may also be present in the landfill.
Mount Whaleback Mine Site	8Km south-west	Multiple	See Section 2.3 and Appendix A.

6. DATA QUALITY OBJECTIVES

The scope of works associated with site investigation has generally complied with the Data Quality Objectives (DQO) methodology outlined in the National Environment Protection Council (NEPC) National Environment Protection (Assessment of Site Contamination) Measure (NEPC, 2013), which provides a systematic planning approach to developing sampling designs for data collection activities that ultimately support the conclusions and recommendations provided in this report. The DQO process has seven steps, as presented below, which have been followed in the planning and execution of this investigation.

1. State the problem;
2. Identify the decision;
3. Identify the information inputs;
4. Define the boundaries of the study;
5. Develop the analytical approach;
6. Specify performance or acceptance criteria; and
7. Optimise the plan for obtaining data.

The process has been summarised in Table H.

Table H – Data Quality Objectives

Data Gap	1. What are the potential sources which may be contributing to the presence of PFAS in groundwater at Eastern Ridge?	2. Is PFAS-containing groundwater currently present and being abstracted as part of operations at Eastern Ridge?	3. If PFAS-containing effluent currently, or has historically been, discharged at Eastern Ridge, has this resulted in the presence of PFAS in surface water or groundwater in the vicinity of the discharge points?	4. Are the potential risks to either human or ecological receptors understood?	5. Is PFAS-containing groundwater likely to be abstracted during planned dewatering at OB32?
1. Problem Statement	Potential sources of PFAS in groundwater beneath Eastern Ridge have not been assessed. This includes both on-site and off-site sources.	The distribution of PFAS in groundwater at Eastern Ridge has not been assessed. To date, characterisation of PFAS in dewatering effluent has not been sufficient to inform the development of a conceptual site model.	The nature and extent of PFAS at dewatering effluent discharge points such as the recharge ponds and Ophthalmia Dam is not understood. Resolution of this is required to allow Data Gap 5 to be resolved.	No assessment of the PFAS-related risks to human health or ecological receptors has been undertaken.	Additional dewatering is planned to facilitate the planned mining at OB32. It is not known if PFAS is likely to present in this dewatering effluent.
2. Decision Identification	Do areas of increased PFAS in groundwater beneath and surrounding Eastern Ridge correlate with identified potential sources of PFAS?	What are the concentrations of PFAS in dewatering effluent from production bores and at the recharge ponds where effluent is discharged?	What are the concentrations of PFAS in groundwater and surface water in the vicinity of Ophthalmia Dam and the recharge ponds?	Do concentrations of PFAS exceed adopted tier 1 assessment criteria? Where such criteria do not exist, are concentrations of total PFAS, or particular groups of PFAS, indicative of potential exceedances following precursor transformation? If exceedances are present, is there a complete, or potentially complete, exposure pathway for any identified receptor?	What are the concentrations and lateral distribution of PFAS in groundwater in and around OB32? If present, do PFAS concentrations vary with depth?
3. Decision inputs	Collection and analysis of groundwater samples from across Eastern Ridge and in the	Collection and analysis of samples from operational production bores. Collection and analysis of samples of water being	Collection and analysis of groundwater samples from the vicinity of the recharge ponds and Ophthalmia Dam.	Comparison of analytical results against adopted tier 1 assessment criteria.	Collection and analysis of samples from groundwater monitoring wells and production bores located within and near to OB32.

	vicinity of identified potential off-site sources. Collection and analysis of surface water and sediment samples at the discharge point of the Newman WWTP.	discharged into the recharge ponds.	Collection of surface water samples from Ophthalmia Dam.	Assessment of exposure pathways to determine completeness.	Collection and analysis of samples from different depths within selected monitoring wells located within OB32.
4. Study Boundaries	Potential sources of PFAS which may discharge directly to Eastern Ridge or which have the potential to migrate onto Eastern Ridge	Groundwater which is currently, being abstracted at Eastern Ridge.	Surface water and groundwater which may have been influenced by discharges to the recharge ponds or Ophthalmia Dam.	Human and ecological receptors which may come into contact with PFAS as a result of current, historical or future activities at Eastern Ridge.	Groundwater beneath OB32 or within the radius of influence of its dewatering.
5. Analytical / Design Approach	If COPC concentrations are identified above the adopted assessment criteria, then further investigation and/or remediation may be required.				
6. Acceptance Criteria	The potential for significant decision errors were minimised by completing a robust Quality Assurance / Quality Control (QA/QC) program in accordance with DER and National Environment Protection (Assessment of Site Contamination) Measure (NEPM) guideline requirements. Standard operating procedures (SOP) were closely followed in the field to ensure accurate and representative data acquisition. Data quality indicators (DQIs) were applied to assess usability of data prior to making decisions, based on precision, accuracy, representativeness, comparability and completeness. The acceptable limit on decision errors is 100% compliance with the applied DQIs. If any of the DQIs are not met, further assessment was necessary to evaluate the significance of the non-conformance and any corrective actions.				
7. Plans for obtaining data	Collection and analysis of representative samples from appropriate media.				

7. INVESTIGATION METHODOLOGIES

7.1 REGULATIONS, STANDARDS AND GUIDELINES

The works have been undertaken with consideration to the following regulations, standards and guidelines:

- National Environment Protection (Assessment of Site Contamination) Measure 1999 (amended 2013) (Contaminated Land NEPM) i.e. National Volume 3 Schedule B2 of the ASC NEPM, and
- PFAS National Environmental Management Plan, Version 2.0 (January 2020) (PFAS NEMP)
- WA DWER (2014) Assessment and Management of Contaminated Sites. Contaminated Sites Guidelines. December 2014
- CRC Care (2018) Technical Report No. 43 – Practitioner Guide to Risk-Based Assessment, Remediation and Management of PFAS Site Contamination
- Standards Australia, 1998a. AS/NZS 5667.1:1998: *Water quality – sampling. Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples.* Standards Australia, New South Wales.
- 1998b. AS/NZS 5667.4:1998: *Water quality – Sampling. Part 4: Guidance on sampling from lakes, natural and man-made.* Standards Australia, New South Wales.
- 1998c. AS/NZS 5667.6:1998: *Water quality – Sampling. Part 6: Guidance on sampling of rivers and streams.* Standards Australia, New South Wales.
- 1998d. AS/NZS 5667.11:1998: *Water quality – Sampling. Part 11: Guidance on sampling of ground waters.* Standards Australia, New South Wales.
- BHP (2020) WAIO Water Supply Schemes – Water Sampling and Analysis to Detect Presence of PFAS.

7.2 PRE-MOBILISATION AND SAFETY

A Health, Safety, Security and Environment (HSSE) Plan was utilised by Tetra Tech which covered all staff under the direct control of Tetra Tech. The HSSE Plan included an Environmental Safe Work Method Statement (ESWMS) and safe work procedure (SWP) for all tasks performed. The plan also addressed COVID-19 risks to reduce the likelihood of exposure of Tetra Tech nominated field personnel.

Site inductions were held prior to the commencement of all site works for Tetra Tech employees. During the site induction, potential environmental impacts and HSE protocols were communicated to all site personnel. Job hazard analysis (JHA) were prepared daily and Take '5' risks assessments completed prior to the completion of each tasks.

Mobilisation of all field personnel were undertaken in accordance with the BHP contractor mobilisation process and any additional site inductions were also completed when required by BHP.

7.3 FIELD PROGRAMMES

The fieldworks were undertaken as three separate phases in December 2020, January-February 2021 and April 2021 as detailed below. Sampling Locations during Round 1 and Round 2 were selected based on the objective of obtaining broad lateral distribution of sampling locations (both groundwater monitoring wells and production bores) across Eastern Ridge, as well as assessing identified potential sources areas (e.g. the Newman WWTP and in-pit sumps at OB23) and receiving water bodies. Conversely, sampling during Round 3 was focussed on OB32 and the Ethel Gorge TEC. The OB32 sampling was undertaken to confirm if PFAS concentrations vary with depth whilst the TEC sampling was undertaken to provide data for use as part of other studies which are outside the scope of this investigation.

In addition to sampled locations, other locations were visited during each of the rounds, but were found to be unsuitable for sampling due to reasons such as lack of water present, production bores having been decommissioned and monitoring well casing damage.

7.3.1 Round 1 – December 2020

The first phase of sampling was undertaken from 30 November to 6 December 2020. Table I provides a summary of the samples collected. Sample locations are illustrated on Figures 9a to 12.

Table I - Summary of Sampling Programme (December 2020)

Sample source	Number of investigation points
Groundwater monitoring wells	40
Production bores	15
Surface water	4

7.3.2 Round 2 – January 2021

The second field programme was primarily undertaken from 25 January to 5 February 2021, with a limited number of hydrasleeves retrieved between 06 April to 13 April. These hydrasleeves were installed during the initial sampling mobilisation but their retrieval was not possible due to flooding. Table J provides a summary of the samples collected. Sample locations are illustrated in Figures 9a to 12.

Table J - Summary of Sampling Programme (January 2020)

Sample source	Number collected*
Groundwater monitoring wells	51
Production bores	41
Surface water	10
Sediment	4**

* primary samples only

** Sediment samples were collected from drainage channels receiving effluent from the Newman WWTP to assess whether these sediments have the potential to act as an ongoing source of PFAS in groundwater at Eastern Ridge.

7.3.3 Round 3 – April 2021

OB32 Vertical Delineation and TEC Sampling

The third field programme was undertaken from 06 April to 13 April 2021. Table K provides a summary of the samples collected. Sample locations are illustrated in Figures 9a to 12.

Table K - Summary of Sampling Programme (Round 3)

Sample source	Number collected*
Groundwater monitoring wells	38
Production bores	4

* primary samples only

7.4 SAMPLING METHODOLOGY

The sampling methodology for each sampling programme during this investigation is summarised in Table L below.

Table L - Sampling Methodology

Activity	Description
Groundwater Sampling Methodology	
Post-Installation Equilibrium Period	All groundwater samples were collected from existing monitoring wells.
Gauging	<p>Each monitoring well was gauged for:</p> <ul style="list-style-type: none"> • Depth to Light Non-Aqueous Phase Liquid (LNAPL) and apparent thickness (if present); • Standing Water Level (SWL); and • Total well depth. <p>Gauging data was acquired using an oil / water interface probe and visual observations for LNAPL were made using a bailer.</p>
Sampling	<p>The majority of wells were sampled using 500mL Hydrasleeves which were installed within the top 1m of the water column. For select monitoring wells, multiple Hydrasleeves were installed at different depths to allow for vertical variations in PFAS concentrations to be assessed. Water levels and Hydrasleeve installation depths are included in Tables 1 to 3.</p> <p>Following a minimum 24-hour equilibration period, groundwater samples were decanted from Hydrasleeves directly into laboratory supplied containers. Care was taken when filling sample containers to ensure that the rim of the sample container was not touched with fingers, gloves or the Hydrasleeve. Aeration of the sample was also avoided during transfer.</p> <p>The following groundwater quality parameters were measured ex-situ using a water quality meter.</p> <ul style="list-style-type: none"> • +/- 10% dissolved oxygen; • +/- 10% temperature; • +/- 10 mV oxygen reduction potential; • +/- 3% electrical conductivity; and • +/- 0.05 pH units. <p>Samples were placed into laboratory prepared containers, preserved for the relevant analyses. Containers were stored in cooled insulated carriers for transport to the selected National Association of Testing Authorities (NATA) accredited laboratory for analysis under chain of custody (COC) control.</p>
Surface Water Sampling Methodology	
Sampling	Surface water samples were collected directly into laboratory supplied containers. The same water quality parameters as groundwater were measured ex-situ using a water quality meter. Containers were stored in a cooled insulated carrier for transport to the selected NATA accredited laboratory for analysis under COC control.
Production Bore Sampling Methodology	
Sampling	Two samples were collected from the sampling tap on each of the production bores. The first sample was collected from the first flush, representing stagnant water within the headworks and bore casing. The second was collected after the production bores had been purged for five to ten minutes (dependent on water flow rates). Samples were collected directly into laboratory supplied containers and stored in a cooled insulated carrier for transport to the selected NATA accredited laboratory for analysis under COC

	control. As per groundwater and surface water, production bore water quality parameters were measured ex-situ using a water quality meter.
Sediment Sampling Methodology	
Sampling	Sediment samples were collected from surface sediments (<15cm) on the banks of the WWTP reed bed using a trowel (e.g. grab sample). Sediment sampling locations are shown on Figure 11.
Other Field Procedures	
PFAS Sampling Requirements	<p>Beyond the normal sample handling methodology as detailed above, the following controls were also implemented:</p> <ul style="list-style-type: none"> • Teflon®-containing or -coated field equipment (tubing, bailers, tape, plumbing paste, etc.) were not used, rather High-Density Polyethylene (HDPE) or silicone tubing and HDPE, polypropylene or stainless-steel field equipment was selected where practicable. • All laboratory provided sampling containers were without Teflon®-lined lids. Sample containers comprised of polypropylene or HDPE. Glass containers with lines lids were not used. • Field personnel undertaking sampling did not use Tyvek suits or new field clothes. Personnel decontamination was undertaken with soap and water, after any activity which may have involved PFAS contaminated materials. • During sample processing and storage, exposure of the samples to light were minimised.

7.5 LABORATORY ANALYSIS

Primary and duplicate samples were submitted to ALS for analysis with triplicate samples submitted to Eurofins | ARL. All samples were analysed for a Super Ultra Trace PFAS suite of 28 compounds, as detailed in Table M.

Table M - Laboratory Analytical Suite

PFAS Analyte	Limit of Reporting (ug/L)
Perfluorononanesulfonic acid (PFNS)	0.001
Perfluoropropanesulfonic acid (PFPrS)	0.001
Perfluorobutane sulfonic acid (PFBS)	0.0005
Perfluoropentane sulfonic acid (PFPeS)	0.0005
Perfluorohexane sulfonic acid (PFHxS)	0.0005
Perfluoroheptane sulfonic acid (PFHpS)	0.0005
Perfluorooctane sulfonic acid (PFOS)	0.0002
Perfluorodecane sulfonic acid (PFDS)	0.0005
Perfluorobutanoic acid (PFBA)	0.002
Perfluoropentanoic acid (PFPeA)	0.0005
Perfluorohexanoic acid (PFHxA)	0.0005
Perfluoroheptanoic acid (PFHpA)	0.0005
Perfluorooctanoic acid (PFOA)	0.0005
Perfluorononanoic acid (PFNA)	0.0005
Perfluorodecanoic acid (PFDA)	0.0005
Perfluoroundecanoic acid (PFUnDA)	0.0005

PFAS Analyte	Limit of Reporting (ug/L)
Perfluorododecanoic acid (PFDoDA)	0.0005
Perfluorotridecanoic acid (PFTrDA)	0.0005
Perfluorotetradecanoic acid (PFTeDA)	0.0005
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.001
Perfluorooctane sulfonamide (FOSA)	0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	0.001
Sum of PFHxS and PFOS	0.0002
Sum of PFAS	0.0002

Selected samples were also analysed for the following general water quality parameters:

- Major anions and cations;
- Electrical conductivity;
- Total dissolved solids; and
- pH.

7.5.1 Sediment Samples

The four sediment samples collected at the WWTP discharge were scheduled for total and leachable (pH 5 and pH 7) PFAS analysis .

7.6 ADOPTED ASSESSMENT CRITERIA

For the purpose of this assessment, laboratory results have been compared against the following assessment criteria.

- NEMP (2020) PFAS Freshwater guideline – high conservation value systems (99%)¹.
- NEMP (2020) PFAS Freshwater guideline – slightly to moderately disturbed ecosystems (95%).
- NEMP (2020) PFAS Drinking Water Quality guideline value.
- NEMP (2020) PFAS Recreational water quality guideline value.
- NEMP (2020) PFAS Ecological guideline values for soil – direct exposure.
- NEMP (2020) PFAS Ecological guideline values for soil – indirect exposure.

¹ It is generally advised that for chemicals that are bioaccumulative and biomagnifying, such as PFAS, the 99% level of protection be adopted for slightly to moderately disturbed systems (typically against the 95% level of protection).

8. QUALITY ASSURANCE AND QUALITY CONTROL & ANALYTICAL DATA VALIDATION

The following section details the quality assurance (QA) and quality control (QC) review associated with the sediment, groundwater and surface water assessment.

Tetra Tech has completed a review of the QA/QC results, according to the following documents.

- NEPC, National Environment Protection (Assessment of Site Contamination) Measure, National Environment Protection Council (2013).
- US EPA Guidance on Environmental Data Verification and Data Validation (2002).
- US EPA Contract Laboratory Program for Organic (1999) and Inorganic (2002) Data Review.
- PFAS National Environmental Management Plan, Version 2.0 (January 2020) (PFAS NEMP)

This included examining holding times, laboratory accreditation, sample preservation methods, a review of field quality control sample results and a review of laboratory quality control sample results.

8.1 FIELD METHOD VALIDATION

A summary of field method validation undertaken during the investigation is detailed in Table N.

Table N - Field Method Validation

Requirements	Yes/No	Comments
Decontamination of sampling equipment	Yes	All dedicated equipment for collection of environmental samples was single use. Where equipment was reused (i.e. interface probe) they were decontaminated between sample locations using a phosphate-free liquid detergent, Liquinox®, and scheme water.
Sample collection	Yes	Together with decontaminated equipment above, dedicated nitrile gloves and new laboratory supplied containers were used during sample collection.
Sample preservation	Yes	All samples were properly preserved and stored in insulated coolers prior to arrival at the laboratory. Sample temperature are documented upon arrival at the laboratory on Sample Receipt Notifications (SRN) and in all cases confirming that ice was present within the coolers.
Water sample holding times within acceptable range (collection to extraction)	Yes, with exceptions	TDS and major anions and cations for samples collected during round 1 and round 2 were analysed one day overdue. This is not considered to be of significance as this data has not been used during this assessment.

8.1.1 Equipment Calibration

Equipment was calibrated by Air-Met Scientific and Eco Environmental prior to being delivered to site. Calibration certificates from the supplier are included as Appendix F.

1.1. LABORATORY QA/QC DATA ASSESSMENT

Primary and duplicate water samples (including field QC samples) were submitted to ALS, with triplicate samples sent to MGT Eurofins. Both labs are NATA accredited for the laboratory analysis performed. Certified laboratory reports and laboratory Quality Assurance QA/QC data are included in Appendix G. An assessment of analytical quality control results is summarised in Table F.

Table O: Analytical quality control validation

Requirement	Yes/No	Comments
Percentage recovery results were all within the acceptable range (70-130%) for all matrix spikes (MS), MS duplicates, laboratory control samples and surrogates for all analytes.	Yes	
Laboratory internal standards, calibration blanks and mid-range calibration verifications were acceptable.	Yes	
Laboratory internal duplicates conducted at a rate of 1 in 10 and inside an acceptable range of 0 – 50%.	Yes, with exceptions	See QCI reports in Appendix G
All laboratory quality control frequency parameters were compliant.	Yes	

8.2 FIELD QA/QC DATA ASSESSMENT

The quality control samples collected during the GME are detailed in Table P, and results are discussed in the sections below.

Table P: Quality Control Samples

Sample Type	Number Analysed
Primary samples	203
Duplicate samples	14
Triplicate samples	14
Field blank	21
Rinsate blanks	21

8.2.1 Duplicate and Triplicate Samples

14 sets of duplicate and triplicate samples were collected over the course of the investigation with 210 primary samples analysed. Whilst this number marginally exceeds the 1:10 ratio of duplicates and triplicates specified in the NEMP it is significantly affected by the collection of both pre- and post-purge samples from production bores.

The precision of analytical techniques is measured by the relative percent difference (RPD) between primary and duplicate and triplicate results. RPD calculations are presented along with the QC sample analytical results in Table 12. All RPDs were generally found to be within the acceptable range of 0-30% (Standards Australia, 1998). Where they were outside this range, a review of the individual results has shown that the variation may be attributed to one or a combination of both of the following causes and are not considered to compromise the integrity of the analytical results.

1. Where one or both of the concentrations in primary and QAQC samples are generally <10 times the LOR, RPD's can be exaggerated, therefore elevated RPDs are unlikely to affect the integrity of the result.

However where one of the two reported concentrations exceed relevant criteria, the highest result (and exceedance) has been used in the assessment as a conservative measure.

- Reported concentrations for both the primary and secondary sample do not have a criteria value, however all results indicate that impact is present. The calculated RPD values are not considered to affect the integrity of the results as the same overall conclusion is drawn from both results. The highest result has been used in the assessment as a conservative measure.

8.2.2 Field Quality Assurance

A field blank and a rinsate blanks were collected during each day of the programme where samples were collected, with results presented in Table 13. Where QAQC samples collected returned results below the LOR indicating field conditions, decontamination procedures and transport conditions were demonstrated to be adequate and no further assessment is required. Five blank samples did however contain measurable concentrations of PFAS. For these samples, the following factors have been considered:

- The blank sample collection methodology
- The time and location of sampling relative to the collection of other samples
- The individual PFAS compounds present versus those in other samples collected

Sample ID	Sample date	Sample type	Other samples collected on same date	Commentary
QC37	04/02/2021	Rinsate from IP collected after installing the hydrasleeve in HHS0023M. The PFAS measured in the blank is attributed to external sources rather than the IP as no PFAS were present in HHS0023M.	HEOP0467M HEOP0538M HEOP0462M HEV0006M HEC0406V1 HEOP0798M HEOP0548M HEOP0386M HEOP0388M HEOP0524M HEQ0002M HEOP0314M HEQ0020M HHS0055M HHS0023M HEQ0008M	Both QC samples contained the same PFAS compounds despite being collected on separate days and at locations where the particular PFAS compounds were not detected in other samples. This indicates that the de-ionised water was potentially compromised. Discussions with the laboratory who supplied this water show that it passed internal QA checks and as such it is attributed to an external source introduced during the field programme.
QC38	05/02/2021	Field blank collected at midday, following collection of the sample at HHS0085M	Sump 3 HEC0312-A HEC0312-B DCSW1 HHS0085M - HEC0411M	
QC01	12/04/2021	Field blank	RPSW02_A, RPSW02_B, RPSW03, RPSW04, RPSW05	All three QC samples contained the same PFAS compounds despite being collected on separate days and at locations where the particular PFAS compounds were not detected in other samples. This indicates that the de-ionised water was potentially compromised. Discussions with the laboratory who supplied this water show that it passed internal QA checks and as such it is attributed to an external source introduced during the field programme.
QC02	08/04/2021	Rinsate from IP collected after installing the Hydrasleeve in HHS0085M.	None. Hydrasleeves installed at following locations: HHS0016M HHS0036M HHS0019M HHS0027M	

Sample ID	Sample date	Sample type	Other samples collected on same date	Commentary
			HHS0029M HHS0085M	
QC12	10/04/2021	Rinsate from scissors used to cut string from Hydrasleeve after last sample (T0411A) was collected which did not contain any measurable PFAS	HNPIWR003 EOP0334R EOP0378R EOP0222R EOP0220R T0399 HEOP0467 HEQ0006 EQ0112R HEOP0398 W029 W028 HEOP0524 HEA0351 HEC0448 T0411A	

8.3 QA/QC SUMMARY

In consideration to the above, the field method validation and laboratory QA/QC measures employed throughout the assessment indicate that the quality of field sample collection and laboratory analysis procedures were generally satisfactory, and the data from both the primary and secondary laboratory is considered of acceptable quality to be used as a basis for assessing current groundwater conditions at the site.

9. RESULTS

A summary of monitoring results for PFOS, PFOA, sum of PFHxS and PFOS and total PFAS from each round plus specific investigations at OB32 and the TEC are provided in the following sub-sections.

9.1 ROUND 1 – DECEMBER 2020

A summary of the PFAS results from the Round 1 (December 2020) field programme is provided in Table Q and Table R. Groundwater and surface water analytical results are presented in Table 4, with production bore analytical results presented in Table 5.

Table Q - Round 1 - Summary of exceedances of adopted PFAS criteria

Sample Source	Number of Sampling Points	Exceedances of Recreational water guideline	Exceedances of FW 95% species protection guideline	Exceedances of FW 99% species protection guideline
Groundwater monitoring wells	36	0	0	23
Production bores	16	0	0	3
Surface water	4	0	0	4

Table R - Round 1 - Summary of PFAS results

Analyte	Assessment Criteria (Source: PFAS NEMP 2020)				Minimum concentration (ug/L) – Production Bores, Monitoring Wells and Surface Water	Maximum Concentration (ug/L)		
	Freshwater 95% (ug/L)	Freshwater 99% (ug/L)	Recreational use (ug/L)	Drinking water (ug/L)		Production Bores	Monitoring Wells	Surface Water
PFOS	0.13	0.00023	NE	NE	<0.0002	0.0005	0.0231	0.0022
PFOA	220	19	10	0.56	<0.0005	<0.0005	0.0171	<0.0005
Sum of PFHxS and PFOS	NE	NE	2	0.07	<0.0002	0.0005	0.0306	0.0022
Sum of PFAS	NE	NE	NE	NE	<0.0002	0.0005	0.285	0.0022

NE = Not Established

9.2 ROUND 2 – JANUARY-FEBRUARY & APRIL 2021

A summary of the PFAS results from the Round 2 field programme is provided in Table S and Table T. Tables of results are presented in Tables 6 and 7. It should be noted that results for OB32 vertical delineation and TEC monitoring are not included below and are reported in Sections 9.3 and 9.4 respectively. Further discussion of individual media and site areas is provided in subsequent sections.

Table S - Round 2 - Summary of exceedances of adopted PFAS criteria

Sample Source	Number of Sampling Points	Exceedances of Recreational water guideline	Exceedances of FW 95% species protection guideline	Exceedances of FW 99% species protection guideline
Groundwater monitoring wells	72	0	0	27
Production bores	22	0	0	8
Surface water	15	0	0	8

Table T - Round 2 - Summary of PFAS results

Analyte	Assessment Criteria (Source: PFAS NEMP 2020)				Minimum concentration (ug/L) – Production Bores, Monitoring Wells and Surface Water	Maximum Concentration (ug/L)		
	Freshwater 95% (ug/L)	Freshwater 99% (ug/L)	Recreational use (ug/L)	Drinking water (ug/L)		Production Bores	Monitoring Wells	Surface Water
PFOS	0.13	0.00023	NE	NE	<0.0002	0.0046	0.0446	0.0141
PFOA	220	19	10	0.56	<0.0005	<0.0005	0.0366	0.0121
Sum of PFHxS and PFOS	NE	NE	2	0.07	<0.0002	0.0094	0.0589	0.0333
Sum of PFAS	NE	NE	NE	NE	<0.0002	0.0114	0.162	0.137

9.3 OB32 VERTICAL DELINEATION

A summary of the PFAS results from vertical delineation sampling at OB32 is provided in Table U and Table V. Tabulated results are presented in Table 8. Further discussion of the results is provided in subsequent sections.

Table U - OB32 Vertical Delineation Wells - Summary of exceedances of adopted PFAS criteria

Sample Source	Number of Sampling Points	Exceedances of Recreational water guideline	Exceedances of FW 95% species protection guideline	Exceedances of FW 99% species protection guideline
Groundwater monitoring wells	8	0	0	1
Production bores	2	0	0	0

Table V - OB32 Vertical Delineation Wells - Summary of PFAS results

Analyte	Assessment Criteria (Source: PFAS NEMP 2020)				Minimum concentration (ug/L) –Monitoring Wells	Maximum Concentration (ug/L) - Monitoring Wells
	Freshwater 95% (ug/L)	Freshwater 99% (ug/L)	Recreational use (ug/L)	Drinking water (ug/L)		
PFOS	0.13	0.00023	NE	NE	<0.0002	0.0005
PFOA	220	19	10	0.56	<0.0005	0.0086
Sum of PFHxS and PFOS	NE	NE	2	0.07	<0.0002	0.0005
Sum of PFAS	NE	NE	NE	NE	<0.0002	0.052

9.4 TEC

A summary of the PFAS results from sampling at specified stygofauna monitoring wells within the TEC in April 2021 is provided in Table W and Table X. Further discussion of the results is provided in subsequent sections.

Table W - TEC - Summary of exceedances of adopted PFAS criteria

Sample Source	Number of Sampling Points	Exceedances of Recreational water guideline	Exceedances of FW 95% species protection guideline	Exceedances of FW 99% species protection guideline
Groundwater monitoring wells	16	0	0	5

Table X - TEC - Summary of PFAS results

Analyte	Assessment Criteria (Source: PFAS NEMP 2020)				Minimum concentration (ug/L) –Monitoring Wells	Maximum Concentration (ug/L) - Monitoring Wells
	Freshwater 95% (ug/L)	Freshwater 99% (ug/L)	Recreational use (ug/L)	Drinking water (ug/L)		
PFOS	0.13	0.00023	NE	NE	<0.0002	0.0250
PFOA	220	19	10	0.56	<0.0005	0.0245
Sum of PFHxS and PFOS	NE	NE	2	0.07	<0.0002	0.0589

Analyte	Assessment Criteria (Source: PFAS NEMP 2020)				Minimum concentration (ug/L) –Monitoring Wells	Maximum Concentration (ug/L) - Monitoring Wells
	Freshwater 95% (ug/L)	Freshwater 99% (ug/L)	Recreational use (ug/L)	Drinking water (ug/L)		
Sum of PFAS	NE	NE	NE	NE	<0.0002	0.128

10. DISCUSSION

The following Section provides discussion of the results of sampling at each area of the site. For simplicity this discussion has been separated into the following areas:

- Mining Operations at OB23 and OB25
- South-western plumes from Newman WWTP and Mount Whaleback
- Discharge, infiltration and migration at the recharge ponds, Ophthalmia Dam and the TEC
- OB32

Analytical results are presented in Tables 4 to 11 with results from Rounds 1 and 2 shown on Figure 8, Figures 9A to 9K and results from OB32 vertical delineation sampling shown on Figure 10.

10.1 APPROACH TO ASSESSMENT

Total PFAS concentrations (presented as ‘Sum of PFAS’) allow an interpretive assessment of the presence of other PFAS compounds which do not currently have environmental guideline values established (with the exception of PFOA). These compounds could be considered potential precursor compounds which over time and under certain conditions may transform to PFHxS, PFOS and/or PFOA. The PFAS NEMP v2.0 (2020) states the following:

“It is therefore important that environmental assessments qualitatively consider the likely total mass and distribution of all PFAS present as well as PFOS, PFOA and PFHxS and other specific PFAS of concern.”

In understanding the results of analysis undertaken during this investigation it is important not to overlook the total PFAS concentrations observed in groundwater. This is particularly the case where elevated total PFAS concentrations are present above or approaching acceptable criteria for individual compounds for which guidelines have been established. Where this has occurred, consideration has been given to the concentrations of individual precursor compounds and their likely transformation products. To contextualise the results, the sum of these groups of precursors (i.e. sulfonic acids and carboxylic acids) have then been added together and compared to the criteria for their respective stable end-point compounds (e.g. PFOS plus PFHxS, PFOA).

10.2 MINING OPERATIONS

10.2.1 OB23

Groundwater samples were collected from seven monitoring wells located within OB23 during Round 1 and Round 2 as shown on Figure 9A. During both rounds, samples from all monitoring wells except EA978RM, located to the west (hydraulically upgradient) of the OB23, exceeded the 99% FWG for PFOS but remained at least two orders of magnitude below the 95% FWG. Highest PFOS concentrations were found in monitoring well HEA0125M, which is located closest to the OB23 pit, with this monitoring well also containing the highest total PFAS concentration and a greater proportion of precursor compounds, including both sulfonic and carboxylic acids. Other monitoring wells in the vicinity of the pit also exhibited higher concentrations relative to the rest of the OB23 monitoring well network, providing evidence that the historical source of the observed PFAS in this area is likely to be within the pit rather than external. This is consistent with anecdotal evidence that testing of fire suppression equipment on mobile plant, including discharges directly to ground, has historically occurred within the pits at Eastern Ridge.

A comparison of the total PFAS concentrations observed in monitoring wells against the drinking water guideline for PFOS plus PFHxS shows that if all precursors were to transform to PFOS or PFHxS then the DWG would be exceeded in HEA0125M (total PFAS of 0.103ug/L) and would be within an order of magnitude in HEA0134M and HEA0141M. However, the majority of precursors in these wells are carboxylic acids which will not degrade to via this route. A comparison of total PFAS against the DWG for PFOA (0.56ug/L) instead shows no exceedances but that the concentration in HEA0125M is within an order of magnitude of the DWG.

Based on the location of the OB23 pit it is likely that any PFAS plume emanating from this source will comingle with any PFAS containing water which being infiltrated at the recharge ponds which are located approximately 400m to the south at their closest point. Furthermore, in the absence of ongoing dewatering at OB23, the proportion of PFAS coming from this area can be expected to increase over time as water levels within the pit increase and equilibrate with the wider aquifer system leading to greater flow away from the OB23 pit.

No production bores were sampled in the immediate vicinity of OB23. However, measurable PFAS was present in production bore HNPI0031P, located 1.5km north-east of the OB23 pit. Concentrations of PFOS in this bore exceeded the 99% FWG with the PFOS plus PFHxS total remaining more than an order of magnitude below the DWG. When consideration is given to the presence of sulfonic acid PFBS (the sole other PFAS present), the combined concentration of 0.0021ug/L still remains more than an order of magnitude below the DWG. It should be noted that this production bore is also likely to be affected by the quality of water discharged at the recharge ponds and Ophthalmia Dam.

10.2.2 OB25

During Round 1 and Round 2, samples were collected from both monitoring wells and production bores located in the across OB32, with samples also collected from each of the four in-pit sumps during Round 2. For the purposes of the discussion OB25 has been split into eastern and western sections.

10.2.2.1 OB25 East

As shown on Figure 9C, highest PFAS concentrations were observed in the sump samples, with concentrations of PFOS in three of the sumps exceeding the 99% FWG, and the fourth sample, collected from Sump 1 to the east, marginally below this guideline but containing a greater proportion of other PFAS compounds (both sulfonic and carboxylic acids). However, PFOS concentrations in all samples (including those from the sumps) remained at least 2 orders of magnitude below the 95% FWG, with total PFAS (as a conservative surrogate criteria for PFOS) also at least an order of magnitude below. Within the sumps, all concentrations remained at least an order of magnitude below DWG. When total PFAS is compared to the DWG for PFOS plus PFHxS, all sump results were at least an order of magnitude below the DWG except sump 3. However, as the majority of precursors in this sump are carboxylic acids, potential PFOS plus PFHxS even under full transformation would still not exceed the DWG. Likewise, a comparison of the sum of carboxylic acids against the DWG for PFOA shows that the results are two orders of magnitude below the guideline.

Of the seven production bores sampled, the two located furthest to the east of the pit contained PFOS marginally above the 99% FWG, with comparable results in these bores across the two rounds. This is consistent with the results from two monitoring wells located in this area which also contained PFAS (including PFOS above the 99% FWG). No other PFAS compounds beyond PFOS were detected in any of these production bores, indicating that any risks to ecological receptors due to abstraction in these locations are currently only attributable to PFOS and not other PFAS compounds which do not yet have assessment criteria.

10.2.2.2 Fuel Farm and Fire Training Ground

Three monitoring wells (MW01a, MW06 and MW07) installed to investigate a historical leak at the old fuel farm, which is located immediately to the east of the OB25 fire training ground, were sampled during the course of this investigation. With the exception of MW07, these wells contained only PFOS, with concentrations marginally exceeding the 99% FWG. During round 1, MW07 contained significantly higher total PFAS with a relatively low proportion of PFOS (approximately 15%) with a significant amount of 6:2FTS also present. During round 2, MW07 did not contain a measurable concentration of 6:2FTS but instead contained PFPeA which is a transformation product of 6:2FTS under aerobic conditions. When compared to the DWG for PFOS plus PFHxS, the total concentration of sulfonic acids is more than an order of magnitude below the guideline. Similarly, a comparison of the PFPeA concentration against the DWG for PFOA (as a conservative approach) shows that the measured concentration is more than two orders of magnitude below this value. However, the variability of the results in this area means that additional sampling is required to determine if the results are representative of a true potential risk. Further information regarding this recommendation is provided in Section 12.1.1.

10.2.2.3 OB25 West

Elevated PFAS concentrations were detected along the southern edge of the western half of OB25 in HEO815M and ECO754RM, with similar results detected in monitoring wells outside the OB25 boundary to the south and south-east, likely linked to the Newman WWTP discharge or other sources present to the west or south west (see Section 10.3). The highest total PFAS concentrations in this area was 0.13ug/L in ECO754RM in round 1, with the round two total PFAS concentration being an order of magnitude lower. The PFAS in samples from this area were dominated largely by carboxylic acid precursors. When compared to the DWG for PFOA, the total of these carboxylic acids was less than an order of magnitude below the DWG. The individual PFAS present in these wells is very similar to those present in HEC0448M which is located further to the west, downgradient of the Newman WWTP. Based on this and easterly groundwater flow direction, it is likely that the PFAS present in this area are primarily from the WWTP. However, other sources in this area, such as Mount Whaleback, may also be contributing.

HEC0407M, located within the centre of the orebody containing total PFAS of up to 0.285ug/L, which was dominated by PFBA, and to a lesser extent, PFOA with the combined concentration approaching the PFOA DWG but significantly below the 99% FWG. It is not possible to determine if this result is related to the sources identified to the south-west, which are characterised by a wider range of carboxylic acids, or if it is the result of a distinct release. However, it is noted that PFBA is typically encountered as a breakdown product of stain-resistant fabrics, paper food packaging and carpets (Minnesota Department of Health, 2017) such as would be encountered in a landfill rather than any identified on-site source.

10.3 SOUTH-WESTERN PLUMES

10.3.1 Newman Wastewater Treatment Plant

Newman WWTP is located to the west of mining operations at Eastern Ridge and discharges treated effluent onto BHP's tenements. It is licenced (Licence no. L6870/1993/12) as a sewage facility, being a premises on which sewage is treated or from which treated sewage is discharged onto land or into waters. Whilst its licence contains monitoring obligations, none relate to PFAS.

In response to the Round 1 result for monitoring well HST1063RM, located downgradient of the WWTP and where peak Round 1 concentrations of PFOS and other PFAS compounds were observed, one surface water and four sediment sampling points at the Newman WWTP discharge were added to the Round 2 sampling programme. Results of these samples are provided in Table 6 (water), Tables 10 and 11 (sediment and leachable PFAS in sediment respectively) and shown on Figure 11.

The WWTP discharge water sample contained a variety of PFAS compounds including PFOS at a concentration of 0.0141ug/L which significantly exceeds the 99% FWG but is an order of magnitude below the 95% FWG. Consistent with this, all four sediment samples contained a range of PFAS compounds, with concentrations of PFOS exceeding the ecological indirect exposure criteria for soil but remaining below the direct exposure criteria in all four samples. The direct exposure criteria apply to organisms that live within, or close contact with soil, such as earthworms or plants. Conversely, the indirect exposure criteria account for the various pathways through which organisms can be exposed whether they are in direct contact with PFAS contaminated soil (i.e. exposure through the food chain) (HEPA, 2020).

Concentrations of PFOS in almost all sediment leachate samples (both pH5 and pH7) exceeded the FWG 95% guideline. Similarly, the sum of PFHxS plus PFOS exceeded the drinking water guideline in all leachate samples. Comparison of the PFAS compounds present discharge water and sediment leachate samples shows that the water being discharged from the WWTP contains a significantly greater proportion of precursor compounds than the sediment samples. This is consistent with the occurrence of transformation processes under aerobic conditions within the discharge channels but may also be influenced by variations in WWTP inputs over time.

The PFAS concentrations observed in sediment and the time over which the WWTP is likely to have discharged suggests that it has potentially been a significant contributing source of the observed PFAS impacts in groundwater across the wider Eastern Ridge area. Based on the results of the surface water sample collected from the discharge culvert, discharges of PFAS containing effluent are continuing to occur and constitute an ongoing primary source of PFAS. Based on an inferred easterly groundwater flow direction, these impacts appear to have affected groundwater quality at OB25 which is approximately 5km hydraulically downgradient (see Section 10.2.2.3).

10.3.2 Mount Whaleback

BHP's Mount Whaleback mine was reported in 2019 under the CS Act as PFAS such as from fire-fighting foams or PFAS-containing wastes were known to have been used at the site and PFAS had been detected in groundwater beneath the site at locations associated with a number of fire training areas and wastewater treatment and discharge locations. Investigations into the presence of PFAS have established that these compounds are present in both soil and groundwater broadly distributed across Mount Whaleback, however, most notably occur at the fire training areas, landfill, wastewater disposal areas and the rail loop ponds.

In February and April 2021 samples were collected from HEA0351 which is located between the Newman WWTP and Mount Whaleback. These samples contained PFOS above the 99% FWG as well as other sulfonic acids. Given the age of Mount Whaleback and the drawdown which has occurred at Eastern Ridge it is plausible that Mount Whaleback is a source of PFAS in groundwater being abstracted at Eastern Ridge. Should this be the case, it is likely that this plume would be comingled with that of the Newman WWTP.

10.4 INFILTRATION AND DISCHARGE ZONES

10.4.1 Recharge Ponds

The Eastern Ridge recharge ponds are used in conjunction with Ophthalmia Dam to manage dewatering effluent generated across Eastern Ridge. They are located adjacent to Homestead Creek and are underlain by the TEC. Unlike elsewhere at Eastern Ridge, groundwater in this area is relatively shallow and is hosted within a calcrete aquifer. Groundwater flow under natural conditions can be expected to be to the north but is heavily influenced by mounding resulting from discharges to both the recharge ponds and nearby Ophthalmia Dam.

To assess the effluent being infiltrated at the recharge ponds, samples were collected from locations across the recharge ponds in December 2020, January and April 2021 with results shown on Figure 8. A peak concentration of PFOS of 0.001ug/L was recorded in both Rounds 1 and 2, with the highest sample

concentrations being recorded in the northern recharge ponds. Conversely, during the April monitoring, the peak PFOS concentration (0.0141ug/L) was recorded in the southern recharge pond. With the exception of sample RPSW04 in April 2021, no results were within an order of magnitude of the DWG for any compound. At RPSW04, the sum of PFOS plus PFHxS was 0.018ug/L (the DWG is 0.13ug/L).

During the December sampling, no PFAS compounds other than PFOS were detected in any sample, with only minor PFBS also detected in January. Conversely, a number of carboxylic acids and 8:2 FTS were also detected in the sample (RPSW04) collected from the southern recharge pond in April. The increase in total PFAS in the southern recharge pond is attributed to either dewatering effluent from OB23 and OB25 being redirected from the northern recharge ponds to the southern recharge ponds from March 2021 onwards, or the mobilisation of PFAS during pond excavation works.

Separate to PFAS present in water being discharged to the recharge ponds, sediment contained at their base is a potential source of PFAS as a result of adsorption over time. This means that it has the potential to act as a source of leachable PFAS into the future even if PFAS can be removed from incoming dewatering effluent. Similarly, whilst the results of this investigation should that water in the ponds does not contain PFAS above the 95% FWG or the DWG, it is possible that water immediately below the ponds may contain higher concentrations due to leaching from sediments as water is infiltrated. The extent to which this continues to occur is unknown following the recent excavation of approximately 14,000m³ of sediment from the recharge ponds; however, it is unlikely that all PFAS-containing sediments were removed. Additionally, sediments within the ponds are likely to be re-contaminated whilst PFAS-containing water continues to be discharged to this location.

10.4.1.1 Excavated Sediments from Recharge Ponds

As described above, 14,000m³ of sediment has recently been excavated from the recharge ponds. This material is currently being stockpiled on unsealed ground and has not been covered. As such, these stockpiles are considered to be a potential source of PFAS containing leachate which may have been generated during the placement of wet material or may be generated during future rainfall events.

10.4.2 Ophthalmia Dam

A single surface water sample was collected from Ophthalmia Dam in both December and January with PFOS concentrations (0.0024ug/L and 0.0022ug/L respectively) exceeding the 99% FWG during both rounds. The absence of PFAS precursors within these samples suggests that the source of PFOS is likely to an aged and degraded discharge. However, as described in Section 3.4, the presence of multiple discharges into Ophthalmia Dam means that it is not possible to definitively attribute the presence of PFAS to Eastern Ridge or any other individual source at this stage. Furthermore, it is not known if the single sampling location is representative of water quality across the wider Ophthalmia Dam and additional sampling is required to allow greater confidence regarding potential risks to ecological receptors which may be present.

10.4.3 Ethel Gorge, the TEC and the Fortescue River

Monitoring wells within the TEC, including components of Homestead Creek, Ethel Gorge and the Fortescue River, were included within all three rounds, with Round 3 specifically including 16 monitoring wells which have been part of BHP's stygofauna monitoring programme for the TEC. The results of these three rounds show that PFAS within the TEC may be considered terms of the following areas:

- An area extending from the recharge ponds to Ophthalmia Dam and incorporating Ethel Gorge itself. Across this area is a broad and largely consistent plume with concentrations of PFOS in all wells exceeding the 99% FWG. Wells closest to the recharge ponds tend to include a greater non-PFOS component whereas those furthest away and most likely influenced by infiltration and runoff from Ophthalmia Dam are almost entirely PFOS containing.

- Downgradient (north) of Ethel Gorge and within the Fortescue River downgradient of Ophthalmia Dam PFAS concentrations decrease with distance north of the recharge ponds and are below detection limits from a point 4.5km north of the ponds. Within this area, periodic exceedances of the 99% FWG for PFOS are observed with various carboxylic acids also present. With the exception of EOP033R and HEOP0504M, located closest to the recharge ponds and Ophthalmia Dam total PFAS concentrations in this area remain more than an order of magnitude below the DWG for any individual compounds. When compared to the DWG for PFOA, as the most appropriate surrogate guideline for carboxylic acids, the results from these two wells are also more than an order of magnitude below the DWG.
- Upgradient (south) of Ophthalmia Dam, including Homestead Creek where concentrations are more variable and appear to be influenced by other sources beyond the discharge and infiltration of dewatering effluent. Of note in this area is HEOP0398M which in April 2021 contained PFOS only marginally above the 99% FWG, but a sum of PFHxS and PFOS of 0.0103ug/L which is less than an order of magnitude below the DWG. When other sulfonic acids which may be expected to transform to PFOS or PFHxS over time are included, the total concentration approaches the 95% FWG for PFOS which may be used to contextualise the result. This monitoring well is located approximately 2.5km from Newman airport which is a potential source of the observed impacts.

In addition to the above, cross-hydraulic gradient from the recharge ponds but downgradient of Ophthalmia Dam, measurable concentrations of PFAS were present in the most easterly well (HNPIWR003) sampled during this investigation. Between this well and the main plume inferred to emanate from the recharge ponds are two monitoring wells (EOP0220R and EOP378R) with significantly lower concentrations, indicating that it is possible the results observed in HNPIWR003 are not connected to the main recharge ponds plume. Furthermore, the absence of precursors and PFOA in samples collected from Ophthalmia Dam to the south suggests that this is unlikely to be the source of these results. Further works required to investigate the extent and significance of the plume in this area are discussed in Section 12.1.1.

10.5 OB32

Monitoring wells and production bores located within OB32 were sampled across all three rounds. This sampling identified the presence of PFAS in a number of monitoring wells located in the centre of the ore body as shown on Figures 9G and 9H. The composition of PFAS within the centre of this apparent plume is dominated by PFBS and a range of carboxylic acids, with relatively minor concentrations of PFOS, albeit at concentrations exceeding the 99% FWG. Given the location of OB32 hydraulically upgradient of known potential sources of PFAS such as the Newman WWTP and OB23, as well as the variety of precursors present, it is likely that there is an unidentified PFAS source in this area.

10.5.1 Vertical Delineation of PFAS in OB32

To assess the likelihood of PFAS being abstracted during future dewatering at OB32, an assessment of the vertical distribution of PFAS was undertaken in selected monitoring wells as part of Round 3. This was accompanied by monitoring of nearby production bores where possible. Within the monitoring wells, hydrasleeves were installed at depths which correspond to different aquifer units as set out in Table 3 and at locations shown on Figure 10. Results of the sampling are presented in Table 8 and demonstrate that, where PFAS is present at OB32, its concentrations decrease with depth. This is consistent with the results from production bores which pump from deeper aquifers and whose effluent did not contain PFAS during the Round 3 sampling event. This suggests that PFAS-related risks associated with dewatering in the short-term are likely to be low. However, without further works to identify and characterise the inferred source, it is not possible to discount future risks under hydraulic gradients generated by long-term dewatering such as would be required to facilitate the complete mining of OB32.

10.6 SUMMARY

The broad scale groundwater sampling and limited surface water and sediment sampling undertaken to date has identified the presence of PFAS across the area of investigation. In certain areas, PFAS concentrations are more elevated and appear to be associated with various potential sources or site activities. Across the entire area of investigation, no concentration of specific PFAS compounds in groundwater exceeds any adopted assessment criteria (where these are available) with the exception of the 99% FWG. However, when consideration is given to the degradation of precursors, particularly sulfonic acids which will most likely degrade to PFOS or PFHxS, concentrations approaching the 95% FWG and DWG are present.

The most significant source of PFAS affecting groundwater beneath Eastern Ridge is likely to be the Newman WWTP. Other areas which are likely to be sources include:

- OB23
- Recharge Ponds and associated excavated sediments
- An unknown source within OB32
- Newman Airport
- OB25 fuel farm and fire training ground.

A tier 1 assessment of the potential risks to receptors is provided in Section 11.

11. CONCEPTUAL SITE MODEL

The DWER risk-based approach to contaminated site management requires that investigations be completed and a CSM developed to determine the source, nature and extent of contamination and potential impacts to human health and the environment. Development of a CSM is the standard preliminary step in the human health and ecological risk assessment process. For a particular contaminant to present a risk, three components must be present:

- **Source** - A potentially hazardous substance that has been released into the environment
- **Receptors** - The human or ecological component potentially at risk of experiencing an adverse response following exposure to the source or derivatives of the source
- **Pathway** - A mechanism by which receptors can become exposed to the source or derivatives of the source.

If one of these three is missing from an exposure scenario, then there can be no risk.

It should be noted that the conceptual site model presented within this report is focused on PFAS-related risks. An assessment of risks related to other contaminants potentially present at the site is outside the scope of this investigation.

11.1 POTENTIAL SOURCES

11.1.1 On-Site Sources

11.1.1.1 Primary sources

A primary source of contamination is the first point at which a chemical has been introduced via a leak, spill or deliberate disposal released directly from the original source. Primary sources of contamination which have been identified or are inferred to be present on site are detailed in Table Z.

Table Y - Potential on-site primary sources of contamination

Potential source	Notes
Excavated sediment from recharge ponds	Approximately 14,000m ³ of sediment has recently been excavated from the recharge ponds. Whilst this has not yet been tested, it is likely to contain PFAS given the nature of the water which has been infiltrated through the recharge ponds.
Mobile equipment fire suppression system testing	Anecdotal evidence suggests that fire suppression systems on mobile equipment have historically been tested within OB23 and OB25. Any ongoing testing or use of this equipment would constitute a primary source.
Unconfirmed source at OB32	Results of groundwater sampling indicate that there is an unidentified source of PFAS resulting in a predominantly shallow plume across the centre of OB32. It is not known if this source is primary, secondary or historical.
Newman WWTP ²	Water being discharged from the WWTP has been confirmed to contain PFAS above adopted assessment criteria.

² For the purpose of this investigation, Newman WWTP is considered to be an on-site source as it discharges to land which is within BHP's Eastern Ridge tenure.

Potential source	Notes
PFAS containing discharges from workshops due to activities such as equipment maintenance	May occur due to either maintenance of fire suppression systems, discharge of PFAS containing hydraulic fluids/lubricants or use of fluorinated surfactants. However, no evidence of large scale impacts from such activities has been observed during this LSI.
Fuel Farm and Fire Training Ground	Both fuel storage and fire training are associated with PFAS containing AFFFs. Elevated PFAS concentrations have been observed in groundwater samples from this area.
Recharge Ponds	Water being discharged to the recharge ponds has been shown to contain PFAS at elevated concentrations.

11.1.1.2 Secondary sources

Secondary sources of contamination which have been identified as potentially present on site are detailed in Table Z.

Table Z - Potential on-site secondary sources of contamination

Potential source	Notes
Sediment within recharge ponds	No confirmatory testing of sediment within the recharge ponds has been undertaken and it is understood that excess sediment from the recharge ponds has recently been excavated and is currently awaiting disposal. However, it is expected that PFAS, which has been confirmed to be present in dewatering effluent will continue to be adsorbed to pond sediment and will constitute an ongoing source as water is infiltrated.
Soil in areas of fire suppression equipment testing	Anecdotal evidence suggests that testing of fire suppression equipment on mining plant has historically been undertaken with pits. This is consistent with the results of groundwater sampling, particularly at OB23. Residual impacted soils have the potential to act as an ongoing source of PFAS particularly as water levels rise at OB23 during its closure.
Sediment impacted by discharges from Newman WWTP	Sediment within the Newman WWTP discharge infiltration area has been confirmed to contain PFAS above adopted assessment criteria for ecological indirect contact and with leachable concentrations above the FWG 95% and drinking water guidelines

11.1.2 Off-Site Sources

For the purpose of preparing this assessment, “off-site” is considered to be any source outside of the area of investigation. Potential off-site sources are listed in Table AA.

Table AA - Potential off-site sources of contamination

Potential source	Notes
Mount Whaleback Mine Site	PFAS has been confirmed to be present in groundwater beneath Mount Whaleback and was present in a groundwater sample collected from between Mount Whaleback and the Newman WWTP.
Newman Landfill	Landfills have been regularly identified as sources of PFAS (HEPA, 2020). According to the Newman WWTP operating licence, solid waste is disposed of to Newman Landfill and can be expected to contain PFAS based on the results of this investigation.

Potential source	Notes
	However, no data has been collected from groundwater bores in the vicinity of the landfill so any source is hypothetical at this stage.
Newman Airport	Airports are commonly associated with the presence of PFAS due to activities associated with fire suppression and firefighting. The results from HEOP0398M are consistent with this occurring but additional data is required to confirm this.

In addition to those potential sources identified above, it is noted that the site is located in relatively close proximity to Newman townsite which is likely to include a variety of activities which could lead to discharge of PFAS. Such discharges may directly impact upon receptors which are also potentially affected by operations at Eastern Ridge, or they may contribute to the presence of PFAS in groundwater beneath Eastern Ridge which can be observed in dewatering effluent being discharged from the site.

11.2 POTENTIAL MIGRATION PATHWAYS

The following potential migration pathways have been identified in relation to groundwater containing PFAS at the site:

- Leaching from soil to groundwater and surface water
- Adsorption onto, and subsequent leaching from, sediments such as those present in the recharge ponds or at the WWTP discharge
- Abstraction of PFAS containing groundwater and pumping to recharge ponds or other infiltration locations
- Overtopping of recharge ponds or other holding ponds within surface water flow into Homestead Creek or other channels
- Surface water flow to and within ephemeral creeks and rivers, including Homestead Creek, Whaleback Creek and the Fortescue River
- Surface water flow out of Ophthalmia Dam
- Infiltration from Ophthalmia Dam
- Lateral and vertical groundwater flow under natural or dewatering-influenced gradients

11.3 POTENTIAL EXPOSURE PATHWAYS

For the purpose of this assessment, possible exposure pathways (P) are identified as natural and/or man-made pathways for the migration of chemicals of concern. The following exposure pathways potentially exist for PFAS at the site.

11.3.1 Human Health Exposure Pathways

- Ingestion of groundwater abstracted for potable purposes
- Ingestion during recreational activities in Ophthalmia Dam
- Inhalation of soil/sediment derived dusts
- Dermal contact with impacted soil/sediment or water (surface or groundwater)

11.3.2 Ecological Exposure Pathways

- Direct contact and uptake of PFAS from soils
- Direct contact and uptake of PFAS in surface water and/or sediment

- Direct contact with and uptake of PFAS in groundwater (deep rooted trees and riparian plants)
- Direct contact and ingestion of PFAS in groundwater (stygo fauna)
- Ingestion of PFAS followed by potential bioaccumulation and biomagnification through the food chain

11.4 IDENTIFIED RECEPTORS

For the purpose of this assessment, potential 'receptors' include persons, structures, utilities, ecological receptors, shallow groundwater and water supply wells that are, or may be, adversely affected by the chemicals of potential concern during or after the completion of the proposed development. Potential receptors on or down-gradient of the site, which have exposure pathways that may be complete, include the following:

Human Health

- On-site workers
- Recreational users of Ophthalmia Dam
- Users of water abstracted from Homestead Borefield

Environmental

- Aquatic flora and fauna within Ophthalmia Dam
- Terrestrial flora and fauna within the vicinity of Ophthalmia Dam, Homestead Creek and Ethel Gorge/Fortescue River
- Aquatic flora and fauna within Ophthalmia Dam
- Stygo fauna within the Ethel Gorge TEC

11.5 PRELIMINARY SOURCE-PATHWAY-RECEPTOR (SPR) LINKAGE ASSESSMENT

A preliminary conceptual site model is presented in Table BB below, which describes the source-pathway-receptor (S-P-R) linkages at the site.

Table BB – Preliminary Conceptual Site Model

Source	Migration Pathway	Potential Receptors	Potential Exposure Pathway	SPR Linkage Status	Discussion	Recommendations
Human Health						
All sources	Leaching to groundwater followed by lateral groundwater flow and subsequent abstraction and discharge to Ophthalmia Dam	Recreational users of Ophthalmia Dam	Ingestion or dermal contact during recreational activities	Incomplete	No PFAS concentrations above or close to recreational water guidelines have been recorded during this investigation. This includes samples collected from Ophthalmia Dam.	
Unconfirmed source at OB32	Leaching to groundwater followed by lateral groundwater flow and subsequent abstraction for potable purposes	Users of potable water supplies abstracted from the Homestead borefield	Ingestion	Incomplete	No PFAS concentrations above or close to drinking water guidelines have been recorded near to the Homestead borefield. The Homestead borefield is located hydraulically upgradient of the Newman WWTP and other significant sources..	
Water being discharged to the recharge ponds PFAS-containing sediments within the recharge ponds Stockpiled potentially PFAS containing sediments excavated from recharge ponds.	Leaching to groundwater followed by lateral groundwater flow and subsequent abstraction	Users of potable water supplies abstracted from the Ophthalmia borefield	Ingestion	Potentially complete	No PFAS concentrations above or close to drinking water guidelines have been recorded near to the Ophthalmia borefield. However, PFAS from infiltration at the recharge ponds has been observed in monitoring wells along Ethel Gorge.	Regular monitoring of production bore water and nearby groundwater monitoring wells.

Source	Migration Pathway	Potential Receptors	Potential Exposure Pathway	SPR Linkage Status	Discussion	Recommendations
OB23	Leaching to groundwater followed by lateral groundwater flow and subsequent abstraction	Users of potable water supplies abstracted from the Ophthalmia borefield	Ingestion	Potentially complete	<p>PFAS concentrations within an order of magnitude of the DWG have been identified in the vicinity of OB23.</p> <p>The contribution of this source to groundwater in the vicinity of the Ophthalmia borefield is expected to increase over time (see Section 10.2.1)</p>	Regular monitoring of production bore water and nearby groundwater monitoring wells.
Locations of potential SME fire suppression system testing or maintenance	At source exposure or migration via windblown dust.	Site workers	Inhalation or ingestion of soil/sediment or derived dusts	Incomplete	<p>No investigation soil quality in the vicinity of fire suppression system testing or maintenance locations has been undertaken.</p> <p>However, dust inhalation is considered typically to be a minor exposure pathway (HEPA, 2020).</p>	Investigation of potential source zones to assess risks.
Stockpiled sediment excavated from recharge ponds	At source exposure or migration via windblown dust	Site workers	Inhalation or ingestion of soil/sediment or derived dusts	Incomplete	<p>No investigation of the stockpiles has been undertaken to date.</p> <p>However, dust inhalation is considered typically to be a minor exposure pathway (HEPA, 2020) with access to the stockpiles being intermittent and typically of short duration.</p>	Characterisation and appropriate management of stockpiled sediment

Source	Migration Pathway	Potential Receptors	Potential Exposure Pathway	SPR Linkage Status	Discussion	Recommendations
Ecological						
Historical and ongoing discharges from the Newman WWTP. PFAS containing sediment downgradient of the Newman WWTP	Surface water flow and adsorption to sediments	Terrestrial flora and fauna immediately downgradient of Newman WWTP.	Direct contact with and uptake of PFAS in surface water and sediment by flora and fauna	Complete	Concentrations of PFAS in sediment downgradient of the WWTP exceed ecological indirect exposure assessment criteria.	Completion of an assessment to characterise the extent of PFAS impacts downgradient of Newman WWTP. Review options to reduce PFAS concentrations in water being discharged from Newman WWTP.
	Surface water flow (either direct from the WWTP or involving leaching of PFAS from sediments) during periods of high rainfall	Terrestrial flora and fauna within Whaleback Creek or Homestead Creek	Direct contact with and uptake of PFAS in surface water by flora and fauna	Complete	Runoff flow paths and surface water/sediment conditions in Whaleback and Homestead Creeks have not been assessed; however, based on the concentrations observed, it is likely that discharge to one or both of these creeks will occur during periods of high rainfall	Assess surface water flow paths from Newman WWTP to determine discharge locations where assessment of surface water and sediment conditions may be required. Review options to reduce PFAS concentrations in water being discharged from Newman WWTP.
	Consumption of PFAS-affected fauna	Predators of PFAS-affected fauna	Bioaccumulation and biomagnification through the food chain	Potentially complete	No assessment of risks to predators through bioaccumulation and biomagnification has not been undertaken.	Completion of an ecological risk assessment.

Source	Migration Pathway	Potential Receptors	Potential Exposure Pathway	SPR Linkage Status	Discussion	Recommendations
Historical and ongoing discharges from the Newman WWTP. PFAS containing sediment downgradient of the Newman WWTP	Direct infiltration or leaching to groundwater followed by lateral groundwater flow	Terrestrial flora and fauna within Whaleback Creek or Homestead Creek	Direct contact with and uptake of PFAS in groundwater by deep rooted trees and riparian plants	Potentially complete	Groundwater level data in the vicinity of Homestead and Whaleback Creeks suggests that groundwater is present a depth of approximately 20m which is below the typical water level ranges of Pilbara riparian vegetation (DoW, 2010). However, water level data in the vicinity of the subject Creeks is limited	Further assessment of groundwater levels in the vicinity of Creeks should be undertaken. This should be accompanied by assessment of the extent of any PFAS plume emanating from the Newman WWTP.
All sources (including on or off-site) as these may cause contamination of dewatering effluent	Leaching to groundwater followed by lateral groundwater flow and subsequent abstraction and discharge to Ophthalmia Dam	Aquatic flora and fauna within Ophthalmia Dam	Direct contact with and uptake of PFAS in surface water and/or sediment	Complete	Concentrations of PFOS in surface water exceed the 99% FWG but remain below the 95% FWG.	
		Terrestrial fauna in the vicinity of Ophthalmia Dam	Ingestion of PFAS containing aquatic flora and fauna	Potentially complete	As an assessment of the food web has not been undertaken it is not possible to confirm if this pollutant linkage is complete	
	Consumption of PFAS-affected fauna	Predators of PFAS-affected fauna	Bioaccumulation and biomagnification through the food chain	Potentially complete	No assessment of risks to predators through bioaccumulation and biomagnification has not been undertaken.	Completion of an ecological risk assessment.

Source	Migration Pathway	Potential Receptors	Potential Exposure Pathway	SPR Linkage Status	Discussion	Recommendations
Water being discharged to the recharge ponds	Infiltration/ leaching to groundwater followed by lateral groundwater flow	Deep rooted trees and riparian plants	Direct contact with and uptake of PFAS in groundwater	Potentially complete	Groundwater in some areas may be shallow enough to coincide with root zones of certain vegetation.	
PFAS-containing sediments within the recharge ponds		Stygofauna	Direct contact with and ingestion of PFAS in groundwater following infiltration of PFAS containing water at Ophthalmia Dam as part of managed aquifer recharge	Potentially complete	Whilst exceedances of the 99% criteria have been observed in Ophthalmia Dam and the vicinity of Ethel Gorge, no assessments of the effects of PFAS on stygofauna have been completed.	Continuation of studies into the effect of PFAS in stygofauna in the Ethel Gorge TEC ³ .
Stockpiled potentially PFAS containing sediments excavated from recharge ponds	Infiltration of PFAS containing water at Ophthalmia Dam as part of managed aquifer recharge			Potentially complete	As stygofauna do not form part of the food web, the use of the 99% FWG due to bioaccumulation considerations may not be applicable.	
All sources as these may cause contamination of dewatering effluent						

³ A study into the ecotoxicity of PFAS on stygofauna in the Newman area is currently being undertaken by CRC Care.

Source	Migration Pathway	Potential Receptors	Potential Exposure Pathway	SPR Linkage Status	Discussion	Recommendations
Water being discharged to the recharge ponds PFAS-containing sediments within the recharge ponds Stockpiled potentially PFAS containing sediments excavated from recharge ponds	Overtopping of recharge ponds during high rainfall events	Stygofauna	Direct contact with and ingestion of PFAS in groundwater following infiltration of PFAS containing water	Potentially complete	Whilst exceedances of the 99% criteria have been observed in Ophthalmia Dam and the vicinity of Ethel Gorge, no assessments of the effects of PFAS on stygofauna have been completed. As stygofauna do not form part of the food web, the use of the 99% FWG due to bioaccumulation considerations may not be applicable.	Continuation of studies into the effect of PFAS in stygofauna in the Ethel Gorge TEC.
		Flora and fauna in Homestead Creek	Direct contact with and uptake of PFAS in surface water	Potentially complete	Concentrations of PFOS in recharge pond water exceed 99% criteria with other PFAS also present. Whilst risks are reduced by the short duration of any overtopping event, the long-term cumulative effects of PFAS containing discharges from multiple sources on Homestead Creek has not been investigated.	Assessment of surface water and sediment quality in Homestead Creek adjacent to and downgradient of the recharge ponds.

Source	Migration Pathway	Potential Receptors	Potential Exposure Pathway	SPR Linkage Status	Discussion	Recommendations
Newman Airport (potential source)	Surface water runoff	Flora and fauna in Creeks downgradient of the Airport, including within Ophthalmia Dam	Direct contact with and uptake of PFAS in surface water	Potentially complete	Significant concentrations of PHxS have been detected in two rounds of sampling at a monitoring well 2.5km to the north (downgradient) of the airport. However, insufficient data is available to confirm that the airport is the source of this PFAS or the significance of the result.	Targeted groundwater sampling around Newman Airport to confirm or exclude this as source.
	Leaching to groundwater followed by lateral groundwater flow	Stygofauna	Direct contact with and ingestion of PFAS in groundwater following infiltration of PFAS containing water	Potentially complete		

12. CONCLUSIONS AND RECOMMENDATIONS

12.1 CONCLUSIONS

Based on the results of this LSI, Tetra Tech makes the following conclusions.

PFAS Source Zones and Activities

The following have been identified as likely sources of PFAS in groundwater at Eastern Ridge include:

- Testing of fire suppression systems on mobile plant which is understood to have occurred within the OB23 and OB25 pits.
- Discharge of PFAS containing effluent from Newman WWTP which has resulted in sediment impacts within the downgradient drainage channels.
- Sediment within recharge ponds or which has recently been excavated from the ponds and is stockpiled nearby.
- PFAS-containing groundwater being abstracted from various locations and subsequently discharged to the recharge ponds or Ophthalmia Dam.

In addition to the above, the following have been identified as potentially being sources of PFAS in groundwater at Eastern Ridge:

- An unidentified source at OB32 which is located hydraulically cross- and up-gradient of likely and potential sources and where a shallow PFAS plume is present.
- Groundwater impacts resulting from historical activities at Mount Whaleback, located to the south-west of the site. Such impacts may migrate towards Eastern Ridge, particularly under hydraulic gradients created by dewatering.
- Newman airport where it is likely firefighting training exercises using PFAS containing AFFF have historically been undertaken.
- Newman townsite which may have a variety of activities which could lead to the discharge of PFAS.

Distribution of Groundwater Impacts

Based on the results of groundwater sampling, the following areas are underlain by PFAS containing groundwater:

- To the north, east and south of the recharge ponds, extending north beneath Ethel Gorge and the Fortescue River and to the south in the vicinity of Homestead Creek. This plume is likely to follow the alignment of the shallow calcrete formation which will likely constitute a preferential pathway for PFAS migration.
- To the north, east and south of OB23, with the plume likely to comingle with the recharge ponds plume.
- Emanating from the Newman WWTP discharge location and extending across the OB25. This plume may also comingle with the plume emanating from Mount Whaleback.
- Within OB32 where a shallow plume is present within the centre of the ore body. Unlike elsewhere, this plume is dominated by PFBS and a range of carboxylic acids, with relatively minor concentrations of PFOS, albeit at concentrations exceeding the 99% FWG.

PFAS Transport

The following migration pathways have been identified as dominating the transport of PFAS at the site:

- Abstraction of PFAS containing groundwater and subsequent discharge and/or infiltration at the recharge ponds and Ophthalmia Dam.
- Lateral flow within groundwater, which generally flows in an easterly direction but is heavily influenced by hydraulic gradients resulting from dewatering activities.

The extent to which PFAS transport is influenced by surface flow, either during discharge of produced water/treated effluent or during flood events is not yet known.

Exposure Pathways

Based on the conceptual site model developed during the course of this investigation the following complete or potentially complete exposure pathways exist in relation to PFAS at the site.

- Complete – direct contact with, and uptake from, PFAS containing surface water and sediment by flora and fauna downgradient of the Newman WWTP.
- Complete – direct contact with, and uptake from, PFAS containing surface water and sediment by flora and fauna at Ophthalmia Dam or Homestead Creek.
- Potentially complete Bioaccumulation and biomagnification through the food chain as a result of ingestion and uptake of PFAS at Ophthalmia Dam or near the WWTP.
- Potentially complete – direct contact with, and uptake of, PFAS in groundwater by deep rooted trees and riparian plants
- Potentially complete - direct contact with, and uptake of, PFAS in surface water by riparian plants following periods of high rainfall and subsequent overtopping of the recharge ponds.
- Potentially complete – Direct contact with, and ingestion of, PFAS containing groundwater by stygofauna following infiltration of water at either the recharge ponds or Ophthalmia Dam.
- Potentially complete – ingestion of PFAS containing water abstracted from Ophthalmia borefield. It is noted that current concentrations of PFAS in this area remain significantly below any published assessment criteria. However, future migration from the recharge ponds and/or OB23 may lead to increased presence of PFAS.

12.1.1 Data Gap Assessment

Based on the results of investigation the status of data gaps identified in Section 6 is as follows.

Data Gap 1 – What are the potential sources which may be contributing to the presence of PFAS in groundwater at Eastern Ridge?

Sources of PFAS beneath Eastern Ridge have broadly been characterised during this investigation but confirmation of the source at OB32 and comprehensive identification of off-site sources has not yet been achieved. As such this data gap is considered to be partially addressed.

Data Gap 2 - Is PFAS-containing groundwater currently present and being abstracted as part of operations at Eastern Ridge?

The results of production bore and recharge pond water confirm that PFAS containing groundwater is being abstracted from limited areas of Eastern Ridge. However, the concentrations observed in production bores have been shown to be significantly below those observed in samples taken from shallower depths in monitoring wells. This data gap is considered to be addressed.

Data Gap 3 - If PFAS-containing effluent currently, or has historically been, discharged at Eastern Ridge, has this resulted in the presence of PFAS in surface water or groundwater in the vicinity of the discharge points?

Concentrations of PFAS within and around the recharge ponds confirm that discharge of PFAS containing effluent has occurred and has resulted in the presence of PFAS in groundwater in this area. The presence of PFAS in surface water at Ophthalmia Dam cannot solely be attributed to Eastern Ridge as it currently and has historically accepted water from multiple locations. No investigation of surface water quality in Creeks around Eastern Ridge has been completed as part of this scope. This data gap is considered to be partially addressed.

Data Gap 4 - Are the potential risks to either human or ecological receptors understood?

Risks to human health are considered to be low, with no confirmed complete SPR linkages and the only potentially complete linkages relating to the Ophthalmia borefield. Potential risks to ecological receptors,

whilst identified, are not fully understood and require further assessment in the form of an ecological risk assessment. This data gap is considered to be partially addressed.

Data Gap 5 – Is PFAS containing groundwater likely to be abstracted during planned dewatering at OB32?

An unknown source of PFAS is inferred to exist at OB32 and as such, the possibility of abstracting PFAS-containing groundwater cannot be discounted. However, the results of vertical delineation and production bore sampling show that PFAS concentrations decrease significantly with depth and as such any concentrations in future dewatering effluent are likely to be extremely low. This data gap is considered to be partially addressed.

12.2 RECOMMENDATIONS

Based on the findings of this investigation, Tetra Tech makes the following recommendations:

1. Additional investigations should be undertaken to characterise PFAS downgradient of the Newman WWTP, which is owned and operated by the Shire of East Pilbara. This is required to address the following data gaps with respect to the CSM:

- The magnitude and extent of the PFAS source within this area which may contribute to groundwater impacts.
- Delineation of the PFAS groundwater plume so that the significance of this source in the context of dewatering and abstraction for other purposes may be understood.
- Surface water flow paths such that discharge locations to Creeks may be better understood.
- The risks to ecological receptors which may be present in this area or may associated via the food web.

2. Further source identification and subsequent characterisation should be undertaken in the following areas:

- OB25 to determine the source of PFAS in sumps
- OB32 where there is an apparent source, noting that this ore body is located up-hydraulic gradient of identified potential sources.
- The old fuel farm and fire training ground

In addition to assessing the sources of PFAS in groundwater, these investigations will quantify the contribution of PFAS at these primary source zones, provide an understanding of the presence of ongoing or residual secondary source contribution and allow the potential for risks to ecological or human health receptors to be further understood.

3. A surface water sampling programme should be undertaken at Ophthalmia Dam and other surface water bodies (ephemeral or permanent) to characterise the presence of PFAS in surface water. This should include assessment of the interactions between surface water, sediment and groundwater. It should also include assessment of other potential sources beyond those related to BHP's operations.

4. Further investigation is required to determine if the results observed at HNPIWR003 (the most easterly well sampled) are related to the recharge ponds as a source or if there another potential source in this area, which may require further investigation.

5. Site procedures should be reviewed to ensure that AFFF products are not discharged to ground during routine servicing and maintenance of mobile plant. This should occur even where AFFFs have been transitioned to fluorine-free products, unless it can be demonstrated that equipment has first been adequately decontaminated such that no residual PFAS remains.

6. A monitoring programme should be designed and implemented to confirm that no PFAS is present in bores supplying water to Newman. This programme should include appropriate sentinel wells to allow early identification of risks.

7. Where total PFAS concentrations have been recorded above or close to the DWG, total oxidisable precursor (TOP) assay analysis should be undertaken to understand the predicted concentrations of stable

end-point compounds which may occur as a result of precursor transformation over time rather than just those which are measured as part of the standard PFAS analysis undertaken to date.

13. REFERENCES

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14. STATEMENT OF LIMITATIONS

IMPORTANT INFORMATION ABOUT YOUR TETRA TECH COFFEY ENVIRONMENTAL REPORT

Introduction

This report has been prepared by Tetra Tech Coffey for you, as Tetra Tech Coffey's client, in accordance with our agreed purpose, scope, schedule and budget.

The report has been prepared using accepted procedures and practices of the consulting profession at the time it was prepared, and the opinions, recommendations and conclusions set out in the report are made in accordance with generally accepted principles and practices of that profession.

The report is based on information gained from environmental conditions (including assessment of some or all of soil, groundwater, vapour and surface water) and supplemented by reported data of the local area and professional experience. Assessment has been scoped with consideration to industry standards, regulations, guidelines and your specific requirements, including budget and timing. The characterisation of site conditions is an interpretation of information collected during assessment, in accordance with industry practice.

This interpretation is not a complete description of all material on or in the vicinity of the site, due to the inherent variation in spatial and temporal patterns of contaminant presence and impact in the natural environment. Tetra Tech Coffey may have also relied on data and other information provided by you and other qualified individuals in preparing this report. Tetra Tech Coffey has not verified the accuracy or completeness of such data or information except as otherwise stated in the report. For these reasons the report must be regarded as interpretative, in accordance with industry standards and practice, rather than being a definitive record.

Your report has been written for a specific purpose

Your report has been developed for a specific purpose as agreed by us and applies only to the site or area investigated. Unless otherwise stated in the report, this report cannot be applied to an adjacent site or area, nor can it be used when the nature of the specific purpose changes from that which we agreed.

For each purpose, a tailored approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible quantify, risks that both recognised and potential contamination pose in the context of the agreed purpose. Such risks may be financial (for example, clean up costs or constraints on site use) and/or physical (for example, potential health risks to users of the site or the general public).

Limitations of the Report

The work was conducted, and the report has been prepared, in response to an agreed purpose and scope, within time and budgetary constraints, and in reliance on certain data and information made available to Tetra Tech Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on that purpose and scope, requirements, data or information, and they could change if such requirements or data are inaccurate or incomplete.

This report is valid as of the date of preparation. The condition of the site (including subsurface conditions) and extent or nature of contamination or other environmental hazards can change over time, as a result of either natural processes or human influence. Tetra Tech Coffey should be kept apprised of any such events and should be consulted for further investigations if any changes are noted, particularly during construction activities where excavations often reveal subsurface conditions.

In addition, advancements in professional practice regarding contaminated land and changes in applicable statutes and/or guidelines may affect the validity of this report. Consequently, the currency of conclusions and recommendations in this report should be verified if you propose to use this report more than 6 months after its date of issue.

The report does not include the evaluation or assessment of potential geotechnical engineering constraints of the site.

Interpretation of factual data

Environmental site assessments identify actual conditions only at those points where samples are taken and on the date collected. Data derived from indirect field measurements, and sometimes other reports on the site, are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Variations in soil and groundwater conditions may occur between test or sample locations and actual conditions may differ from those inferred to exist. No environmental assessment program, no matter how comprehensive, can reveal all subsurface details and anomalies. Similarly, no professional, no matter how well qualified, can reveal what is hidden by earth, rock or changed through time.

The actual interface between different materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of a suitably qualified and experienced environmental consultant through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other unrecognised features encountered on site. Tetra Tech Coffey would be pleased to assist with any investigation or advice in such circumstances.

Recommendations in this report

This report assumes, in accordance with industry practice, that the site conditions recognised through discrete sampling are representative of actual conditions throughout the investigation area. Recommendations are based on the resulting interpretation.

Should further data be obtained that differs from the data on which the report recommendations are based (such as through excavation or other additional assessment), then the recommendations would need to be reviewed and may need to be revised.

Report for benefit of client

Unless otherwise agreed between us, the report has been prepared for your benefit and no other party. Other parties should not rely upon the report or the accuracy or completeness of any recommendation and should make their own enquiries and obtain independent advice in relation to such matters.

Tetra Tech Coffey assumes no responsibility and will not be liable to any other person or organisation for, or in relation to, any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report.

To avoid misuse of the information presented in your report, we recommend that Tetra Tech Coffey be consulted before the report is provided to another party who may not be familiar with the background and the purpose of the report. In particular, an environmental disclosure report for a property vendor may not be suitable for satisfying the needs of that property's purchaser. This report should not be applied for any purpose other than that stated in the report.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, a suitably qualified and experienced environmental consultant should be retained to explain the implications of the report to other professionals referring to the report and then review plans and specifications produced to see how other professionals have incorporated the report findings.

Given Tetra Tech Coffey prepared the report and has familiarity with the site, Tetra Tech Coffey is well placed to provide such assistance. If another party is engaged to interpret the recommendations of the report, there is a risk that the contents of the report may be misinterpreted and Tetra Tech Coffey disowns any responsibility for such misinterpretation.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists or engineers based on their interpretation of field logs, field testing and laboratory evaluation of samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

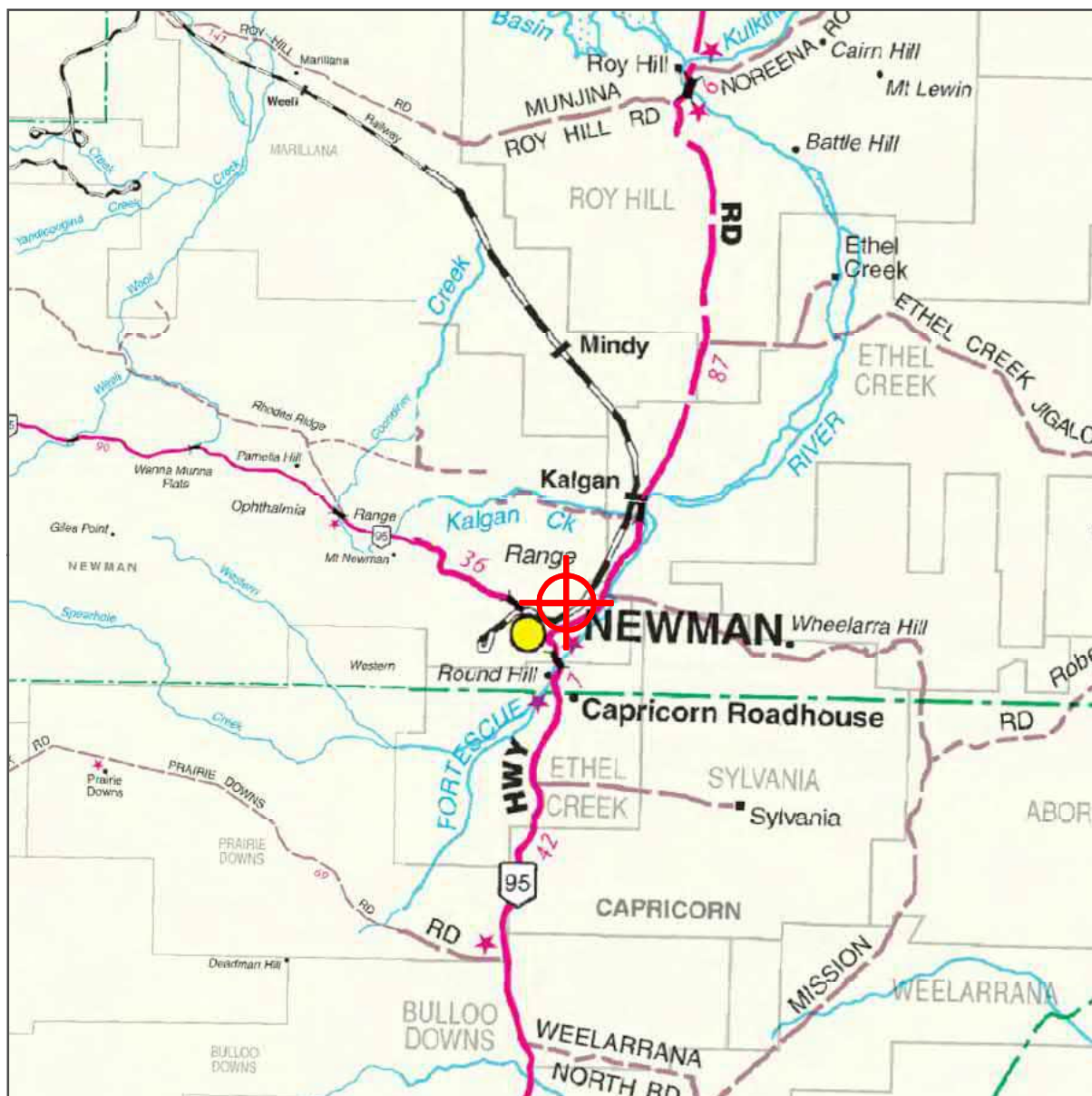
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Responsibility

Environmental reporting relies on interpretation of factual information using professional judgement and opinion and has a level of uncertainty attached to it, which is much less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. As noted earlier, the recommendations and findings set out in this report should only be regarded as interpretive and should not be taken as accurate and complete information about all environmental media at all depths and locations across the site.



GENERAL AREA MAP



REGIONAL AREA MAP



IMAGE SOURCE: Travellers Atlas 2006



LOCAL AREA MAP

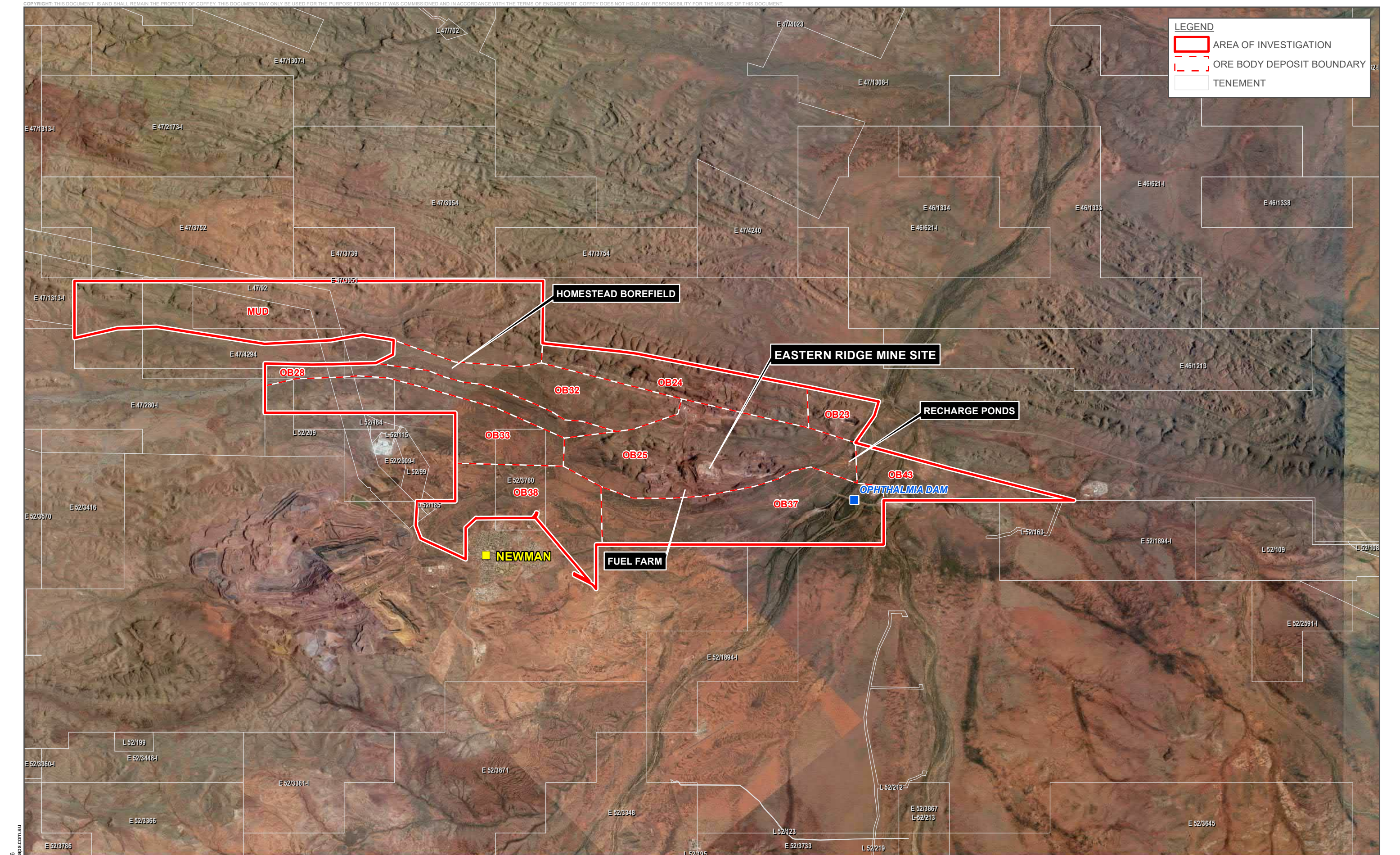


IMAGE SOURCE: Open Street Map

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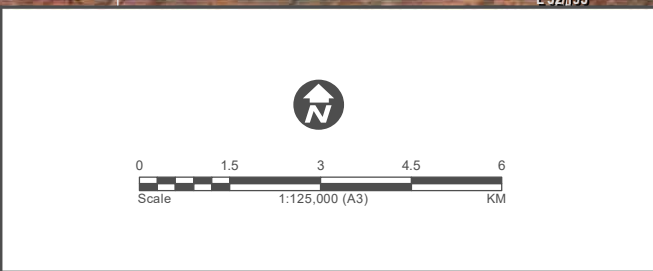
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project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES		
title:	SITE LOCATION PLAN		
project no:	754-PEREN282113_R03	figure no:	1
		rev:	A



LEGEND

- AREA OF INVESTIGATION
- ORE BODY DEPOSIT BOUNDARY
- TENEMENT

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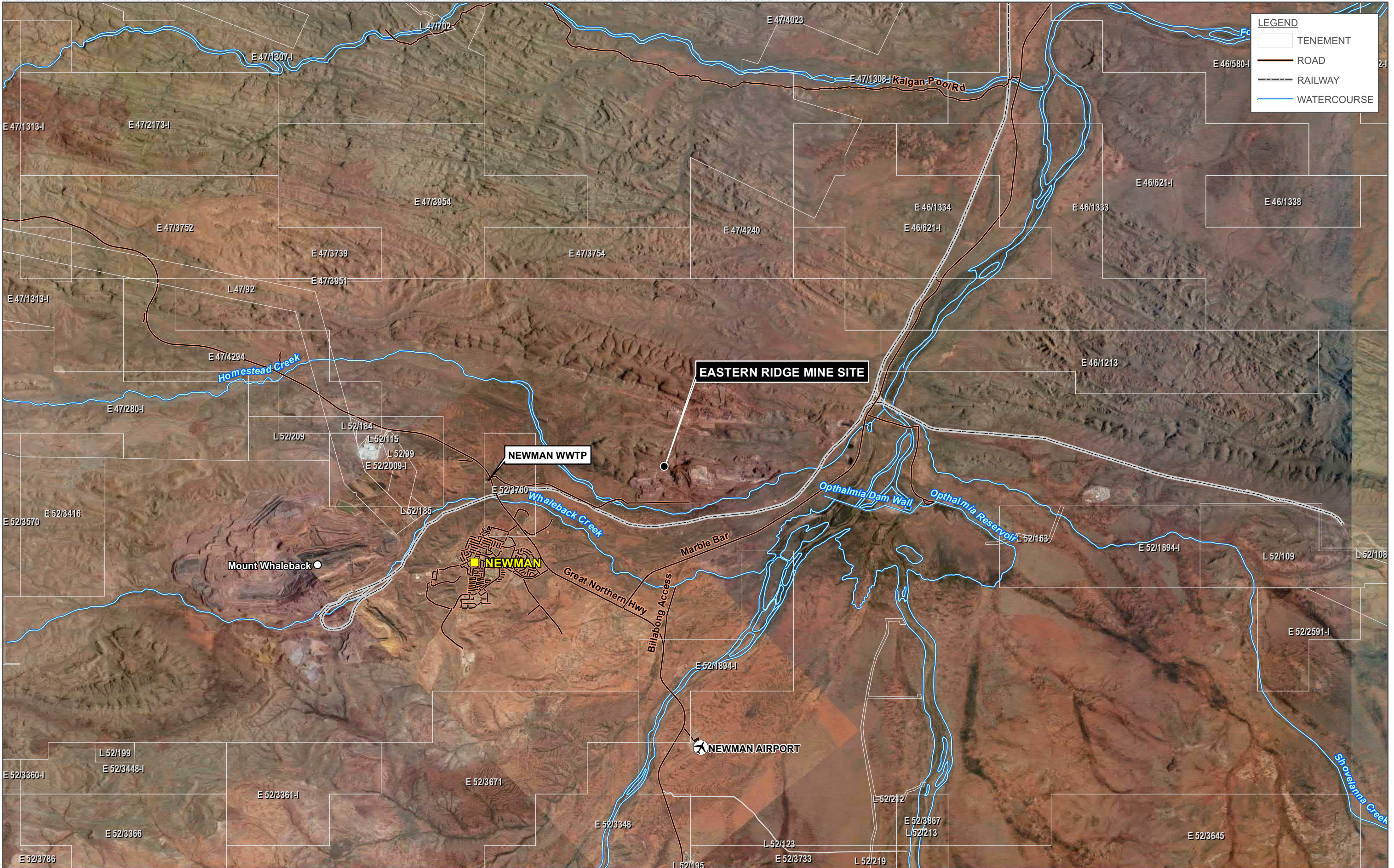


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title:	SITE FEATURES PLAN		
project no:	754-PEREN282113_R03	figure no:	2
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LEGEND

- TENEMENT
- ROAD
- RAILWAY
- WATERCOURSE

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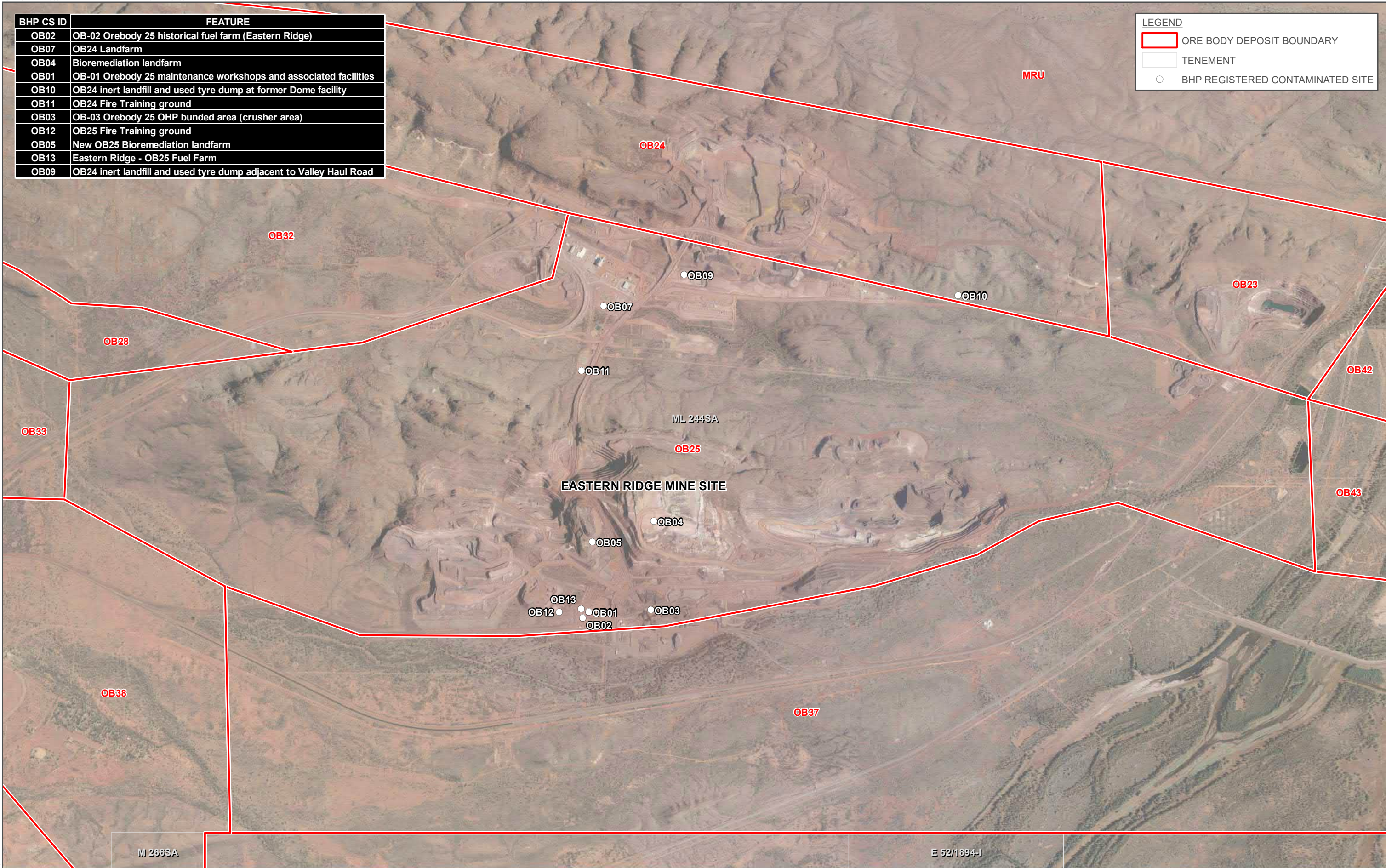
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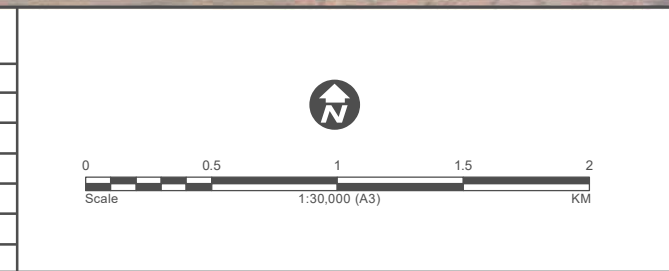
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OB02	OB-02 Orebody 25 historical fuel farm (Eastern Ridge)
OB07	OB24 Landfarm
OB04	Bioremediation landfarm
OB01	OB-01 Orebody 25 maintenance workshops and associated facilities
OB10	OB24 inert landfill and used tyre dump at former Dome facility
OB11	OB24 Fire Training ground
OB03	OB-03 Orebody 25 OHP bunded area (crusher area)
OB12	OB25 Fire Training ground
OB05	New OB25 Bioremediation landfarm
OB13	Eastern Ridge - OB25 Fuel Farm
OB09	OB24 inert landfill and used tyre dump adjacent to Valley Haul Road

LEGEND	
	ORE BODY DEPOSIT BOUNDARY
	TENEMENT
	BHP REGISTERED CONTAMINATED SITE



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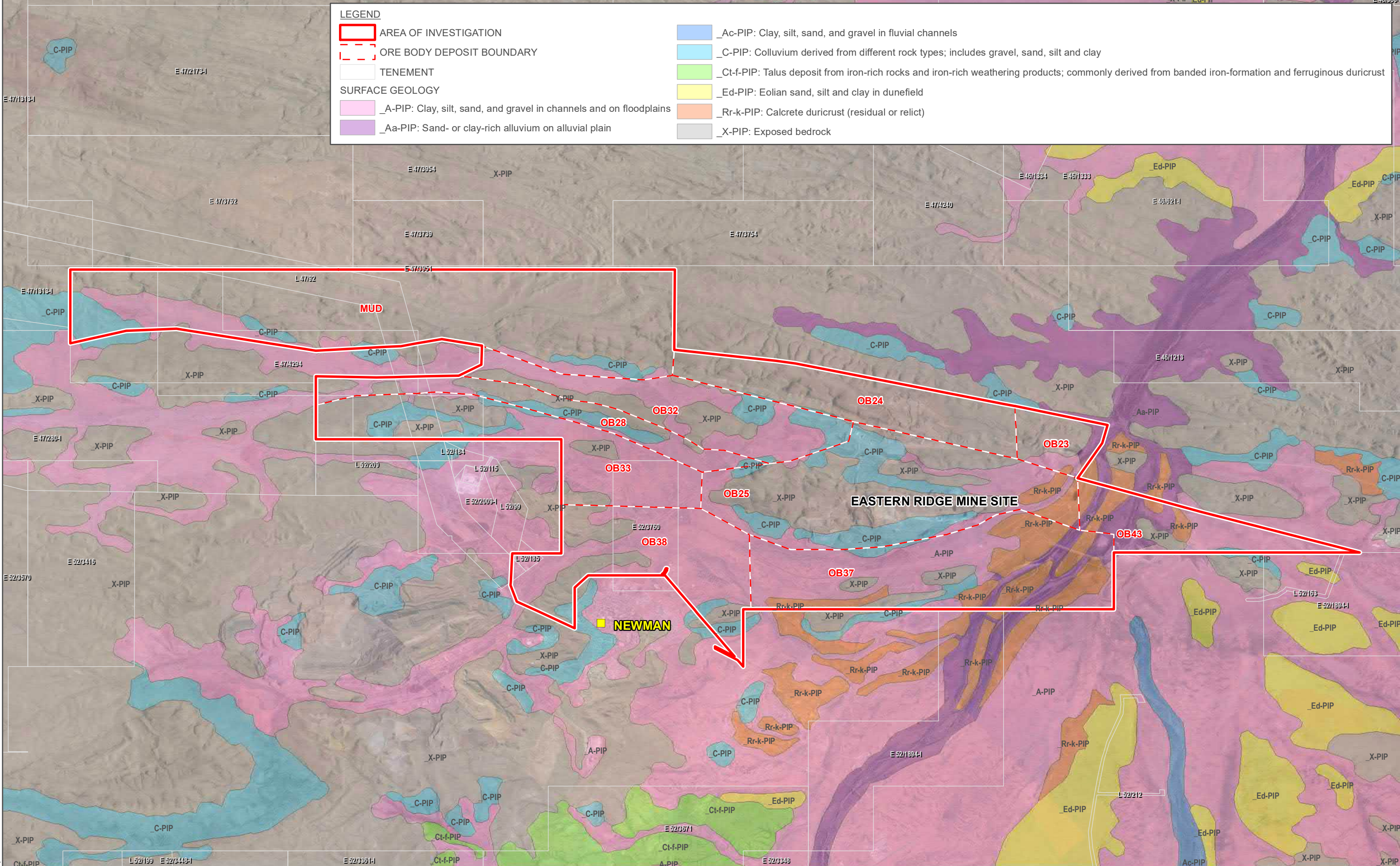
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title:	BHP REGISTERED CONTAMINATED SITES		
project no:	754-PEREN282113_R03	figure no:	4
rev:	A		



LEGEND

AREA OF INVESTIGATION

ORE BODY DEPOSIT BOUNDARY

TENEMENT

SURFACE GEOLOGY

_A-PIP: Clay, silt, sand, and gravel in channels and on floodplains

_Aa-PIP: Sand- or clay-rich alluvium on alluvial plain

_Ac-PIP: Clay, silt, sand, and gravel in fluvial channels

_C-PIP: Colluvium derived from different rock types; includes gravel, sand, silt and clay

_Ct-f-PIP: Talus deposit from iron-rich rocks and iron-rich weathering products; commonly derived from banded iron-formation and ferruginous duricrust

_Ed-PIP: Eolian sand, silt and clay in dunefield

_Rr-k-PIP: Calcrete duricrust (residual or relict)

_X-PIP: Exposed bedrock

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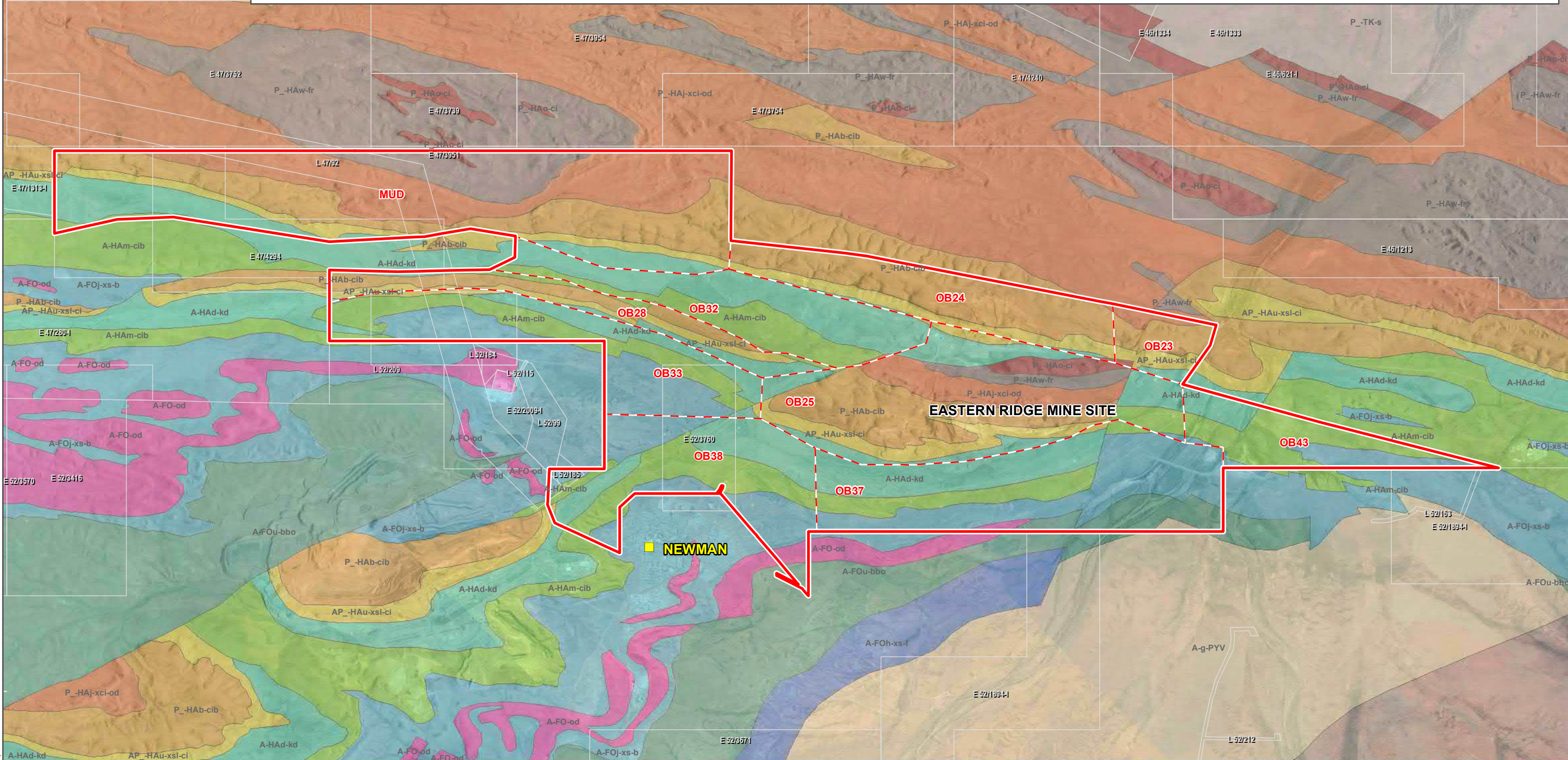
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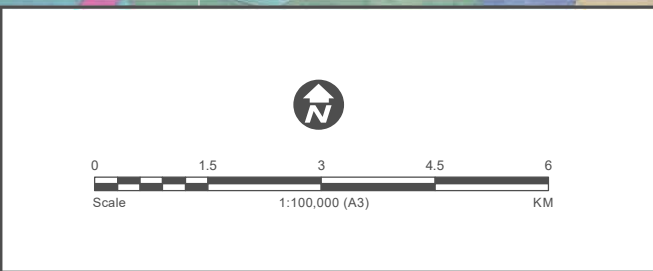
- AREA OF INVESTIGATION
- ORE BODY DEPOSIT BOUNDARY
- TENEMENT

BEDROCK GEOLOGY

- A-FO-od: Fortescue Group: Dolerite dyke or sill
- A-FOh-xs-f: Hardey Formation: Sedimentary and felsic volcanic rocks; local intrusive rocks
- A-FOj-xs-b: Jeerinah Formation: Siliciclastic sedimentary rocks, mafic volcanic rocks and minor felsic volcanic rocks; local carbonate rocks, chert, and dolerite sills
- A-FOu-bbo: Bunjinah Formation: Pillowed and massive basaltic flows; basaltic breccia and basaltic volcanic sandstone; minor chert; amygdaloidal basalt flows occur in upper parts of formation; metamorphosed
- A-HAd-kd: Wittenoom Formation: Thinly bedded dolomite and dolomitic shale, with minor black chert, shale, banded iron formation and sandstone
- A-HAm-cib: Marra Mamba Iron Formation: Chert, banded iron-formation, mudstone, and siltstone; minor carbonate; metamorphosed
- A-g-PYV: Sylvania Inlier granitic unit: Granite to granodiorite; metamorphosed and variably foliated
- AP_-HAu-xsl-ci: Mount McRae Shale and Mount Sylvania Formation: Mudstone, siltstone, chert, banded iron-formation, and dolomite
- P_-HAb-cib: Brockman Iron Formation: Banded iron-formation, chert, mudstone, and siltstone; minor dolerite sills
- P_-HAj-xci-od: Weeli Wolli Formation: Banded iron-formation (commonly jaspilitic), mudstone, siltstone, and numerous dolerite sills; minor basalt
- P_-HAo-ci: Boolgeeda Iron Formation: Fine-grained, finely laminated iron-formation, mudstone, siltstone, and chert; minor dolomite, sandstone, conglomerate, and diamictite
- P_-HAW-fr: Woongarra Rhyolite: Rhyolite, rhyodacite, rhyolitic breccia, banded iron-formation, and mudstone
- P_-TK-s: Turee Creek Group: Mudstone, siltstone, sandstone, conglomerate, dolomite; minor diamictite, limestone and iron formation; intruded by Balgara Dolerite sills



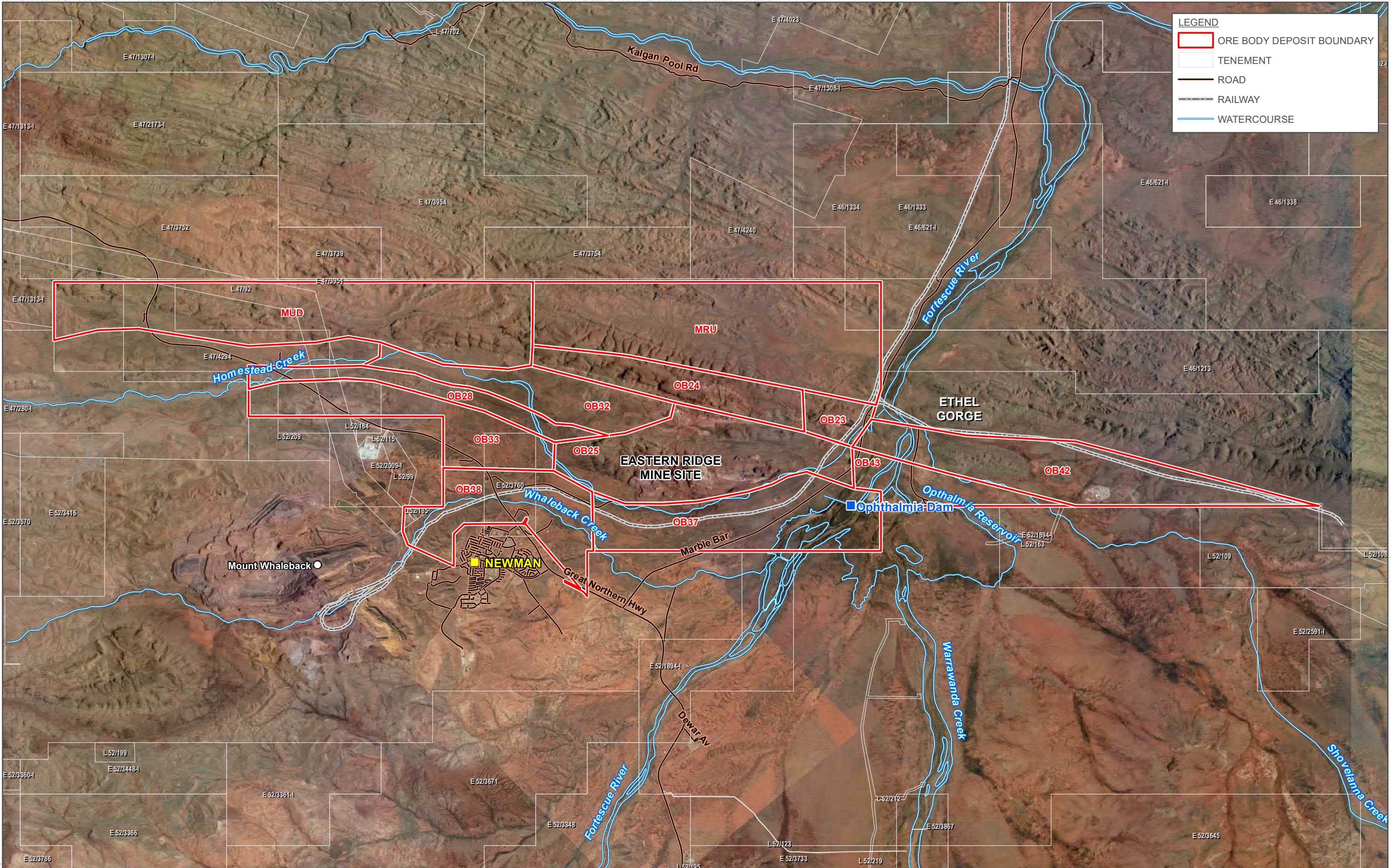
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A	ORIGINAL ISSUE			



drawn	ENVIRONMAPS
approved	DB
date	10/05/2021
scale	AS SHOWN
original size	A3




client:	BHP EASTERN RIDGE		
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES		
title:	BEDROCK GEOLOGY		
project no:	754-PEREN282113_R03	figure no:	6
rev:	A		



LEGEND

- ORE BODY DEPOSIT BOUNDARY
- TENEMENT
- ROAD
- RAILWAY
- WATERCOURSE

no.	description	drawn	approved	date
A	ORIGINAL ISSUE			



Scale: 0 1.5 3 4.5 6
1:125,000 (A3) KM

drawn	ENVIRONMAPS
approved	DB
date	6/05/2021
scale	AS SHOWN
original size	A3



client:	BHP EASTERN RIDGE		
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES		
title:	HYDROLOGY		
project no:	754-PEREN282113_R03	figure no:	7
rev:	A		

I.D.	RPSW02_A
Sampled Date	12-Apr-21
PFHxS	<0.0005
PFOS	0.0006
PFOA	<0.0005
Sum of PFAS	0.0012
Sum of PFHxS & PFOS	0.0006

I.D.	RPSW02_B
Sampled Date	12-Apr-21
PFHxS	<0.0005
PFOS	0.0004
PFOA	<0.0005
Sum of PFAS	0.0004
Sum of PFHxS & PFOS	0.0004

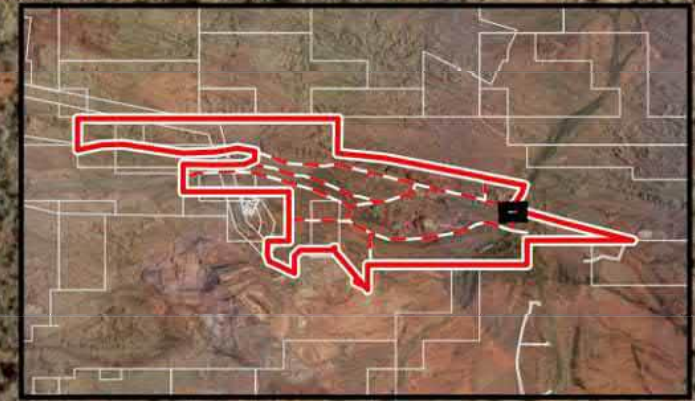
I.D.	RPSW02	RPSW02
Sampled Date	06-Dec-20	31-Jan-21
PFHxS	<0.0005	<0.0005
PFOS	0.0006	0.001
PFOA	<0.0005	<0.0005
Sum of PFAS	0.0006	0.0016
Sum of PFHxS & PFOS	0.0006	0.001

I.D.	RPSW05
Sampled Date	12-Apr-21
PFHxS	<0.0005
PFOS	0.0005
PFOA	<0.0005
Sum of PFAS	0.0052
Sum of PFHxS & PFOS	0.0005

I.D.	RPSW04	RPSW04
Sampled Date	31-Jan-21	12-Apr-21
PFHxS	<0.0005	0.0039
PFOS	<0.0002	0.0141
PFOA	<0.0005	0.0017
Sum of PFAS	<0.0002	0.025
Sum of PFHxS & PFOS	<0.0002	0.018

I.D.	RPSW01	RPSW01
Sampled Date	06-Dec-20	31-Jan-21
PFHxS	<0.0005	<0.0005
PFOS	0.0009	0.0007
PFOA	<0.0005	<0.0005
Sum of PFAS	0.0009	0.0007
Sum of PFHxS & PFOS	0.0009	0.0007

I.D.	RPSW03	RPSW03	RPSW03
Sampled Date	06-Dec-20	31-Jan-21	12-Apr-21
PFHxS	<0.0005	<0.0005	<0.0005
PFOS	0.0007	0.0022	0.0006
PFOA	<0.0005	<0.0005	<0.0005
Sum of PFAS	0.0007	0.0022	0.0038
Sum of PFHxS & PFOS	0.0007	0.0022	0.0006



OB25

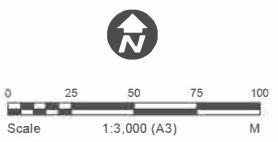
OB23

OB43

LEGEND	
	AREA OF INVESTIGATION
	ORE BODY DEPOSIT BOUNDARY
	TENEMENT
	SURFACE WATER SAMPLE

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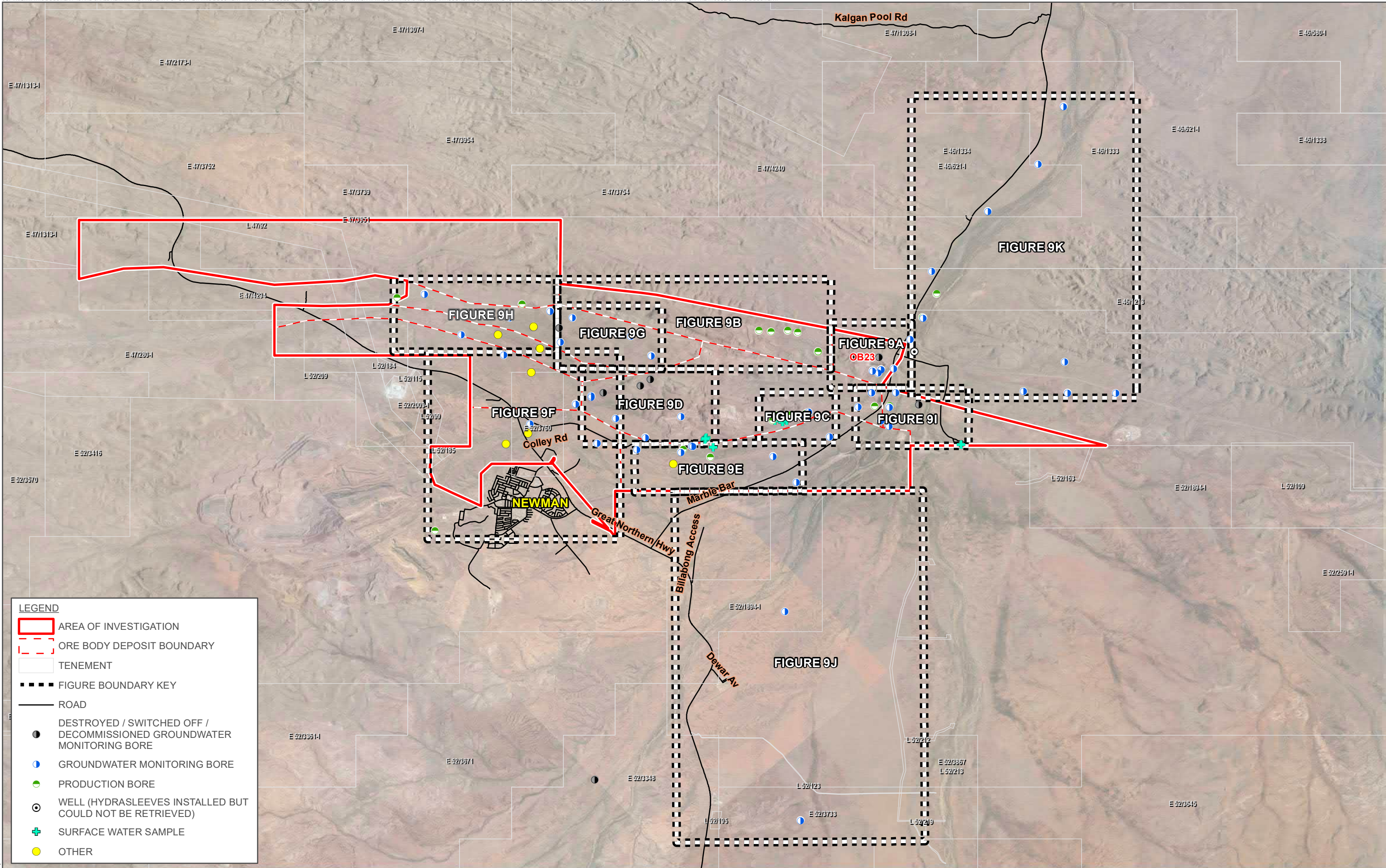
no.	description	drawn	approved	date
A	ORIGINAL ISSUE			



drawn	ENVIRONMAPS
approved	DB
date	10/05/2021
scale	AS SHOWN
original size	A3



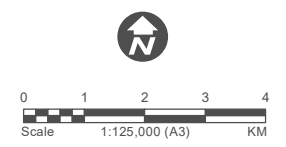
client:	BHP EASTERN RIDGE		
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES		
title:	RECHARGE POND ANALYTICAL RESULTS		
project no:	754-PEREN282113_R03	figure no:	8
rev:	A		



LEGEND

- AREA OF INVESTIGATION
- ORE BODY DEPOSIT BOUNDARY
- TENEMENT
- FIGURE BOUNDARY KEY
- ROAD
- DESTROYED / SWITCHED OFF / DECOMMISSIONED GROUNDWATER MONITORING BORE
- GROUNDWATER MONITORING BORE
- PRODUCTION BORE
- WELL (HYDRASLEEVEES INSTALLED BUT COULD NOT BE RETRIEVED)
- + SURFACE WATER SAMPLE
- OTHER

no.	description	drawn	approved	date
A	ORIGINAL ISSUE			



drawn	ENVIRONMAPS
approved	DB
date	15/06/2021
scale	AS SHOWN
original size	A3



client:	BHP EASTERN RIDGE		
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES		
title:	GROUNDWATER ANALYTICAL RESULTS ROUND 1 AND 2 - MAP KEY		
project no:	754-PEREN282113_R03	figure no:	9
rev:	A		

	Output unit	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water
Perfluorohexane sulfonic acid (PFHxS)	µg/L	NE	NE	NE	NE
Perfluorooctane sulfonic acid (PFOS)	µg/L	NE	0.13	0.00023	NE
Perfluorooctanoic acid (PFOA)	µg/L	0.56	220	19	10
Sum of PFAS	µg/L	NE	NE	NE	NE
Sum of PFHxS and PFOS	µg/L	0.07	NE	NE	2

I.D.	HEA0125M	HEA0125M
Sampled Date	05-Dec-20	02-Feb-21
PFHxS	0.0005	<0.0005
PFOS	0.0013	0.0033
PFOA	0.006	0.007
Sum of PFAS	0.188	0.103
Sum of PFHxS and PFOS	0.0018	0.0033

I.D.	HEA0149M
Sampled Date	06-Dec-20
PFHxS	<0.0005
PFOS	0.0005
PFOA	<0.0005
Sum of PFAS	0.0005
Sum of PFHxS and PFOS	0.0005

I.D.	EA0978RM	EA0978RM
Sampled Date	04-Dec-20	09-Apr-21
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	0.011	0.0021
Sum of PFHxS and PFOS	<0.0002	<0.0002

I.D.	HEA0123M
Sampled Date	05-Dec-20
PFHxS	<0.0005
PFOS	0.0014
PFOA	<0.0005
Sum of PFAS	0.0014
Sum of PFHxS and PFOS	0.0014

I.D.	HEOP0430M	HEOP0430M
Sampled Date	05-Dec-20	02-Feb-21
PFHxS	<0.0005	<0.0005
PFOS	0.0009	0.0004
PFOA	<0.0005	<0.0005
Sum of PFAS	0.0018	0.0004
Sum of PFHxS and PFOS	0.0009	0.0004

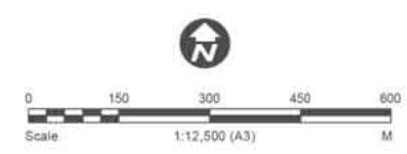
I.D.	HEA0141M	HEA0141M
Sampled Date	05-Dec-20	02-Feb-21
PFHxS	0.0006	0.0008
PFOS	0.0015	0.001
PFOA	0.0013	0.0006
Sum of PFAS	0.0044	0.0361
Sum of PFHxS and PFOS	0.0021	0.0018

I.D.	HEA0134M	HEA0134M
Sampled Date	05-Dec-20	02-Feb-21
PFHxS	<0.0005	0.0005
PFOS	0.0006	0.0008
PFOA	0.0028	0.0033
Sum of PFAS	0.019	0.0287
Sum of PFHxS and PFOS	0.0006	0.0013

LEGEND

- AREA OF INVESTIGATION
- ORE BODY DEPOSIT BOUNDARY
- TENEMENT
- ROAD
- DESTROYED / SWITCHED OFF / DECOMMISSIONED GROUNDWATER MONITORING BORE
- GROUNDWATER MONITORING BORE
- PRODUCTION BORE
- WELL (HYDRASLEEVE INSTALLED BUT COULD NOT BE RETRIEVED)
- SURFACE WATER SAMPLE
- OTHER

no.	description	drawn	approved	date
A	ORIGINAL ISSUE			

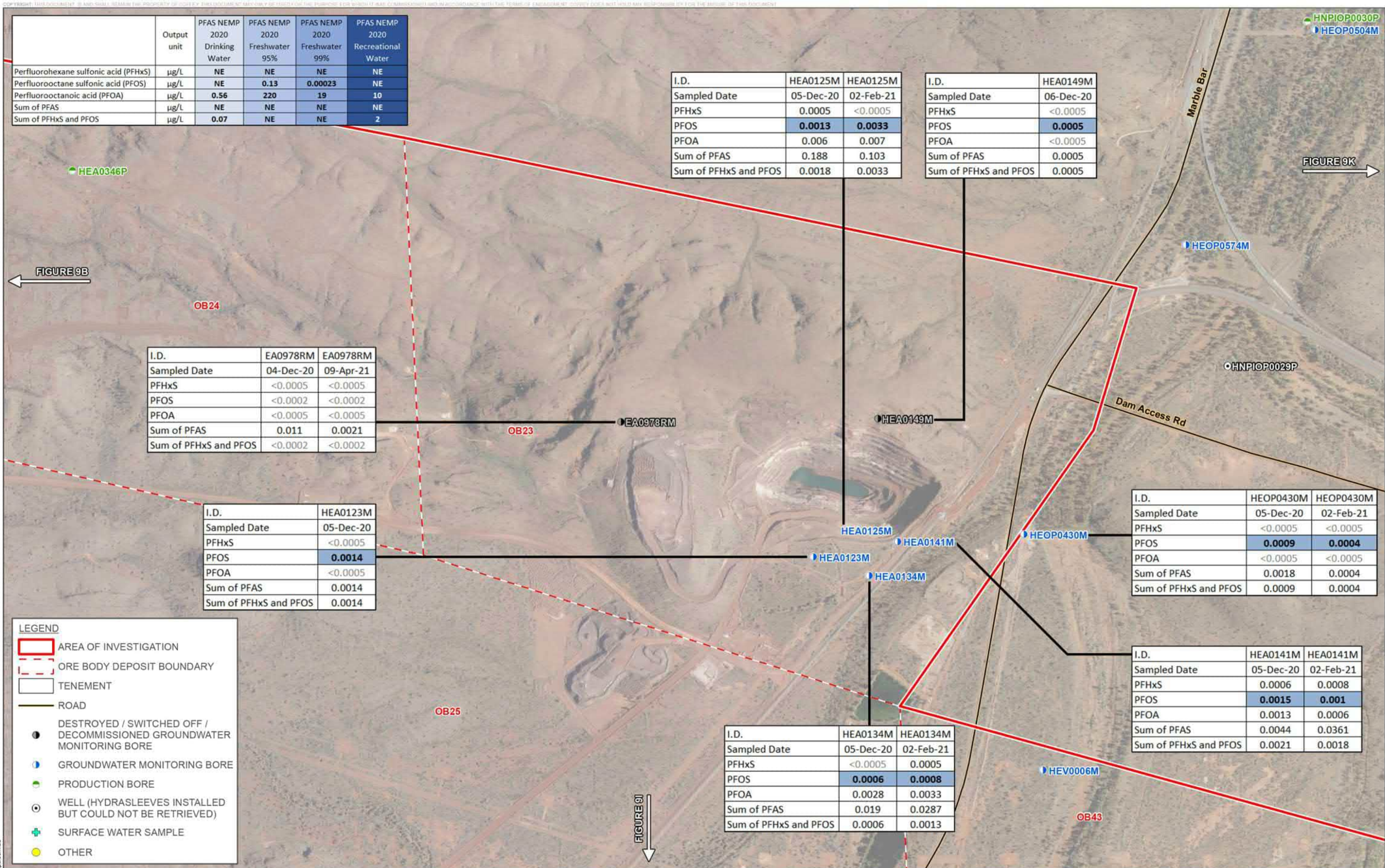


drawn	ENVIRONMAPS
approved	DB
date	31/05/2021
scale	AS SHOWN
original size	A3

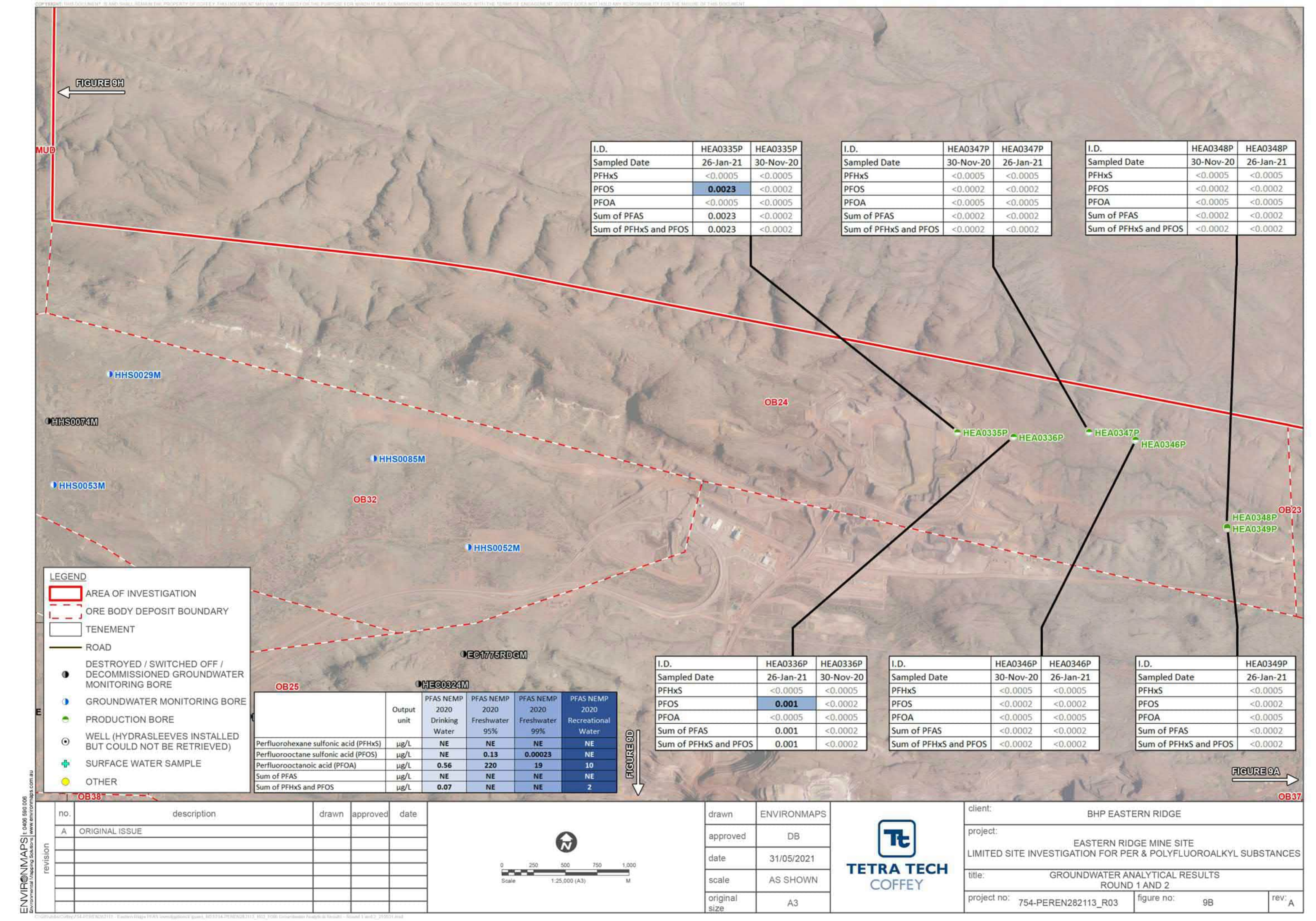


client:	BHP EASTERN RIDGE
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES
title:	GROUNDWATER ANALYTICAL RESULTS ROUND 1 AND 2
project no:	754-PEREN282113_R03
figure no:	9A
rev:	A

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HNPIOP0030P
HEOP0504M



I.D.	HEA0335P	HEA0335P
Sampled Date	26-Jan-21	30-Nov-20
PFHxS	<0.0005	<0.0005
PFOS	0.0023	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	0.0023	<0.0002
Sum of PFHxS and PFOS	0.0023	<0.0002

I.D.	HEA0347P	HEA0347P
Sampled Date	30-Nov-20	26-Jan-21
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	<0.0002	<0.0002
Sum of PFHxS and PFOS	<0.0002	<0.0002

I.D.	HEA0348P	HEA0348P
Sampled Date	30-Nov-20	26-Jan-21
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	<0.0002	<0.0002
Sum of PFHxS and PFOS	<0.0002	<0.0002

	Output unit	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water
Perfluorohexane sulfonic acid (PFHxS)	µg/L	NE	NE	NE	NE
Perfluorooctane sulfonic acid (PFOS)	µg/L	NE	0.13	0.00023	NE
Perfluorooctanoic acid (PFOA)	µg/L	0.56	220	19	10
Sum of PFAS	µg/L	NE	NE	NE	NE
Sum of PFHxS and PFOS	µg/L	0.07	NE	NE	2

I.D.	HEA0336P	HEA0336P
Sampled Date	26-Jan-21	30-Nov-20
PFHxS	<0.0005	<0.0005
PFOS	0.001	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	0.001	<0.0002
Sum of PFHxS and PFOS	0.001	<0.0002

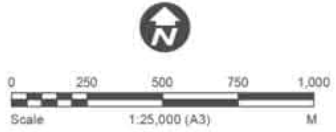
I.D.	HEA0346P	HEA0346P
Sampled Date	30-Nov-20	26-Jan-21
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	<0.0002	<0.0002
Sum of PFHxS and PFOS	<0.0002	<0.0002

I.D.	HEA0349P
Sampled Date	26-Jan-21
PFHxS	<0.0005
PFOS	<0.0002
PFOA	<0.0005
Sum of PFAS	<0.0002
Sum of PFHxS and PFOS	<0.0002

LEGEND

- AREA OF INVESTIGATION
- ORE BODY DEPOSIT BOUNDARY
- TENEMENT
- ROAD
- DESTROYED / SWITCHED OFF / DECOMMISSIONED GROUNDWATER MONITORING BORE
- GROUNDWATER MONITORING BORE
- PRODUCTION BORE
- WELL (HYDRASLEEVEES INSTALLED BUT COULD NOT BE RETRIEVED)
- + SURFACE WATER SAMPLE
- OTHER

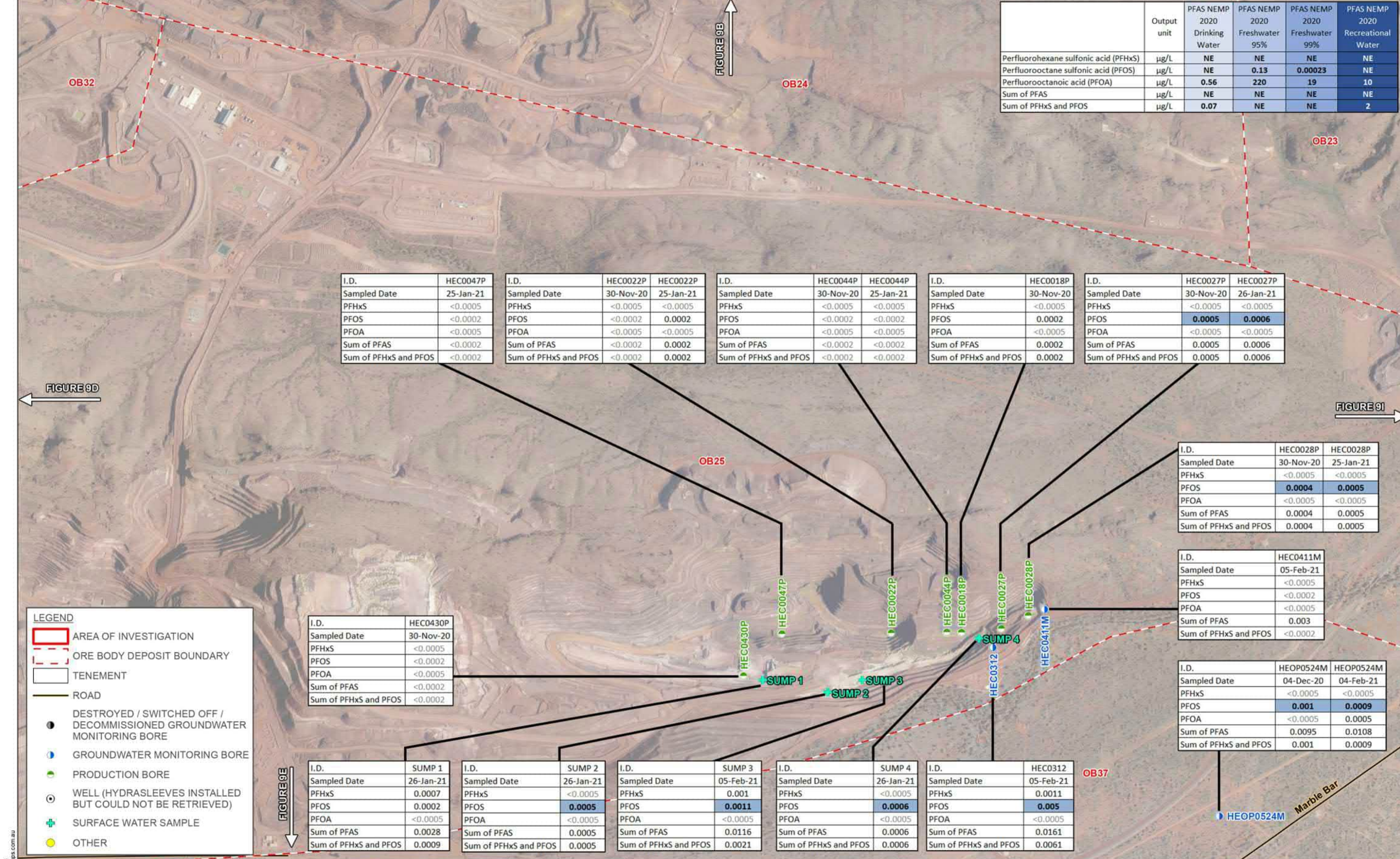
no.	description	drawn	approved	date
A	ORIGINAL ISSUE			



drawn	ENVIRONMAPS
approved	DB
date	31/05/2021
scale	AS SHOWN
original size	A3



client:	BHP EASTERN RIDGE		
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES		
title:	GROUNDWATER ANALYTICAL RESULTS ROUND 1 AND 2		
project no:	754-PEREN282113_R03	figure no:	9B
rev:	A		



	Output unit	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water
Perfluorohexane sulfonic acid (PFHxS)	µg/L	NE	NE	NE	NE
Perfluorooctane sulfonic acid (PFOS)	µg/L	NE	0.13	0.00023	NE
Perfluorooctanoic acid (PFOA)	µg/L	0.56	220	19	10
Sum of PFAS	µg/L	NE	NE	NE	NE
Sum of PFHxS and PFOS	µg/L	0.07	NE	NE	2

I.D.	HEC0047P
Sampled Date	25-Jan-21
PFHxS	<0.0005
PFOS	<0.0002
PFOA	<0.0005
Sum of PFAS	<0.0002
Sum of PFHxS and PFOS	<0.0002

I.D.	HEC0022P	HEC0022P
Sampled Date	30-Nov-20	25-Jan-21
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	<0.0002	0.0002
Sum of PFHxS and PFOS	<0.0002	0.0002

I.D.	HEC0044P	HEC0044P
Sampled Date	30-Nov-20	25-Jan-21
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	<0.0002	<0.0002
Sum of PFHxS and PFOS	<0.0002	<0.0002

I.D.	HEC0018P
Sampled Date	30-Nov-20
PFHxS	<0.0005
PFOS	0.0002
PFOA	<0.0005
Sum of PFAS	0.0002
Sum of PFHxS and PFOS	0.0002

I.D.	HEC0027P	HEC0027P
Sampled Date	30-Nov-20	26-Jan-21
PFHxS	<0.0005	<0.0005
PFOS	0.0005	0.0006
PFOA	<0.0005	<0.0005
Sum of PFAS	0.0005	0.0006
Sum of PFHxS and PFOS	0.0005	0.0006

I.D.	HEC0028P	HEC0028P
Sampled Date	30-Nov-20	25-Jan-21
PFHxS	<0.0005	<0.0005
PFOS	0.0004	0.0005
PFOA	<0.0005	<0.0005
Sum of PFAS	0.0004	0.0005
Sum of PFHxS and PFOS	0.0004	0.0005

I.D.	HEC0411M
Sampled Date	05-Feb-21
PFHxS	<0.0005
PFOS	<0.0002
PFOA	<0.0005
Sum of PFAS	0.003
Sum of PFHxS and PFOS	<0.0002

I.D.	HEOP0524M	HEOP0524M
Sampled Date	04-Dec-20	04-Feb-21
PFHxS	<0.0005	<0.0005
PFOS	0.001	0.0009
PFOA	<0.0005	0.0005
Sum of PFAS	0.0095	0.0108
Sum of PFHxS and PFOS	0.001	0.0009

I.D.	HEC0430P
Sampled Date	30-Nov-20
PFHxS	<0.0005
PFOS	<0.0002
PFOA	<0.0005
Sum of PFAS	<0.0002
Sum of PFHxS and PFOS	<0.0002

I.D.	SUMP 1
Sampled Date	26-Jan-21
PFHxS	0.0007
PFOS	0.0002
PFOA	<0.0005
Sum of PFAS	0.0028
Sum of PFHxS and PFOS	0.0009

I.D.	SUMP 2
Sampled Date	26-Jan-21
PFHxS	<0.0005
PFOS	0.0005
PFOA	<0.0005
Sum of PFAS	0.0005
Sum of PFHxS and PFOS	0.0005

I.D.	SUMP 3
Sampled Date	05-Feb-21
PFHxS	0.001
PFOS	0.0011
PFOA	<0.0005
Sum of PFAS	0.0116
Sum of PFHxS and PFOS	0.0021

I.D.	SUMP 4
Sampled Date	26-Jan-21
PFHxS	<0.0005
PFOS	0.0006
PFOA	<0.0005
Sum of PFAS	0.0006
Sum of PFHxS and PFOS	0.0006

I.D.	HEC0312
Sampled Date	05-Feb-21
PFHxS	0.0011
PFOS	0.005
PFOA	<0.0005
Sum of PFAS	0.0161
Sum of PFHxS and PFOS	0.0061

FIGURE 9D

FIGURE 9I

LEGEND

- AREA OF INVESTIGATION
- ORE BODY DEPOSIT BOUNDARY
- TENEMENT
- ROAD
- DESTROYED / SWITCHED OFF / DECOMMISSIONED GROUNDWATER MONITORING BORE
- GROUNDWATER MONITORING BORE
- PRODUCTION BORE
- WELL (HYDRASLEEVEES INSTALLED BUT COULD NOT BE RETRIEVED)
- SURFACE WATER SAMPLE
- OTHER

no.	description	drawn	approved	date
A	ORIGINAL ISSUE			



drawn	ENVIRONMAPS
approved	DB
date	31/05/2021
scale	AS SHOWN
original size	A3



client:	BHP EASTERN RIDGE
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES
title:	GROUNDWATER ANALYTICAL RESULTS ROUND 1 AND 2
project no:	754-PEREN282113_R03
figure no:	9C
rev:	A

	Output unit	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water
Perfluorohexane sulfonic acid (PFHxS)	µg/L	NE	NE	NE	NE
Perfluorooctane sulfonic acid (PFOS)	µg/L	NE	0.13	0.00023	NE
Perfluorooctanoic acid (PFOA)	µg/L	0.56	220	19	10
Sum of PFAS	µg/L	NE	NE	NE	NE
Sum of PFHxS and PFOS	µg/L	0.07	NE	NE	2

I.D.	EC1775RDGM	EC1775RDGM
Sampled Date	04-Dec-20	09-Apr-21
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	0.0064	0.001
Sum of PFHxS and PFOS	<0.0002	<0.0002

I.D.	HEC0324M
Sampled Date	09-Apr-21
PFHxS	<0.0005
PFOS	<0.0002
PFOA	<0.0005
Sum of PFAS	<0.0002
Sum of PFHxS and PFOS	<0.0002

I.D.	ECO0681R
Sampled Date	09-Apr-21
PFHxS	<0.0005
PFOS	<0.0002
PFOA	<0.0005
Sum of PFAS	<0.0002
Sum of PFHxS and PFOS	<0.0002

I.D.	HEC0318M1	HEC0318M1
Sampled Date	05-Dec-20	01-Feb-21
PFHxS	<0.0005	<0.0005
PFOS	0.0002	<0.0002
PFOA	<0.0005	0.0013
Sum of PFAS	0.0002	0.0063
Sum of PFHxS and PFOS	0.0002	<0.0002

I.D.	HEC0319M1
Sampled Date	02-Feb-21
PFHxS	<0.0005
PFOS	<0.0002
PFOA	<0.0005
Sum of PFAS	<0.0002
Sum of PFHxS and PFOS	<0.0002

I.D.	MW07	MW07
Sampled Date	05-Dec-20	01-Feb-21
PFHxS	0.0021	<0.0005
PFOS	0.0065	0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	0.0446	0.0039
Sum of PFHxS and PFOS	0.0086	0.0002

I.D.	MW01a	MW01a
Sampled Date	05-Dec-20	01-Feb-21
PFHxS	<0.0005	<0.0005
PFOS	0.0006	0.0008
PFOA	<0.0005	<0.0005
Sum of PFAS	0.0006	0.0008
Sum of PFHxS and PFOS	0.0006	0.0008

I.D.	HEC0407M	HEC0407M
Sampled Date	05-Dec-20	02-Feb-21
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	0.0054	0.0057
Sum of PFAS	0.285	0.162
Sum of PFHxS and PFOS	<0.0002	<0.0002

I.D.	MW06	MW06
Sampled Date	05-Dec-20	01-Feb-21
PFHxS	<0.0005	<0.0005
PFOS	0.0004	0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	0.0004	0.0002
Sum of PFHxS and PFOS	0.0004	0.0002

I.D.	ECO754RM	ECO754RM
Sampled Date	04-Dec-20	02-Feb-21
PFHxS	0.0009	<0.0005
PFOS	0.0033	0.0034
PFOA	0.01	0.0072
Sum of PFAS	0.13	0.0755
Sum of PFHxS and PFOS	0.0042	0.0034

I.D.	HEOP0815M	HEOP0815M
Sampled Date	04-Dec-20	02-Feb-21
PFHxS	<0.0005	<0.0005
PFOS	0.0009	0.0005
PFOA	0.0016	0.0019
Sum of PFAS	0.0102	0.0066
Sum of PFHxS and PFOS	0.0009	0.0005

LEGEND

- AREA OF INVESTIGATION
- ORE BODY DEPOSIT BOUNDARY
- TENEMENT
- ROAD
- DESTROYED / SWITCHED OFF / DECOMMISSIONED GROUNDWATER MONITORING BORE
- GROUNDWATER MONITORING BORE
- PRODUCTION BORE
- WELL (HYDRASLEEVEES INSTALLED BUT COULD NOT BE RETRIEVED)
- SURFACE WATER SAMPLE
- OTHER

no.	description	drawn	approved	date
A	ORIGINAL ISSUE			



drawn	ENVIRONMAPS
approved	DB
date	31/05/2021
scale	AS SHOWN
original size	A3



client:	BHP EASTERN RIDGE		
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES		
title:	GROUNDWATER ANALYTICAL RESULTS ROUND 1 AND 2		
project no:	754-PEREN282113_R03	figure no:	9D
rev:	A		

	Output unit	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water
Perfluorohexane sulfonic acid (PFHxS)	µg/L	NE	NE	NE	NE
Perfluorooctane sulfonic acid (PFOS)	µg/L	NE	0.13	0.00023	NE
Perfluorooctanoic acid (PFOA)	µg/L	0.56	220	19	10
Sum of PFAS	µg/L	NE	NE	NE	NE
Sum of PFHxS and PFOS	µg/L	0.07	NE	NE	2

I.D.	HHS0106P
Sampled Date	01-Feb-21
PFHxS	<0.0005
PFOS	<0.0002
PFOA	<0.0005
Sum of PFAS	<0.0002
Sum of PFHxS and PFOS	<0.0002

I.D.	HST1782RM	HST1782RM
Sampled Date	05-Dec-20	01-Feb-21
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	<0.0002	<0.0002
Sum of PFHxS and PFOS	<0.0002	<0.0002

I.D.	HST1063RM	HST1063RM
Sampled Date	06-Dec-20	03-Feb-21
PFHxS	0.0025	<0.0005
PFOS	0.0213	0.0237
PFOA	0.0058	0.0093
Sum of PFAS	0.0333	0.0426
Sum of PFHxS and PFOS	0.0238	0.0237

I.D.	HEC0448	HEC0448M	HEC0448M
Sampled Date	10-Apr-21	06-Dec-20	01-Feb-21
PFHxS	<0.0005	0.0075	0.0121
PFOS	0.025	0.0231	0.0446
PFOA	0.0245	0.0171	0.0366
Sum of PFAS	0.128	0.105	0.137
Sum of PFHxS and PFOS	0.025	0.0306	0.0567

I.D.	HEA0350M-A
Sampled Date	03-Feb-21
PFHxS	<0.0005
PFOS	<0.0002
PFOA	<0.0005
Sum of PFAS	<0.0002
Sum of PFHxS and PFOS	<0.0002

I.D.	HEA0351	HEA0351M
Sampled Date	10-Apr-21	03-Feb-21
PFHxS	0.0583	0.0006
PFOS	0.0006	0.0005
PFOA	<0.0005	<0.0005
Sum of PFAS	0.0807	0.0025
Sum of PFHxS and PFOS	0.0589	0.0011

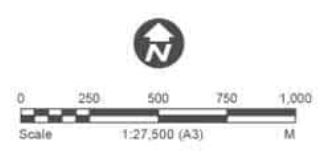
I.D.	HEOP0317M
Sampled Date	03-Feb-21
PFHxS	<0.0005
PFOS	0.0014
PFOA	<0.0005
Sum of PFAS	0.0014
Sum of PFHxS and PFOS	0.0014

I.D.	HNPIOP0018P
Sampled Date	31-Jan-21
PFHxS	0.0048
PFOS	0.0046
PFOA	<0.0005
Sum of PFAS	0.0114
Sum of PFHxS and PFOS	0.0094

LEGEND

- AREA OF INVESTIGATION
- ORE BODY DEPOSIT BOUNDARY
- TENEMENT
- ROAD
- DESTROYED / SWITCHED OFF / DECOMMISSIONED GROUNDWATER MONITORING BORE
- GROUNDWATER MONITORING BORE
- PRODUCTION BORE
- WELL (HYDRASLEEVES INSTALLED BUT COULD NOT BE RETRIEVED)
- + SURFACE WATER SAMPLE
- OTHER

no.	description	drawn	approved	date
A	ORIGINAL ISSUE			



drawn	ENVIRONMAPS
approved	DB
date	31/05/2021
scale	AS SHOWN
original size	A3



client:	BHP EASTERN RIDGE		
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES		
title:	GROUNDWATER ANALYTICAL RESULTS ROUND 1 AND 2		
project no:	754-PEREN282113_R03	figure no:	9F
rev:	A		

I.D.	HHS0027M	HHS0027M	HHS0027M_35
Sampled Date	05-Dec-20	01-Feb-21	11-Apr-21
PFHxS	<0.0005	<0.0005	<0.0005
PFOS	<0.0002	0.0002	<0.0002
PFOA	<0.0005	<0.0005	<0.0005
Sum of PFAS	<0.0002	0.0002	<0.0002
Sum of PFHxS and PFOS	<0.0002	0.0002	<0.0002

I.D.	HHS0029M	HHS0029M_35
Sampled Date	01-Feb-21	11-Apr-21
PFHxS	<0.0005	<0.0005
PFOS	0.0007	0.0005
PFOA	0.0015	0.001
Sum of PFAS	0.0512	0.0467
Sum of PFHxS and PFOS	0.0007	0.0005

I.D.	HEOP0574M	HHS0074M
Sampled Date	02-Feb-21	09-Apr-21
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	0.0004
PFOA	<0.0005	<0.0005
Sum of PFAS	<0.0002	0.0189
Sum of PFHxS and PFOS	<0.0002	0.0004

I.D.	HHS0052M
Sampled Date	29-Jan-21
PFHxS	<0.0005
PFOS	<0.0002
PFOA	<0.0005
Sum of PFAS	<0.0002
Sum of PFHxS and PFOS	<0.0002

HHS0027M

HHS0029M

HHS0074M

OB24

HHS0085M

HHS0052M

HHS0053M

I.D.	HHS0053M
Sampled Date	29-Jan-21
PFHxS	<0.0005
PFOS	0.001
PFOA	<0.0005
Sum of PFAS	0.001
Sum of PFHxS and PFOS	0.001

FIGURE 9H

FIGURE 9B

OB32

OB28

LEGEND

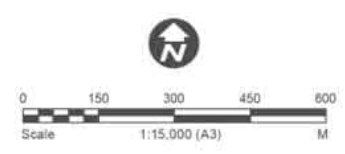
- AREA OF INVESTIGATION
- ORE BODY DEPOSIT BOUNDARY
- TENEMENT
- ROAD
- DESTROYED / SWITCHED OFF / DECOMMISSIONED GROUNDWATER MONITORING BORE
- GROUNDWATER MONITORING BORE
- PRODUCTION BORE
- WELL (HYDRASLEEVEES INSTALLED BUT COULD NOT BE RETRIEVED)
- SURFACE WATER SAMPLE
- OTHER

	Output unit	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water
Perfluorohexane sulfonic acid (PFHxS)	µg/L	NE	NE	NE	NE
Perfluorooctane sulfonic acid (PFOS)	µg/L	NE	0.13	0.00023	NE
Perfluorooctanoic acid (PFOA)	µg/L	0.56	220	19	10
Sum of PFAS	µg/L	NE	NE	NE	NE
Sum of PFHxS and PFOS	µg/L	0.07	NE	NE	2

I.D.	HHS0085M	HHS0085M	HHS0085M_64
Sampled Date	05-Dec-20	05-Feb-21	11-Apr-21
PFHxS	<0.0005	<0.0005	<0.0005
PFOS	0.0002	0.0006	<0.0002
PFOA	<0.0005	<0.0005	<0.0005
Sum of PFAS	0.003	0.0102	0.0084
Sum of PFHxS and PFOS	0.0002	0.0006	<0.0002

FIGURE 9D

no.	description	drawn	approved	date
A	ORIGINAL ISSUE			



drawn	ENVIRONMAPS
approved	DB
date	31/05/2021
scale	AS SHOWN
original size	A3



client:	BHP EASTERN RIDGE		
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES		
title:	GROUNDWATER ANALYTICAL RESULTS ROUND 1 AND 2		
project no:	754-PEREN282113_R03	figure no:	9G
rev:	A		

I.D.	HNPIHS0045P
Sampled Date	11-Apr-21
PFHxS	<0.0005
PFOS	<0.0002
PFOA	<0.0005
Sum of PFAS	<0.0002
Sum of PFHxS and PFOS	<0.0002

I.D.	HHS0055M	HHS0055M
Sampled Date	05-Dec-20	04-Feb-21
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	<0.0002	<0.0002
Sum of PFHxS and PFOS	<0.0002	<0.0002

I.D.	HHS0042M	HHS0042M
Sampled Date	06-Dec-20	01-Feb-21
PFHxS	<0.0005	<0.0005
PFOS	0.0008	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	0.0008	<0.0002
Sum of PFHxS and PFOS	0.0008	<0.0002

I.D.	HNPIHS0039	HNPIHS0039	HNPIHS0039P
Sampled Date	01-Dec-20	27-Jan-21	11-Apr-21
PFHxS	<0.0005	<0.0005	<0.0005
PFOS	<0.0002	<0.0002	<0.0002
PFOA	<0.0005	<0.0005	<0.0005
Sum of PFAS	<0.0002	<0.0002	<0.0002
Sum of PFHxS and PFOS	<0.0002	<0.0002	<0.0002

I.D.	HHS0023M	HHS0023M
Sampled Date	05-Dec-20	04-Feb-21
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	<0.0002	<0.0002
Sum of PFHxS and PFOS	<0.0002	<0.0002

I.D.	HNPIHS0013	HNPIHS0013-A
Sampled Date	05-Dec-20	27-Jan-21
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	<0.0002	<0.0002
Sum of PFHxS and PFOS	<0.0002	<0.0002

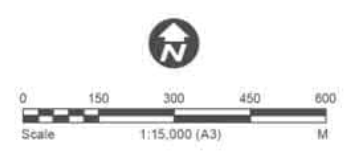
I.D.	HST1536RM
Sampled Date	01-Feb-21
PFHxS	<0.0005
PFOS	<0.0002
PFOA	<0.0005
Sum of PFAS	<0.0002
Sum of PFHxS and PFOS	<0.0002

	Output unit	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water
Perfluorohexane sulfonic acid (PFHxS)	µg/L	NE	NE	NE	NE
Perfluorooctane sulfonic acid (PFOS)	µg/L	NE	0.13	0.00023	NE
Perfluorooctanoic acid (PFOA)	µg/L	0.56	220	19	10
Sum of PFAS	µg/L	NE	NE	NE	NE
Sum of PFHxS and PFOS	µg/L	0.07	NE	NE	2

LEGEND

- AREA OF INVESTIGATION
- ORE BODY DEPOSIT BOUNDARY
- TENEMENT
- ROAD
- DESTROYED / SWITCHED OFF / DECOMMISSIONED GROUNDWATER MONITORING BORE
- GROUNDWATER MONITORING BORE
- PRODUCTION BORE
- WELL (HYDRASLEEVEES INSTALLED BUT COULD NOT BE RETRIEVED)
- SURFACE WATER SAMPLE
- OTHER

no.	description	drawn	approved	date
A	ORIGINAL ISSUE			



drawn	ENVIRONMAPS
approved	DB
date	31/05/2021
scale	AS SHOWN
original size	A3



client:	BHP EASTERN RIDGE				
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES				
title:	GROUNDWATER ANALYTICAL RESULTS ROUND 1 AND 2				
project no:	754-PEREN282113_R03	figure no:	9H	rev:	A

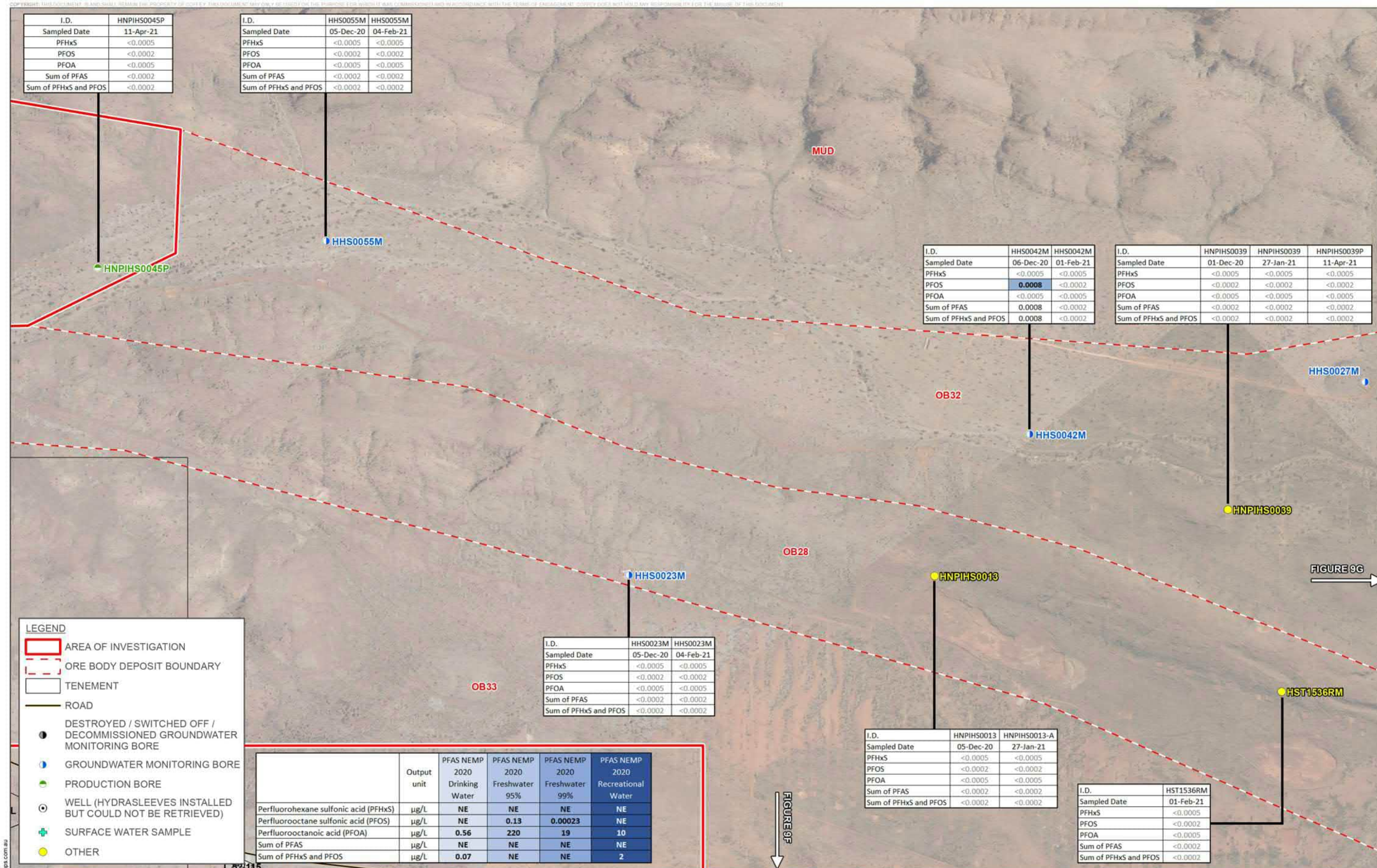


FIGURE 9G

FIGURE 9F

I.D.	HEOP0388M	HEOP0388M	I.D.	HEOP0548M	I.D.	HEOP0386M	HEOP0386M	I.D.	HEV0006M	HEV0006M
Sampled Date	04-Dec-20	04-Feb-21	Sampled Date	04-Feb-21	Sampled Date	04-Dec-20	04-Feb-21	Sampled Date	06-Dec-20	04-Feb-21
PFHxS	0.0015	<0.0005	PFHxS	<0.0005	PFHxS	<0.0005	<0.0005	PFHxS	<0.0005	<0.0005
PFOS	0.0015	0.0022	PFOS	0.0006	PFOS	<0.0002	0.0018	PFOS	0.0006	0.001
PFOA	<0.0005	<0.0005	PFOA	<0.0005	PFOA	<0.0005	<0.0005	PFOA	0.0005	0.0009
Sum of PFAS	0.003	0.0022	Sum of PFAS	0.0006	Sum of PFAS	<0.0002	0.0025	Sum of PFAS	0.0022	0.0041
Sum of PFHxS and PFOS	0.003	0.0022	Sum of PFHxS and PFOS	0.0006	Sum of PFHxS and PFOS	<0.0002	0.0018	Sum of PFHxS and PFOS	0.0006	0.001

I.D.	HNPIOP0011P
Sampled Date	28-Jan-21
PFHxS	<0.0005
PFOS	0.0007
PFOA	<0.0005
Sum of PFAS	0.0007
Sum of PFHxS and PFOS	0.0007

I.D.	HNPIOP0012P
Sampled Date	30-Jan-21
PFHxS	<0.0005
PFOS	0.0008
PFOA	<0.0005
Sum of PFAS	0.0008
Sum of PFHxS and PFOS	0.0008

I.D.	HEOP0415M
Sampled Date	09-Apr-21
PFHxS	<0.0005
PFOS	0.0038
PFOA	<0.0005
Sum of PFAS	0.0038
Sum of PFHxS and PFOS	0.0038

	Output unit	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water
Perfluorohexane sulfonic acid (PFHxS)	µg/L	NE	NE	NE	NE
Perfluorooctane sulfonic acid (PFOS)	µg/L	NE	0.13	0.00023	NE
Perfluorooctanoic acid (PFOA)	µg/L	0.56	220	19	10
Sum of PFAS	µg/L	NE	NE	NE	NE
Sum of PFHxS and PFOS	µg/L	0.07	NE	NE	2

I.D.	HEC0406M	HEC0406V1
Sampled Date	06-Dec-20	04-Feb-21
PFHxS	<0.0005	<0.0005
PFOS	0.001	0.0024
PFOA	<0.0005	0.0009
Sum of PFAS	0.001	0.0045
Sum of PFHxS and PFOS	0.001	0.0024

I.D.	HEOP0798M
Sampled Date	04-Feb-21
PFHxS	<0.0005
PFOS	0.0013
PFOA	<0.0005
Sum of PFAS	0.0013
Sum of PFHxS and PFOS	0.0013

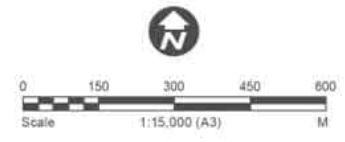
I.D.	HEOP0387M	HEOP0387M
Sampled Date	06-Dec-20	02-Feb-21
PFHxS	0.0006	0.001
PFOS	0.0009	0.0018
PFOA	<0.0005	0.0006
Sum of PFAS	0.0015	0.0074
Sum of PFHxS and PFOS	0.0015	0.0028

I.D.	OPHSW01	OPHSW01
Sampled Date	31-Jan-21	05-Dec-20
PFHxS	<0.0005	<0.0005
PFOS	0.0024	0.0022
PFOA	<0.0005	<0.0005
Sum of PFAS	0.0024	0.0022
Sum of PFHxS and PFOS	0.0024	0.0022

LEGEND

- AREA OF INVESTIGATION
- ORE BODY DEPOSIT BOUNDARY
- TENEMENT
- ROAD
- DESTROYED / SWITCHED OFF / DECOMMISSIONED GROUNDWATER MONITORING BORE
- GROUNDWATER MONITORING BORE
- PRODUCTION BORE
- WELL (HYDRASLEEVES INSTALLED BUT COULD NOT BE RETRIEVED)
- SURFACE WATER SAMPLE
- OTHER

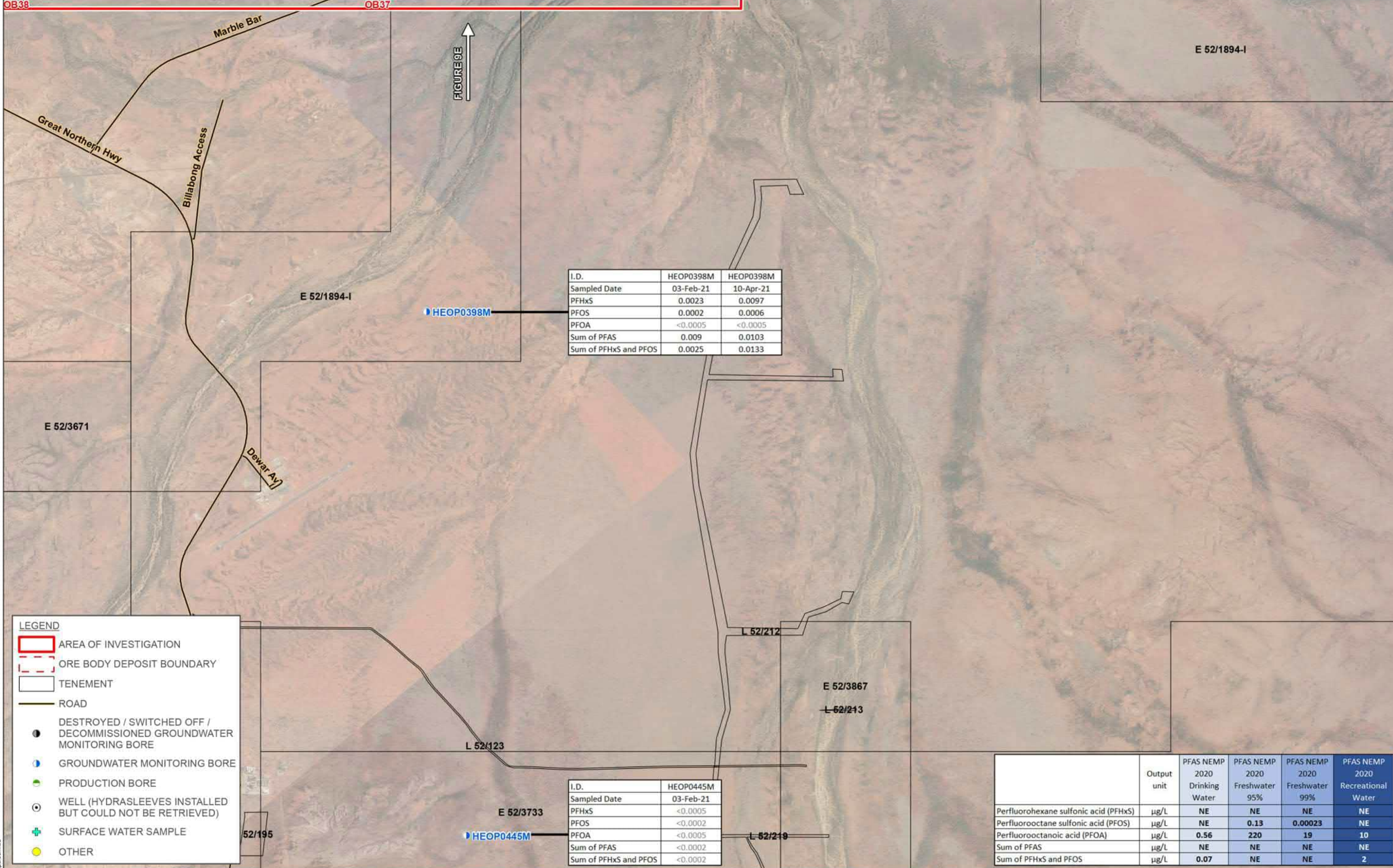
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A	ORIGINAL ISSUE			



drawn	ENVIRONMAPS
approved	DB
date	31/05/2021
scale	AS SHOWN
original size	A3



client:	BHP EASTERN RIDGE
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES
title:	GROUNDWATER ANALYTICAL RESULTS ROUND 1 AND 2
project no:	754-PEREN282113_R03
figure no:	91
rev:	A



I.D.	HEOP0398M	HEOP0398M
Sampled Date	03-Feb-21	10-Apr-21
PFHxS	0.0023	0.0097
PFOS	0.0002	0.0006
PFOA	<0.0005	<0.0005
Sum of PFAS	0.009	0.0103
Sum of PFHxS and PFOS	0.0025	0.0133

HEOP0398M

LEGEND

- AREA OF INVESTIGATION
- ORE BODY DEPOSIT BOUNDARY
- TENEMENT
- ROAD
- DESTROYED / SWITCHED OFF / DECOMMISSIONED GROUNDWATER MONITORING BORE
- GROUNDWATER MONITORING BORE
- PRODUCTION BORE
- WELL (HYDRASLEEVE INSTALLED BUT COULD NOT BE RETRIEVED)
- SURFACE WATER SAMPLE
- OTHER


I.D.	HEOP0445M
Sampled Date	03-Feb-21
PFHxS	<0.0005
PFOS	<0.0002
PFOA	<0.0005
Sum of PFAS	<0.0002
Sum of PFHxS and PFOS	<0.0002


E 52/3733

HEOP0445M

	Output unit	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water
Perfluorohexane sulfonic acid (PFHxS)	µg/L	NE	NE	NE	NE
Perfluorooctane sulfonic acid (PFOS)	µg/L	NE	0.13	0.00023	NE
Perfluorooctanoic acid (PFOA)	µg/L	0.56	220	19	10
Sum of PFAS	µg/L	NE	NE	NE	NE
Sum of PFHxS and PFOS	µg/L	0.07	NE	NE	2

no.	description	drawn	approved	date
A	ORIGINAL ISSUE			





drawn	ENVIRONMAPS
approved	DB
date	30/06/2021
scale	AS SHOWN
original size	A3



client:	BHP EASTERN RIDGE		
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES		
title:	GROUNDWATER ANALYTICAL RESULTS ROUND 1 AND 2		
project no:	754-PEREN282113_R03	figure no:	9J
rev:	A		

	Output unit	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water
Perfluorohexane sulfonic acid (PFHxS)	µg/L	NE	NE	NE	NE
Perfluorooctane sulfonic acid (PFOS)	µg/L	NE	0.13	0.00023	NE
Perfluorooctanoic acid (PFOA)	µg/L	0.56	220	19	10
Sum of PFAS	µg/L	NE	NE	NE	NE
Sum of PFHxS and PFOS	µg/L	0.07	NE	NE	2

FIGURE 9A

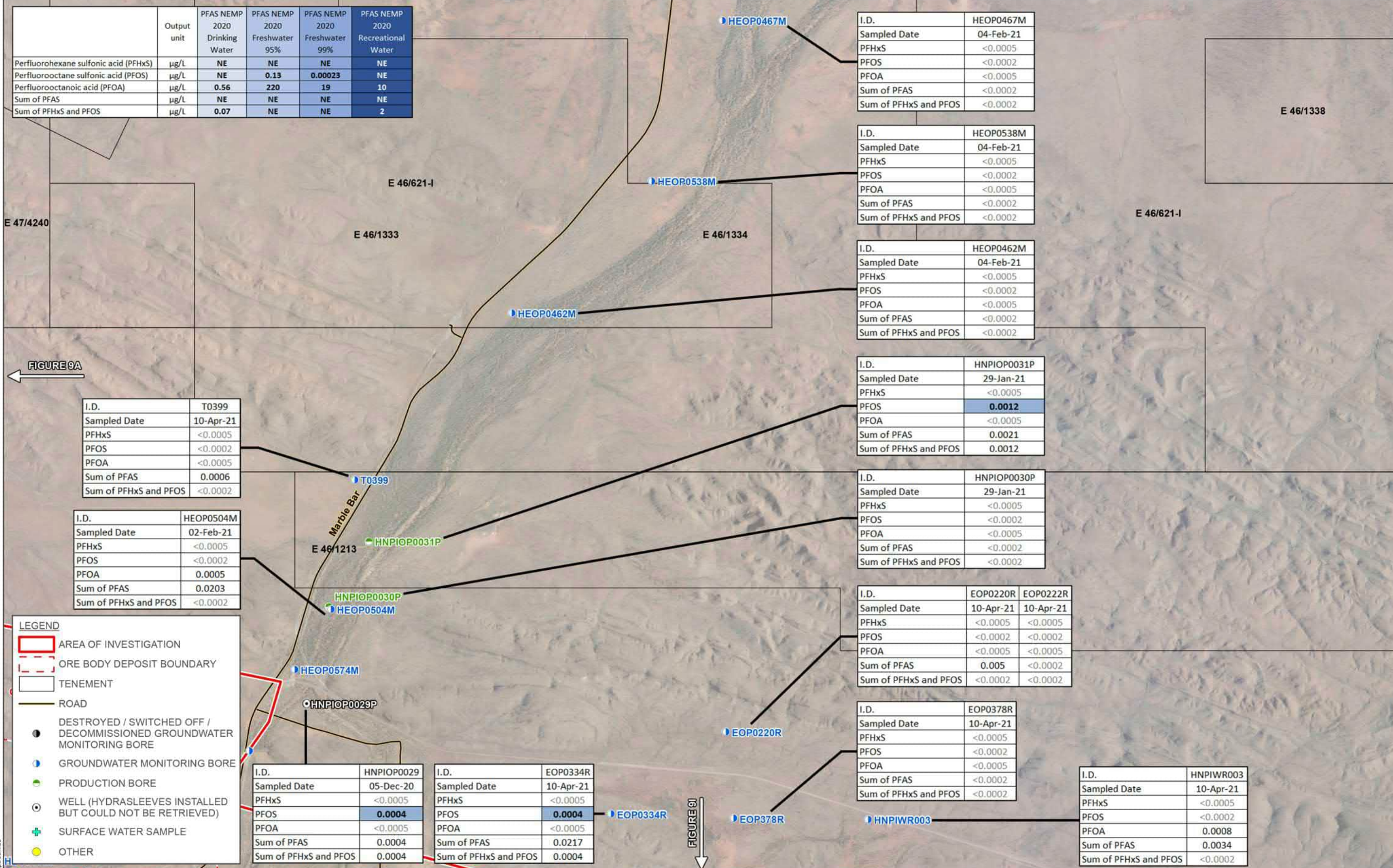
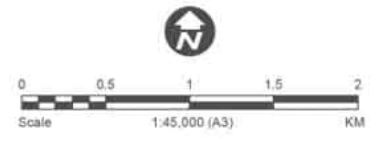


FIGURE 9I

no.	description	drawn	approved	date
A	ORIGINAL ISSUE			



drawn	ENVIRONMAPS
approved	DB
date	31/05/2021
scale	AS SHOWN
original size	A3



client:	BHP EASTERN RIDGE		
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES		
title:	GROUNDWATER ANALYTICAL RESULTS ROUND 1 AND 2		
project no:	754-PEREN282113_R03	figure no:	9K
rev:	A		

I.D.	HNPIHS0045P_A	HNPIHS0045P_B
Sample Depth (m)	27 - 165	27 - 165
Aquifer	OB	OB
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	<0.0002	<0.0002
Sum of PFHxS & PFOS	<0.0002	<0.0002

MUD

I.D.	HHS0016M_45	HHS0016M_110
Sample Depth (m)	45	110
Aquifer	MM	N1
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	<0.0002	<0.0002
Sum of PFHxS & PFOS	<0.0002	<0.0002

I.D.	HNPIHS0039P_A	HNPIHS0039P_B
Sample Depth (m)	72 - 156	72 - 156
Aquifer	N2, N3 & WA1	N2, N3 & WA1
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	<0.0002	<0.0002
Sum of PFHxS & PFOS	<0.0002	<0.0002

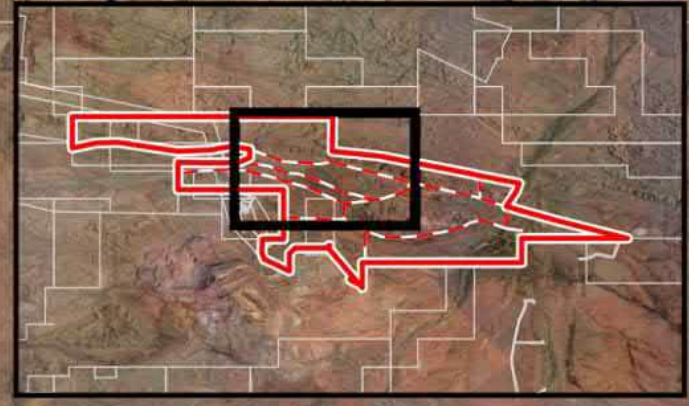
I.D.	HHS0029M_35	HHS0029M_95	HHS0029M_120
Sample Depth (m)	35	95	120
Aquifer	VB2		HC1
PFHxS	<0.0005	<0.0005	<0.0005
PFOS	0.0005	<0.0002	<0.0002
PFOA	0.001	<0.0005	<0.0005
Sum of PFAS	0.0467	0.0038	0.0018
Sum of PFHxS & PFOS	0.0005	<0.0002	<0.0002

I.D.	HHS0085M_64	HHS0085M_90
Sample Depth (m)	64	90
Aquifer	OB	OB
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	<0.0005	<0.0005
Sum of PFAS	0.0084	0.0092
Sum of PFHxS & PFOS	<0.0002	<0.0002

I.D.	HHS0036M_19	HHS0036M_50
Sample Depth (m)	19	50
Aquifer	STS	OB
PFHxS	<0.0005	<0.0005
PFOS	<0.0002	<0.0002
PFOA	0.0086	0.0064
Sum of PFAS	0.052	0.0371
Sum of PFHxS & PFOS	<0.0002	<0.0002

I.D.	HHS0019M_40	HHS0019M_75	HHS0019M_110
Sample Depth (m)	40	75	110
Aquifer	N2	N2	N3
PFHxS	<0.0005	<0.0005	<0.0005
PFOS	<0.0002	<0.0002	<0.0002
PFOA	<0.0005	<0.0005	<0.0005
Sum of PFAS	<0.0002	<0.0002	<0.0002
Sum of PFHxS & PFOS	<0.0002	<0.0002	<0.0002

I.D.	HHS0027M_35	HHS0027M_70	HHS0027M_100
Sample Depth (m)	35	70	100
Aquifer	VB2	OB	OB
PFHxS	<0.0005	<0.0005	<0.0005
PFOS	<0.0002	<0.0002	<0.0002
PFOA	<0.0005	<0.0005	<0.0005
Sum of PFAS	<0.0002	<0.0002	<0.0002
Sum of PFHxS & PFOS	<0.0002	<0.0002	<0.0002



HNPIHS0045P
HHS0036M

HHS0016M

HHS0027M

HHS0029M

HHS0085M

HNPIHS0039P
HHS0019M

OB28

OB32

OB24

OB33

OB25

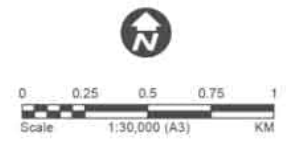
OB38



LEGEND

- AREA OF INVESTIGATION
- ORE BODY DEPOSIT BOUNDARY
- TENEMENT
- GROUNDWATER MONITORING BORE
- PRODUCTION BORE

no.	description	drawn	approved	date
A	ORIGINAL ISSUE			



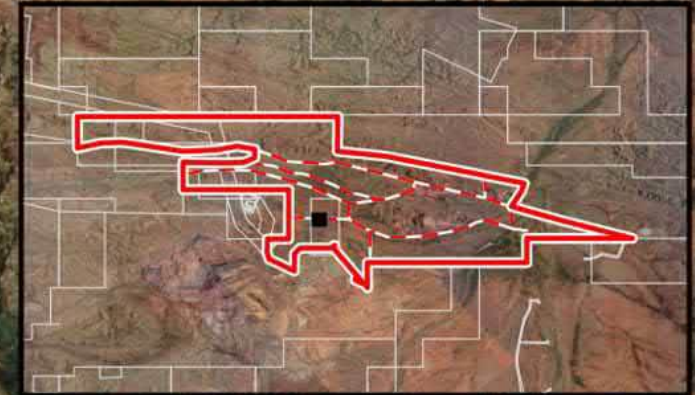
drawn	ENVIRONMAPS
approved	DB
date	10/05/2021
scale	AS SHOWN
original size	A3



client:	BHP EASTERN RIDGE		
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES		
title:	GROUNDWATER ANALYTICAL RESULTS OB32 VERTICAL DELINEATION		
project no:	754-PEREN282113_R03	figure no:	10
rev:	A		

ChemName	Output unit	LOR	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2

WWTP SEDIMENT			PFAS NEMP 2020 Ecological direct exposure	PFAS NEMP 2020 Ecological indirect exposure
ChemName	Output unit	LOR		
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	NE	NE
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	1	0.01
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	10	NE
Sum of PFAS	mg/kg	0.0002	NE	NE
Sum of PFHxS and PFOS	mg/kg	0.0002	NE	NE



I.D.	DCSW1
Sampled Date	05-Feb-21
PFHxS	0.0192
PFOS	0.0141
PFOA	0.0121
Sum of PFAS	0.137
Sum of PFHxS & PFOS	0.0333

I.D.	SED2	SED2
Sampled Date	05-Feb-21	05-Feb-21
pH	pH5	pH7
PFHxS	0.0027	0.0032
PFOS	0.393	0.871
PFOA	0.0216	0.0301
Sum of PFAS	0.515	1.07
Sum of PFHxS & PFOS	0.396	0.874

I.D.	SED4	SED4
Sampled Date	05-Feb-21	05-Feb-21
pH	pH5	pH7
PFHxS	0.0027	0.0018
PFOS	0.13	0.24
PFOA	0.0106	0.0078
Sum of PFAS	0.174	0.303
Sum of PFHxS & PFOS	0.133	0.242

I.D.	SED2
Sampled Date	05-Feb-21
PFHxS	<0.0002
PFOS	0.0448
PFOA	0.001
Sum of PFAS	0.0622
Sum of PFHxS & PFOS	0.0448

I.D.	SED4
Sampled Date	05-Feb-21
PFHxS	0.0004
PFOS	0.068
PFOA	0.0017
Sum of PFAS	0.101
Sum of PFHxS & PFOS	0.0684

I.D.	SED1	SED1
Sampled Date	05-Feb-21	05-Feb-21
pH	pH5	pH7
PFHxS	0.0053	0.005
PFOS	0.288	0.589
PFOA	0.0326	0.0394
Sum of PFAS	0.418	0.781
Sum of PFHxS & PFOS	0.293	0.594

I.D.	SED3	SED3
Sampled Date	05-Feb-21	05-Feb-21
pH	pH5	pH7
PFHxS	0.0048	0.007
PFOS	0.278	0.806
PFOA	0.0294	0.0323
Sum of PFAS	0.419	1.08
Sum of PFHxS & PFOS	0.283	0.813

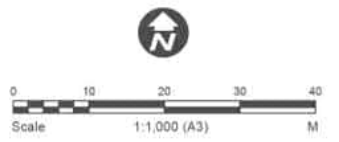
I.D.	SED1
Sampled Date	05-Feb-21
PFHxS	0.0002
PFOS	0.0339
PFOA	0.0017
Sum of PFAS	0.0551
Sum of PFHxS & PFOS	0.0341

I.D.	SED3
Sampled Date	05-Feb-21
PFHxS	<0.0002
PFOS	0.0187
PFOA	0.0003
Sum of PFAS	0.0262
Sum of PFHxS & PFOS	0.0187

LEGEND

- AREA OF INVESTIGATION
- ORE BODY DEPOSIT BOUNDARY
- TENEMENT
- SURFACE WATER SAMPLE
- SEDIMENT SAMPLE

no.	description	drawn	approved	date
A	ORIGINAL ISSUE			



drawn	ENVIRONMAPS
approved	DB
date	10/05/2021
scale	AS SHOWN
original size	A3



client:	BHP EASTERN RIDGE		
project:	EASTERN RIDGE MINE SITE LIMITED SITE INVESTIGATION FOR PER & POLYFLUOROALKYL SUBSTANCES		
title:	WWTP ANALYTICAL RESULTS		
project no:	754-PEREN282113_R03	figure no:	11
rev:	A		

Table 1
BHP Eastern Ridge PFAS Assessment
Round 1 - Groundwater Gauging and Hydrasleeve Installation Details
754-PEREN282113

Well ID	Date	Water Level	HydroSleeve Depth	Comments
EA0978RM	04-Dec-20	82.512	83	-
EC1775RDGM	04-Dec-20	53.940	55	-
ECO754RM	04-Dec-20	28.694	29.4	-
H10	01-Dec-20	-	-	-
HEA0123M	05-Dec-20	13.791	14.5	-
HEA0125M	05-Dec-20	13.226	13.5	-
HEA0134M	05-Dec-20	11.715	12	-
HEA0141M	05-Dec-20	24.059	25	-
HEA0149M	06-Dec-20	-	-	-
HEC0318M1	05-Dec-20	27.280	25	-
HEC0406M	06-Dec-20	3.313	4	-
HEC0407M	05-Dec-20	97.608	98	-
HEC0448M	06-Dec-20	-	-	-
HEOP0314M	06-Dec-20	6.740	7.0	-
HEOP0368M	04-Dec-20	21.501	22	-
HEOP0386M	04-Dec-20	5.582	6	-
HEOP0387M	06-Dec-20	7.718	8.5	-
HEOP0388M	04-Dec-20	9.390	10	-
HEOP0430M	05-Dec-20	11.395	11.7	-
HEOP0524M	04-Dec-20	8.429	9	-
HEOP0815M	04-Dec-20	21.684	24.5	-
HEQ0002M	04-Dec-20	11.313	12	-
HEQ0008	04-Dec-20	19.480	19.9	-
HEQ0020M	04-Dec-20	23.105	24	-
HEV0006M	06-Dec-20	8.364	10	-
HHS0023M	05-Dec-20	34.314	35	-
HHS0027M	05-Dec-20	31.999	32.6	-
HHS0042M	06-Dec-20	34.571	35.0	-
HHS0055M	05-Dec-20	18.435	19.3	-
HHS0085M	05-Dec-20	62.200	63	-
HST1063RM	06-Dec-20	-	-	-
HST1782RM	05-Dec-20	26.810	27.5	-
MB03	04-Dec-20	22.008	22.5	-
MW01a	05-Dec-20	27.510	28	-
MW06	05-Dec-20	25.829	26.5	-
MW07	05-Dec-20	26.42	26.9	-
HEA0335P	30-Nov-20	-	-	No dip tube
HEA0336P	30-Nov-20	-	-	No dip tube
HEA0346P	30-Nov-20	-	-	No dip tube
HEA0347P	30-Nov-20	-	-	No dip tube
HEA0348P	30-Nov-20	-	-	No dip tube
HEC0018P	30-Nov-20	-	18	No dip tube
HEC0022P	30-Nov-20	-	22	No dip tube
HEC0027P	30-Nov-20	-	27	No dip tube
HEC0028P	30-Nov-20	-	28	No dip tube

Table 2
BHP Eastern Ridge PFAS Assessment
Round 2 - Groundwater Gauging and Hydrasleeve Installation Details
754-PEREN282113

Well ID	Date	Water Level	HydroSleeve Depth	Comments
EA0978RM	09-Apr-21	-	83	-
EC00681R	09-Apr-21	-	55	-
EC1775RDGM	09-Apr-21	54.229	55	-
ECO754RM	02-Feb-21	28.673	29.4	-
EOP0220R	10-Apr-21	20.967	22.5	-
EOP0222R	10-Apr-21	25.332	26.5	-
EOP0334R	10-Apr-21	13.855	15	-
EOP0378R	10-Apr-21	13.329	14.5	-
EQ0112R	10-Apr-21	28.095	29.5	-
HEA0125M	02-Feb-21	12.895	13.5	-
HEA0134M	02-Feb-21	11.595	12	-
HEA0141M	02-Feb-21	23.921	25	-
HEA0350M-A	03-Feb-21	20.875	22	-
HEA0350M-B	03-Feb-21	20.875	30	-
HEA0350M-C	03-Feb-21	20.875	50	-
HEA0351	10-Apr-21	19.359	20.5	-
HEA0351M-A	03-Feb-21	20.117	21	-
HEA0351M-B	03-Feb-21	20.117	50	-
HEC0312-A	05-Feb-21	25.762	26.6	-
HEC0312-B	05-Feb-21	25.762	60	-
HEC0318M1	01-Feb-21	23.910	25	-
HEC0319M1	02-Feb-21	27.490	28	-
HEC0324M	09-Apr-21	88.532	99	-
HEC0406V1	04-Feb-21	3.140	3.9	-
HEC0407M	02-Feb-21	-	-	no reading
HEC0411M	05-Feb-21	60.400	61	-
HEC0448	10-Apr-21	20.524	22	-
HEC0448M-A	01-Feb-21	21.118	22	-
HEC0448M-B	01-Feb-21	21.118	40	-
HEOP0314M	04-Feb-21	6.041	6.6	-
HEOP0317M	03-Feb-21	18.315	19	-
HEOP0366M	01-Feb-21	18.999	19.5	-
HEOP0368M	01-Feb-21	21.311	22	-
HEOP0386M	04-Feb-21	5.469	6	-
HEOP0387M	02-Feb-21	8.979	9.5	-
HEOP0388M	04-Feb-21	9.335	10	-
HEOP0398	10-Apr-21	7.023	8.5	-
HEOP0398M	03-Feb-21	7.367	8	-
HEOP0415M	09-Apr-21	-	-	-
HEOP0430M	02-Feb-21	11.054	11.7	-
HEOP0445M	03-Feb-21	8.283	8.9	-
HEOP0462M	04-Feb-21	8.097	8.5	-
HEOP0467	10-Apr-21	6.531	8	-
HEOP0467M	04-Feb-21	7.354	8	-
HEOP0489M	09-Apr-21	-	-	-

Table 2
BHP Eastern Ridge PFAS Assessment
Round 2 - Groundwater Gauging and Hydrasleeve Installation Details
754-PEREN282113

Well ID	Date	Water Level	HydroSleeve Depth	Comments
HEOP0504M	02-Feb-21	7.230	8	-
HEOP0524	10-Apr-21	7.451	9	-
HEOP0524M	04-Feb-21	7.801	8.5	-
HEOP0538M	04-Feb-21	9.477	10	-
HEOP0548M	04-Feb-21	11.082	11.6	-
HEOP0574M	02-Feb-21	8.544	9	-
HEOP0798M	04-Feb-21	5.155	6	-
HEOP0815M	02-Feb-21	23.953	24.5	-
HEQ0002M	04-Feb-21	10.945	11.5	-
HEQ0006	10-Apr-21	17.421	19	-
HEQ0008M	04-Feb-21	19.383	20	-
HEQ0020M	04-Feb-21	22.963	24	-
HEV0006M	04-Feb-21	9.238	10	-
HHS0016M_110	11-Apr-21	44.363	110	-
HHS0016M_45	11-Apr-21	44.363	45	-
HHS0019M_110	11-Apr-21	36.172	110	-
HHS0019M_40	11-Apr-21	36.172	40	-
HHS0019M_75	11-Apr-21	36.172	75	-
HHS0023M	04-Feb-21	34.316	35	-
HHS0027M	01-Feb-21	32.033	32.6	-
HHS0027M_100	11-Apr-21	31.870	100	-
HHS0027M_35	11-Apr-21	31.870	35	-
HHS0027M_70	11-Apr-21	31.870	70	-
HHS0029M	01-Feb-21	33.968	34.5	-
HHS0029M_120	11-Apr-21	33.830	120	-
HHS0029M_35	11-Apr-21	33.830	35	-
HHS0029M_95	11-Apr-21	33.830	95	-
HHS0036M_19	11-Apr-21	17.855	19	-
HHS0036M_50	11-Apr-21	17.855	50	-
HHS0042M	01-Feb-21	26.669	27.4	-
HHS0052M	29-Jan-21	35.025	35.7	-
HHS0053M	29-Jan-21	24.957	26	-
HHS0055M	04-Feb-21	18.656	19.3	-
HHS0074M	09-Apr-21	27.101	27.5	-
HHS0085M	05-Feb-21	62.336	63	-
HHS0085M_64	11-Apr-21	62.266	64	-
HHS0085M_90	11-Apr-21	62.266	90	-
HNPIWR003	10-Apr-21	31.745	32	-
HST1063RM-A	03-Feb-21	23.252	25	-
HST1063RM-B	03-Feb-21	23.252	35	-
HST1536RM	01-Feb-21	68.770	69.5	-
HST1782RM	01-Feb-21	26.733	27.5	-
MB03	01-Feb-21	22.000	22.5	-
MW01a	01-Feb-21	27.392	28	-
MW06	01-Feb-21	25.791	26.5	-

Table 2
BHP Eastern Ridge PFAS Assessment
Round 2 - Groundwater Gauging and Hydrasleeve Installation Details
754-PEREN282113

Well ID	Date	Water Level	HydroSleeve Depth	Comments
MW07	01-Feb-21	26.260	26.9	-
T0399	10-Apr-21	6.440	8	-
T0411A	10-Apr-21	22.575	24	-
W028	10-Apr-21	6.727	8.5	-
W029	10-Apr-21	6.390	8	-
HEA0335P-A	26-Jan-21	-	-	No dip tube
HEA0335P-B	26-Jan-21	-	-	No dip tube
HEA0336P-A	26-Jan-21	-	-	No dip tube
HEA0336P-B	26-Jan-21	-	-	No dip tube
HEA0346P-A	26-Jan-21	-	-	No dip tube
HEA0346P-B	26-Jan-21	-	-	No dip tube
HEA0347P-A	26-Jan-21	-	-	No dip tube
HEA0347P-B	26-Jan-21	-	-	No dip tube
HEA0348P-A	26-Jan-21	-	-	No dip tube
HEA0348P-B	26-Jan-21	-	-	No dip tube
HEA0349P-A	26-Jan-21	-	-	No dip tube
HEA0349P-B	26-Jan-21	-	-	No dip tube
HEC0022P-A	25-Jan-21	-	-	No dip tube
HEC0022P-B	25-Jan-21	-	-	No dip tube
HEC0027P-A	26-Jan-21	-	-	No dip tube
HEC0027P-B	26-Jan-21	-	-	No dip tube
HEC0028P-A	25-Jan-21	-	-	No dip tube
HEC0028P-B	25-Jan-21	-	-	No dip tube
HEC0044P-A	25-Jan-21	-	-	No dip tube
HEC0044P-B	25-Jan-21	-	-	No dip tube
HEC0047P-A	25-Jan-21	-	-	No dip tube
HEC0047P-B	25-Jan-21	-	-	No dip tube
HHS0106P	01-Feb-21	23.642	24.5	-
HNPIHS0013-A	27-Jan-21	-	-	No dip tube
HNPIHS0013-B	27-Jan-21	-	-	No dip tube
HNPIHS0039-A	27-Jan-21	-	-	No dip tube
HNPIHS0039-B	27-Jan-21	-	-	No dip tube
HNPIHS0039P_A	11-Apr-21	-	-	-
HNPIHS0039P_B	11-Apr-21	-	-	-
HNPIHS0045P_A	11-Apr-21	-	-	-
HNPIHS0045P_B	11-Apr-21	-	-	-
HNPIHS0048-A	27-Jan-21	-	-	No dip tube
HNPIHS0048-B	27-Jan-21	-	-	No dip tube
HNPIOP0008P-A	28-Jan-21	-	-	No dip tube
HNPIOP0008P-B	28-Jan-21	-	-	No dip tube
HNPIOP0011P-A	28-Jan-21	-	-	No dip tube
HNPIOP0011P-B	28-Jan-21	-	-	No dip tube
HNPIOP0012P-A	30-Jan-21	-	-	No dip tube
HNPIOP0012P-B	30-Jan-21	-	-	No dip tube
HNPIOP0018P-A	31-Jan-21	-	-	No dip tube

Table 2
BHP Eastern Ridge PFAS Assessment
Round 2 - Groundwater Gauging and Hydrasleeve Installation Details
754-PEREN282113

Well ID	Date	Water Level	HydroSleeve Depth	Comments
HNPIOP0018P-B	31-Jan-21	-	-	No dip tube
HNPIOP0030P-A	29-Jan-21	-	-	No dip tube
HNPIOP0030P-B	29-Jan-21	-	-	No dip tube
HNPIOP0031P-A	29-Jan-21	-	-	No dip tube
HNPIOP0031P-B	29-Jan-21	-	-	No dip tube

Table 1
BHP Eastern Ridge PFAS Assessment
Round 1 - Groundwater Gauging and Hydrasleeve Installation Details
754-PEREN282113

Well ID	Date	Water Level	HydroSleeve Depth	Comments
HEC0044P	30-Nov-20	-	44	No dip tube
HEC0047P	30-Nov-20	-	47	No dip tube
HEC0430P	30-Nov-20	-	-	No dip tube
HNPIHS0013	05-Dec-20	51.389	-	-
HNPIHS0039	01-Dec-20	35.162	-	-
HNPIHS0048	01-Dec-20	32.580	-	-
HNPIOP0029	05-Dec-20	-	-	No dip tube

Table 3
BHP Eastern Ridge PFAS Assessment
Round 2 - Groundwater Gauging and Hydrasleeve Installation Details - Vertical Delineation
754-PEREN282113

Well ID	Related Production Bore	Date	Water Level	HydroSleeve Depth
HHS0016M_45	-	11-Apr-21	44.363	45
HHS0016M_110	-	11-Apr-21	44.363	110
HHS0019M_40	HNPIH0039P	11-Apr-21	36.172	40
HHS0019M_75	HNPIH0039P	11-Apr-21	36.172	75
HHS0019M_110	HNPIH0039P	11-Apr-21	36.172	110
HHS0027M_35	-	11-Apr-21	31.870	35
HHS0027M_70	HNPIHS0049P	11-Apr-21	31.870	70
HHS0027M_100	HNPIHS0049P	11-Apr-21	31.870	100
HHS0029M_35	HNPIH0040P	11-Apr-21	33.830	35
HHS0029M_95	HNPIH0040P	11-Apr-21	33.830	95
HHS0029M_120	-	11-Apr-21	33.830	120
HHS0036M_19	-	11-Apr-21	17.855	19
HHS0036M_50	-	11-Apr-21	17.855	50
HHS0085M_64	-	11-Apr-21	62.266	64
HHS0085M_90	-	11-Apr-21	62.266	90
HNPIHS0039P_A	-	11-Apr-21	-	72-156
HNPIHS0039P_B	-	11-Apr-21	-	72-156
HNPIHS0045P_A	-	11-Apr-21	-	27-165
HNPIHS0045P_B	-	11-Apr-21	-	27-165

Table 4
BHP - Eastern Ridge PFAS Assessment
Round 1 - Monitoring Wells and Surface Water Analytical Results
754-PEREN282113

Field_ID	SampleDate	SampleCode	Ore_Body	Type	HEC0406M	EA0978RM	HEA0123M	HEA0125M	HEA0134M	HEA0141M	HEA0149M	EC1775RDGM	ECO754RM	HEC0318M1	HEC0407M	HEOP0386M	HEOP0388M	HEOP0815M	MB03	MW01a	MW06		
					HEC0406M	EA0978RM	HEA0123M	HEA0125M	HEA0134M	HEA0141M	HEA0149M	EC1775RDGM	ECO754RM	HEC0318M1	HEC0407M	HEOP0386M	HEOP0388M	HEOP0815M	MB03	MW01a	MW06		
					06-Dec-20	04-Dec-20	05-Dec-20	05-Dec-20	05-Dec-20	05-Dec-20	06-Dec-20	04-Dec-20	04-Dec-20	05-Dec-20	05-Dec-20	04-Dec-20	04-Dec-20	04-Dec-20	04-Dec-20	04-Dec-20	05-Dec-20	05-Dec-20	
SampleCode	EP2013633027	EP2013633005	EP2013633008	EP2013633010	EP2013633009	EP2013633011	EP2013633029	EP2013633042	EP2013633037	EP2013633049	EP2013633007	EP2013633006	EP2013633039	EP2013633045	EP2013633038	EP2013633001	EP2013633048						
Ore_Body	Homestead	OB23	OB23	OB23	OB23	OB23	OB25	OB25	OB25	OB25	OB25	OB25	OB25	OB25	OB25	OB25	OB25						
Type	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring						
ChemName	output unit	EQL	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water																	
Physical Parameters																							
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	830	-	-	-	-	-	-	-	-	574	-	-	-	-	640	773	
Alkalinity																							
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	311	-	-	-	-	-	-	-	-	420	-	-	-	-	328	272	
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	<1	-	-	-	-	-	-	-	-	<1	-	-	-	-	<1	<1	
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	311	-	-	-	-	-	-	-	-	420	-	-	-	-	328	272	
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	<1	-	-	-	-	-	-	-	-	<1	-	-	-	-	<1	<1	
Ions																							
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	88	-	-	-	-	-	-	-	-	67	-	-	-	-	71	67	
Chloride	mg/L	1	NE	NE	NE	NE	195	-	-	-	-	-	-	-	-	115	-	-	-	-	119	139	
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	7	-	-	-	-	-	-	-	-	9	-	-	-	-	10	17	
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	106	-	-	-	-	-	-	-	-	74	-	-	-	-	76	128	
Ionic Balance	%	0.01	NE	NE	NE	NE	3.06	-	-	-	-	-	-	-	-	2.8	-	-	-	-	4.31	3.35	
Anions Total	meq/L	0.01	NE	NE	NE	NE	13.9	-	-	-	-	-	-	-	-	11.6	-	-	-	-	11.6	12.7	
Cations Total	meq/L	0.01	NE	NE	NE	NE	14.8	-	-	-	-	-	-	-	-	12.3	-	-	-	-	12.6	13.5	
Inorganics																							
Sulfate as SO4 (Filtered)	mg/L	1	NE	NE	NE	NE	105	-	-	-	-	-	-	-	-	<1	-	-	-	-	80	159	
TOC	mg/L	1	NE	NE	NE	NE	6	-	-	-	-	6	-	-	-	25	-	-	-	-	8	5	
Metals																							
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	68	-	-	-	-	-	-	-	-	67	-	-	-	-	67	51	
Perfluoroalkane Sulfonic Acids																							
Perfluorobutanoic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	<0.0005
Perfluoropentanoic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	0.0009	<0.0005	<0.0005	<0.0005	0.0015	<0.0005	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctanoic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	0.001	<0.0002	0.0014	0.0013	0.0006	0.0015	0.0005	<0.0002	0.0033	0.0002	<0.0002	<0.0002	0.0015	0.0009	<0.0002	0.0006	0.0004
Perfluorodecanoic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids																							
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	<0.002	<0.002	0.12	0.0041	<0.002	<0.002	0.003	0.019	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	0.0381	0.0021	<0.0005	<0.0005	0.0014	0.0416	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	0.0063	0.0008	<0.0005	<0.0005	0.0256	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	0.0077	0.0016	0.0005	<0.0005	0.023	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctanoic acid (PFDA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	<0.0005	0.006	0.0028	0.0013	<0.0005	0.01	<0.0005	0.0054	<0.0005	<0.0005	<0.0005	0.0016	0.0046	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	0.0021	0.0013	0.0005	<0.0005	0.0024	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	0.0028	0.0007	<0.0005	<0.0005	0.0045	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids																							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	0.006	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	0.002	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	0.005	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	0.002	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides																							
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE																		

Table 4
BHP - Eastern Ridge PFAS Assessment
Round 1 - Monitoring Wells and Surface Water Analytical Results
754-PEREN282113

Field_ID	HEOP0387M	HEV0006M	RPSW01	RPSW02	RPSW03	OPSW1	Statistical Summary										
	Sampled_Date	06-Dec-20	06-Dec-20	06-Dec-20	06-Dec-20	06-Dec-20						05-Dec-20	Minimum	Maximum	Average	Median	Standard
SampleCode	EP2013633026	EP2013633025	EP2013633034	EP2013633035	EP2013633036	EP2013633033											
Ore_Body	OB43	OB43	Discharge	Discharge	Discharge	OB23											
Type	Monitoring	Monitoring	Surface	Surface	Surface	Surface											
ChemName	output unit	EQL	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water											
Physical Parameters																	
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	742	-	1320	1320	1330	670	280	1330	819	758	296
Alkalinity																	
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	279	-	248	254	253	130	68	420	284	279	103
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	<1	-	<1	<1	<1	<1	<1	<1	0.5	0.5	0
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	279	-	248	254	253	42	42	420	278	279	114
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	<1	-	<1	<1	<1	88	<1	88	6.3	0.5	23
Ions																	
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	38	-	94	96	94	12	12	96	70	81	27
Chloride	mg/L	1	NE	NE	NE	NE	172	-	453	448	449	265	42	453	220	170	132
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	7	-	14	14	14	19	4	19	10	9	4.5
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	165	-	214	212	211	131	31	214	116	104	59
Ionic Balance	%	0.01	NE	NE	NE	NE	0.2	-	0.32	0.2	0.62	0.69	0.2	6.02	2.4	2.8	1.9
Anions Total	meq/L	0.01	NE	NE	NE	NE	12.9	-	23.3	23.3	23.2	12.2	4.83	23.3	14	12.9	5.3
Cations Total	meq/L	0.01	NE	NE	NE	NE	12.9	-	23.2	23.2	23	12	5.29	23.2	15	13.7	5.1
Inorganics																	
Sulfate as SO4 (Filtered)	mg/L	1	NE	NE	NE	NE	120	-	268	267	265	103	<1	268	116	103	91
TOC	mg/L	1	NE	NE	NE	NE	6	-	5	4	5	7	1	25	7	6	5.1
Metals																	
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	44	-	107	107	106	64	23	107	73	68	24
Perfluoroalkane Sulfonic Acids																	
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0069	0.00049	0.00025	0.0011
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0075	0.00062	0.00025	0.0012
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0011	0.00027	0.00025	0.00013
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	0.0009	0.0006	0.0009	0.0006	0.0007	0.0022	<0.0002	0.0231	0.0019	0.0006	0.0048
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
Perfluoroalkane Carboxylic Acids																	
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.278	0.012	0.001	0.047
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0416	0.0026	0.00025	0.0087
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0256	0.0013	0.00025	0.0042
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.023	0.0012	0.00025	0.0038
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	<0.0005	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0171	0.0017	0.00025	0.0033
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0024	0.00041	0.00025	0.00047
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0045	0.00046	0.00025	0.00078
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
(n:2) Fluorotelomer Sulfonic Acids																	
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.036	0.002	0.0005	0.0058
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.005	0.00069	0.0005	0.00077
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	0.0006	0.0005	0.00046
Perfluoroalkyl Sulfonamides																	
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0
PFASs Summations																	
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	0.0015	0.0006	0.0009	0.0006	0.0007	0.0022	<0.0002	0.0306	0.0024	0.00065	0.006
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	0.0015	0.0022	0.0009	0.0006	0.0007	0.0022	<0.0002	0.285	0.022	0.00165	0.056
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	0.0015	0.0022	0.0009	0.0006	0.0007	0.0022	<0.0002	0.285	0.023	0.00165	0.057

Notes:
LOR = Limit of reporting
- = not analysed
mg/L = milligrams per litre
µg/L = micrograms per litre

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

Table 5
BHP - Eastern Ridge PFAS Assessment
Round 1 - Production Bore Analytical Results
754-PEREN282113

Field_ID	HNPIHS0048	HEA0335P *	HEA0336P *	HEA0346P *	HEA0347P *	HEA0348P *	HEC0018P *	HEC0022P *	HEC0027P *	HEC0028P *							
Sample Date	01-Dec-20	30-Nov-20	30-Nov-20	30-Nov-20	30-Nov-20	30-Nov-20	30-Nov-20	30-Nov-20	30-Nov-20	30-Nov-20							
Sample Code	EP2013567015	EP2013567008	EP2013567009	EP2013567011	EP2013567012	EP2013567010	EP2013567004	EP2013567007	EP2013567005	EP2013567006							
Ore Body	MUD	OB24	OB24	OB24	OB24	OB24	OB25	OB25	OB25	OB25							
Type	Production	Production	Production	Production	Production	Production	Production	Production	Production	Production							
ChemName	output unit	EQL	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water	754	755	756	757	758	759	760	761	762	763	764
Physical Parameters																	
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	675	354	432	502	500	466	728	740	749	800	
Alkalinity																	
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	412	100	186	227	254	276	304	286	314	338	
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	412	100	186	227	254	276	304	286	314	338	
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Ions																	
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	72	15	48	62	62	60	70	78	75	76	
Chloride	mg/L	1	NE	NE	NE	NE	132	123	112	114	102	95	182	177	191	205	
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	8	14	14	16	15	15	7	9	8	8	
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	97	67	63	63	62	62	97	95	105	107	
Ionic Balance	%	0.01	NE	NE	NE	NE	2.97	5.98	4.83	6.22	4.84	2.66	1.63	4.64	3.12	0.52	
Anions Total	meq/L	0.01	NE	NE	NE	NE	13.4	6.34	8.12	9.15	9.26	9.5	13.4	13.7	14	15.2	
Cations Total	meq/L	0.01	NE	NE	NE	NE	14.2	7.15	8.95	10.4	10.2	10	13.8	15.1	14.8	15.3	
Inorganics																	
Sulfate as SO4 (Filtered)	mg/L	1	NE	NE	NE	NE	68	42	60	67	63	63	104	146	110	126	
TOC	mg/L	1	NE	NE	NE	NE	15	2	4	3	5	4	6	5	6	12	
Metals																	
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	75	38	42	50	49	48	72	83	77	81	
Perfluoroalkane Sulfonic Acids																	
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	0.0005	0.0004	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids																	
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctanoic acid (PFDA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
(n-2) Fluorotelomer Sulfonic Acids																	
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides																	
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PFASs Summations																	
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	0.0005	0.0004	
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	0.0005	0.0004	
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	0.0005	0.0004	

Notes:

LOR = Limit of reporting
 - = not analysed
 mg/L = milligrams per litre
 µg/L = micrograms per litre

Shaded & bolded cells exceed NEMP investigation levels (NEMP, 2020) - Drinking Water
 Shaded & bolded cells exceed NEMP investigation levels (NEMP, 2020) - Freshwater 95%
 Shaded & bolded cells exceed NEMP investigation levels (NEMP, 2020) - Freshwater 99%
 Shaded & bolded cells exceed NEMP investigation levels (NEMP, 2020) - Recreational Water

* Lab COA labels incorrect, corrected list below

- HEA0335P = WB335
- HEA0336P = WB336
- HEA0346P = WB24-346
- HEA0347P = WB24-347
- HEA0348P = WB24-348
- HEC0018P = WB25-18
- HEC0022P = WB25-22
- HEC0027P = WB25-27
- HEC0028P = WB25-28
- HEC0044P = WB25-44
- HEC0047P = WB25-47
- HEC0430P = WB25-430

Table 5
BHP - Eastern Ridge PFAS Assessment
Round 1 - Production Bore Analytical Results
754-PEREN282113

Field ID	HEC0044P *	HEC0047P *	HEC0430P *	HNPIHS0013	HNPIHS0039	HNPIOP0029												
	Sample Date	30-Nov-20	30-Nov-20	30-Nov-20	05-Dec-20	01-Dec-20	05-Dec-20											
Sample Code	EP2013567003	EP2013567001	EP2013567002	EP2013633031	EP2013567017	EP2013633032												
Ore Body	OB25	OB25	OB25	OB28	OB32	OB32												
Type	Production	Production	Production	Production	Production	Production												
ChemName	output unit	EQL	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water						Statistical Summary						
							Minimum	Maximum	Average	Median	Standard							
Physical Parameters																		
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	719	670	590	760	680	1150	354	1150	657	677.5	188	
Alkalinity																		
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	308	293	309	472	416	319	100	472	301	306	89	
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	0.5	0.5	0	
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	308	293	309	472	416	319	100	472	301	306	89	
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	<1	<1	<1	<1	<1	<1	<1	<1	0.5	0.5	0	
Ions																		
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	71	69	63	87	81	93	15	93	68	70.5	18	
Chloride	mg/L	1	NE	NE	NE	NE	193	145	119	139	121	364	95	364	157	135.5	66	
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	8	10	8	9	7	12	7	16	11	9	3.2	
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	104	82	73	84	84	184	62	184	89	84	30	
Ionic Balance	%	0.01	NE	NE	NE	NE	2.17	4.42	3.68	0.33	4.28	0.94	0.33	6.22	3.3	3.4	1.8	
Anions Total	meq/L	0.01	NE	NE	NE	NE	13.9	12.5	11.2	15.1	13.1	20.8	6.34	20.8	12	13.25	3.5	
Cations Total	meq/L	0.01	NE	NE	NE	NE	14.5	13.7	12.1	15.2	14.3	21.2	7.15	21.2	13	14	3.3	
Inorganics																		
Sulfate as SO4 (Filtered)	mg/L	1	NE	NE	NE	NE	111	124	83	85	67	199	42	199	95	84	40	
TOC	mg/L	1	NE	NE	NE	NE	5	4	5	5	9	4	2	15	5.9	5	3.4	
Metals																		
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	76	78	68	85	78	100	38	100	69	75.5	18	
Perfluoroalkane Sulfonic Acids																		
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	<0.0005	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	0.0005	0.00017	0.0001	0.00014	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluoroalkane Carboxylic Acids																		
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.001	0.001	0	
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluorooctanoic acid (PFDA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluorododecanoic acid (PFDDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluoropentadecanoic acid (PFPeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluorohexadecanoic acid (PFHxDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
(n:2) Fluorotelomer Sulfonic Acids																		
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0	
Perfluoroalkyl Sulfonamides																		
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
N-Methylperfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0	
N-Methylperfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
N-Methylperfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0	
N-Ethylperfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0	
N-Ethylperfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0	
N-Ethylperfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0	
PFASs Summations																		
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	0.0005	0.00017	0.0001	0.00014	
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	0.0005	0.00017	0.0001	0.00014	
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	0.0005	0.00017	0.0001	0.00014	

Notes:

LOR = Limit of reporting
 - = not analysed
 mg/L = milligrams per litre
 µg/L = micrograms per litre

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

* Lab COA labels incorrect, corrected list below

- HEA0335P = WB335
- HEA0336P = WB336
- HEA0346P = WB24-346
- HEA0347P = WB24-347
- HEA0348P = WB24-348
- HEC0018P = WB25-18
- HEC0022P = WB25-22
- HEC0027P = WB25-27
- HEC0028P = WB25-28
- HEC0044P = WB25-44
- HEC0047P = WB25-47
- HEC0430P = WB25-430

Table 6
BHP - Eastern Ridge PFAS Assessment
Round 2 - Monitoring Wells and Surface Water Analytical Result
754-PEREN282113

Field_ID	HEOP0398	HEOP0489M	HEOP0524	W028	W029	HEOP0462M	HEOP0467M	HEOP0504M	HEOP0538M	HEOP0574M	HEOP0398M	HEOP0445M						
Sampled_Date	10-Apr-21	09-Apr-21	10-Apr-21	10-Apr-21	10-Apr-21	04-Feb-21	04-Feb-21	02-Feb-21	04-Feb-21	02-Feb-21	03-Feb-21	03-Feb-21						
SampleCode	EP2104088017	EP2104088002	EP2104088020	EP2104088019	EP2104088018	EP2101173009	EP2101173008	EP2101111011	EP2101173007	EP2101111010	EP2101111020	EP2101111019						
Ore_Body	Airport	Airport	Airport	Airport	Airport	Creek (North)	Creek (North)	Creek (North)	Creek (North)	Creek (North)	Creek (South)	Creek (South)						
Type	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring						
Sample_Depth	8.5		9	8.5	8	8.5	8	8	10	9	8	8.9						
ChemName	output unit	EQL	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water												
Physical Parameters																		
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	-	-	-	-	-	-						
Alkalinity																		
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-						
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-						
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-						
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-						
Ions																		
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-						
Chloride	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-						
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-						
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-						
Ionic Balance	%	0.01	NE	NE	NE	NE	-	-	-	-	-	-						
Anions Total	meq/L	0.01	NE	NE	NE	NE	-	-	-	-	-	-						
Cations Total	meq/L	0.01	NE	NE	NE	NE	-	-	-	-	-	-						
Nutrients																		
Nitrite + Nitrate as N	mg/L	0.01	NE	NE	NE	NE	-	-	-	-	-	-						
Nitrogen (Total)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-						
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-						
Inorganics																		
Sulfate as SO4 (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-						
TOC	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-						
Metals																		
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-						
Perfluoroalkane Sulfonic Acids																		
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	0.001	<0.0005	<0.0005	0.0014	0.0011	<0.0005	<0.0005	0.0014	<0.0005	<0.0005	0.0035	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	0.0097	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0023	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	0.0006	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids																		
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	0.0069	0.0349	<0.002	<0.002	<0.002	<0.002	0.0049	<0.002	<0.002	0.003	<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	0.0008	0.0152	<0.0005	<0.0005	<0.0005	<0.0005	0.0041	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	0.0026	<0.0005	<0.0005	<0.0005	<0.0005	0.0009	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	0.0037	0.0012	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids																		
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	0.001	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	0.008	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides																		
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PFASs Summations																		
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	0.0103	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0025	<0.0002
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	0.0123	0.0164	0.0541	0.0014	0.0011	<0.0002	<0.0002	0.0203	<0.0002	<0.0002	0.009	<0.0002
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	0.0133	0.0164	0.0541	0.0014	0.0011	<0.0002	<0.0002	0.0203	<0.0002	<0.0002	0.009	<0.0002

Notes:
LOR = Limit of reporting
- = not analysed
mg/L = milligrams per litre
µg/L = micrograms per litre
NE = Guideline value not established

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

Table 6
BHP - Eastern Ridge PFAS Assessment
Round 2 - Monitoring Wells and Surface Water Analytical Result
754-PEREN282113

Field_ID	HEC0406V1	T0399	HEOP0467	EOP0220R	EOP0222R	EA0978RM	HEA0125M	HEA0134M	HEA0141M	EC00681R	EC1775RDGM	EC0754RM
Sampled_Date	04-Feb-21	10-Apr-21	10-Apr-21	10-Apr-21	10-Apr-21	09-Apr-21	02-Feb-21	02-Feb-21	02-Feb-21	09-Apr-21	09-Apr-21	02-Feb-21
SampleCode	EP2101173010	EP2104088013	EP2104088014	EP2104088012	EP2104088011	EP2104088001	EP2101111015	EP2101111014	EP2101111009	EP2104088004	EP2104088006	EP2101111008
Ore_Body	Homestead	Maru/TEC	Nth Marble Bar R	OB21/22/TEC	OB21/22/TEC	OB23	OB23	OB23	OB23	OB25	OB25	OB25
Type	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring
Sample_Depth	3.9	8	8	22.5	26.5	83	13.5	12	25	55	55	29.4

ChemName	output unit	EQL	PFAS NEMP	PFAS NEMP	PFAS NEMP	PFAS NEMP														
			2020 Drinking Water	2020 Freshwater 95%	2020 Freshwater 99%	2020 Recreational Water														
Physical Parameters																				
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	847	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity																				
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	283	-	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	<1	-	-	-	-	-	-	-	-	-	-	-	-	-
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	283	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	<1	-	-	-	-	-	-	-	-	-	-	-	-	-
Ions																				
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	78	-	-	-	-	-	-	-	-	-	-	-	-	-
Chloride	mg/L	1	NE	NE	NE	NE	212	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	7	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	105	-	-	-	-	-	-	-	-	-	-	-	-	-
Ionic Balance	%	0.01	NE	NE	NE	NE	0.08	-	-	-	-	-	-	-	-	-	-	-	-	-
Anions Total	meq/L	0.01	NE	NE	NE	NE	14.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Cations Total	meq/L	0.01	NE	NE	NE	NE	14.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Nutrients																				
Nitrite + Nitrate as N	mg/L	0.01	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrogen (Total)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																				
Sulfate as SO4 (Filtered)	mg/L	1	NE	NE	NE	NE	122	-	-	-	-	-	-	-	-	-	-	-	-	-
TOC	mg/L	1	NE	NE	NE	NE	<1	-	-	-	-	-	-	-	-	-	-	-	-	-
Metals																				
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	67	-	-	-	-	-	-	-	-	-	-	-	-	-
Perfluoroalkane Sulfonic Acids																				
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	0.0006	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	0.004	0.0006	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	0.0024	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0033	0.0008	0.001	<0.0002	<0.0002	<0.0002	0.0034	0.0034
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids																				
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0241	0.0068	0.0329	<0.002	<0.002	<0.002	0.012	0.012
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	0.0014	0.0401	0.0024	<0.0005	<0.0005	<0.0005	<0.0005	0.0236	0.0236
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	0.0083	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	0.011	0.011
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0079	0.0019	<0.0005	<0.0005	<0.0005	<0.0005	0.0123	0.0123
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	0.0009	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.007	0.0033	0.0006	<0.0005	<0.0005	<0.0005	0.0072	0.0072
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0029	0.0015	<0.0005	<0.0005	<0.0005	<0.0005	0.0018	0.0018
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0032	0.0011	<0.0005	<0.0005	<0.0005	<0.0005	0.0036	0.0036
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	0.0006
(n:2) Fluorotelomer Sulfonic Acids																				
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.006	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides																				
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PFASs Summations																				
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	0.0024	<0.0002	<0.0002	<0.0002	<0.0002	<0.0								

Table 6
BHP - Eastern Ridge PFAS Assessment
Round 2 - Monitoring Wells and Surface Water Analytical Result
754-PEREN282113

Field_ID	HEC0312-A	HEC0312-B	HEC0318M1	HEC0319M1	HEC0324M	HEC0407M	HEC0411M	HEOP0386M	HEOP0388M	HEOP0548M	HEOP0815M	MB03	
Sampled_Date	05-Feb-21	05-Feb-21	01-Feb-21	02-Feb-21	09-Apr-21	02-Feb-21	05-Feb-21	04-Feb-21	04-Feb-21	04-Feb-21	02-Feb-21	01-Feb-21	
SampleCode	EP2101173026	EP2101173027	EP2101036027	EP2101111007	EP2104088005	EP2101111016	EP2101173033	EP2101173016	EP2101173013	EP2101173017	EP2101111006	EP2101111003	
Ore_Body	OB25	OB25	OB25	OB25	OB25	OB25	OB25	OB25	OB25	OB25	OB25	OB25	
Type	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	
Sample_Depth	26.6	60	25	28	99			61	6	10	11.6	24.5	22.5

ChemName	output unit	EQL	PFAS NEMP	PFAS NEMP	PFAS NEMP	PFAS NEMP												
			2020 Drinking Water	2020 Freshwater 95%	2020 Freshwater 99%	2020 Recreational Water	HEC0312-A	HEC0312-B	HEC0318M1	HEC0319M1	HEC0324M	HEC0407M	HEC0411M	HEOP0386M	HEOP0388M	HEOP0548M	HEOP0815M	MB03
Physical Parameters																		
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	630	642	-	-	-	618	-	-	-	-	-	
Alkalinity																		
Alkalinity (total as CaCO ₃)	mg/L	1	NE	NE	NE	NE	260	260	-	-	-	437	-	-	-	-	-	
Alkalinity (Hydroxide) as CaCO ₃	mg/L	1	NE	NE	NE	NE	<1	<1	-	-	-	<1	-	-	-	-	-	
Bicarbonate Alkalinity as CaCO ₃	mg/L	1	NE	NE	NE	NE	260	260	-	-	-	437	-	-	-	-	-	
Carbonate Alkalinity as CaCO ₃	mg/L	1	NE	NE	NE	NE	<1	<1	-	-	-	<1	-	-	-	-	-	
Ions																		
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	56	58	-	-	-	61	-	-	-	-	-	
Chloride	mg/L	1	NE	NE	NE	NE	152	152	-	-	-	127	-	-	-	-	-	
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	6	6	-	-	-	8	-	-	-	-	-	
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	86	86	-	-	-	69	-	-	-	-	-	
Ionic Balance	%	0.01	NE	NE	NE	NE	0.1	0.89	-	-	-	3.87	-	-	-	-	-	
Anions Total	meq/L	0.01	NE	NE	NE	NE	11.4	11.4	-	-	-	12.4	-	-	-	-	-	
Cations Total	meq/L	0.01	NE	NE	NE	NE	11.5	11.6	-	-	-	11.4	-	-	-	-	-	
Nutrients																		
Nitrite + Nitrate as N	mg/L	0.01	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	
Nitrogen (Total)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	
Inorganics																		
Sulfate as SO ₄ (Filtered)	mg/L	1	NE	NE	NE	NE	94	94	-	-	-	2	-	-	-	-	-	
TOC	mg/L	1	NE	NE	NE	NE	<1	<1	-	-	-	46	-	-	-	-	-	
Metals																		
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	58	59	-	-	-	63	-	-	-	-	-	
Perfluoroalkane Sulfonic Acids																		
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0076	<0.0005	0.0007	<0.0005	<0.0005	0.0007	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	0.0011	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	0.005	0.0026	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0018	0.0022	0.0006	0.0005	<0.0002
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids																		
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	<0.002	<0.002	<0.002	<0.002	0.147	<0.002	<0.002	<0.002	<0.002	0.0028	<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	0.0013	<0.0005	<0.0005	0.0057	<0.0005	<0.0005	<0.0005	<0.0005	0.0019	0.0032
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids																		
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	0.01	0.005	<0.001	<0.001	<0.001	0.002	0.003	<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides																		
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PFASs Summations																		
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	0.0061	0.0032	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0018	0.0022	0.0006	0.0005	<0.0002
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	0.0161	0.0082	0.0013	<0.0002	<0.0002	0.162	0.003	0.0025	0.0022	0.0006	0.0066	0.0032
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	0.0161	0.0082	0.0063	<0.0002	<0.0002	0.162	0.003	0.0025	0.0022	0.0006	0.0066	0.0032

Notes:
LOR = Limit of reporting
- = not analysed
mg/L = milligrams per litre
µg/L = micrograms per litre
NE = Guideline value not established

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

Table 6
BHP - Eastern Ridge PFAS Assessment
Round 2 - Monitoring Wells and Surface Water Analytical Result
754-PEREN282113

Field_ID	HHS0085M	HHS0085M_64	HHS0085M_90	HST1063RM-A	HST1063RM-B	HST1782RM	EQ0112R	HEOP0314M	HEOP0366M	HEOP0368M	HEOP0524M	HEQ0002M
Sampled_Date	05-Feb-21	11-Apr-21	11-Apr-21	03-Feb-21	03-Feb-21	01-Feb-21	10-Apr-21	04-Feb-21	01-Feb-21	01-Feb-21	04-Feb-21	04-Feb-21
SampleCode	EP2101173028	EP2104088041	EP2104088042	EP2101173002	EP2101173003	EP2101036031	EP2104088016	EP2101173012	EP2101111002	EP2101111001	EP2101173014	EP2101173015
Ore_Body	OB32	OB32	OB32	OB33	OB33	OB33	OB37	OB37	OB37	OB37	OB37	OB37
Type	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring
Sample_Depth	63	64	90	25	35	27.5	29.5	6.6	19.5	22		

ChemName	output unit	EQL	PFAS NEMP	PFAS NEMP	PFAS NEMP	PFAS NEMP													
			2020 Drinking Water	2020 Freshwater 95%	2020 Freshwater 99%	2020 Recreational Water													
Water Quality																			
Physical Parameters																			
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	-	-	-	1890	1820	-	-	778	-	-	-	-	-
Alkalinity																			
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	-	-	-	374	387	-	-	71	-	-	-	-	-
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	-	-	-	<1	<1	-	-	<1	-	-	-	-	-
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	-	-	374	387	-	-	71	-	-	-	-	-
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	-	-	<1	<1	-	-	<1	-	-	-	-	-
Ions																			
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	144	151	-	-	27	-	-	-	-	-
Chloride	mg/L	1	NE	NE	NE	NE	-	-	-	479	480	-	-	289	-	-	-	-	-
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	12	13	-	-	4	-	-	-	-	-
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	198	203	-	-	66	-	-	-	-	-
Ionic Balance	%	0.01	NE	NE	NE	NE	-	-	-	1.96	0.46	-	-	2.1	-	-	-	-	-
Anions Total	meq/L	0.01	NE	NE	NE	NE	-	-	-	30.1	30.3	-	-	9.57	-	-	-	-	-
Cations Total	meq/L	0.01	NE	NE	NE	NE	-	-	-	28.9	30	-	-	9.18	-	-	-	-	-
Nutrients																			
Nitrite + Nitrate as N	mg/L	0.01	NE	NE	NE	NE	-	-	-	2.17	2.48	-	-	-	-	-	-	-	-
Nitrogen (Total)	mg/L	0.1	NE	NE	NE	NE	-	-	-	4.7	5.1	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1	NE	NE	NE	NE	-	-	-	2.5	2.6	-	-	-	-	-	-	-	-
Inorganics																			
Sulfate as SO4 (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	438	434	-	-	<1	-	-	-	-	-
TOC	mg/L	1	NE	NE	NE	NE	-	-	-	<1	4	-	-	<1	-	-	-	-	-
Metals																			
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	156	162	-	-	59	-	-	-	-	-
PFAS																			
Perfluoroalkane Sulfonic Acids																			
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	0.0009	0.0009	0.0018	0.0011	<0.0005	<0.0005	0.001	<0.0005	0.0006	<0.0005	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	0.0036	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	0.0006	<0.0002	<0.0002	0.0237	0.0209	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0009	0.0021	0.0021
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids																			
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	0.0076	0.0075	0.0083	0.0022	<0.002	<0.002	<0.002	0.0022	<0.002	<0.002	0.0036	<0.002	<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	0.002	0.0016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	0.0052	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	0.002	0.0016	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	0.0006	0.0007
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	<0.0005	0.0093	0.0076	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	0.0017	0.0017
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0008
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids																			
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides																			
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PFASs Summations																			
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	0.0006	<0.0002	<0.0002	0.0237	0.0245	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0009	0.0021	0.0021
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	0.0102	0.0084	0.0092	0.041	0.0374	<0.0002	<0.0002	0.0032	<0.0002	0.0012	0.0108	0.0045	0.0045
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	0.0102	0.0084	0.0092	0.0426	0.0374	<0.0002	<0.0002	0.0032	<0.0002	0.0012	0.0108	0.0053	0.0053

Notes:
LOR = Limit of reporting
- = not analysed
mg/L = milligrams per litre
µg/L = micrograms per litre
NE = Guideline value not established

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

Table 6
BHP - Eastern Ridge PFAS Assessment
Round 2 - Monitoring Wells and Surface Water Analytical Result
754-PEREN282113

Field_ID	HEQ0006	HEQ0008M	HEQ0020M	T0411A	HEA0350M-A	HEA0350M-B	HEA0350M-C	HEA0351	HEA0351M-A	HEA0351M-B	HEC0448	HEC0448M-A
Sampled_Date	10-Apr-21	04-Feb-21	04-Feb-21	10-Apr-21	03-Feb-21	03-Feb-21	03-Feb-21	10-Apr-21	03-Feb-21	03-Feb-21	10-Apr-21	01-Feb-21
SampleCode	EP2104088015	EP2101173019	EP2101173004	EP2104088023	EP2101111023	EP2101111024	EP2101111025	EP2104088021	EP2101111021	EP2101111022	EP2104088022	EP2101111004
Ore_Body	OB37	OB37	OB37	OB37	OB38	OB38	OB38	OB38	OB38	OB38	OB38	OB38
Type	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring
Sample_Depth	19		24	24	22	30	50	20.5	21	50	22	22

ChemName	output unit	EQL	PFAS NEMP	PFAS NEMP	PFAS NEMP	PFAS NEMP													
			2020 Drinking Water	2020 Freshwater 95%	2020 Freshwater 99%	2020 Recreational Water													
Physical Parameters																			
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	1250
Alkalinity																			
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	528
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	<1
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	528
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	<1
Ions																			
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	64
Chloride	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	339
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	4
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	226
Ionic Balance	%	0.01	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	4.1
Anions Total	meq/L	0.01	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	23.4
Cations Total	meq/L	0.01	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	21.5
Nutrients																			
Nitrite + Nitrate as N	mg/L	0.01	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	<0.01
Nitrogen (Total)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	1.2
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	1.2
Inorganics																			
Sulfate as SO4 (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	156
TOC	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	333
Metals																			
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-	102
Perfluoroalkane Sulfonic Acids																			
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	0.007	<0.0005	<0.0005	<0.0005	<0.0005	0.0109	<0.0005	0.0014	0.0018	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0077	<0.0005	<0.0005	0.0007	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0013	0.0583	0.0007	0.0006	<0.0005	0.0098	
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0068	
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	0.0002	0.0002	0.001	<0.0002	<0.0002	<0.0002	0.0005	0.0006	0.0004	0.0005	0.025	0.0338	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroalkane Carboxylic Acids																			
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0032	<0.002	<0.002	0.0278	0.0332	
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	0.0009	<0.0005	0.0014	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0084	0.006	
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	0.0009	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0124	0.007	
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	0.0014	<0.0005	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0042	0.0031	
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	0.0141	<0.0005	0.0043	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0245	0.0311	
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0016	0.0009	
Perfluorododecanoic acid (PFDDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0011	0.0018	
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
(n:2) Fluorotelomer Sulfonic Acids																			
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.012	0.013
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.007	0.003
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001
Perfluoroalkyl Sulfonamides																			
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PFASs Summations																			
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	0.0002	0.0002	0.001	<0.0002	<0.0002	<0.0002	0.0018	0.0589	0.0011	0.0011	0.025	0.0436	
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	0.0205	0.0002	0.015	<0.0002	<0.0002	<0.0002	0.0018	0.073	0.0011	0.0025	0.123	0.14	
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	0.0205	0.0002	0.015	<0.0002	<0.0002	<0.0002	0.0018	0.0807	0.001				

Table 6
BHP - Eastern Ridge PFAS Assessment
Round 2 - Monitoring Wells and Surface Water Analytical Result
754-PEREN282113

			Field_ID	Sump 3	Sump 4	RPSW01	RPSW02	RPSW02_A	RPSW02_B	RPSW03	RPSW03	RPSW04	RPSW04			
			Sampled_Date	05-Feb-21	26-Jan-21	31-Jan-21	31-Jan-21	12-Apr-21	12-Apr-21	31-Jan-21	12-Apr-21	31-Jan-21	12-Apr-21			
			SampleCode	EP2101173034	EP2100985003	EP2101036023	EP2101036024	EP2104088056	EP2104088057	EP2101036025	EP2104088058	EP2101036026	EP2104088059			
			Ore_Body	OB25	OB25	Discharge	Discharge	Discharge	Discharge	Discharge	Discharge	Discharge	Discharge			
			Type	Sump	Sump	Surface	Surface	Surface	Surface	Surface	Surface	Surface	Surface			
			Sample_Depth													
			PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water										
ChemName	output unit	EQL														
Physical Parameters																
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	-	610	-	-	-	-	-	-		
Alkalinity																
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	-	242	-	-	-	-	-	-		
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	-	<1	-	-	-	-	-	-		
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	225	-	-	-	-	-	-		
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	17	-	-	-	-	-	-		
Ions																
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	-	51	-	-	-	-	-	-		
Chloride	mg/L	1	NE	NE	NE	NE	-	169	-	-	-	-	-	-		
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	-	6	-	-	-	-	-	-		
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	-	89	-	-	-	-	-	-		
Ionic Balance	%	0.01	NE	NE	NE	NE	-	0.58	-	-	-	-	-	-		
Anions Total	meq/L	0.01	NE	NE	NE	NE	-	11.8	-	-	-	-	-	-		
Cations Total	meq/L	0.01	NE	NE	NE	NE	-	11.7	-	-	-	-	-	-		
Nutrients																
Nitrite + Nitrate as N	mg/L	0.01	NE	NE	NE	NE	-	-	-	-	-	-	-	-		
Nitrogen (Total)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-	-		
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-	-		
Inorganics																
Sulfate as SO4 (Filtered)	mg/L	1	NE	NE	NE	NE	-	106	-	-	-	-	-	-		
TOC	mg/L	1	NE	NE	NE	NE	-	2	-	-	-	-	-	-		
Metals																
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	-	62	-	-	-	-	-	-		
Perfluoroalkane Sulfonic Acids																
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	0.001	<0.0005	<0.0005	0.0006	0.0006	<0.0005	<0.0005	<0.0005	0.0008	
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0039	
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	0.0011	0.0006	0.0007	0.001	0.0006	0.0004	0.0022	0.0006	0.0141	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroalkane Carboxylic Acids																
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	0.003	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0032	<0.002	
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	0.0035	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	0.0013	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0009	
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0017	
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
(n:2) Fluorotelomer Sulfonic Acids																
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Perfluoroalkyl Sulfonamides																
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
PFASs Summations																
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	0.0021	0.0006	0.0007	0.001	0.0006	0.0004	0.0022	0.0006	<0.0002	0.018
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	0.0116	0.0006	0.0007	0.0016	0.0012	0.0004	0.0022	0.0038	<0.0002	0.025
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	0.0116	0.0006	0.0007	0.0016	0.0012	0.0004	0.0022	0.0038	<0.0002	0.025

Notes:
LOR = Limit of reporting
- = not analysed
mg/L = milligrams per litre
µg/L = micrograms per litre
NE = Guideline value not established

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

Table 6
 BHP - Eastern Ridge PFAS Assessment
 Round 2 - Monitoring Wells and Surface Water Analytical Result
 754-PEREN282113

ChemName	output unit	EQL	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water	Field_ID	RPSW05	OPHSW01	DCSW1	Statistical Summary						
							Sampled_Date	SampleCode	Ore_Body	Type	Sample_Depth	Minimum	Maximum	Average	Median	Standard	
Water Quality																	
Physical Parameters																	
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	-	448	1740	96	1890	900	766.5	459			
Alkalinity																	
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	-	139	178	56	528	306	329.5	120			
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	-	<1	<1	<1	<1	0.5	0.5	0			
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	122	178	56	528	305	329.5	122			
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	17	<1	<1	17	2	0.5	4.9			
Ions																	
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	-	21	121	9	151	70	65	35			
Chloride	mg/L	1	NE	NE	NE	NE	-	154	405	4	480	223	173.5	123			
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	-	14	18	2	18	8.3	7	4.1			
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	-	78	256	12	280	119	87.5	70			
Ionic Balance	%	0.01	NE	NE	NE	NE	-	1.32	1.11	0.08	4.32	1.6	1.14	1.4			
Anions Total	meq/L	0.01	NE	NE	NE	NE	-	8.31	27.4	1.31	30.3	16	14	7.4			
Cations Total	meq/L	0.01	NE	NE	NE	NE	-	8.09	26.8	1.43	30	15	13.85	7.1			
Nutrients																	
Nitrite + Nitrate as N	mg/L	0.01	NE	NE	NE	NE	-	-	4.04	<0.01	4.04	2.4	2.48	1.5			
Nitrogen (Total)	mg/L	0.1	NE	NE	NE	NE	-	-	5.7	1.2	5.7	4.1	4.7	1.8			
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1	NE	NE	NE	NE	-	-	1.7	0.6	2.6	1.7	1.7	0.85			
Inorganics																	
Sulfate as SO4 (Filtered)	mg/L	1	NE	NE	NE	NE	-	57	599	<1	599	160	114	154			
TOC	mg/L	1	NE	NE	NE	NE	-	8	3	<1	333	20	3	71			
Metals																	
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	-	40	112	5	162	78	69.5	36			
Perfluoroalkane Sulfonic Acids																	
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	0.0007	<0.0005	<0.0005	<0.0005	0.0417	0.0012	0.00025	0.0044			
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	0.0025	<0.0005	0.0077	0.00039	0.00025	0.00083			
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	0.0192	<0.0005	0.0583	0.0015	0.00025	0.0064			
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	0.0068	0.00033	0.00025	0.00067			
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	0.0005	0.0024	0.0141	<0.0002	0.0446	0.0024	0.0004	0.007			
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0			
Perfluoroalkane Carboxylic Acids																	
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	0.004	<0.002	0.0105	<0.002	0.147	0.005	0.001	0.016			
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	0.0225	<0.0005	0.0401	0.0018	0.00025	0.0055			
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	0.025	<0.0005	0.025	0.0012	0.00025	0.0033			
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	0.0095	<0.0005	0.0123	0.00077	0.00025	0.0018			
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	0.0121	<0.0005	0.0366	0.002	0.00025	0.0058			
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	0.0029	0.00035	0.00025	0.00037			
Perfluorododecanoic acid (PFDDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0			
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	0.0128	<0.0005	0.0128	0.0005	0.00025	0.0014			
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0			
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0			
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	0.00026	0.00025	0.00005			
(n:2) Fluorotelomer Sulfonic Acids																	
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0			
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	0.009	<0.001	0.013	0.0014	0.0005	0.0027			
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	0.007	0.0007	0.0005	0.00086			
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	0.006	0.00059	0.0005	0.0006			
Perfluoroalkyl Sulfonamides																	
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0			
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	0.002	0.00052	0.0005	0.00015			
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0			
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0			
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	0.003	0.00053	0.0005	0.00025			
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0			
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0			
PFASs Summations																	
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	0.0005	0.0024	0.0333	<0.0002	0.0589	0.0037	0.0004	0.011			
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	0.0052	0.0024	0.122	<0.0002	0.162	0.015	0.0022	0.033			
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	0.0052	0.0024	0.137	<0.0002	0.162	0.016	0.0024	0.035			

Notes:
 LOR = Limit of reporting
 - = not analysed
 mg/L = milligrams per litre
 µg/L = micrograms per litre
 NE = Guideline value not established

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
 Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
 Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
 Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

Table 7
BHP - Eastern Ridge PFAS Assessment
Round 2 - Production Bore Analytical Results
754-PEREN282113

Field_ID	HNPIOP0030P-A	HNPIOP0030P-B	HNPIOP0031P-A	HNPIOP0031P-B	HNPIH0048-A	HNPIH0048-B	HEA0335P-A	HEA0335P-B	HEA0336P-A	HEA0336P-B	HEA0346P-A	HEA0346P-B						
Sample Code	EP2101036003	EP2101036004	EP2101036005	EP2101036006	EP2100985014	EP2100985015	EP2100985038	EP2100985039	EP2100985040	EP2100985041	EP2100985010	EP2100985011						
Ore Body	Creek (North)	Creek (North)	Creek (North)	Creek (North)	MUD	MUD	OB24	OB24	OB24	OB24	OB24	OB24						
Type	Production	Production	Production	Production	Production	Production	Production	Production	Production	Production	Production	Production						
Sample Depth																		
	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water														
ChemName	output unit	EQL																
Physical Parameters																		
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	-	1230	-	1220	-	646	344	348	438	433	-	471
Alkalinity																		
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	-	340	-	310	-	402	104	103	191	183	-	222
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	-	<1	-	<1	-	<1	<1	<1	<1	<1	-	<1
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	340	-	310	-	402	104	103	191	183	-	222
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	<1	-	<1	-	<1	<1	<1	<1	<1	-	<1
Ions																		
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	-	80	-	55	-	78	14	14	46	44	-	56
Chloride	mg/L	1	NE	NE	NE	NE	-	354	-	392	-	139	120	119	113	113	-	117
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	-	9	-	9	-	8	13	13	13	13	-	15
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	-	188	-	272	-	97	62	63	60	60	-	60
Ionic Balance	%	0.01	NE	NE	NE	NE	-	2.88	-	3.29	-	4.74	2.26	3.14	1.06	1.18	-	1.27
Anions Total	meq/L	0.01	NE	NE	NE	NE	-	21.5	-	22.1	-	13.3	6.32	6.25	8.19	8.07	-	9.17
Cations Total	meq/L	0.01	NE	NE	NE	NE	-	20.3	-	20.7	-	14.6	6.61	6.65	8.36	8.26	-	9.41
Nutrients																		
Nitrite + Nitrate as N	mg/L	0.01	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Nitrogen (Total)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																		
Sulfate as SO4 (Filtered)	mg/L	1	NE	NE	NE	NE	-	227	-	235	-	66	41	40	57	59	-	69
TOC	mg/L	1	NE	NE	NE	NE	-	3	-	7	-	7	<1	1	2	1	-	2
Metals																		
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	-	96	-	72	-	77	35	35	38	38	-	44
Perfluoroalkane Sulfonic Acids																		
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	0.0009	0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	<0.0002	<0.0002	0.0012	0.001	<0.0002	<0.0002	0.0023	0.001	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids																		
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids																		
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides																		
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PFAS Summations																		
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	<0.0002	<0.0002	0.0012	0.001	<0.0002	<0.0002	<0.0002	0.0023	0.001	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	<0.0002	<0.0002	0.0021	0.002	<0.0002	<0.0002	<0.0002	0.0023	0.001	<0.0002	<0.0002	<0.0002
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	<0.0002	<0.0002	0.0021	0.002	<0.0002	<0.0002	<0.0002	0.0023	0.001	<0.0002	<0.0002	<0.0002

Notes:

LOR = Limit of reporting

-- not analysed

mg/L = milligrams per litre

µg/L = micrograms per litre

NE = Guideline value not established

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

Table 7
BHP - Eastern Ridge PFAS Assessment
Round 2 - Production Bore Analytical Results
754-PEREN282113

Field_ID	HEA0347P-A	HEA0347P-B	HEA0348P-A	HEA0348P-B	HEA0349P-A	HEA0349P-B	HEC0022P-A	HEC0022P-B	HEC0027P-A	HEC0027P-B	HEC0028P-A	HEC0028P-B						
Sample Code	EP2100985006	EP2100985007	EP2100985008	EP2100985009	EP2100985042	EP2100985043	EP2100985020	EP2100985021	EP2100985001	EP2100985002	EP2100985024	EP2100985025						
Ore Body	OB24	OB24	OB24	OB24	OB24	OB24	OB25	OB25	OB25	OB25	OB25	OB25						
Type	Production	Production	Production	Production	Production	Production	Production	Production	Production	Production	Production	Production						
Sample_Depth																		
ChemName	output unit	EQL	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water												
Physical Parameters																		
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	-	468	-	446	482	490	-	718	-	748	-	794
Alkalinity																		
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	-	244	-	239	249	245	-	280	-	312	-	329
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	-	<1	-	<1	<1	<1	-	<1	-	<1	-	<1
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	244	-	239	249	245	-	280	-	312	-	329
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	<1	-	<1	<1	<1	-	<1	-	<1	-	<1
Ions																		
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	-	54	-	56	56	56	-	69	-	67	-	74
Chloride	mg/L	1	NE	NE	NE	NE	-	102	-	107	103	105	-	178	-	195	-	206
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	-	14	-	15	14	14	-	8	-	7	-	8
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	-	58	-	59	59	59	-	89	-	98	-	105
Ionic Balance	%	0.01	NE	NE	NE	NE	-	0.16	-	1.96	0.91	0.81	-	0.01	-	3.36	-	0.83
Anions Total	meq/L	0.01	NE	NE	NE	NE	-	9.08	-	9.08	9.17	9.19	-	13.5	-	14.4	-	15.1
Cations Total	meq/L	0.01	NE	NE	NE	NE	-	9.11	-	9.45	9.34	9.34	-	13.5	-	13.5	-	14.9
Nutrients																		
Nitrite + Nitrate as N	mg/L	0.01	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Nitrogen (Total)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																		
Sulfate as SO4 (Filtered)	mg/L	1	NE	NE	NE	NE	-	64	-	62	62	64	-	140	-	128	-	132
TOC	mg/L	1	NE	NE	NE	NE	-	4	-	1	20	4	-	2	-	2	-	2
Metals																		
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	-	43	-	45	44	44	-	73	-	69	-	78
Perfluoroalkane Sulfonic Acids																		
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0002	0.0007	0.0006	0.0005	<0.0002
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids																		
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids																		
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides																		
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PFAS Summations																		
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0002	0.0007	0.0006	0.0005	<0.0002
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0002	0.0007	0.0006	0.0005	<0.0002
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0002	0.0007	0.0006	0.0005	<0.0002

Notes:
LOR = Limit of reporting
- = not analysed
mg/L = milligrams per litre
µg/L = micrograms per litre
NE = Guideline value not established

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

Table 7
BHP - Eastern Ridge PFAS Assessment
Round 2 - Production Bore Analytical Results
754-PEREN282113

Field ID	HEC0044P-A	HEC0044P-B	HEC0047P-A	HEC0047P-B	HNPIOP0011P-A	HNPIOP0011P-B	HNPIHS0013-A	HNPIHS0013-B	HNPIHS0039-A	HNPIHS0039-B						
Sample Date	25-Jan-21	25-Jan-21	25-Jan-21	25-Jan-21	28-Jan-21	28-Jan-21	27-Jan-21	27-Jan-21	27-Jan-21	27-Jan-21						
Sample Code	EP2100985026	EP2100985027	EP2100985022	EP2100985023	EP2101036001	EP2101036002	EP2100985017	EP2100985016	EP2100985012	EP2100985013						
Ore Body	OB25	OB25	OB25	OB25	OB25	OB25	OB28	OB28	OB32	OB32						
Type	Production	Production	Production	Production	Production	Production	Production	Production	Production	Production						
Sample Depth																
ChemName	output unit	EQL	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water										
Water Quality																
Physical Parameters																
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	-	716	-	682	-	773	-	779	-	652
Alkalinity																
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	-	300	-	282	-	302	-	431	-	401
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	-	<1	-	<1	-	<1	-	<1	-	<1
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	300	-	282	-	302	-	431	-	401
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	<1	-	<1	-	<1	-	<1	-	<1
Ions																
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	-	67	-	64	-	62	-	82	-	72
Chloride	mg/L	1	NE	NE	NE	NE	-	193	-	142	-	177	-	151	-	137
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	-	8	-	9	-	6	-	8	-	8
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	-	99	-	76	-	102	-	85	-	94
Ionic Balance	%	0.01	NE	NE	NE	NE	-	0.94	-	0.33	-	1.59	-	0.2	-	1.82
Anions Total	meq/L	0.01	NE	NE	NE	NE	-	13.9	-	12.4	-	13.9	-	14.8	-	13.4
Cations Total	meq/L	0.01	NE	NE	NE	NE	-	13.6	-	12.5	-	13.4	-	14.8	-	13.9
Nutrients																
Nitrite + Nitrate as N	mg/L	0.01	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-
Nitrogen (Total)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-	-	-	-
Inorganics																
Sulfate as SO4 (Filtered)	mg/L	1	NE	NE	NE	NE	-	117	-	133	-	137	-	91	-	73
TOC	mg/L	1	NE	NE	NE	NE	-	1	-	2	-	4	-	7	-	6
Metals																
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	-	70	-	70	-	70	-	83	-	73
PFAS																
Perfluoroalkane Sulfonic Acids																
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	0.0007	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids																
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids																
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides																
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PFAS Summations																
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	0.0007	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	0.0007	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	0.0007	<0.0002	<0.0002	<0.0002	<0.0002

Notes:
LOR = Limit of reporting
- = not analysed
mg/L = milligrams per litre
µg/L = micrograms per litre
NE = Guideline value not established

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

Table 7
BHP - Eastern Ridge PFAS Assessment
Round 2 - Production Bore Analytical Results
754-PEREN282113

			Field_ID	HHS0106P	HNPIOP0018P-A	HNPIOP0018P-B	HNPIOP0008P-A	HNPIOP0008P-B	HNPIOP0012P-A	HNPIOP0012P-B			
			Sampled_Date	01-Feb-21	31-Jan-21	31-Jan-21	28-Jan-21	28-Jan-21	30-Jan-21	30-Jan-21			
			SampleCode	EP2101036028	EP2101036021	EP2101036020	EP2100985036	EP2100985037	EP2101036012	EP2101036013			
			Ore_Body	OB33	OB33	OB33	OB37	OB37	OB43	OB43			
			Type	Production	Production	Production	Production	Production	Production	Production			
			Sample_Depth										
			PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water							
ChemName	output unit	EQL											
Water Quality													
Physical Parameters													
Total Dissolved Solids (TDS)	mg/L	10	NE	NE	NE	NE	-	-	871	-	656	-	945
Alkalinity													
Alkalinity (total as CaCO3)	mg/L	1	NE	NE	NE	NE	-	-	347	-	372	-	304
Alkalinity (Hydroxide) as CaCO3	mg/L	1	NE	NE	NE	NE	-	-	<1	-	<1	-	<1
Bicarbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	-	347	-	372	-	304
Carbonate Alkalinity as CaCO3	mg/L	1	NE	NE	NE	NE	-	-	<1	-	<1	-	<1
Ions													
Calcium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	85	-	72	-	75
Chloride	mg/L	1	NE	NE	NE	NE	-	-	217	-	110	-	268
Potassium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	7	-	5	-	8
Sodium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	98	-	74	-	130
Ionic Balance	%	0.01	NE	NE	NE	NE	-	-	0.85	-	0.84	-	3.39
Anions Total	meq/L	0.01	NE	NE	NE	NE	-	-	16.2	-	12.4	-	16.9
Cations Total	meq/L	0.01	NE	NE	NE	NE	-	-	15.9	-	12.6	-	15.8
Nutrients													
Nitrite + Nitrate as N	mg/L	0.01	NE	NE	NE	NE	-	-	-	-	-	-	-
Nitrogen (Total)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-
Total Kjeldahl Nitrogen (TKN)	mg/L	0.1	NE	NE	NE	NE	-	-	-	-	-	-	-
Inorganics													
Sulfate as SO4 (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	151	-	90	-	156
TOC	mg/L	1	NE	NE	NE	NE	-	-	6	-	4	-	2
Metals													
Magnesium (Filtered)	mg/L	1	NE	NE	NE	NE	-	-	88	-	69	-	75
Perfluoroalkane Sulfonic Acids													
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	0.0006	0.0008	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	0.0006	0.0007	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	0.0045	0.0048	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	<0.0002	0.0046	0.0046	<0.0002	<0.0002	0.0007	0.0008
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids													
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids													
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides													
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PFAS Summations													
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	<0.0002	0.0091	0.0094	<0.0002	<0.0002	0.0007	0.0008
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	<0.0002	0.0097	0.0107	<0.0002	<0.0002	0.0007	0.0008
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	<0.0002	0.0103	0.0114	<0.0002	<0.0002	0.0007	0.0008

Notes:
LOR = Limit of reporting
-- = not analysed
mg/L = milligrams per litre
µg/L = micrograms per litre
NE = Guideline value not established

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

Table 8
BHP - Eastern Ridge PFAS Assessment
Vertical Delineation Analytical Results
754-PEREN282113

Field_ID	HHS0016M_45	HHS0016M_110	HHS0019M_40	HHS0019M_75	HHS0019M_110	HHS0027M_35	HHS0027M_70	HHS0027M_100	HHS0029M_35	HHS0029M_95	HHS0029M_120	HHS0036M_19	HHS0036M_50
Sampled_Date	11-Apr-21	11-Apr-21	11-Apr-21	11-Apr-21	11-Apr-21	11-Apr-21	11-Apr-21	11-Apr-21	11-Apr-21	11-Apr-21	11-Apr-21	11-Apr-21	11-Apr-21
SampleCode	EP2104088028	EP2104088029	EP2104088030	EP2104088031	EP2104088032	EP2104088035	EP2104088036	EP2104088037	EP2104088038	EP2104088039	EP2104088040	EP2104088024	EP2104088025
Ore_Body	Homestead	Homestead	Homestead	Homestead	Homestead	OB32	OB32	OB32	OB32	OB32	OB32	Homestead	Homestead
Type	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring
Sample_Depth	45	110	40	75	110	35	70	100	35	95	120	19	50
Aquifer_Type	MM	N1	N2	N2	N3	VB2	OB	OB	VB2	-	HC1	STS	OB

ChemName	output unit	EQL	PFAS NEMP	PFAS NEMP	PFAS NEMP	PFAS NEMP																	
			2020 Drinking Water	2020 Freshwater 95%	2020 Freshwater 99%	2020 Recreational Water																	
Perfluoroalkane Sulfonic Acids																							
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0005	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids																							
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0022	<0.002	<0.002	<0.002	<0.002	0.0077	0.0073		
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0044	0.0006	<0.0005	<0.0005	<0.0005	0.0057	0.0039		
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0024	<0.0005	<0.0005	<0.0005	<0.0005	0.0049	0.0033		
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0012	<0.0005	<0.0005	<0.0005	<0.0005	0.0053	0.0035		
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.001	<0.0005	<0.0005	<0.0005	<0.0005	0.0086	0.0064		
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0014	0.0009		
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	<0.0005		
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids																							
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	<0.001	0.001	0.002	0.002				
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides																							
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PFASs Summations																							
Sum of PFHxS AND PFOS	Sum of PFHxS µg/L		0.0002	0.07	NE	NE	2	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER LIST)	Sum of PFAS µg/L		0.0002	NE	NE	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0038	0.0018	0.0499	0.0362				
Sum of PFAS	Sum of PFAS µg/L		0.0002	NE	NE	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0038	0.0018	0.052	0.0371				

Notes:
LOR = Limit of reporting
- = not analysed
mg/L = milligrams per litre
µg/L = micrograms per litre
NE = Guideline value not established

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

Table 8
BHP - Eastern Ridge PFAS Assessment
Vertical Delineation Analytical Results
754-PEREN282113

			PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water	Field_ID	HHS0085M_64	HHS0085M_90	HNPIHS0039P_A	HNPIHS0039P_B	HNPIHS0045P_A	HNPIHS0045P_B
ChemName	output unit	EQL					Sampled_Date	11-Apr-21	11-Apr-21	11-Apr-21	11-Apr-21	11-Apr-21	11-Apr-21
							SampleCode	EP2104088041	EP2104088042	EP2104088033	EP2104088034	EP2104088026	EP2104088027
							Ore_Body	OB32	OB32	OB32	OB32	OB32	OB32
							Type	Monitoring	Monitoring	Production	Production	Production	Production
							Sample_Depth	64	90	72-156	72-156	27-165	27-165
							Aquifer_Type	OB	OB	N2, N3 & WA1	N2, N3 & WA1	OB	OB
Perfluoroalkane Sulfonic Acids													
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	0.0009	0.0009	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids													
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	0.0075	0.0083	<0.002	<0.002	<0.002	<0.002	<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids													
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides													
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PFASs Summations													
Sum of PFHxS AND PFOS	Sum of PFHxS µg/L	0.0002	0.07	NE	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER LIST)	Sum of PFAS µg/L	0.0002	NE	NE	NE	NE	0.0084	0.0092	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Sum of PFAS	Sum of PFAS µg/L	0.0002	NE	NE	NE	NE	0.0084	0.0092	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002

Notes:
LOR = Limit of reporting
- = not analysed
mg/L = milligrams per litre
µg/L = micrograms per litre
NE = Guideline value not established

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

Table 9
BHP - Eastern Ridge PFAS Assessment
Round 2 - Threatened Ecological Community - Analytical Result
754-PEREN282113

Field_ID	HEOP0398	W028	W029	HEOP0467M	T0399	EOP0220R	EOP0222R	EQ0112R	HEOP0524M	HEQ0006	T0411A
Sampled_Date	10-Apr-21	10-Apr-21	10-Apr-21	04-Feb-21	10-Apr-21	10-Apr-21	10-Apr-21	10-Apr-21	04-Feb-21	10-Apr-21	10-Apr-21
SampleCode	EP2104088017	EP2104088019	EP2104088018	EP2101173008	EP2104088013	EP2104088012	EP2104088011	EP2104088016	EP2101173014	EP2104088015	EP2104088023
Ore_Body	Airport	Airport	Airport	Creek (North)	Maru/TEC	OB21/22/TEC	OB21/22/TEC	OB37	OB37	OB37	OB37
Type	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring
Sample_Depth	8.5	8.5	8	8	8	22.5	26.5	29.5		19	24

ChemName	output unit	EQL	PFAS NEMP	PFAS NEMP	PFAS NEMP	PFAS NEMP												
			2020 Drinking Water	2020 Freshwater 95%	2020 Freshwater 99%	2020 Recreational Water												
Perfluoroalkane Sulfonic Acids																		
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	0.001	0.0014	0.0011	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	0.001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	0.0097	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	0.0006	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0009	0.0002	0.0002	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids																		
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0036	<0.002	<0.002	<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0052	0.0009	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	0.0009	<0.0005	<0.0005
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0014	<0.0005	<0.0005
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0005	0.0141	<0.0005	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids																		
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	0.001	<0.001	<0.001	<0.001	<0.001	0.005	<0.001	<0.001	<0.001	0.003	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides																		
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PFASs Summations																		
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	0.0103	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0009	0.0002	<0.0002	<0.0002
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	0.0123	0.0014	0.0011	<0.0002	0.0006	0.005	<0.0002	<0.0002	0.0108	0.0205	<0.0002	<0.0002
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	0.0133	0.0014	0.0011	<0.0002	0.0006	0.005	<0.0002	<0.0002	0.0108	0.0205	<0.0002	<0.0002

Notes:
LOR = Limit of reporting
- = not analysed
mg/L = milligrams per litre
µg/L = micrograms per litre
NE = Guideline value not established

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

Table 9
BHP - Eastern Ridge PFAS Assessment
Round 2 - Threatened Ecological Community - Analytical Result
754-PEREN282113

			Field_ID	HEA0351	HEC0448	EOP0334R	EOP0378R	HNPIWR003			
			Sampled_Date	10-Apr-21	10-Apr-21	10-Apr-21	10-Apr-21	10-Apr-21			
			SampleCode	EP2104088021	EP2104088022	EP2104088009	EP2104088010	EP2104088008			
			Ore_Body	OB38	OB38	OB42	OB42	OB42			
			Type	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring			
			Sample_Depth	20.5	22	15	14.5				
			PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water					
ChemName	output unit	EQL									
Perfluoroalkane Sulfonic Acids											
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	0.0109	0.0018	<0.0005	<0.0005	0.0021
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	0.0077	0.0007	<0.0005	<0.0005	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	0.0583	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	0.0006	0.025	0.0004	<0.0002	<0.0002
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroalkane Carboxylic Acids											
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	0.0032	0.0278	0.0029	<0.002	<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	0.0084	<0.0005	<0.0005	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	0.0124	0.0008	<0.0005	0.0005
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	0.0042	<0.0005	<0.0005	<0.0005
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	0.56	220	19	10	<0.0005	0.0245	<0.0005	<0.0005	0.0008
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	0.0016	0.0006	<0.0005	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	0.0011	<0.0005	<0.0005	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
(n:2) Fluorotelomer Sulfonic Acids											
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	0.012	0.013	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	0.007	0.004	<0.001	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	0.002	<0.001	<0.001	<0.001
Perfluoroalkyl Sulfonamides											
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001
PFASs Summations											
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	0.0589	0.025	0.0004	<0.0002	<0.0002
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	0.073	0.123	0.0211	<0.0002	0.0034
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	0.0807	0.128	0.0217	<0.0002	0.0034

Notes:
LOR = Limit of reporting
- = not analysed
mg/L = milligrams per litre
µg/L = micrograms per litre
NE = Guideline value not established

Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Drinking Water
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEPM investigation levels (NEPM, 2020) - Recreational Water

Table 10
BHP - Eastern Ridge PFAS Assessment
Sediment Analytical Results
754-PEREN282113

			Field_ID	Sed1	Sed2	Sed3	Sed4	Statistical Summary					
			Lab_Report	EP2101173	EP2101173	EP2101173	EP2101173	Minimum	Maximum	Average	Median	Standard	
			SampleCode	EP2101173029	EP2101173030	EP2101173031	EP2101173032						
			Sampled_Date	05-Feb-21	05-Feb-21	05-Feb-21	05-Feb-21						
ChemName	output unit	LOR	PFAS NEMP 2020 Ecological direct exposure	PFAS NEMP 2020 Ecological indirect exposure									
Asbestos													
Moisture Content	%	0.1	NE	NE	10.8	7.7	21.2	11.7	7.7	21.2	13	11.25	5.8
Inorganics													
pH (aqueous extract)	pH_Units	0.1	NE	NE	-	-	-	-	99999	0			
pH (Final)	-	0.1	NE	NE	-	-	-	-	99999	0			
Perfluoroalkane Sulfonic Acids													
Perfluorobutane sulfonic acid (PFBS)	mg/kg	0.0002	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0001	0.0001	0
Perfluoropentane sulfonic acid (PFPeS)	mg/kg	0.0002	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0001	0.0001	0
Perfluorohexane sulfonic acid (PFHxS)	mg/kg	0.0002	NE	NE	0.0002	<0.0002	<0.0002	0.0004	<0.0002	0.0004	0.0002	0.00015	0.00014
Perfluoroheptane sulfonic acid (PFHpS)	mg/kg	0.0002	NE	NE	<0.0002	<0.0002	<0.0002	0.0003	<0.0002	0.0003	0.00015	0.0001	0.0001
Perfluorooctane sulfonic acid (PFOS)	mg/kg	0.0002	1	0.01	0.0339	0.0448	0.0187	0.068	0.0187	0.068	0.041	0.03935	0.021
Perfluorodecane sulfonic acid (PFDS)	mg/kg	0.0002	NE	NE	0.0007	0.0005	0.0005	0.0019	0.0005	0.0019	0.0009	0.0006	0.00067
Perfluoroalkane Carboxylic Acids													
Perfluorobutanoic acid (PFBA)	mg/kg	0.001	NE	NE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0005	0.0005	0
Perfluoropentanoic acid (PFPeA)	mg/kg	0.0002	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0001	0.0001	0
Perfluorohexanoic acid (PFHxA)	mg/kg	0.0002	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0001	0.0001	0
Perfluoroheptanoic acid (PFHpA)	mg/kg	0.0002	NE	NE	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0001	0.0001	0
Perfluorooctanoic acid (PFOA)	mg/kg	0.0002	10	NE	0.0017	0.001	0.0003	0.0017	0.0003	0.0017	0.0012	0.00135	0.00067
Perfluorodecanoic acid (PFDA)	mg/kg	0.0002	NE	NE	0.002	0.0026	0.0014	0.0041	0.0014	0.0041	0.0025	0.0023	0.0012
Perfluorododecanoic acid (PFDoDA)	mg/kg	0.0002	NE	NE	0.0015	0.0015	0.0009	0.0022	0.0009	0.0022	0.0015	0.0015	0.00053
Perfluorononanoic acid (PFNA)	mg/kg	0.0002	NE	NE	0.0003	0.0005	<0.0002	0.0008	<0.0002	0.0008	0.00043	0.0004	0.0003
Perfluorotetradecanoic acid (PFTeDA)	mg/kg	0.0005	NE	NE	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	0.0006	0.00034	0.00025	0.00018
Perfluorotridecanoic acid (PFTrDA)	mg/kg	0.0002	NE	NE	0.0003	0.0003	<0.0002	0.0004	<0.0002	0.0004	0.00028	0.0003	0.00013
Perfluoroundecanoic acid (PFUnDA)	mg/kg	0.0002	NE	NE	0.0007	0.0008	0.0005	0.0013	0.0005	0.0013	0.00083	0.00075	0.00034
(n:2) Fluorotelomer Sulfonic Acids													
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	mg/kg	0.0005	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	mg/kg	0.0005	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	mg/kg	0.0005	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	mg/kg	0.0005	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
Perfluoroalkyl Sulfonamides													
Perfluorooctane sulfonamide (FOSA)	mg/kg	0.0002	NE	NE	0.0023	0.001	0.0007	0.0042	0.0007	0.0042	0.0021	0.00165	0.0016
N-Methyl perfluorooctane sulfonamide (MeFOSA)	mg/kg	0.0005	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	mg/kg	0.0002	NE	NE	0.0086	0.0059	0.0024	0.0124	0.0024	0.0124	0.0073	0.00725	0.0042
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	mg/kg	0.0005	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	mg/kg	0.0005	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	mg/kg	0.0002	NE	NE	0.0029	0.0033	0.0008	0.003	0.0008	0.0033	0.0025	0.00295	0.0011
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	mg/kg	0.0005	NE	NE	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.00025	0.00025	0
PFASs Summations													
Sum of PFHxS and PFOS	mg/kg	0.0002	NE	NE	0.0341	0.0448	0.0187	0.0684	0.0187	0.0684	0.042	0.03945	0.021
Sum of PFAS	mg/kg	0.0002	NE	NE	0.0551	0.0622	0.0262	0.101	0.0262	0.101	0.061	0.05865	0.031

Table 11
BHP - Eastern Ridge PFAS Assessment
Leachate Analytical Results
754-PEREN282113

Field_ID	Sed1	Sed1	Sed2	Sed2	Sed3	Sed3	Sed4	Sed4	Statistical Summary										
									Minimum	Maximum	Average	Median	Standard						
SampleCode	EP2101690001	EP2101690005	EP2101690002	EP2101690006	EP2101690003	EP2101690007	EP2101690004	EP2101690008											
Sample Date	05-Feb-21	05-Feb-21	05-Feb-21	05-Feb-21	05-Feb-21	05-Feb-21	05-Feb-21	05-Feb-21											
ChemName	output unit	LOR	PFAS NEMP 2020 Drinking Water	PFAS NEMP 2020 Freshwater 95%	PFAS NEMP 2020 Freshwater 99%	PFAS NEMP 2020 Recreational Water	pH5	pH7	pH5	pH7	pH5	pH7	pH5	pH7					
Perfluoroalkane Sulfonic Acids																			
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	NE	NE	NE	NE	0.0009	<0.0016	<0.0005	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0005	<0.0016	0.00074	0.0008	0.0002
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	NE	NE	NE	NE	0.0007	<0.0016	<0.0005	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0005	<0.0016	0.00072	0.0008	0.00019
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	NE	NE	NE	NE	0.0053	0.005	0.0027	0.0032	0.0048	0.007	0.0027	0.0018	0.0018	0.007	0.0041	0.004	0.0017
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	NE	NE	NE	NE	0.0019	<0.0016	0.0024	0.0037	<0.0016	0.0032	<0.0016	<0.0016	<0.0016	0.0037	0.0018	0.00135	0.0012
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002	NE	0.13	0.00023	NE	0.288	0.589	0.393	0.871	0.278	0.806	0.13	0.24	0.13	0.871	0.45	0.3405	0.27
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	NE	NE	NE	NE	0.0007	<0.0016	0.001	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	0.0007	<0.0016	0.00081	0.0008	0.00083
Perfluoroalkane Carboxylic Acids																			
Perfluorobutanoic acid (PFBA)	µg/L	0.002	NE	NE	NE	NE	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.001	0.001	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	NE	NE	NE	NE	0.0258	0.0293	0.0182	0.0301	0.0448	0.0974	0.0216	0.031	0.0182	0.0974	0.037	0.0297	0.026
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	NE	NE	NE	NE	0.0018	<0.0016	<0.0005	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0005	0.0018	0.00086	0.0008	0.00043
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	NE	NE	NE	NE	0.003	<0.0016	0.0016	<0.0016	0.003	<0.0016	<0.0016	<0.0016	<0.0016	0.003	0.0015	0.0008	0.001
Perfluorooctanoic acid (PFDA)	µg/L	0.0005	0.56	220	19	10	0.0326	0.0394	0.0222	0.0301	0.0294	0.0323	0.0106	0.0078	0.0078	0.0394	0.025	0.02975	0.011
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	NE	NE	NE	NE	0.015	0.019	0.0222	0.0326	0.0152	0.0443	0.0054	0.0107	0.0054	0.0443	0.021	0.0171	0.013
Perfluorododecanoic acid (PFDDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0016	0.0005	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0005	<0.0016	0.00069	0.0008	0.00021
Perfluorononanoic acid (PFNA)	µg/L	0.0005	NE	NE	NE	NE	0.0047	0.0058	0.0105	0.0142	0.0078	0.013	0.0035	0.0043	0.0035	0.0142	0.008	0.0068	0.0041
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.004	<0.0005	<0.004	<0.004	<0.004	<0.0005	<0.004	<0.0005	<0.004	0.0016	0.002	0.00081
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005	NE	NE	NE	NE	<0.0005	<0.0016	<0.0005	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	<0.0005	<0.0016	0.00066	0.0008	0.00025
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	NE	NE	NE	NE	0.0011	<0.0016	0.0018	<0.0016	<0.0016	<0.0016	<0.0016	<0.0016	0.0011	0.0018	0.00096	0.0008	0.00035
(n-2) Fluorotelomer Sulfonic Acids																			
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	0.00088	0.001	0.00023
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	0.00088	0.001	0.00023
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.002	<0.001	<0.002	0.006	<0.002	<0.002	<0.002	<0.001	0.006	0.0015	0.001	0.0018
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.002	<0.001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001	<0.002	0.00088	0.001	0.00023
Perfluoroalkyl Sulfonamides																			
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	NE	NE	NE	NE	0.0032	0.04	0.003	0.037	0.0027	0.0126	<0.0016	0.0021	<0.0016	0.04	0.013	0.0031	0.016
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.004	<0.001	<0.004	<0.004	<0.004	<0.004	<0.004	<0.001	<0.004	0.0016	0.002	0.00069
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	NE	NE	NE	NE	0.03	0.045	0.031	0.0326	0.0269	0.0549	<0.0016	0.0054	<0.0016	0.0549	0.028	0.0305	0.018
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.004	<0.001	<0.004	<0.004	<0.004	<0.004	<0.004	<0.001	<0.004	0.0016	0.002	0.00069
N-Ethyl perfluorooctane sulfonamide (EFOSA)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.004	<0.001	<0.004	<0.004	<0.004	<0.004	<0.004	<0.001	<0.004	0.0016	0.002	0.00069
N-Ethyl perfluorooctane sulfonamidoacetic acid (EFOSAA)	µg/L	0.0005	NE	NE	NE	NE	0.0032	0.0088	0.0052	0.0158	<0.0016	0.0098	<0.0016	<0.0016	<0.0016	0.0158	0.0057	0.0042	0.0054
N-Ethyl perfluorooctane sulfonamidoethanol (EFOSE)	µg/L	0.001	NE	NE	NE	NE	<0.001	<0.004	<0.001	<0.004	<0.004	<0.004	<0.004	<0.004	<0.001	<0.004	0.0016	0.002	0.00069
PFAS Summations																			
Sum of PFHxS and PFOS	µg/L	0.0002	0.07	NE	NE	2	0.293	0.594	0.396	0.874	0.283	0.813	0.133	0.242	0.133	0.874	0.45	0.3445	0.28
Sum of PFAS (WA DER List)	µg/L	0.0002	NE	NE	NE	NE	0.357	0.663	0.437	0.934	0.366	0.943	0.165	0.281	0.165	0.943	0.52	0.4015	0.3
Sum of PFAS	µg/L	0.0002	NE	NE	NE	NE	0.418	0.781	0.515	1.07	0.419	1.08	0.174	0.303	0.174	1.08	0.6	0.467	0.34

Notes:

LOR = Limit of reporting
 - = not analyzed
 mg/L = milligrams per litre
 µg/L = micrograms per litre
 NE = Guideline value not established

Shaded & bolded cells exceed NEMP investigation levels (NEMP, 2020) - Drinking Water
Shaded & bolded cells exceed NEMP investigation levels (NEMP, 2020) - Freshwater 95%
Shaded & bolded cells exceed NEMP investigation levels (NEMP, 2020) - Freshwater 99%
Shaded & bolded cells exceed NEMP investigation levels (NEMP, 2020) - Recreational Water

Table 12
BHP Eastern Ridge PFAS Assessment
QAQC Results
754-PEREN282113

Field Duplicates (water)

SDG	ALSE-Perth 07-Dec-20	ALSE-Perth 07-Dec-20		ALSE-Perth 07-Dec-20	Interlab_D	ALSE-Perth 07-Dec-20	ALSE-Perth 07-Dec-20		ALSE-Perth 07-Dec-20	Interlab_D		
Field ID	HNPIHS0013	QC07	RPD	HNPIHS0013	QC08	RPD	HHS0027M	QC11	RPD	HHS0027M	QC12	RPD
Sampled Date/Time	5/12/2020	5/12/2020		5/12/2020	5/12/2020		5/12/2020	5/12/2020		5/12/2020	5/12/2020	

ChemName	Units	LOR										
Sum of PFAS (WA DER List)_	µg/L	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.0002
Physical Parameters												
Total Dissolved Solids (TDS)	mg/l	10	760	783	3	760	800	5				
Alkalinity												
Alkalinity (total as CaCO3)	mg/l	1 : 20 (Interlab)	472	470	0	472	470	0				
Alkalinity (Hydroxide) as CaCO3	mg/l	1 : 20 (Interlab)	<1	<1	0	<1	<20	0				
Bicarbonate Alkalinity as CaCO3	mg/l	1 : 20 (Interlab)	472	470	0	472	460	3				
Carbonate Alkalinity as CaCO3	mg/l	1 : 10 (Interlab)	<1	<1	0	<1	12	169				
Ions												
Calcium (Filtered)	mg/l	1	87	85	2	87						
Chloride	mg/l	1	139	138	1	139	160	14				
Potassium (Filtered)	mg/l	1	9	10	11	9						
Sodium (Filtered)	mg/l	1	84	86	2	84						
Ionic Balance	%	0.01	0.33	0.67	68	0.33						
Anions Total	meq/L	0.01	15.1	15	1	15.1						
Cations Total	meq/L	0.01	15.2	15.2	0	15.2						
Inorganics												
Sulfate as SO4 (Filtered)	mg/l	1	85	84	1	85						
TOC	mg/l	1 : 5 (Interlab)	5	6	18	5	<5	0				
Metals												
Magnesium (Filtered)	mg/l	1	85	85	0	85						
Perfluoroalkane Sulfonic Acids												
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.0001	0	<0.0002	<0.0002	0	<0.0001
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005
Perfluoroalkane Carboxylic Acids												
Perfluorobutanoic acid (PFBA)	µg/L	0.002 : 0.05 (Interlab)	<0.002	<0.002	0	<0.002	<0.05	0	<0.002	<0.002	0	<0.05
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.01
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.01
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.01
Perfluorooctanoic acid (PFOA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.01
Perfluorodecanoic acid (PFDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.01
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.01
Perfluorononanoic acid (PFNA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.01
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.01
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.01
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.01
(n:2) Fluorotelomer Sulfonic Acids												
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001
Perfluoroalkyl Sulfonamides												
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.05	0	<0.0005	<0.0005	0	<0.05
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.05	0	<0.001	<0.001	0	<0.05
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.05	0	<0.0005	<0.0005	0	<0.05
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.05	0	<0.001	<0.001	0	<0.05
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.05	0	<0.001	<0.001	0	<0.05
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.05	0	<0.0005	<0.0005	0	<0.05
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.05	0	<0.001	<0.001	0	<0.05
PFAS												
Sum of PFHxS and PFOS	µg/L	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.001	0	<0.0002	<0.0002	0	<0.0002
Sum of PFAS	µg/L	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002	<0.005	0	<0.0002	<0.0002	0	<0.005

*RPDs have only been considered where a concentration is greater than 0 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (0-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL))

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

Table 12
BHP Eastern Ridge PFAS Assessment
QAQC Results
754-PEREN282113

Field Duplicates (water)

SDG Field ID Sampled Date/Time	ALSE-Perth 07-Dec-20 OPSW1 5/12/2020	ALSE-Perth 07-Dec-20 QC13 5/12/2020	RPD	ALSE-Perth 07-Dec-20 OPSW1 5/12/2020	Interlab_D QC14 5/12/2020	RPD	ALSE-Perth 02-Feb-21 HNPIOP0030P-B 29/01/2021	ALSE-Perth 02-Feb-21 QC11 29/01/2021	RPD	ALSE-Perth 02-Feb-21 HNPIOP0030P-B 29/01/2021	Interlab_D QC12 29/01/2021	RPD
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ChemName	Units	LOR												
Sum of PFAS (WA DER List)_	µg/L	0.0002 : 0.005 (Interlab)	0.0022	0.002	10	0.0022	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0
Physical Parameters														
Total Dissolved Solids (TDS)	mg/l	10	670	638	5	670	690	3	1230	1180	4	1230	1400	13
Alkalinity														
Alkalinity (total as CaCO3)	mg/l	1 : 20 (Interlab)	130	131	1	130	140	7	340	331	3	340	430	23
Alkalinity (Hydroxide) as CaCO3	mg/l	1 : 20 (Interlab)	<1	<1	0	<1	<20	0	<1	<1	0	<1	<20	0
Bicarbonate Alkalinity as CaCO3	mg/l	1 : 20 (Interlab)	42	38	10	42	57	30	340	331	3	340	420	21
Carbonate Alkalinity as CaCO3	mg/l	1 : 10 (Interlab)	88	93	6	88	85	3	<1	<1	0	<1	<10	0
Ions														
Calcium (Filtered)	mg/l	1	12	12	0	12			80	76	5	80		
Chloride	mg/l	1	265	261	2	265	210	23	354	349	1	354	310	13
Potassium (Filtered)	mg/l	1	19	19	0	19			9	9	0	9		
Sodium (Filtered)	mg/l	1	131	131	0	131			188	188	0	188		
Ionic Balance	%	0.01	0.69	0.29	82	0.69			2.88	2.93	2	2.88		
Anions Total	meq/L	0.01	12.2	12.1	1	12.2			21.5	21.2	1	21.5		
Cations Total	meq/L	0.01	12	12.1	1	12			20.3	20	1	20.3		
Inorganics														
Sulfate as SO4 (Filtered)	mg/l	1	103	100	3	103			227	229	1	227		
TOC	mg/l	1 : 5 (Interlab)	7	8	13	7	<5	33	3	2	40	3	6.2	70
Metals														
Magnesium (Filtered)	mg/l	1	64	65	2	64			96	95	1	96		
Perfluoroalkane Sulfonic Acids														
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002 : 0.001 (Interlab)	0.0022	0.002	10	0.0022	0.0015	38	<0.0002	<0.0002	0	<0.0002	0.0002	0
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoroalkane Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.002 : 0.05 (Interlab)	<0.002	<0.002	0	<0.002	<0.05	0	<0.002	<0.002	0	<0.002	<0.005	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorooctanoic acid (PFOA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorodecanoic acid (PFDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorononanoic acid (PFNA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.01	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
(n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.05	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.05	0	<0.001	<0.001	0	<0.001	<0.005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.05	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.05	0	<0.001	<0.001	0	<0.001	<0.005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.05	0	<0.001	<0.001	0	<0.001	<0.005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.05	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.05	0	<0.001	<0.001	0	<0.001	<0.005	0
PFAS														
Sum of PFHxS and PFOS	µg/L	0.0002 : 0.001 (Interlab)	0.0022	0.002	10	0.0022	0.0015	38	<0.0002	<0.0002	0	<0.0002	<0.001	0
Sum of PFAS	µg/L	0.0002 : 0.005 (Interlab)	0.0022	0.002	10	0.0022	<0.005	0	<0.0002	<0.0002	0	<0.0002	<0.005	0

*RPDs have only been considered where a concentration is greater than 0 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (0-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL))

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

Table 12
BHP Eastern Ridge PFAS Assessment
QAQC Results
754-PEREN282113

Field Duplicates (water)

ChemName	Units	LOR	ALSE-Perth 02-Feb-21			Interlab_D			ALSE-Perth 02-Feb-21			Interlab_D		
			Field ID	QC15	RPD	Field ID	QC16	RPD	Field ID	QC21	RPD	Field ID	QC22	RPD
Sampled Date/Time			HNPIOP0012P-B	30/01/2021	30/01/2021	HNPIOP0012P-B	30/01/2021	30/01/2021	OPHSW01	31/01/2021	31/01/2021	OPHSW01	31/01/2021	31/01/2021
Sum of PFAS (WA DER List)_	µg/L	0.0002 : 0.005 (Interlab)	0.0008	0.0008	0	0.0008	<0.005	0	0.0024	0.0027	12	0.0024	<0.005	0
Physical Parameters														
Total Dissolved Solids (TDS)	mg/l	10	945	936	1	945	1200	24						
Alkalinity														
Alkalinity (total as CaCO3)	mg/l	1 : 20 (Interlab)	304	277	9	304	380	22						
Alkalinity (Hydroxide) as CaCO3	mg/l	1 : 20 (Interlab)	<1	<1	0	<1	<20	0						
Bicarbonate Alkalinity as CaCO3	mg/l	1 : 20 (Interlab)	304	277	9	304	380	22						
Carbonate Alkalinity as CaCO3	mg/l	1 : 10 (Interlab)	<1	<1	0	<1	<10	0						
Ions														
Calcium (Filtered)	mg/l	1	75	74	1	75								
Chloride	mg/l	1	268	269	0	268	240	11						
Potassium (Filtered)	mg/l	1	8	8	0	8								
Sodium (Filtered)	mg/l	1	130	128	2	130								
Ionic Balance	%	0.01	3.39	2.62	26	3.39								
Anions Total	meq/L	0.01	16.9	16.4	3	16.9								
Cations Total	meq/L	0.01	15.8	15.6	1	15.8								
Inorganics														
Sulfate as SO4 (Filtered)	mg/l	1	156	157	1	156								
TOC	mg/l	1 : 5 (Interlab)	2	3	40	2	11	138						
Metals														
Magnesium (Filtered)	mg/l	1	75	74	1	75								
Perfluoroalkane Sulfonic Acids														
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002 : 0.001 (Interlab)	0.0008	0.0008	0	0.0008	0.0005	46	0.0024	0.0027	12	0.0024	0.0017	34
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoroalkane Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.002 : 0.05 (Interlab)	<0.002	<0.002	0	<0.002	<0.005	0	<0.002	<0.002	0	<0.002	<0.005	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorooctanoic acid (PFOA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorodecanoic acid (PFDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorononanoic acid (PFNA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
(n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
PFAS														
Sum of PFHxS and PFOS	µg/L	0.0002 : 0.001 (Interlab)	0.0008	0.0008	0	0.0008	<0.001	0	0.0024	0.0027	12	0.0024	0.0017	34
Sum of PFAS	µg/L	0.0002 : 0.005 (Interlab)	0.0008	0.0008	0	0.0008	<0.005	0	0.0024	0.0027	12	0.0024	<0.005	0

*RPDs have only been considered where a concentration is greater than 0 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (0-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL))

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

Table 12
BHP Eastern Ridge PFAS Assessment
QAQC Results
754-PEREN282113

Field Duplicates (water)

SDG Field ID Sampled Date/Time	ALSE-Perth 02-Feb-21 HHS0027M 1/02/2021	ALSE-Perth 02-Feb-21 QC23 1/02/2021	RPD	ALSE-Perth 02-Feb-21 HHS0027M 1/02/2021	Interlab_D QC24 1/02/2021	RPD	ALSE-Perth 02-Feb-21 HEC0318M1 1/02/2021	ALSE-Perth 02-Feb-21 QC25 1/02/2021	RPD	ALSE-Perth 02-Feb-21 HEC0318M1 1/02/2021	Interlab_D QC26 1/02/2021	RPD
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ChemName	Units	LOR												
Sum of PFAS (WA DER List)_	µg/L	0.0002 : 0.005 (Interlab)	0.0002	0.0002	0	0.0002	<0.005	0	0.0013	0.0016	21	0.0013	<0.005	0
Physical Parameters														
Total Dissolved Solids (TDS)	mg/l	10												
Alkalinity														
Alkalinity (total as CaCO3)	mg/l	1 : 20 (Interlab)												
Alkalinity (Hydroxide) as CaCO3	mg/l	1 : 20 (Interlab)												
Bicarbonate Alkalinity as CaCO3	mg/l	1 : 20 (Interlab)												
Carbonate Alkalinity as CaCO3	mg/l	1 : 10 (Interlab)												
Ions														
Calcium (Filtered)	mg/l	1												
Chloride	mg/l	1												
Potassium (Filtered)	mg/l	1												
Sodium (Filtered)	mg/l	1												
Ionic Balance	%	0.01												
Anions Total	meq/L	0.01												
Cations Total	meq/L	0.01												
Inorganics														
Sulfate as SO4 (Filtered)	mg/l	1												
TOC	mg/l	1 : 5 (Interlab)												
Metals														
Magnesium (Filtered)	mg/l	1												
Perfluoroalkane Sulfonic Acids														
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002 : 0.001 (Interlab)	0.0002	0.0002	0	0.0002	0.0002	0	<0.0002	<0.0002	0	<0.0002	<0.0001	0
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoroalkane Carboxylic Acids														
Perfluorobutanoic acid (PFBA)	µg/L	0.002 : 0.05 (Interlab)	<0.002	<0.002	0	<0.002	<0.005	0	<0.002	<0.002	0	<0.002	<0.005	0
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorooctanoic acid (PFOA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	0.0013	0.0016	21	0.0013	0.001	26
Perfluorodecanoic acid (PFDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorononanoic acid (PFNA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001	0
(n:2) Fluorotelomer Sulfonic Acids														
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0	<0.001	<0.001	0
Perfluoroalkyl Sulfonamides														
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	0.002	<0.001	67	0.002	<0.005	0
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	0.003	<0.001	100	0.003	<0.005	0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.005	0	<0.0005	<0.0005	0	<0.0005	<0.005	0
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001	<0.005	0
PFAS														
Sum of PFHxS and PFOS	µg/L	0.0002 : 0.001 (Interlab)	0.0002	0.0002	0	0.0002	<0.001	0	<0.0002	<0.0002	0	<0.0002	<0.001	0
Sum of PFAS	µg/L	0.0002 : 0.005 (Interlab)	0.0002	0.0002	0	0.0002	<0.005	0	0.0063	0.0016	119	0.0063	<0.005	23

*RPDs have only been considered where a concentration is greater than 0 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (0-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL))

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

Table 12
BHP Eastern Ridge PFAS Assessment
QAQC Results
754-PEREN282113

Field Duplicates (water)

SDG Field ID Sampled Date/Time	ALSE-Perth 15-Apr-21 HEOP0415M 9/04/2021 15:00	ALSE-Perth 15-Apr-21 QC03 9/04/2021 15:00	RPD	ALSE-Perth 15-Apr-21 HEOP0415M 9/04/2021 15:00	Interlab_D QC04 9/04/2021 15:00	RPD	ALSE-Perth 15-Apr-21 EOP0334R 10/04/2021 15:00	ALSE-Perth 15-Apr-21 QC08 10/04/2021 15:00	RPD	ALSE-Perth 15-Apr-21 EOP0334R 10/04/2021 15:00	Interlab_D QC09 10/04/2021 15:00	RPD
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ChemName	Units	LOR										
Sum of PFAS (WA DER List)_	µg/L	0.0002 : 0.005 (Interlab)	0.0038	0.002	62	0.0038			0.0211	0.0152	33	0.0211
Physical Parameters												
Total Dissolved Solids (TDS)	mg/l	10										
Alkalinity												
Alkalinity (total as CaCO3)	mg/l	1 : 20 (Interlab)										
Alkalinity (Hydroxide) as CaCO3	mg/l	1 : 20 (Interlab)										
Bicarbonate Alkalinity as CaCO3	mg/l	1 : 20 (Interlab)										
Carbonate Alkalinity as CaCO3	mg/l	1 : 10 (Interlab)										
Ions												
Calcium (Filtered)	mg/l	1										
Chloride	mg/l	1										
Potassium (Filtered)	mg/l	1										
Sodium (Filtered)	mg/l	1										
Ionic Balance	%	0.01										
Anions Total	meq/L	0.01										
Cations Total	meq/L	0.01										
Inorganics												
Sulfate as SO4 (Filtered)	mg/l	1										
TOC	mg/l	1 : 5 (Interlab)										
Metals												
Magnesium (Filtered)	mg/l	1										
Perfluoroalkane Sulfonic Acids												
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	0.0011	75	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002 : 0.001 (Interlab)	0.0038	0.0009	123	0.0038	0.002	62	0.0004	0.0002	67	0.0004
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluoroalkane Carboxylic Acids												
Perfluorobutanoic acid (PFBA)	µg/L	0.002 : 0.05 (Interlab)	<0.002	<0.002	0	<0.002			0.0029	<0.002	37	0.0029
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			0.0008	<0.0005	46	0.0008
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorooctanoic acid (PFOA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			0.0006	<0.0005	18	0.0006
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
(n:2) Fluorotelomer Sulfonic Acids												
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	0.013	0.012	8	0.013
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001			0.004	0.003	29	0.004
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001
Perfluoroalkyl Sulfonamides												
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001
PFAS												
Sum of PFHxS and PFOS	µg/L	0.0002 : 0.001 (Interlab)	0.0038	0.0009	123	0.0038	0.002	62	0.0004	0.0002	67	0.0004
Sum of PFAS	µg/L	0.0002 : 0.005 (Interlab)	0.0038	0.002	62	0.0038			0.0217	0.0152	35	0.0217

*RPDs have only been considered where a concentration is greater than 0 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (0-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL))

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

Table 12
BHP Eastern Ridge PFAS Assessment
QAQC Results
754-PEREN282113

Field Duplicates (water)

SDG	ALSE-Perth 15-Apr-21	ALSE-Perth 15-Apr-21	RPD	ALSE-Perth 15-Apr-21	Interlab_D	ALSE-Perth 15-Apr-21	ALSE-Perth 15-Apr-21	RPD	ALSE-Perth 15-Apr-21	Interlab_D		
Field ID	HEQ0006	QC10		HEQ0006	QC11		HHS0036M_19	QC14		HHS0036M_19	QC15	
Sampled Date/Time	10/04/2021	10/04/2021		10/04/2021	10/04/2021		11/04/2021	11/04/2021		11/04/2021	11/04/2021	

ChemName	Units	LOR											
Sum of PFAS (WA DER List)_	µg/L	0.0002 : 0.005 (Interlab)	0.0205	0.0207	1	0.0205			0.0499	0.0525	5	0.0499	
Physical Parameters													
Total Dissolved Solids (TDS)	mg/l	10											
Alkalinity													
Alkalinity (total as CaCO3)	mg/l	1 : 20 (Interlab)											
Alkalinity (Hydroxide) as CaCO3	mg/l	1 : 20 (Interlab)											
Bicarbonate Alkalinity as CaCO3	mg/l	1 : 20 (Interlab)											
Carbonate Alkalinity as CaCO3	mg/l	1 : 10 (Interlab)											
Ions													
Calcium (Filtered)	mg/l	1											
Chloride	mg/l	1											
Potassium (Filtered)	mg/l	1											
Sodium (Filtered)	mg/l	1											
Ionic Balance	%	0.01											
Anions Total	meq/L	0.01											
Cations Total	meq/L	0.01											
Inorganics													
Sulfate as SO4 (Filtered)	mg/l	1											
TOC	mg/l	1 : 5 (Interlab)											
Metals													
Magnesium (Filtered)	mg/l	1											
Perfluoroalkane Sulfonic Acids													
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			0.0157	0.0205	27	0.0157	
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005	<0.001
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002 : 0.001 (Interlab)	0.0002	0.0004	67	0.0002	<0.001	0	<0.0002	<0.0002	0	<0.0002	<0.001
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	
Perfluoroalkane Carboxylic Acids													
Perfluorobutanoic acid (PFBA)	µg/L	0.002 : 0.05 (Interlab)	<0.002	<0.002	0	<0.002			0.0077	0.008	4	0.0077	
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005 : 0.01 (Interlab)	0.0009	0.0008	12	0.0009			0.0057	0.0039	38	0.0057	
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005 : 0.01 (Interlab)	0.0009	0.0006	40	0.0009			0.0049	0.002	84	0.0049	
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005 : 0.01 (Interlab)	0.0014	<0.0005	95	0.0014			0.0053	0.0053	0	0.0053	
Perfluorooctanoic acid (PFOA)	µg/L	0.0005 : 0.01 (Interlab)	0.0141	0.0169	18	0.0141	0.023	48	0.0086	0.0108	23	0.0086	0.012
Perfluorodecanoic acid (PFDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			0.0014	0.0012	15	0.0014	
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	
Perfluorononanoic acid (PFNA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			0.0007	0.0006	15	0.0007	
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	
(n:2) Fluorotelomer Sulfonic Acids													
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001 : 0.005 (Interlab)	0.003	0.002	40	0.003	0.008	91	0.002	0.002	0	0.002	<0.005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	
Perfluoroalkyl Sulfonamides													
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001	
PFAS													
Sum of PFHxS and PFOS	µg/L	0.0002 : 0.001 (Interlab)	0.0002	0.0004	67	0.0002	<0.001	0	<0.0002	<0.0002	0	<0.0002	<0.001
Sum of PFAS	µg/L	0.0002 : 0.005 (Interlab)	0.0205	0.0207	1	0.0205			0.052	0.0543	4	0.052	

*RPDs have only been considered where a concentration is greater than 0 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (0-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL))

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

Table 12
BHP Eastern Ridge PFAS Assessment
QAQC Results
754-PEREN282113

Field Duplicates (water)

SDG	ALSE-Perth 15-Apr-21	ALSE-Perth 15-Apr-21		ALSE-Perth 15-Apr-21	Interlab_D	ALSE-Perth 15-Apr-21	ALSE-Perth 15-Apr-21		EP2104088	787790		
Field ID	HNPIHS0039P_B	QC16	RPD	HNPIHS0039P_B	QC17	RPD	RPSW02_A	QC02	RPD	RPSW02_A	QC03	RPD
Sampled Date/Time	11/04/2021	11/04/2021		11/04/2021	11/04/2021		12/04/2021	12/04/2021		12/04/2021	12/04/2021	

ChemName	Units	LOR										
Sum of PFAS (WA DER List)_	µg/L	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002			0.0012	0.0053	126	0.0012
Physical Parameters												
Total Dissolved Solids (TDS)	mg/l	10										
Alkalinity												
Alkalinity (total as CaCO3)	mg/l	1 : 20 (Interlab)										
Alkalinity (Hydroxide) as CaCO3	mg/l	1 : 20 (Interlab)										
Bicarbonate Alkalinity as CaCO3	mg/l	1 : 20 (Interlab)										
Carbonate Alkalinity as CaCO3	mg/l	1 : 10 (Interlab)										
Ions												
Calcium (Filtered)	mg/l	1										
Chloride	mg/l	1										
Potassium (Filtered)	mg/l	1										
Sodium (Filtered)	mg/l	1										
Ionic Balance	%	0.01										
Anions Total	meq/L	0.01										
Cations Total	meq/L	0.01										
Inorganics												
Sulfate as SO4 (Filtered)	mg/l	1										
TOC	mg/l	1 : 5 (Interlab)										
Metals												
Magnesium (Filtered)	mg/l	1										
Perfluoroalkane Sulfonic Acids												
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			0.0006	0.0008	29	0.0006
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	0.003	175	0.0006	0.0007	15	0.0006
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005 : 0.001 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluoroalkane Carboxylic Acids												
Perfluorobutanoic acid (PFBA)	µg/L	0.002 : 0.05 (Interlab)	<0.002	<0.002	0	<0.002			<0.002	0.0038	62	<0.002
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorooctanoic acid (PFOA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005	<0.001	0	<0.0005	<0.0005	0	<0.0005
Perfluorodecanoic acid (PFDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorononanoic acid (PFNA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005 : 0.01 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
(n:2) Fluorotelomer Sulfonic Acids												
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001 : 0.005 (Interlab)	<0.001	<0.001	0	<0.001	<0.005	0	<0.001	<0.001	0	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001
Perfluoroalkyl Sulfonamides												
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.0005
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.001
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005 : 0.05 (Interlab)	<0.0005	<0.0005	0	<0.0005			<0.0005	<0.0005	0	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001 : 0.05 (Interlab)	<0.001	<0.001	0	<0.001			<0.001	<0.001	0	<0.001
PFAS												
Sum of PFHxS and PFOS	µg/L	0.0002 : 0.001 (Interlab)	<0.0002	<0.0002	0	<0.0002	0.003	175	0.0006	0.0007	15	0.0006
Sum of PFAS	µg/L	0.0002 : 0.005 (Interlab)	<0.0002	<0.0002	0	<0.0002			0.0012	0.0053	126	0.0012

*RPDs have only been considered where a concentration is greater than 0 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (0-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL))

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

Table 13
BHP Eastern Ridge PFAS Assessment
Field Blank Results
754-PEREN282113

Field Blanks (water)
Filter: ALL

SDG	ALSE-Perth 02-Feb-21	ALSE-Perth 04-Feb-21	ALSE-Perth 04-Feb-21	ALSE-Perth 08-Feb-21	ALSE-Perth 15-Apr-21	ALSE-Perth 15-Apr-21	ALSE-Perth 15-Apr-21	ALSE-Perth 15-Apr-21	ALSE-Perth 15-Apr-21	ALSE-Perth 15-Apr-21	ALSE-Perth 29-Jan-21	ALSE-Perth 29-Jan-21
Field ID	QC28	QC31	QC33	QC37	QC01	QC02	QC06	QC12	QC18	QC09	QC10	
Sampled_Date/Time	1/02/2021	2/02/2021	3/02/2021	4/02/2021	7/04/2021	8/04/2021	9/04/2021	10/04/2021	11/04/2021	28/01/2021	28/01/2021	
Sample Type	Rinsate	Rinsate	Rinsate	Rinsate	Rinsate	Rinsate	Rinsate	Rinsate	Rinsate	Trip B	Trip B	
ChemName	Units	EQL										
Sum of PFAS (WA DER List)	µg/L	0.0002	<0.0002	<0.0002	<0.0002	0.0154	<0.0002	0.0253	<0.0002	0.0009	<0.0002	
Sum of US EPA PFAS (PFOS + PFOA)*	µg/L	0.001										
(n:2) Fluorotelomer Sulfonic Acids												
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001	<0.001	<0.001	<0.001	0.012	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Alkalinity												
Alkalinity (total as CaCO3)	mg/l	1										
Alkalinity (Hydroxide) as CaCO3	mg/l	1										
Bicarbonate Alkalinity as CaCO3	mg/l	1										
Carbonate Alkalinity as CaCO3	mg/l	1										
BTEX												
Benzene	µg/L	1									<1	<1
Toluene	µg/L	2									<2	<2
Ethylbenzene	µg/L	2									<2	<2
Xylene (m & p)	µg/L	2									<2	<2
Xylene (o)	µg/L	2									<2	<2
Xylene Total	µg/L	2									<2	<2
Total BTEX	µg/L	1									<1	<1
Inorganics												
Sulfate as SO4	mg/l	5										
Sulfate as SO4 (Filtered)	mg/l	1										
TOC	mg/l	1										
Ions												
Calcium	mg/l	0.5										
Calcium (Filtered)	mg/l	1										
Chloride	mg/l	1										
Potassium	mg/l	0.5										
Potassium (Filtered)	mg/l	1										
Sodium	mg/l	0.5										
Sodium (Filtered)	mg/l	1										
Ionic Balance	%	0.01										
Anions Total	meq/L	0.01										
Cations Total	meq/L	0.01										
Metals												
Magnesium	mg/l	0.5										
Magnesium (Filtered)	mg/l	1										
Nutrients												
Nitrite + Nitrate as N	mg/l	0.01										
Nitrogen (Total)	mg/l	0.1										
Total Kjeldahl Nitrogen (TKN)	mg/l	0.1										
Perfluoroalkane Carboxylic Acids												
Perfluorobutanoic acid (PFBA)	µg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0249	<0.002	<0.002	<0.002	
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctanoic acid (PFOA)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorononanoic acid (PFNA)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorotridecanoic acid (PFTTrDA)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroalkane Sulfonic Acids												
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.001										
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	0.0008	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0001	<0.0002	<0.0002	<0.0002	0.0026	<0.0002	0.0004	<0.0002	0.0009	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroalkyl Sulfonamides												
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
N-ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
N-ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
N-ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
PFAS												
Sum of PFHxS and PFOS	µg/L	0.0002	<0.0002	<0.0002	<0.0002	0.0034	<0.0002	0.0004	<0.0002	0.0009	<0.0002	
Sum of PFAS	µg/L	0.0002	<0.0002	<0.0002	<0.0002	0.0154	<0.0002	0.0253	<0.0002	0.0009	<0.0002	
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.001										
PFOS/PFOA												
Perfluorononanesulfonic acid (PFNS)(trace)	ug/L	0.001										
Physical Parameters												
Electrical Conductivity @ 25C (lab)	µS/cm	10										
Total Dissolved Solids (TDS)	mg/l	10										
pH (lab)	pH_unit	0.1										
Polycyclic Aromatic Hydrocarbons												
Naphthalene	µg/L	5									<5	<5
TPH												
F1 (C6-C10) less BTEX	mg/l	0.02									<0.02	<0.02
C6 - C9	mg/l	0.02									<0.02	<0.02
F1 (C6-C10)	mg/l	0.02									<0.02	<0.02

Table 13
BHP Eastern Ridge PFAS Assessment
Field Blank Results
754-PEREN282113

Field Blanks (water)
Filter: ALL

	SDG	ALSE-Perth 02-Feb-21	ALSE-Perth 02-Feb-21	ALSE-Perth 04-Feb-21	ALSE-Perth 08-Feb-21	ALSE-Perth 08-Feb-21
Field ID	QC29	QC30	QC35	QC39	QC40	QC40
Sample Date/Time	1/02/2021	1/02/2021	3/02/2021	5/02/2021	5/02/2021	5/02/2021
Sample Type	Trip B	Trip B	Trip B	Trip B	Trip B	Trip B
ChemName	Units	EQL				
Sum of PFAS (WA DER List)	µg/L	0.0002			<0.0002	
Sum of US EPA PFAS (PFOS + PFOA)*	µg/L	0.001				
(n:2) Fluorotelomer Sulfonic Acids						
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	µg/L	0.001			<0.001	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	µg/L	0.001			<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	µg/L	0.001			<0.001	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	µg/L	0.001			<0.001	
Alkalinity						
Alkalinity (total as CaCO3)	mg/l	1				
Alkalinity (Hydroxide) as CaCO3	mg/l	1				
Bicarbonate Alkalinity as CaCO3	mg/l	1				
Carbonate Alkalinity as CaCO3	mg/l	1				
BTEX						
Benzene	µg/L	1	<1	<1	<1	<1
Toluene	µg/L	2	<2	<2	<2	<2
Ethylbenzene	µg/L	2	<2	<2	<2	<2
Xylene (m & p)	µg/L	2	<2	<2	<2	<2
Xylene (o)	µg/L	2	<2	<2	<2	<2
Xylene Total	µg/L	2	<2	<2	<2	<2
Total BTEX	µg/L	1	<1	<1	<1	<1
Inorganics						
Sulfate as SO4	mg/l	5				
Sulfate as SO4 (Filtered)	mg/l	1				
TOC	mg/l	1				
Ions						
Calcium	mg/l	0.5				
Calcium (Filtered)	mg/l	1				
Chloride	mg/l	1				
Potassium	mg/l	0.5				
Potassium (Filtered)	mg/l	1				
Sodium	mg/l	0.5				
Sodium (Filtered)	mg/l	1				
Ionic Balance	%	0.01				
Anions Total	meq/L	0.01				
Cations Total	meq/L	0.01				
Metals						
Magnesium	mg/l	0.5				
Magnesium (Filtered)	mg/l	1				
Nutrients						
Nitrite + Nitrate as N	mg/l	0.01				
Nitrogen (Total)	mg/l	0.1				
Total Kjeldahl Nitrogen (TKN)	mg/l	0.1				
Perfluoroalkane Carboxylic Acids						
Perfluorobutanoic acid (PFBA)	µg/L	0.002			<0.002	
Perfluoropentanoic acid (PFPeA)	µg/L	0.0005			<0.0005	
Perfluorohexanoic acid (PFHxA)	µg/L	0.0005			<0.0005	
Perfluoroheptanoic acid (PFHpA)	µg/L	0.0005			<0.0005	
Perfluorooctanoic acid (PFOA)	µg/L	0.0005			<0.0005	
Perfluorodecanoic acid (PFDA)	µg/L	0.0005			<0.0005	
Perfluorododecanoic acid (PFDoDA)	µg/L	0.0005			<0.0005	
Perfluorononanoic acid (PFNA)	µg/L	0.0005			<0.0005	
Perfluorotetradecanoic acid (PFTeDA)	µg/L	0.0005			<0.0005	
Perfluorotridecanoic acid (PFTrDA)	µg/L	0.0005			<0.0005	
Perfluoroundecanoic acid (PFUnDA)	µg/L	0.0005			<0.0005	
Perfluoroalkane Sulfonic Acids						
Perfluoropropanesulfonic acid (PFPrS)	µg/L	0.001				
Perfluorobutane sulfonic acid (PFBS)	µg/L	0.0005			<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	µg/L	0.0005			<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	µg/L	0.0005			<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	µg/L	0.0005			<0.0005	
Perfluorooctane sulfonic acid (PFOS)	µg/L	0.0001			<0.0002	
Perfluorodecane sulfonic acid (PFDS)	µg/L	0.0005			<0.0005	
Perfluoroalkyl Sulfonamides						
Perfluorooctane sulfonamide (FOSA)	µg/L	0.0005			<0.0005	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	µg/L	0.001			<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	µg/L	0.0005			<0.0005	
N-methyl perfluorooctane sulfonamidoethanol (MeFOSE)	µg/L	0.001			<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	µg/L	0.001			<0.001	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	µg/L	0.0005			<0.0005	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	µg/L	0.001			<0.001	
PFAS						
Sum of PFHxS and PFOS	µg/L	0.0002			<0.0002	
Sum of PFAS	µg/L	0.0002			<0.0002	
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)	µg/L	0.001				
PFOS/PFOA						
Perfluorononanesulfonic acid (PFNS)(trace)	µg/L	0.001				
Physical Parameters						
Electrical Conductivity @ 25C (lab)	µS/cm	10				
Total Dissolved Solids (TDS)	mg/l	10				
pH (lab)	pH unit	0.1				
Polycyclic Aromatic Hydrocarbons						
Naphthalene	µg/L	5	<5	<5	<5	<5
TPH						
F1 (C6-C10) less BTEX	mg/l	0.02	<0.02	<0.02	<0.02	<0.02
C6 - C9	mg/l	0.02	<0.02	<0.02	<0.02	<0.02
F1 (C6-C10)	mg/l	0.02	<0.02	<0.02	<0.02	<0.02

Appendix A – CS Act Classification Details



Sandra Carles
BHP Billiton Iron Ore
PO Box 7122
Cloisters Square WA 6850

Your ref:
Our ref: DMO 11753
Enquiries: Balbir Singh
Phone: 1300 762 982
Fax: (08) 6364 7001
Email: info@dwer.wa.gov.au

Dear Sir/Madam

This letter is the formal notice of classification of a known or suspected contaminated site in which you have an interest. This constitutes the notice the Department of Water and Environmental Regulation (the department) is legally obliged to give under the *Contaminated Sites Act 2003* (the Act), which came into effect on 1 December 2006.

The Act was set up to record and manage contaminated sites in Western Australia, in order to protect people's health and the environment. Please note that contamination does not necessarily mean that an area is unsafe to live or work in – for example, it may be limited to groundwater, and only becomes an issue to be managed if a groundwater bore was being considered.

This notice explains why the site has been classified, what restrictions, if any, have been placed on the use of the site and how you can appeal the classification. In some cases, this notice may include other lots which also form part of the classified site, in addition to the lot in which you have an interest.

If, after reading this letter, you have any further queries, please contact the department on 1300 762 982 (Contaminated Sites Information Line).

NOTICE OF A CLASSIFICATION OF A KNOWN OR SUSPECTED CONTAMINATED SITE GIVEN UNDER SECTION 15 OF THE *CONTAMINATED SITES ACT 2003*

The site detailed below (**the site**), consisting of 1 parcel(s) of land, was reported to the CEO of the department as a known or suspected contaminated site and has been classified under the Act:

- Parcel 77606 = Approximate spatial representation of Eastern Ridge Iron Ore Mining Operation on Mining Lease 244SA, within a section of Lot 556 on Deposited Plan 400578 as shown on certificate of title LR3164/255 Newman WA 6753

This notification is being sent to you in accordance with section 15(1) of the Act on the grounds that you, as the recipient, are one or more of the following:

- (a) owner of the site (contact details sourced from the current certificate of title);
- (b) occupier of the site;
- (c) relevant public authority;
- (d) person who, in the CEO's opinion, there is particular reason to notify;
- (e) person who made the report under section 11 or 12; and
- (f) person who, in the CEO's opinion, may be responsible for remediation of a site classified as *contaminated – remediation required*.

Site Classification

Category of site classification: Possibly contaminated - investigation required

Date of site classification: 29/07/2020

Reasons for classification: This site was reported to the Department of Water and Environmental Regulation (the department) as per reporting obligations under section 11 of the 'Contaminated Sites Act 2003' (the Act), which commenced on 1 December 2006. The site has been classified under section 13 of the Act based on information submitted to the department by June 2020.

The site is located within an area mapped as a Priority P1 Public Drinking Water Source Area (PDWSA), and contains a small ephemeral wetland in its south eastern portion.

The department understands that treated wastewater generated by adjacent Newman Wastewater Treatment Plant (L6870/1993/12) has been disposed into the wetland from around 2010. Disposal of wastewater is a land use that has the potential to cause contamination, as specified in the guideline 'Potentially Contaminating Activities, Industries and Land uses' (Department of Environment Regulation [DER] 2014).

Wastewater has the potential to contain a range of contaminants including metals, nutrients (such as nitrogen, phosphorus), pathogens and per- and poly-fluoroalkyl substances (PFAS). Soil, surface water and groundwater at the site have not been investigated and the quality of soil, surface water and groundwater beneath the site remains unknown.

Potential risks posed by the substances of concern at the site to human health, the environment or environmental values have also not been assessed.

As the site has not been investigated, a comment cannot be made on the suitability of the site as a whole for any land use.

There are grounds to indicate possible contamination of the site located within a Priority 1 PDWSA, and a contamination assessment to determine the risk to human health, the environment and environmental values has not been carried out. Therefore, the site is classified 'possibly contaminated - investigation required'.

When the results of soil and groundwater investigations are submitted to the department, these will be reviewed, and the site may be reclassified.

The department, in consultation with the Department of Health, has classified this site based on the information available to the department at the time of classification. It is acknowledged that the contamination status of the site may have changed since the information was collated and/or submitted to the department, and as such, the usefulness of this information may be limited. In accordance with Department of Health advice, if groundwater is being, or is proposed to be abstracted, the department recommends that analytical testing should be carried out to determine whether the groundwater is suitable for its intended use.

Other Relevant Information:

Additional information included herein is relevant to the contamination status of the site and includes department's expectations for action that should be taken to address potential or actual contamination described in the Reasons for Classification.

Action Required:

Soil, sediment, surface water and groundwater investigations are required to determine the contamination status of the site and to assess any potential risk to the PDWSA. A Detailed Site Investigation report documenting the results of these investigations should be submitted to department by 31 March 2021.

Investigations are to be carried out in accordance with department's Contaminated Sites Guidelines and the 'National Environment Protection (Assessment of Site Contamination) Measure 1999' (NEPM).

General Information

The nature and extent of contamination and any restrictions on the use of the land, if applicable, are listed in Attachment A.

Information relating to the classification of the site is also available by submitting a request for a summary of records (using Form 2) to: Department of Water and Environmental Regulation, Locked Bag 10, Joondalup DC, WA 6919. A fee of \$30 currently applies for a Basic Summary of Records. Forms are available from www.der.wa.gov.au/contaminatedsites.

In some instances the department has had to classify sites based on historical information. A site may be re-classified at any stage when additional information becomes available, for example where a new investigation or remediation report completed in accordance with the department's 'Contaminated Sites Guidelines' and the *National Environment Protection (Assessment of Site Contamination) Measure 1999*, is submitted to the department. The current site classification is the classification most recently conferred on the site.

Memorials

In accordance with section 58(1) of the Act, the department will lodge a memorial with the Registrar of Landgate, recording the classification against the site's Certificate(s) of Title. Parcel(s) without a registration number or certificate of title will not have a memorial lodged against them until a certificate of title has been created. Once complete, confirmation of the lodgement of the memorial(s) will be forwarded to the following people:

- (a) each owner,
- (b) Western Australian Planning Commission;
- (c) CEO of the Department of Health;
- (d) Local Government Authority;
- (e) relevant scheme authority.

Given that memorial(s) will be lodged against the site, the Western Australian Planning Commission (WAPC) may not approve the subdivision of the land under Section 135 of the *Planning and Development Act 2005*, or the amalgamation of that land with any other land without seeking, and taking into account, the advice of the department as to the suitability of the land for subdivision or amalgamation. Furthermore, a responsible authority (e.g. Local Government Authorities) may not grant approval under a scheme for any proposed development of the land without seeking, and taking into account, advice from the department as to the suitability of the proposed development.

Appealing the Site Classification

All site classifications given by the department are appealable. However, only certain people can lodge a valid appeal. The people who can lodge a valid appeal varies, depending on the classification category, as detailed in Fact Sheet 4: *Site classifications and appeals*. Appeals need to be lodged in writing with the Contaminated Sites Committee at Forrest Centre, Level 22, 221 St Georges Terrace, Perth WA 6000, within **45 days** of being given this notification. The appeal should set out the appellant's relationship to the site, and must include the grounds and facts upon which it is based. An appeal fee (currently \$45) applies.

To find out more about the appeal process, see the Contaminated Sites Committee website at www.csc.wa.gov.au or contact the office of the Committee on (08) 6364 7264.

For further information on all aspects of site classification, please refer to Fact Sheet 4 and the 'Contaminated Sites Guidelines', which are available from the department's website at www.der.wa.gov.au/contaminatedsites or by contacting the Contaminated Sites Information Line on 1300 762 982.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Paul Newell', with a small horizontal line at the end.

Paul Newell, Manager

CONTAMINATED SITES REGULATION
Delegated Officer under section 91
of the *Contaminated Sites Act 2003*

30/07/2020

Enc. Attachment A – Nature and Extent and Restrictions on Use.

[Fact Sheet 4: Site classifications and appeals](#)

[Fact Sheet 5: Buyer beware – buying and selling contaminated land](#)

ATTACHMENT A – Nature and Extent and Restrictions on Use

- Approximate spatial representation of Eastern Ridge Iron Ore Mining Operation on Mining Lease 244SA, within a section of Lot 556 on Deposited Plan 400578

Nature and Extent: Nutrients (such as nitrogen, phosphorus), pathogens and per- and poly-fluoroalkyl substances (PFAS) may be present in surface water and groundwater at elevated concentrations.

Restriction on Use: Please refer to Reasons for Classification for further information on the potential contamination present at the site.



Sandra Carles
BHP Billiton Iron Ore
PO Box 7122
Cloisters Square WA 6850

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Our ref: DMO 11753
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Category of site classification: Possibly contaminated - investigation required

Date of site classification: 29/07/2020

Reasons for classification: This site was reported to the Department of Water and Environmental Regulation (the department) as per reporting obligations under section 11 of the 'Contaminated Sites Act 2003' (the Act), which commenced on 1 December 2006. The site has been classified under section 13 of the Act based on information submitted to the department by June 2020.

The site is located within an area mapped as a Priority P1 Public Drinking Water Source Area (PDWSA), and contains a small ephemeral wetland in its south eastern portion.

The department understands that treated wastewater generated by adjacent Newman Wastewater Treatment Plant (L6870/1993/12) has been disposed into the wetland from around 2010. Disposal of wastewater is a land use that has the potential to cause contamination, as specified in the guideline 'Potentially Contaminating Activities, Industries and Land uses' (Department of Environment Regulation [DER] 2014).

Wastewater has the potential to contain a range of contaminants including metals, nutrients (such as nitrogen, phosphorus), pathogens and per- and poly-fluoroalkyl substances (PFAS). Soil, surface water and groundwater at the site have not been investigated and the quality of soil, surface water and groundwater beneath the site remains unknown.

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As the site has not been investigated, a comment cannot be made on the suitability of the site as a whole for any land use.

There are grounds to indicate possible contamination of the site located within a Priority 1 PDWSA, and a contamination assessment to determine the risk to human health, the environment and environmental values has not been carried out. Therefore, the site is classified 'possibly contaminated - investigation required'.

When the results of soil and groundwater investigations are submitted to the department, these will be reviewed, and the site may be reclassified.

The department, in consultation with the Department of Health, has classified this site based on the information available to the department at the time of classification. It is acknowledged that the contamination status of the site may have changed since the information was collated and/or submitted to the department, and as such, the usefulness of this information may be limited. In accordance with Department of Health advice, if groundwater is being, or is proposed to be abstracted, the department recommends that analytical testing should be carried out to determine whether the groundwater is suitable for its intended use.

Other Relevant Information:

Additional information included herein is relevant to the contamination status of the site and includes department's expectations for action that should be taken to address potential or actual contamination described in the Reasons for Classification.

Action Required:

Soil, sediment, surface water and groundwater investigations are required to determine the contamination status of the site and to assess any potential risk to the PDWSA. A Detailed Site Investigation report documenting the results of these investigations should be submitted to department by 31 March 2021.

Investigations are to be carried out in accordance with department's Contaminated Sites Guidelines and the 'National Environment Protection (Assessment of Site Contamination) Measure 1999' (NEPM).

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Yours sincerely

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Paul Newell, Manager

CONTAMINATED SITES REGULATION
Delegated Officer under section 91
of the *Contaminated Sites Act 2003*

30/07/2020

Enc. Attachment A – Nature and Extent and Restrictions on Use.

[Fact Sheet 4: Site classifications and appeals](#)

[Fact Sheet 5: Buyer beware – buying and selling contaminated land](#)

ATTACHMENT A – Nature and Extent and Restrictions on Use

- Approximate spatial representation of Eastern Ridge Iron Ore Mining Operation on Mining Lease 244SA, within a section of Lot 556 on Deposited Plan 400578

Nature and Extent: Nutrients (such as nitrogen, phosphorus), pathogens and per- and poly-fluoroalkyl substances (PFAS) may be present in surface water and groundwater at elevated concentrations.

Restriction on Use: Please refer to Reasons for Classification for further information on the potential contamination present at the site.



Contaminated Sites Act 2003 Basic Summary of Records Search Response

Report generated at 04:33:16PM, 25/03/2021

Receipt No:

ID No: 2177

Search Results

This response relates to a search request received for:

1328 Newman Dr
Newman, WA, 6753

This parcel belongs to a site that contains 1 parcel(s).

According to Department of Water and Environmental Regulation records, this land has been reported as a known or suspected contaminated site.

Address	1328 Newman Dr Newman, WA, 6753
Lot on Plan Address	Lot 1328 On Plan 183375
Parcel Status	<p>Classification: 26/07/2013 - Contaminated - restricted use</p> <p>Nature and Extent of Contamination:</p> <p>Hydrocarbons (such as from petrol) are present in groundwater as a plume in the southern portion of the site. Hydrocarbon-impacted soil remains in-situ beneath the location of former underground fuel storage tanks in the southern portion of the site at a depth of approximately 5 metres below the surface, and at a depth of approximately 1.2 metres below the surface along the site's southern boundary.</p> <p>Restrictions on Use:</p> <p>A site-specific health and safety plan should be developed and implemented to address the risks to the health of any workers undertaking intrusive works below 2 mbgl.</p> <p>Due to the nature and extent of groundwater contamination identified to date, the abstraction of groundwater for any purpose is not recommended.</p> <p>Reason for Classification:</p> <p>This site was reported to Department of Environment Regulation (DER) prior to the commencement of the 'Contaminated Sites Act 2003' (the Act). The site classification was based on information submitted to DER by February 1999. These reasons for classification have been updated to reflect information submitted to DER by June 2013.</p> <p>This site was historically used as a service station for approximately 28 years, from 1970 to 1998. This is a land use that has the potential to cause contamination, as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004).</p> <p>A limited site assessment, undertaken in 1992, identified areas of stained surface soils and hydrocarbon vapours in subsurface soils. Groundwater investigations, utilising a single monitoring well located at the site's eastern boundary, identified significant concentrations of hydrocarbons (such as from petrol) and elevated concentrations of lead in groundwater within the confined aquifer</p>

Disclaimer

This Summary of Records has been prepared by Department of Water and Environmental Regulation (DWER) as a requirement of the Contaminated Sites Act 2003. DWER makes every effort to ensure the accuracy, currency and reliability of this information at the time it was prepared, however advises that due to the ability of contamination to potentially change in nature and extent over time, circumstances may have changed since the information was originally provided. Users must exercise their own skill and care when interpreting the information contained within this Summary of Records and, where applicable, obtain independent professional advice appropriate to their circumstances. In no event will DWER, its agents or employees be held responsible for any loss or damage arising from any use of or reliance on this information. Additionally, the Summary of Records must not be reproduced or supplied to third parties except in full and unabridged form.



Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:16PM, 25/03/2021

beneath the site.

Further soil investigations were undertaken across the site between 1996 and 1998 associated with the impending closure of the service station. These investigations identified hydrocarbons (such as from petrol and diesel) in soils at depths of up to 4 metres below ground level (mbgl). The concentrations of hydrocarbons reported exceeded BP Industrial Use Criteria, as detailed in 'BP Oil Australia's Contaminated Land Management Manual' (BP Australia Limited, 1991), which were considered relevant criteria at the time of assessment. The concentrations of hydrocarbons reported in soils also exceed Ecological Investigation Levels and Health-based Investigation Levels for commercial and industrial sites, as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation, 2010), which are the relevant criteria at the time of updating these reasons for classification.

Groundwater investigations in 1998 identified significant concentrations of hydrocarbons (such as from petrol) in groundwater down hydraulic-gradient of the former service station infrastructure. The concentration of dissolved-phase hydrocarbons in groundwater indicated that phase-separated hydrocarbons (PSH) may have been present at the site (i.e. petroleum hydrocarbons may have been floating on top of the water table).

Following the removal of fuel-related infrastructure in 1998, remedial works were undertaken comprising the excavation and off-site disposal of 1955 cubic metres of hydrocarbon-impacted soils. The excavation extended to a maximum depth of 5.7 mbgl in the former forecourt area and to a maximum depth of 1.2 mbgl along the sites southern boundary. The collection and analysis of soil validation samples indicated that residual soil impacts were present at the base of the main excavation pit, and in soils at a depth of 1.2 mbgl associated with buried services running along the site's southern boundary. The concentrations of hydrocarbons remaining in soils following remedial works exceeded Ecological Investigation Levels and Health-based Investigation Levels for commercial and industrial sites, as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation, 2010).

Soil investigations were undertaken in March and December 2007. However these investigations were limited and do not meet the standard required as outlined in the DER 'Contaminated Sites Management Series' of guidelines.

A detailed site investigation was undertaken in early 2013 to establish baseline environmental conditions prior to the proposed redevelopment of the site into a service station. These investigations confirmed the presence of residual soil impacts in the southern portion of the site. Groundwater monitoring identified significant concentrations of hydrocarbons (such as from degraded petrol) in groundwater exceeding domestic non-potable groundwater use guidelines as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment and Conservation, 2010). Furthermore, a hydrocarbon sheen was observed in one monitoring well located adjacent to the location of the former fuel-related below-ground infrastructure. The presence of PSH in 2013 indicates that the attenuation of hydrocarbons in groundwater is occurring very slowly, and/or that the residual soil impacts are acting as a significant secondary source of groundwater impact. However, given the confined nature of the aquifer setting, the pathway between the soil impacts and the groundwater table is not clear.

Groundwater investigations in 2013 also identified Methyl Tertiary Butyl Ether (MTBE), a fuel additive, in groundwater beneath the site at a concentration exceeding domestic non-potable groundwater use guidelines. As the MTBE-impacted groundwater was identified along the site's down hydraulic-gradient boundary, it is considered possible that MTBE-impacted groundwater has migrated off-site to

Disclaimer

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:16PM, 25/03/2021

the west. Therefore DER recommends that groundwater monitoring is undertaken periodically as part of the proposed ongoing use of the site as an operational service station.

An intermediate risk assessment has indicated that the contamination present on the site does not currently pose an unacceptable risk to human health, the environment or environmental values under the proposed commercial land use. However, the contamination may present an unacceptable risk to human health under a more sensitive land use.

Based on the available information, the site appears suitable for continued commercial/industrial land use, however, further assessment of potential contamination should be undertaken before any change to a more sensitive land use (e.g. residential housing, childcare centres).

As the site, although contaminated, is suitable for commercial/industrial land use, but may not be suitable for a more sensitive land use, the site has been classified as 'contaminated - restricted use'.

A memorial stating the site's classification has been placed on the certificate of title, and will trigger the need for further investigations and risk assessment should the site be proposed for a more sensitive land use.

DER, in consultation with the Department of Health, has classified this site based on the information available to DER at the time of classification. It is acknowledged that the contamination status of the site may have changed since the information was collated and/or submitted to DER, and as such, the usefulness of this information may be limited.

Action Required

DER recommends that periodic groundwater monitoring be undertaken to evaluate changes in groundwater quality associated with the historical land use of the site, and the proposed future use of the site as an operational service station.

Due to the presence of hydrocarbons in soils, a site-specific health and safety plan should be developed and implemented to address the risks to the health of any workers undertaking intrusive works below 2 mbgl

Certificate of Title Memorial	Under the Contaminated Sites Act 2003, this site has been classified as "Contaminated - restricted use". For further information on the contamination status of this site, please contact the Contaminated Sites section of the Department of Environment & Conservation.
Current Regulatory Notice Issued	Type of Regulatory Notice: <i>Nil</i> Date Issued: <i>Nil</i>
General	No other information relating to this parcel.

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Contaminated Sites Act 2003 Basic Summary of Records Search Response

Report generated at 04:33:45PM, 25/03/2021

Receipt No:

ID No: 12297

Search Results

This response relates to a search request received for:

Unallocated Crown Land
Newman, WA, 6753

Unallocated Crown Land (Landgate PIN: 1121622), Newman WA 6753

This parcel belongs to a site that contains 5 parcel(s).

According to Department of Water and Environmental Regulation records, this land has been reported as a known or suspected contaminated site.

Address	Unallocated Crown Land Newman, WA, 6753 Unallocated Crown Land (Landgate PIN: 1121622), Newman WA 6753
Lot on Plan Address	Unallocated Crown Land
Parcel Status	<p>Classification: 10/12/2020 - <i>Contaminated - remediation required</i></p> <p>Nature and Extent of Contamination:</p> <p>Soils and groundwater in the mine operations area are impacted by petroleum hydrocarbons (such as from diesel or oil), perfluoroalkyl and polyfluoroalkyl substances (PFAS) and asbestos.</p> <p>Petroleum hydrocarbons have been identified in surface and sub-surface soils to 45 meters below ground level, at the former power station site. Light non-aqueous phase liquid hydrocarbons (such as pure petrol or diesel) has been observed floating on the surface of the watertable beneath the former power station site.</p> <p>PFAS, associated with fire suppression foam application and disposal at the site, has been detected in groundwater beneath the site.</p> <p>Asbestos containing materials (ACM) are present in former and current asbestos waste disposal areas and in general landfill.</p> <p>Restrictions on Use:</p> <p>Please refer to Reasons for Classification for further information on the potential contamination present at the site.</p> <p>Reason for Classification:</p> <p>This site was originally reported to the Department of Water & Environmental Regulation (the department) prior to the commencement of the 'Contaminated Sites Act 2003' (the Act), and was reported again as per reporting obligations under section 11 of the Act in May 2007 and October 2019.</p> <p>The original site classification under section 13 of the Act was based on information submitted to the department by October 2004, with the 'reasons for classification' subsequently updated to reflect additional technical information submitted to the department by August 2012, and again by October</p>

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:46PM, 25/03/2021

2019.

The Mount Whaleback Iron Ore Mine (the mine operation) is situated in the Whaleback Creek, Ophthalmia Dam and Fortescue River catchment area and located within a Priority 1 Public Drinking Water Supply Area. The mine has operated since 1968.

The site comprises 4147 hectares of land and is used for mining of iron ore including the storage of chemicals and minerals associated with the operation of the iron ore mine. Mining and mineral processing are land uses that have the potential to cause contamination as specified in the guideline 'Assessment and management of contaminated sites' (Department of Environment Regulation [DER], 2014).

The site was originally reported because light non-aqueous phase liquid (LNAPL), such as pure hydrocarbon (diesel), was found to be floating on the surface of groundwater beneath the former power station, and significant hydrocarbon staining of soils were observed at the site. Additionally, known hydrocarbon leaks and contaminated discharges to Whaleback Creek have been recorded at the site.

A site inspection conducted by a department officer in July 2012, identified hydrocarbon leakage and staining within industrial/operational portions of the site.

The site was reported again in February 2019 because perfluoroalkyl and polyfluoroalkyl substances (PFAS), such as from fire-fighting foams or PFAS-containing waste were known to have been used at the site and had been detected in groundwater beneath the site associated with a number of fire training areas and wastewater treatment and discharge locations.

This mine site is divided into a number of areas used for industrial and operational purposes. Each of these areas are discussed below.

1) Former diesel fired power station

This area of the site was reported because it was used as a diesel fired power station for 44 years, between 1967 and 1994. A fuel leak occurred in 1992 from an underground fuel pipeline network, comprising the loss of an estimated 90,000L of diesel, and evidence of surface staining indicated hydrocarbon contamination at the site.

The former power station was decommissioned between 1996 and 2000. In 2007 the central portion of the site was redeveloped as a mine laboratory. The department understands that the development of the balance of the former power station site, for either open space or car parking is being considered.

Sub-surface soil and groundwater investigations in 2003 found hydrocarbons were present in sub-surface soils across the site between 1 meter and 45 meters below ground level, and in groundwater beneath the site. Testing of surface soils less than 1m below ground level was not included in this investigation. Hydrocarbon concentrations in soil had been found to exceed Ecological Investigation Levels as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment, 2003) which were the relevant guidelines at that time. LNAPL was detected floating on the surface of the groundwater beneath the central portion of the power station site. Dissolved hydrocarbons (such as from diesel or oil) were present in groundwater at concentrations that were found to exceed the Groundwater Intervention Values (Netherlands Ministry for Housing, Spatial Planning and Environment, 2000), which were the relevant groundwater guidelines at that time.

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:46PM, 25/03/2021

A Health Risk Assessment in 2004 recommended that LNAPL be removed from groundwater beneath the former power station site prior to redevelopment for commercial use or open space. Soil remediation works have not been undertaken at the power station site, and sub-surface infrastructure such as fuel tanks and pipelines, concrete floors and bunds remain in-situ.

Groundwater remedial works, comprising the recovery of phase separated hydrocarbons (and reuse within the mine operation) have been carried out on the site and the department understands these are ongoing. Approximately 21,940 L of diesel has been reported to the department to date as recovered for re-use within the mine-site.

An accredited auditor was voluntarily appointed by the site operator on 24 May 2018 to provide an independent review of further contamination investigations being undertaken at the power station. An interim voluntary auditor's report (VAR) was submitted to the department in October 2019 reporting on the progress of investigations associated with the former power station. The auditor's interim advice found that the investigations were generally progressing in accordance with the department's 'Contaminated Sites Guidelines' (2014) and the 'National Environment Protection (Assessment of Site Contamination) Measure 1999' (the NEPM).

In 2019 a soil vapour investigation was undertaken at an adjoining laboratory building to the former power station site that found no health risk to indoor site users. Further contamination investigations and VARs are scheduled.

2) Ampress Facility

The Ampress facility is known to have had historical incidents of hydrocarbon waste water discharging into an unlined pond and/or Whaleback Creek. The facility treats hydrocarbon containing waste waters that are pumped from the rail loop ponds, by a flocculation process.

3) ANFO Ammonium Nitrate Storage Facility

The ANFO ammonium nitrate storage facility is known to have had spillages during unloading/storage of ammonium nitrate. Elevated levels of nutrients in receiving surface waters and elevated levels of ammonia in soils at the facility has been reported.

4) ANFO Fuel Facility

Surface staining has been observed outside of the bunded area of the fuel facility adjacent to the bowser and tank refill points. Limited soil sampling has been undertaken at this facility, which indicated no vertical migration of hydrocarbons through the soil profile had occurred.

5) Acid Rock Drainage Dam

The Acid Rock Drainage (ARD) Dam and evaporation ponds are clay lined to store ARD water associated with the mining operations. In 2000 it was reported that there was evidence of elevated sulphate levels and low pH water in the drain at the downstream perimeter of the ARD Dam, with groundwater monitoring having also identified elevated sulphates adjacent to the ARD Dam and the southern perimeter of the evaporation ponds. A geotechnical investigation undertaken in 2000 indicated that the ARD Dam was leaking at that time. The ARD Dam was upgraded in 2000 with additional work being carried out on the downstream wall. Further upgrades were carried out in 2001, including a clay compacted liner and division of the impoundment area. Groundwater monitoring is

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:46PM, 25/03/2021

undertaken in the vicinity of the ARD facility. However, the results have not been provided to the Contaminated Sites Branch of the department.

6) Asbestos Waste Disposal Area - Former

The former asbestos mining waste disposal area previously received asbestos waste and has since been decommissioned and the surface rehabilitated. Buried asbestos waste remains contained at this location.

7) Asbestos Waste Disposal Area - Current

The current asbestos mining waste disposal area receives asbestos waste material.

8) Bioremediation Landfarm

The bioremediation landfarm is used to bioremediate hydrocarbon contaminated material from within the Mt Whaleback mine operations. Wastewater was historically collected from across the Operation and disposed at unlined evaporation ponds at the landfarm.

9) Checkpoint Refuelling Facilities

Diesel spillages have been reported at this facility and evidence of hydrocarbon staining has been observed adjacent to the hardstand areas.

10) Diesel Distribution Pipeline

Diesel has been transferred on-site through buried pipelines to the mobile equipment workshop and the lower checkpoint location. A diesel leak from a fuel line occurred on 17 December 1998. The extent of diesel contamination in the vicinity of the diesel leak was estimated to have spread 5m laterally and 27m along pipeline bedding material.

11) Former power station open drains

Earthen/unlined drains formerly received and directed overflow from oily waste water ponds at the former power station into Whaleback Creek. Following a diesel spill from the former power station in 1992, hydrocarbons were detected in surface sediment samples taken from the drainage channel 100m downstream of the spill. Drains were subsequently re-directed to the rail loop ponds by concrete diversion structures to prevent further discharge to Whaleback Creek.

12) Fuel farm and Rail Diesel Tank Unloading Facility

The bulk fuel storage facility for the mine operation and satellite orebodies, incorporates an unloading facility for diesel rail tankers. Diesel spills during unloading of rail tankers are known to have occurred, and a diesel leak from an underground pipeline in the vicinity of the rail unloading facility was also identified.

13) Landfill locations

The waste disposal facility receives general waste associated with the mine operation. A minor amount of asbestos piping is reported to have been disposed at the landfill. PFAS residues associated with firefighting training is reported as historically being deposited into landfills at the site.

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:46PM, 25/03/2021

14) No. 1 Secondary crusher sump

This is a former collection sump that received oily wastes/washdown waters from the secondary crusher plant (Line No. 1). The sump is earthen/unlined and discharges containing hydrocarbons are thought to be captured from the plant transfer points, compressor washdown and spillage of coolant. The area has now been infilled with the quality of fill being unknown.

15) No. 2 Primary crusher sump

The No. 2 Primary Crusher sump is the collection point for oily wastewaters and washdown waters from the primary crushing plant (Line No. 2). The earthen/unlined sump collects hydrocarbon-containing discharges, that are thought to be captured from the plant transfer points, compressor washdown and spillage of coolant.

16) No. 2 Secondary crusher sump

The No. 2 Secondary Crusher sump is a collection point for oily wastewaters and washdown waters from the secondary crushing plant (Line No. 2). The sump is earthen/unlined and collects hydrocarbon-containing discharges captured from the plant transfer point, compressor washdown and spillage of coolant.

17) Overburden storage areas

Overburden waste dumps include designated areas identified for the disposal of net acid generating (NAG) material. Although specific management practices are in place to ensure NAG material is encapsulated, a small proportion of NAG material is misplaced in overburden storage areas for 'clean' material. Historic practices are also known to have resulted in NAG material being inter-dispersed with 'clean' material. The clean fill and misplaced NAG material is not encapsulated and is a potential source of contamination.

18) Ponderosa workshop

The Ponderosa workshop is used for maintenance of mining equipment. Surface staining from hydrocarbons has been observed adjacent to hardstand areas and bowser/tank refill points. Hydrocarbon contamination has been reported as having potentially occurred due to minor spillages during vehicle maintenance/servicing, refuelling and oil/waste transfer operations.

19) Fire response training areas

A number of areas at the site were reported in February 2019 as being used for fire response training. 2018 soil sampling results indicated that PFAS residues are present in soils at these locations. The department understands that PFAS contamination investigations are currently being undertaken across the site.

20) Rail loop ponds

The rail loop ponds are the principal wastewater collection point for the mine operations and industrial area receiving oily wastewater discharge from the power station. Hydrocarbon contamination of underlying soils may have occurred due to the ponds being earthen/unlined and receiving discharges from diesel spillages, washdown of mining equipment and maintenance workshop runoff.

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:46PM, 25/03/2021

Residual fire suppressants are reported to have been discharged directly into unlined wastewater ponds (i.e.. such as the 'Rail Loop Ponds').

Soil and groundwater investigations were undertaken in 2018 in proximity to the Rail Loop Ponds and at down hydraulic gradient locations.

PFAS was detected in soils and also found to be present in groundwater at concentrations exceeding health-based guidance values for drinking water, and guideline values for freshwater ecosystems, as published in the 'PFAS National Environmental Management Plan' (Heads of EPAs Australia and New Zealand, January 2018), and recreational water quality 'Guidance on Per and Polyfluoroalkyl (PFAS) in Recreational Water' (National Health and Medical Research Council, August 2019).

LNAPL and dissolved phase hydrocarbons (such as from diesel or oil) were found in groundwater beneath the rail loop ponds. However, no assessment levels are currently available for the compounds present relevant to potable and non-potable uses of groundwater or ecosystem protection.

Metals (boron, copper and manganese) and nutrients (nitrate) were present in groundwater at concentrations exceeding assessment levels for fresh waters, with metals (boron, copper and manganese) also exceeding drinking water and/or domestic non-potable use of groundwater, as published in the guideline 'Assessment and management of contaminated sites' (DER, 2014).

A tier 1 screening risk assessment indicates that concentrations of contaminants exceed adopted assessment levels for drinking water and ecological investigation, therefore further investigation is required to determine the risk to human health, the environment and environmental values in this area.

Remedial works for the rail loop ponds are being proposed for the site such as capping the ponds with an impervious cover.

21) Surface drainage network (unlined)

The open drain network at the site receives runoff from the mine operation industrial area. The drainage network is largely unlined and ultimately flows into the Rail Loop Ponds. Historical spillages of diesel at the checkpoint refuelling facility have resulted in diesel overflow to the open drain. Oily wastewater discharges and diesel spillages have also occurred from various other facilities throughout the industrial area. Contamination by hydrocarbons (such as from diesel) and other potential contaminants (such as chlorinated hydrocarbons and PFAS) of underlying soils may have occurred due to discharges from diesel spillages, washdown of mining equipment and maintenance workshop runoff.

Wash down of heavy vehicles associated with fire response training has resulted in discharge of PFAS residue to the workshop bay, the wastewater drainage network and oily water separator.

22) Train Load-out facility

Visual staining has been identified at the entrance to the iron-ore train load out tunnels. Oil residue is associated with compressed air used within the loadout tunnel that discharges via ports at the exits of the tunnels.

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:46PM, 25/03/2021

23) Water treatment plant

A build-up of sulphate-containing precipitant within the discharge drainage channel is known to have occurred and there has been visual evidence of backwash discharge infiltrating into soils before discharging into Whaleback Creek.

24) Whaleback open pit

There is evidence of pyritic material in the walls of the open pit. The pit has a low pH. Any pyritic material mined is encapsulated with inert material in overburden storage areas. Low pH water from the pit is pumped to the ARD dam and evaporation ponds.

Oxidation of metals (such as chromium, molybdenum, selenium and tungsten) in aquifer sediments may result from mine dewatering. Selenium concentrations in the Newman water supply wellfield periodically exceed drinking water guidelines.

Soil and groundwater investigations undertaken in areas 1 - 24 are limited, and the quality of soil and groundwater beneath across the site are unknown. Further soil and groundwater investigations are required to determine the contamination status of the soil and groundwater at the reported areas.

Limited sediment investigations in Whaleback Creek were reported as being conducted following the diesel spill in 1992. However the current quality of sediments on/off-site are unknown.

Risk assessment is currently limited to targeted portions of the site and has not yet been fully carried out to determine the potential risk posed by all substances of concern at the site or off-site, to human health, the environment or any environmental value.

Reporting of routine groundwater monitoring carried out to comply with Part V 'Environmental Protection Act 1986' licence conditions for the premises contains insufficient technical/hydrogeological information and/or documentation to enable an assessment of contamination to be carried out in accordance with the department's 'Contaminated Sites Guidelines' (2014) and the NEPM.

As hydrocarbons including LNAPL (such as from diesel, oil) and PFAS are present in the soil and groundwater at the power station and rail loop ponds (areas 1 and 20 above), which are acting as a significant source of dissolved-phase groundwater contamination, which presents a risk to human health, the environment, or environmental values, the site is classified as 'contaminated - remediation required'.

Once the results of further investigations and remedial works have been submitted to the department for areas 1 - 24, these will be reviewed and the site (or portions of the site) may be re-classified.

A memorial stating the site's classification has been placed on the certificate of title, and will trigger the need for further investigations and risk assessment should the site be proposed for a more sensitive land use.

The department, in consultation with the Department of Health, has classified this site based on the information available to the department at the time of classification. It is acknowledged that the contamination status of the site may have changed since the information was collated and/or submitted to the department, and as such, the usefulness of this information may be limited.

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:46PM, 25/03/2021

In accordance with Department of Health advice, if groundwater is being, or is proposed to be abstracted, the department recommends that analytical testing should be carried out to determine whether the groundwater is suitable for its intended use.

Other Relevant Information:

Additional information included herein is relevant to the contamination status of the site and includes the department's expectations for action that should be taken to address potential or actual contamination described in the Reasons for Classification.

Action Required:

Further soil investigations, groundwater investigations and an appropriate risk assessment are required to adequately delineate and characterise the current nature and extent of soil and groundwater contamination. Groundwater investigations should fully characterise and delineate the lateral and vertical extent of the groundwater contamination beneath the site, capture seasonal variations and further characterise the hydrogeology at the site.

Soil, sediment and groundwater investigations should meet the standards outlined in the departments 'Contaminated Sites Guidelines' (2014) and the NEPM.

If further investigation identifies off-site impacts, future reports on investigation, assessment, monitoring or remediation of the site which are submitted to the department will need to be accompanied by a Mandatory Auditor's Report, in accordance with regulation 31(1)(b) of the Contaminated Sites Regulations 2006.

Further investigations are required to address PFAS, which are potential contaminants of concern at wastewater treatment facilities, landfills and fire-fighting training facilities, as specified in 'PFAS National Environmental Management Plan' (Heads of EPAs Australia and New Zealand, January 2018). PFAS investigations and assessment are to be carried out in accordance with the 'PFAS National Environmental Management Plan Version 2.0' (Heads of EPAs Australia and New Zealand, January 2020).

Asbestos investigations are required to determine the nature and extent of asbestos impacts in the former/current asbestos disposal areas, the general landfill and the potential for asbestos impact across the site. Investigations should be carried out in accordance with the 'Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia' (Department of Health, May 2009).

A risk assessment is required to determine potential risk to human health, the environment or any environmental value and should include an assessment of all potential receptors, including site users, down-gradient groundwater users and the risk assessment should be carried out in accordance with guidance in the department's Contaminated Sites Guidelines and the NEPM.

Particular emphasis should be placed on determining risk to: on-site workers, the P1 Public Drinking Water Supply Area, drinking water production bores (on-site or off-site), Ophthalmia Dam town water supply and the freshwater ecosystems of Whaleback Creek and Fortescue River.

Remediation of the site is required to mitigate potential risks to human health, the environment and/or any environmental value. Remedial options are required to be assessed and remediation action plans progressively developed for the site and submitted to the department or an auditor.

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Contaminated Sites Act 2003 Basic Summary of Records Search Response

Report generated at 04:33:46PM, 25/03/2021

The department recommends that all areas of significant contamination in soils at the site, be either actively remediated or capped with an impervious barrier in order to achieve long term protection of the regional groundwater aquifer and freshwater ecosystems.

An interim site management plan for PFAS in soils and groundwater across the site including, but not limited to, fire training areas, wastewater disposal areas and the rail loop ponds should be submitted to the department by April 2021.

A remediation action plan for the rail loop ponds should be developed for the site and submitted to the department by July 2021.

Due to the presence of contaminants including hydrocarbons, PFAS and asbestos in soil and/or groundwater, a site-specific health and safety plan should be developed and implemented to address the risks to the health of any workers undertaking intrusive works until further notice.

Certificate of Title Memorial

Under the Contaminated Sites Act 2003, this site has been classified as "Contaminated - remediation required". For further information on the contamination status of this site, please contact the Contaminated Sites section of the Department of Environment & Conservation.

Current Regulatory Notice Issued

Type of Regulatory Notice: *Nil*

Date Issued: *Nil*

General

No other information relating to this parcel.

Disclaimer

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Contaminated Sites Act 2003 Basic Summary of Records Search Response

Report generated at 04:33:31PM, 25/03/2021

Receipt No:

ID No: 20961

Search Results

This response relates to a search request received for:

2339 Radio Hill Dr
Newman, WA, 6753

This parcel belongs to a site that contains 1 parcel(s).

According to Department of Water and Environmental Regulation records, this land has been reported as a known or suspected contaminated site.

Address	2339 Radio Hill Dr Newman, WA, 6753
Lot on Plan Address	Lot 2339 On Plan 218369
Parcel Status	<p>Classification: 23/06/2011 - Remediated for restricted use</p> <p>Nature and Extent of Contamination:</p> <p>Isolated areas of hydrocarbon-impacted soil (such as from diesel) remain on site following remediation.</p> <p>Restrictions on Use:</p> <p>The land use of the site is restricted to commercial/industrial use, which excludes childcare centres, kindergartens, pre-schools and primary schools. The site should not be developed for a more sensitive use such as recreational open space; residential use or childcare centres without further contamination assessment and/or remediation.</p> <p>Reason for Classification:</p> <p>This site was reported to the Department of Environment and Conservation (DEC) under section 11 of the 'Contaminated Sites Act 2003', which commenced on 1 December 2006. The site classification is based on information submitted to DEC by May 2011.</p> <p>This site is used as a concrete batching plant and storage depot, a land use that has the potential to cause contamination, as specified in the guideline 'Potentially Contaminating Activities, Industries and Landuses' (Department of Environment, 2004).</p> <p>In March 2009 DEC's Pilbara Industry Regulation team conducted an inspection of the site to assess compliance with the Environmental Protection (Concrete Batching and Cement Product Manufacturing) Regulations 1998. The site was reported because during the inspection DEC identified that a fuel storage bund had been compromised and hydrocarbons (such as from diesel) had been allowed to enter the environment.</p> <p>A contamination assessment and remedial works were carried out in 2010. Soil remediation involving excavation and off-site disposal of soils was carried out at the site, and the majority of impacted soils were successfully remediated. Soil validation sampling found that total petroleum hydrocarbons</p>

Disclaimer

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Contaminated Sites Act 2003 **Basic Summary of Records Search Response**

Report generated at 04:33:31PM, 25/03/2021

remain in a small volume of soil at concentrations exceeding Ecological Investigation Levels, but not exceeding Health-based Investigation Levels for commercial and industrial sites as published in 'Assessment Levels for Soil, Sediment and Water' (DEC, 2010).

Groundwater bores in the area indicate that groundwater occurs at approximately 30 metres below ground level; however, site-specific investigations have not been carried out. Due to the expected depth to groundwater, groundwater is not considered to be at risk of impact from the residual hydrocarbons in shallow soils of the site.

A Screening Risk Assessment has indicated that the levels of substances present on the site do not pose an unacceptable risk to human health, the environment or any environmental value under the current land use.

Based on the available information, the site is suitable for continued commercial/industrial land use, however, further assessment of potential contamination should be undertaken before any change to a more sensitive land use (e.g. residential housing, childcare centres).

As the site is contaminated and has been remediated such that it is suitable for the current landuse, but may not be suitable for a more sensitive landuse, the site is classified as 'remediated for restricted use'.

A memorial stating the site's classification has been placed on the Certificate of Title, and will trigger the need for further investigations and risk assessment should the site be proposed for a more sensitive land use.

DEC, in consultation with the Department of Health, has classified this site based on the information available at the time of classification. It is acknowledged that the contamination status may have changed since this time, and as such the usefulness of this information may be limited.

In accordance with Department of Health advice if groundwater is being, or is proposed to be, abstracted DEC recommends that analytical testing should be carried out to determine whether the groundwater is suitable for its intended use.

Certificate of Title Memorial

Under the Contaminated Sites Act 2003, this site has been classified as "remediated for restricted use". For further information on the contamination status of this site, please contact the Contaminated Sites Branch of the Department of Environment & Conservation.

Current Regulatory Notice Issued

Type of Regulatory Notice: *Nil*
Date Issued: *Nil*

General

No other information relating to this parcel.

Disclaimer

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Contaminated Sites Act 2003 Basic Summary of Records Search Response

Report generated at 04:33:10PM, 25/03/2021

Receipt No:

ID No: 36079

Search Results

This response relates to a search request received for:

1 Hilditch Av
Newman, WA, 6753

This parcel belongs to a site that contains 2 parcel(s).

According to Department of Water and Environmental Regulation records, this land has been reported as a known or suspected contaminated site.

Address	1 Hilditch Av Newman, WA, 6753
Lot on Plan Address	Lot 18 On Plan 14767
Parcel Status	<p>Classification: 05/04/2016 - <i>Remediated for restricted use</i></p> <p>Nature and Extent of Contamination:</p> <p>Uncontrolled fill material, potentially impacted with asbestos-contaminating materials (ACM), remains at depths greater than 0.3 metres at isolated locations across the site.</p> <p>Restrictions on Use:</p> <p>The land use of the site is restricted to commercial/industrial use; which excludes sensitive uses with accessible soil such as childcare centres, kindergartens, pre-schools and primary schools. The site should not be developed for a more sensitive use such as recreational open space; residential use or childcare centres without further contamination assessment and/or remediation.</p> <p>Due to the presence of asbestos in soil, an Ongoing Site Management Plan (OSMP) must be developed and implemented to address the risks to the health of any workers undertaking intrusive works. The site is to be managed in accordance with the provisions of an auditor-approved OSMP.</p> <p>Reason for Classification:</p> <p>This site, comprised of Lots 18 and 21 Hilditch Avenue, Newman, was used as a mess hall for mining workers, and accommodation for railway workers for approximately 38 years, from 1969 to 2007. Following demolition of buildings on the site, contamination investigations were carried out in 2013 and 2014 to assess the site's suitability for a proposed commercial redevelopment. The site classification is based on information submitted to the Department of Environment Regulation (DER) by November 2015.</p> <p>The investigations identified uncontrolled fill material across both lots, extending to a maximum depth of 1.2 metres and with an average depth of 0.3 metres. Fragments of asbestos containing materials (ACM), and free asbestos fibres were identified within the fill material.</p> <p>Remediation works were carried out at the site in 2014, comprising the excavation and off-site</p>

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:10PM, 25/03/2021

disposal of the top 0.3 metres of soil from the site. Following remediation, some areas of uncontrolled fill remained on the site in locations where the depth of the fill material exceeded 0.3 metres, and within batters constructed on the perimeter of the site around the edges of the excavation. Validation sampling confirmed that the excavated area was free of any visible ACM fragments or asbestos fibres, however the potential for residual ACM or asbestos fibres to remain at depth was noted in the remediation and validation report for the site.

The investigations, remediation and validation works undertaken at the site were the subject of an independent review by an accredited Contaminated Sites Auditor, who provided a Voluntary Auditor's Report (VAR) dated August 2014. The VAR recommended that the site is suitable for ongoing commercial/industrial use, subject to the development and implementation of an Ongoing Site Management Plan (OSMP) to address the risks associated with potential future excavation of residual uncontrolled fill material. DER has reviewed the site investigations and accepts the findings of the VAR.

As the site is contaminated and has been remediated such that it is suitable for the current land use, subject to implementation of the OSMP, but may not be suitable for a more sensitive land use, the site is classified as 'remediated for restricted use'.

DER, in consultation with the Department of Health, has classified this site based on the information available to DER at the time of classification. It is acknowledged that the contamination status of the site may have changed since the information was collated and/or submitted to DER, and as such, the usefulness of this information may be limited.

In accordance with Department of Health advice, if groundwater is being, or is proposed to be abstracted, DER recommends that analytical testing should be carried out to determine whether the groundwater is suitable for its intended use.

Other Relevant Information:

Additional information included herein is relevant to the contamination status of the site and includes DER's expectations for action that should be taken to address potential or actual contamination described in the Reasons for Classification.

Where the land is part of a transaction - sale, mortgagee or lease agreement, the land owners **MUST PROVIDE WRITTEN DISCLOSURE** (on the prescribed Form 6) of the site's status to any potential owner, mortgagee (e.g financial institutions) or lessee at least 14 days before the completion of the transaction. A copy of the disclosure must also be forwarded to DER.

Action Required:

Due to the presence of asbestos in soil, and consistent with advice provided by the contaminated sites auditor, an Ongoing Site Management Plan must be developed and implemented to address the risks to the health of any workers undertaking intrusive works until further notice.

Certificate of Title Memorial

Under the Contaminated Sites Act 2003, this site has been classified as "remediated for restricted use". For further information on the contamination status of this site, please contact Contaminated Sites at the Department of Environment Regulation.

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:10PM, 25/03/2021

Current Regulatory Notice Issued	Type of Regulatory Notice: <i>Nil</i> Date Issued: <i>Nil</i>
General	No other information relating to this parcel.

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Contaminated Sites Act 2003 Basic Summary of Records Search Response

Report generated at 04:33:04PM, 25/03/2021

Receipt No:

ID No: 36080

Search Results

This response relates to a search request received for:

69 Newman Dr
Newman, WA, 6753

This parcel belongs to a site that contains 2 parcel(s).

According to Department of Water and Environmental Regulation records, this land has been reported as a known or suspected contaminated site.

Address	69 Newman Dr Newman, WA, 6753
Lot on Plan Address	Lot 21 On Plan 24130
Parcel Status	<p>Classification: 05/04/2016 - <i>Remediated for restricted use</i></p> <p>Nature and Extent of Contamination:</p> <p>Uncontrolled fill material, potentially impacted with asbestos-contaminating materials (ACM), remains at depths greater than 0.3 metres at isolated locations across the site.</p> <p>Restrictions on Use:</p> <p>The land use of the site is restricted to commercial/industrial use; which excludes sensitive uses with accessible soil such as childcare centres, kindergartens, pre-schools and primary schools. The site should not be developed for a more sensitive use such as recreational open space; residential use or childcare centres without further contamination assessment and/or remediation.</p> <p>Due to the presence of asbestos in soil, an Ongoing Site Management Plan (OSMP) must be developed and implemented to address the risks to the health of any workers undertaking intrusive works. The site is to be managed in accordance with the provisions of an auditor-approved OSMP.</p> <p>Reason for Classification:</p> <p>This site, comprised of Lots 18 and 21 Hilditch Avenue, Newman, was used as a mess hall for mining workers, and accommodation for railway workers for approximately 38 years, from 1969 to 2007. Following demolition of buildings on the site, contamination investigations were carried out in 2013 and 2014 to assess the site's suitability for a proposed commercial redevelopment. The site classification is based on information submitted to the Department of Environment Regulation (DER) by November 2015.</p> <p>The investigations identified uncontrolled fill material across both lots, extending to a maximum depth of 1.2 metres and with an average depth of 0.3 metres. Fragments of asbestos containing materials (ACM), and free asbestos fibres were identified within the fill material.</p> <p>Remediation works were carried out at the site in 2014, comprising the excavation and off-site</p>

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:04PM, 25/03/2021

disposal of the top 0.3 metres of soil from the site. Following remediation, some areas of uncontrolled fill remained on the site in locations where the depth of the fill material exceeded 0.3 metres, and within batters constructed on the perimeter of the site around the edges of the excavation. Validation sampling confirmed that the excavated area was free of any visible ACM fragments or asbestos fibres, however the potential for residual ACM or asbestos fibres to remain at depth was noted in the remediation and validation report for the site.

The investigations, remediation and validation works undertaken at the site were the subject of an independent review by an accredited Contaminated Sites Auditor, who provided a Voluntary Auditor's Report (VAR) dated August 2014. The VAR recommended that the site is suitable for ongoing commercial/industrial use, subject to the development and implementation of an Ongoing Site Management Plan (OSMP) to address the risks associated with potential future excavation of residual uncontrolled fill material. DER has reviewed the site investigations and accepts the findings of the VAR.

As the site is contaminated and has been remediated such that it is suitable for the current land use, subject to implementation of the OSMP, but may not be suitable for a more sensitive land use, the site is classified as 'remediated for restricted use'.

DER, in consultation with the Department of Health, has classified this site based on the information available to DER at the time of classification. It is acknowledged that the contamination status of the site may have changed since the information was collated and/or submitted to DER, and as such, the usefulness of this information may be limited.

In accordance with Department of Health advice, if groundwater is being, or is proposed to be abstracted, DER recommends that analytical testing should be carried out to determine whether the groundwater is suitable for its intended use.

Other Relevant Information:

Additional information included herein is relevant to the contamination status of the site and includes DER's expectations for action that should be taken to address potential or actual contamination described in the Reasons for Classification.

Where the land is part of a transaction - sale, mortgagee or lease agreement, the land owners **MUST PROVIDE WRITTEN DISCLOSURE** (on the prescribed Form 6) of the site's status to any potential owner, mortgagee (e.g financial institutions) or lessee at least 14 days before the completion of the transaction. A copy of the disclosure must also be forwarded to DER.

Action Required:

Due to the presence of asbestos in soil, and consistent with advice provided by the contaminated sites auditor, an Ongoing Site Management Plan must be developed and implemented to address the risks to the health of any workers undertaking intrusive works until further notice.

Certificate of Title Memorial

Under the Contaminated Sites Act 2003, this site has been classified as "remediated for restricted use". For further information on the contamination status of this site, please contact Contaminated Sites at the Department of Environment Regulation.

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:04PM, 25/03/2021

Current Regulatory Notice Issued	Type of Regulatory Notice: <i>Nil</i> Date Issued: <i>Nil</i>
General	No other information relating to this parcel.

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Contaminated Sites Act 2003 Basic Summary of Records Search Response

Report generated at 04:33:26PM, 25/03/2021

Receipt No:

ID No: 75084

Search Results

This response relates to a search request received for:

Lot 19 On Plan 48921
Newman, WA, 6753

This parcel belongs to a site that contains 5 parcel(s).

According to Department of Water and Environmental Regulation records, this land has been reported as a known or suspected contaminated site.

Address	Lot 19 On Plan 48921 Newman, WA, 6753
Lot on Plan Address	Lot 19 On Plan 48921
Parcel Status	<p>Classification: 10/12/2020 - <i>Contaminated - remediation required</i></p> <p>Nature and Extent of Contamination:</p> <p>Soils and groundwater in the mine operations area are impacted by petroleum hydrocarbons (such as from diesel or oil), perfluoroalkyl and polyfluoroalkyl substances (PFAS) and asbestos.</p> <p>Petroleum hydrocarbons have been identified in surface and sub-surface soils to 45 meters below ground level, at the former power station site. Light non-aqueous phase liquid hydrocarbons (such as pure petrol or diesel) has been observed floating on the surface of the watertable beneath the former power station site.</p> <p>PFAS, associated with fire suppression foam application and disposal at the site, has been detected in groundwater beneath the site.</p> <p>Asbestos containing materials (ACM) are present in former and current asbestos waste disposal areas and in general landfill.</p> <p>Restrictions on Use:</p> <p>Please refer to Reasons for Classification for further information on the potential contamination present at the site.</p> <p>Reason for Classification:</p> <p>This site was originally reported to the Department of Water & Environmental Regulation (the department) prior to the commencement of the 'Contaminated Sites Act 2003' (the Act), and was reported again as per reporting obligations under section 11 of the Act in May 2007 and October 2019.</p> <p>The original site classification under section 13 of the Act was based on information submitted to the department by October 2004, with the 'reasons for classification' subsequently updated to reflect additional technical information submitted to the department by August 2012, and again by October</p>

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:27PM, 25/03/2021

2019.

The Mount Whaleback Iron Ore Mine (the mine operation) is situated in the Whaleback Creek, Ophthalmia Dam and Fortescue River catchment area and located within a Priority 1 Public Drinking Water Supply Area. The mine has operated since 1968.

The site comprises 4147 hectares of land and is used for mining of iron ore including the storage of chemicals and minerals associated with the operation of the iron ore mine. Mining and mineral processing are land uses that have the potential to cause contamination as specified in the guideline 'Assessment and management of contaminated sites' (Department of Environment Regulation [DER], 2014).

The site was originally reported because light non-aqueous phase liquid (LNAPL), such as pure hydrocarbon (diesel), was found to be floating on the surface of groundwater beneath the former power station, and significant hydrocarbon staining of soils were observed at the site. Additionally, known hydrocarbon leaks and contaminated discharges to Whaleback Creek have been recorded at the site.

A site inspection conducted by a department officer in July 2012, identified hydrocarbon leakage and staining within industrial/operational portions of the site.

The site was reported again in February 2019 because perfluoroalkyl and polyfluoroalkyl substances (PFAS), such as from fire-fighting foams or PFAS-containing waste were known to have been used at the site and had been detected in groundwater beneath the site associated with a number of fire training areas and wastewater treatment and discharge locations.

This mine site is divided into a number of areas used for industrial and operational purposes. Each of these areas are discussed below.

1) Former diesel fired power station

This area of the site was reported because it was used as a diesel fired power station for 44 years, between 1967 and 1994. A fuel leak occurred in 1992 from an underground fuel pipeline network, comprising the loss of an estimated 90,000L of diesel, and evidence of surface staining indicated hydrocarbon contamination at the site.

The former power station was decommissioned between 1996 and 2000. In 2007 the central portion of the site was redeveloped as a mine laboratory. The department understands that the development of the balance of the former power station site, for either open space or car parking is being considered.

Sub-surface soil and groundwater investigations in 2003 found hydrocarbons were present in sub-surface soils across the site between 1 meter and 45 meters below ground level, and in groundwater beneath the site. Testing of surface soils less than 1m below ground level was not included in this investigation. Hydrocarbon concentrations in soil had been found to exceed Ecological Investigation Levels as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment, 2003) which were the relevant guidelines at that time. LNAPL was detected floating on the surface of the groundwater beneath the central portion of the power station site. Dissolved hydrocarbons (such as from diesel or oil) were present in groundwater at concentrations that were found to exceed the Groundwater Intervention Values (Netherlands Ministry for Housing, Spatial Planning and Environment, 2000), which were the relevant groundwater guidelines at that time.

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

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A Health Risk Assessment in 2004 recommended that LNAPL be removed from groundwater beneath the former power station site prior to redevelopment for commercial use or open space. Soil remediation works have not been undertaken at the power station site, and sub-surface infrastructure such as fuel tanks and pipelines, concrete floors and bunds remain in-situ.

Groundwater remedial works, comprising the recovery of phase separated hydrocarbons (and reuse within the mine operation) have been carried out on the site and the department understands these are ongoing. Approximately 21,940 L of diesel has been reported to the department to date as recovered for re-use within the mine-site.

An accredited auditor was voluntarily appointed by the site operator on 24 May 2018 to provide an independent review of further contamination investigations being undertaken at the power station. An interim voluntary auditor's report (VAR) was submitted to the department in October 2019 reporting on the progress of investigations associated with the former power station. The auditor's interim advice found that the investigations were generally progressing in accordance with the department's 'Contaminated Sites Guidelines' (2014) and the 'National Environment Protection (Assessment of Site Contamination) Measure 1999' (the NEPM).

In 2019 a soil vapour investigation was undertaken at an adjoining laboratory building to the former power station site that found no health risk to indoor site users. Further contamination investigations and VARs are scheduled.

2) Ampress Facility

The Ampress facility is known to have had historical incidents of hydrocarbon waste water discharging into an unlined pond and/or Whaleback Creek. The facility treats hydrocarbon containing waste waters that are pumped from the rail loop ponds, by a flocculation process.

3) ANFO Ammonium Nitrate Storage Facility

The ANFO ammonium nitrate storage facility is known to have had spillages during unloading/storage of ammonium nitrate. Elevated levels of nutrients in receiving surface waters and elevated levels of ammonia in soils at the facility has been reported.

4) ANFO Fuel Facility

Surface staining has been observed outside of the bunded area of the fuel facility adjacent to the bowser and tank refill points. Limited soil sampling has been undertaken at this facility, which indicated no vertical migration of hydrocarbons through the soil profile had occurred.

5) Acid Rock Drainage Dam

The Acid Rock Drainage (ARD) Dam and evaporation ponds are clay lined to store ARD water associated with the mining operations. In 2000 it was reported that there was evidence of elevated sulphate levels and low pH water in the drain at the downstream perimeter of the ARD Dam, with groundwater monitoring having also identified elevated sulphates adjacent to the ARD Dam and the southern perimeter of the evaporation ponds. A geotechnical investigation undertaken in 2000 indicated that the ARD Dam was leaking at that time. The ARD Dam was upgraded in 2000 with additional work being carried out on the downstream wall. Further upgrades were carried out in 2001, including a clay compacted liner and division of the impoundment area. Groundwater monitoring is

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:27PM, 25/03/2021

undertaken in the vicinity of the ARD facility. However, the results have not been provided to the Contaminated Sites Branch of the department.

6) Asbestos Waste Disposal Area - Former

The former asbestos mining waste disposal area previously received asbestos waste and has since been decommissioned and the surface rehabilitated. Buried asbestos waste remains contained at this location.

7) Asbestos Waste Disposal Area - Current

The current asbestos mining waste disposal area receives asbestos waste material.

8) Bioremediation Landfarm

The bioremediation landfarm is used to bioremediate hydrocarbon contaminated material from within the Mt Whaleback mine operations. Wastewater was historically collected from across the Operation and disposed at unlined evaporation ponds at the landfarm.

9) Checkpoint Refuelling Facilities

Diesel spillages have been reported at this facility and evidence of hydrocarbon staining has been observed adjacent to the hardstand areas.

10) Diesel Distribution Pipeline

Diesel has been transferred on-site through buried pipelines to the mobile equipment workshop and the lower checkpoint location. A diesel leak from a fuel line occurred on 17 December 1998. The extent of diesel contamination in the vicinity of the diesel leak was estimated to have spread 5m laterally and 27m along pipeline bedding material.

11) Former power station open drains

Earthen/unlined drains formerly received and directed overflow from oily waste water ponds at the former power station into Whaleback Creek. Following a diesel spill from the former power station in 1992, hydrocarbons were detected in surface sediment samples taken from the drainage channel 100m downstream of the spill. Drains were subsequently re-directed to the rail loop ponds by concrete diversion structures to prevent further discharge to Whaleback Creek.

12) Fuel farm and Rail Diesel Tank Unloading Facility

The bulk fuel storage facility for the mine operation and satellite orebodies, incorporates an unloading facility for diesel rail tankers. Diesel spills during unloading of rail tankers are known to have occurred, and a diesel leak from an underground pipeline in the vicinity of the rail unloading facility was also identified.

13) Landfill locations

The waste disposal facility receives general waste associated with the mine operation. A minor amount of asbestos piping is reported to have been disposed at the landfill. PFAS residues associated with firefighting training is reported as historically being deposited into landfills at the site.

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:27PM, 25/03/2021

14) No. 1 Secondary crusher sump

This is a former collection sump that received oily wastes/washdown waters from the secondary crusher plant (Line No. 1). The sump is earthen/unlined and discharges containing hydrocarbons are thought to be captured from the plant transfer points, compressor washdown and spillage of coolant. The area has now been infilled with the quality of fill being unknown.

15) No. 2 Primary crusher sump

The No. 2 Primary Crusher sump is the collection point for oily wastewaters and washdown waters from the primary crushing plant (Line No. 2). The earthen/unlined sump collects hydrocarbon-containing discharges, that are thought to be captured from the plant transfer points, compressor washdown and spillage of coolant.

16) No. 2 Secondary crusher sump

The No. 2 Secondary Crusher sump is a collection point for oily wastewaters and washdown waters from the secondary crushing plant (Line No. 2). The sump is earthen/unlined and collects hydrocarbon-containing discharges captured from the plant transfer point, compressor washdown and spillage of coolant.

17) Overburden storage areas

Overburden waste dumps include designated areas identified for the disposal of net acid generating (NAG) material. Although specific management practices are in place to ensure NAG material is encapsulated, a small proportion of NAG material is misplaced in overburden storage areas for 'clean' material. Historic practices are also known to have resulted in NAG material being inter-dispersed with 'clean' material. The clean fill and misplaced NAG material is not encapsulated and is a potential source of contamination.

18) Ponderosa workshop

The Ponderosa workshop is used for maintenance of mining equipment. Surface staining from hydrocarbons has been observed adjacent to hardstand areas and bowser/tank refill points. Hydrocarbon contamination has been reported as having potentially occurred due to minor spillages during vehicle maintenance/servicing, refuelling and oil/waste transfer operations.

19) Fire response training areas

A number of areas at the site were reported in February 2019 as being used for fire response training. 2018 soil sampling results indicated that PFAS residues are present in soils at these locations. The department understands that PFAS contamination investigations are currently being undertaken across the site.

20) Rail loop ponds

The rail loop ponds are the principal wastewater collection point for the mine operations and industrial area receiving oily wastewater discharge from the power station. Hydrocarbon contamination of underlying soils may have occurred due to the ponds being earthen/unlined and receiving discharges from diesel spillages, washdown of mining equipment and maintenance workshop runoff.

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Residual fire suppressants are reported to have been discharged directly into unlined wastewater ponds (i.e.. such as the 'Rail Loop Ponds').

Soil and groundwater investigations were undertaken in 2018 in proximity to the Rail Loop Ponds and at down hydraulic gradient locations.

PFAS was detected in soils and also found to be present in groundwater at concentrations exceeding health-based guidance values for drinking water, and guideline values for freshwater ecosystems, as published in the 'PFAS National Environmental Management Plan' (Heads of EPAs Australia and New Zealand, January 2018), and recreational water quality 'Guidance on Per and Polyfluoroalkyl (PFAS) in Recreational Water' (National Health and Medical Research Council, August 2019).

LNAPL and dissolved phase hydrocarbons (such as from diesel or oil) were found in groundwater beneath the rail loop ponds. However, no assessment levels are currently available for the compounds present relevant to potable and non-potable uses of groundwater or ecosystem protection.

Metals (boron, copper and manganese) and nutrients (nitrate) were present in groundwater at concentrations exceeding assessment levels for fresh waters, with metals (boron, copper and manganese) also exceeding drinking water and/or domestic non-potable use of groundwater, as published in the guideline 'Assessment and management of contaminated sites' (DER, 2014).

A tier 1 screening risk assessment indicates that concentrations of contaminants exceed adopted assessment levels for drinking water and ecological investigation, therefore further investigation is required to determine the risk to human health, the environment and environmental values in this area.

Remedial works for the rail loop ponds are being proposed for the site such as capping the ponds with an impervious cover.

21) Surface drainage network (unlined)

The open drain network at the site receives runoff from the mine operation industrial area. The drainage network is largely unlined and ultimately flows into the Rail Loop Ponds. Historical spillages of diesel at the checkpoint refuelling facility have resulted in diesel overflow to the open drain. Oily wastewater discharges and diesel spillages have also occurred from various other facilities throughout the industrial area. Contamination by hydrocarbons (such as from diesel) and other potential contaminants (such as chlorinated hydrocarbons and PFAS) of underlying soils may have occurred due to discharges from diesel spillages, washdown of mining equipment and maintenance workshop runoff.

Wash down of heavy vehicles associated with fire response training has resulted in discharge of PFAS residue to the workshop bay, the wastewater drainage network and oily water separator.

22) Train Load-out facility

Visual staining has been identified at the entrance to the iron-ore train load out tunnels. Oil residue is associated with compressed air used within the loadout tunnel that discharges via ports at the exits of the tunnels.

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23) Water treatment plant

A build-up of sulphate-containing precipitant within the discharge drainage channel is known to have occurred and there has been visual evidence of backwash discharge infiltrating into soils before discharging into Whaleback Creek.

24) Whaleback open pit

There is evidence of pyritic material in the walls of the open pit. The pit has a low pH. Any pyritic material mined is encapsulated with inert material in overburden storage areas. Low pH water from the pit is pumped to the ARD dam and evaporation ponds.

Oxidation of metals (such as chromium, molybdenum, selenium and tungsten) in aquifer sediments may result from mine dewatering. Selenium concentrations in the Newman water supply wellfield periodically exceed drinking water guidelines.

Soil and groundwater investigations undertaken in areas 1 - 24 are limited, and the quality of soil and groundwater beneath across the site are unknown. Further soil and groundwater investigations are required to determine the contamination status of the soil and groundwater at the reported areas.

Limited sediment investigations in Whaleback Creek were reported as being conducted following the diesel spill in 1992. However the current quality of sediments on/off-site are unknown.

Risk assessment is currently limited to targeted portions of the site and has not yet been fully carried out to determine the potential risk posed by all substances of concern at the site or off-site, to human health, the environment or any environmental value.

Reporting of routine groundwater monitoring carried out to comply with Part V 'Environmental Protection Act 1986' licence conditions for the premises contains insufficient technical/hydrogeological information and/or documentation to enable an assessment of contamination to be carried out in accordance with the department's 'Contaminated Sites Guidelines' (2014) and the NEPM.

As hydrocarbons including LNAPL (such as from diesel, oil) and PFAS are present in the soil and groundwater at the power station and rail loop ponds (areas 1 and 20 above), which are acting as a significant source of dissolved-phase groundwater contamination, which presents a risk to human health, the environment, or environmental values, the site is classified as 'contaminated - remediation required'.

Once the results of further investigations and remedial works have been submitted to the department for areas 1 - 24, these will be reviewed and the site (or portions of the site) may be re-classified.

A memorial stating the site's classification has been placed on the certificate of title, and will trigger the need for further investigations and risk assessment should the site be proposed for a more sensitive land use.

The department, in consultation with the Department of Health, has classified this site based on the information available to the department at the time of classification. It is acknowledged that the contamination status of the site may have changed since the information was collated and/or submitted to the department, and as such, the usefulness of this information may be limited.

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In accordance with Department of Health advice, if groundwater is being, or is proposed to be abstracted, the department recommends that analytical testing should be carried out to determine whether the groundwater is suitable for its intended use.

Other Relevant Information:

Additional information included herein is relevant to the contamination status of the site and includes the department's expectations for action that should be taken to address potential or actual contamination described in the Reasons for Classification.

Action Required:

Further soil investigations, groundwater investigations and an appropriate risk assessment are required to adequately delineate and characterise the current nature and extent of soil and groundwater contamination. Groundwater investigations should fully characterise and delineate the lateral and vertical extent of the groundwater contamination beneath the site, capture seasonal variations and further characterise the hydrogeology at the site.

Soil, sediment and groundwater investigations should meet the standards outlined in the departments 'Contaminated Sites Guidelines' (2014) and the NEPM.

If further investigation identifies off-site impacts, future reports on investigation, assessment, monitoring or remediation of the site which are submitted to the department will need to be accompanied by a Mandatory Auditor's Report, in accordance with regulation 31(1)(b) of the Contaminated Sites Regulations 2006.

Further investigations are required to address PFAS, which are potential contaminants of concern at wastewater treatment facilities, landfills and fire-fighting training facilities, as specified in 'PFAS National Environmental Management Plan' (Heads of EPAs Australia and New Zealand, January 2018). PFAS investigations and assessment are to be carried out in accordance with the 'PFAS National Environmental Management Plan Version 2.0' (Heads of EPAs Australia and New Zealand, January 2020).

Asbestos investigations are required to determine the nature and extent of asbestos impacts in the former/current asbestos disposal areas, the general landfill and the potential for asbestos impact across the site. Investigations should be carried out in accordance with the 'Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia' (Department of Health, May 2009).

A risk assessment is required to determine potential risk to human health, the environment or any environmental value and should include an assessment of all potential receptors, including site users, down-gradient groundwater users and the risk assessment should be carried out in accordance with guidance in the department's Contaminated Sites Guidelines and the NEPM.

Particular emphasis should be placed on determining risk to: on-site workers, the P1 Public Drinking Water Supply Area, drinking water production bores (on-site or off-site), Ophthalmia Dam town water supply and the freshwater ecosystems of Whaleback Creek and Fortescue River.

Remediation of the site is required to mitigate potential risks to human health, the environment and/or any environmental value. Remedial options are required to be assessed and remediation action plans progressively developed for the site and submitted to the department or an auditor.

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Contaminated Sites Act 2003 Basic Summary of Records Search Response

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The department recommends that all areas of significant contamination in soils at the site, be either actively remediated or capped with an impervious barrier in order to achieve long term protection of the regional groundwater aquifer and freshwater ecosystems.

An interim site management plan for PFAS in soils and groundwater across the site including, but not limited to, fire training areas, wastewater disposal areas and the rail loop ponds should be submitted to the department by April 2021.

A remediation action plan for the rail loop ponds should be developed for the site and submitted to the department by July 2021.

Due to the presence of contaminants including hydrocarbons, PFAS and asbestos in soil and/or groundwater, a site-specific health and safety plan should be developed and implemented to address the risks to the health of any workers undertaking intrusive works until further notice.

Certificate of Title Memorial

Under the Contaminated Sites Act 2003, this site has been classified as "Contaminated - remediation required". For further information on the contamination status of this site, please contact the Contaminated Sites section of the Department of Environment & Conservation.

Current Regulatory Notice Issued

Type of Regulatory Notice: *Nil*

Date Issued: *Nil*

General

No other information relating to this parcel.

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Contaminated Sites Act 2003 Basic Summary of Records Search Response

Report generated at 04:33:20PM, 25/03/2021

Receipt No:

ID No: 75085

Search Results

This response relates to a search request received for:

Lot 556 On Plan 400578
Newman, WA, 6753

This parcel belongs to a site that contains 5 parcel(s).

According to Department of Water and Environmental Regulation records, this land has been reported as a known or suspected contaminated site.

Address	Lot 556 On Plan 400578 Newman, WA, 6753
Lot on Plan Address	Lot 556 On Plan 400578
Parcel Status	<p>Classification: 10/12/2020 - <i>Contaminated - remediation required</i></p> <p>Nature and Extent of Contamination:</p> <p>Soils and groundwater in the mine operations area are impacted by petroleum hydrocarbons (such as from diesel or oil), perfluoroalkyl and polyfluoroalkyl substances (PFAS) and asbestos.</p> <p>Petroleum hydrocarbons have been identified in surface and sub-surface soils to 45 meters below ground level, at the former power station site. Light non-aqueous phase liquid hydrocarbons (such as pure petrol or diesel) has been observed floating on the surface of the watertable beneath the former power station site.</p> <p>PFAS, associated with fire suppression foam application and disposal at the site, has been detected in groundwater beneath the site.</p> <p>Asbestos containing materials (ACM) are present in former and current asbestos waste disposal areas and in general landfill.</p> <p>Restrictions on Use:</p> <p>Please refer to Reasons for Classification for further information on the potential contamination present at the site.</p> <p>Reason for Classification:</p> <p>This site was originally reported to the Department of Water & Environmental Regulation (the department) prior to the commencement of the 'Contaminated Sites Act 2003' (the Act), and was reported again as per reporting obligations under section 11 of the Act in May 2007 and October 2019.</p> <p>The original site classification under section 13 of the Act was based on information submitted to the department by October 2004, with the 'reasons for classification' subsequently updated to reflect additional technical information submitted to the department by August 2012, and again by October</p>

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Contaminated Sites Act 2003

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2019.

The Mount Whaleback Iron Ore Mine (the mine operation) is situated in the Whaleback Creek, Ophthalmia Dam and Fortescue River catchment area and located within a Priority 1 Public Drinking Water Supply Area. The mine has operated since 1968.

The site comprises 4147 hectares of land and is used for mining of iron ore including the storage of chemicals and minerals associated with the operation of the iron ore mine. Mining and mineral processing are land uses that have the potential to cause contamination as specified in the guideline 'Assessment and management of contaminated sites' (Department of Environment Regulation [DER], 2014).

The site was originally reported because light non-aqueous phase liquid (LNAPL), such as pure hydrocarbon (diesel), was found to be floating on the surface of groundwater beneath the former power station, and significant hydrocarbon staining of soils were observed at the site. Additionally, known hydrocarbon leaks and contaminated discharges to Whaleback Creek have been recorded at the site.

A site inspection conducted by a department officer in July 2012, identified hydrocarbon leakage and staining within industrial/operational portions of the site.

The site was reported again in February 2019 because perfluoroalkyl and polyfluoroalkyl substances (PFAS), such as from fire-fighting foams or PFAS-containing waste were known to have been used at the site and had been detected in groundwater beneath the site associated with a number of fire training areas and wastewater treatment and discharge locations.

This mine site is divided into a number of areas used for industrial and operational purposes. Each of these areas are discussed below.

1) Former diesel fired power station

This area of the site was reported because it was used as a diesel fired power station for 44 years, between 1967 and 1994. A fuel leak occurred in 1992 from an underground fuel pipeline network, comprising the loss of an estimated 90,000L of diesel, and evidence of surface staining indicated hydrocarbon contamination at the site.

The former power station was decommissioned between 1996 and 2000. In 2007 the central portion of the site was redeveloped as a mine laboratory. The department understands that the development of the balance of the former power station site, for either open space or car parking is being considered.

Sub-surface soil and groundwater investigations in 2003 found hydrocarbons were present in sub-surface soils across the site between 1 meter and 45 meters below ground level, and in groundwater beneath the site. Testing of surface soils less than 1m below ground level was not included in this investigation. Hydrocarbon concentrations in soil had been found to exceed Ecological Investigation Levels as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment, 2003) which were the relevant guidelines at that time. LNAPL was detected floating on the surface of the groundwater beneath the central portion of the power station site. Dissolved hydrocarbons (such as from diesel or oil) were present in groundwater at concentrations that were found to exceed the Groundwater Intervention Values (Netherlands Ministry for Housing, Spatial Planning and Environment, 2000), which were the relevant groundwater guidelines at that time.

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A Health Risk Assessment in 2004 recommended that LNAPL be removed from groundwater beneath the former power station site prior to redevelopment for commercial use or open space. Soil remediation works have not been undertaken at the power station site, and sub-surface infrastructure such as fuel tanks and pipelines, concrete floors and bunds remain in-situ.

Groundwater remedial works, comprising the recovery of phase separated hydrocarbons (and reuse within the mine operation) have been carried out on the site and the department understands these are ongoing. Approximately 21,940 L of diesel has been reported to the department to date as recovered for re-use within the mine-site.

An accredited auditor was voluntarily appointed by the site operator on 24 May 2018 to provide an independent review of further contamination investigations being undertaken at the power station. An interim voluntary auditor's report (VAR) was submitted to the department in October 2019 reporting on the progress of investigations associated with the former power station. The auditor's interim advice found that the investigations were generally progressing in accordance with the department's 'Contaminated Sites Guidelines' (2014) and the 'National Environment Protection (Assessment of Site Contamination) Measure 1999' (the NEPM).

In 2019 a soil vapour investigation was undertaken at an adjoining laboratory building to the former power station site that found no health risk to indoor site users. Further contamination investigations and VARs are scheduled.

2) Ampress Facility

The Ampress facility is known to have had historical incidents of hydrocarbon waste water discharging into an unlined pond and/or Whaleback Creek. The facility treats hydrocarbon containing waste waters that are pumped from the rail loop ponds, by a flocculation process.

3) ANFO Ammonium Nitrate Storage Facility

The ANFO ammonium nitrate storage facility is known to have had spillages during unloading/storage of ammonium nitrate. Elevated levels of nutrients in receiving surface waters and elevated levels of ammonia in soils at the facility has been reported.

4) ANFO Fuel Facility

Surface staining has been observed outside of the bunded area of the fuel facility adjacent to the bowser and tank refill points. Limited soil sampling has been undertaken at this facility, which indicated no vertical migration of hydrocarbons through the soil profile had occurred.

5) Acid Rock Drainage Dam

The Acid Rock Drainage (ARD) Dam and evaporation ponds are clay lined to store ARD water associated with the mining operations. In 2000 it was reported that there was evidence of elevated sulphate levels and low pH water in the drain at the downstream perimeter of the ARD Dam, with groundwater monitoring having also identified elevated sulphates adjacent to the ARD Dam and the southern perimeter of the evaporation ponds. A geotechnical investigation undertaken in 2000 indicated that the ARD Dam was leaking at that time. The ARD Dam was upgraded in 2000 with additional work being carried out on the downstream wall. Further upgrades were carried out in 2001, including a clay compacted liner and division of the impoundment area. Groundwater monitoring is

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undertaken in the vicinity of the ARD facility. However, the results have not been provided to the Contaminated Sites Branch of the department.

6) Asbestos Waste Disposal Area - Former

The former asbestos mining waste disposal area previously received asbestos waste and has since been decommissioned and the surface rehabilitated. Buried asbestos waste remains contained at this location.

7) Asbestos Waste Disposal Area - Current

The current asbestos mining waste disposal area receives asbestos waste material.

8) Bioremediation Landfarm

The bioremediation landfarm is used to bioremediate hydrocarbon contaminated material from within the Mt Whaleback mine operations. Wastewater was historically collected from across the Operation and disposed at unlined evaporation ponds at the landfarm.

9) Checkpoint Refuelling Facilities

Diesel spillages have been reported at this facility and evidence of hydrocarbon staining has been observed adjacent to the hardstand areas.

10) Diesel Distribution Pipeline

Diesel has been transferred on-site through buried pipelines to the mobile equipment workshop and the lower checkpoint location. A diesel leak from a fuel line occurred on 17 December 1998. The extent of diesel contamination in the vicinity of the diesel leak was estimated to have spread 5m laterally and 27m along pipeline bedding material.

11) Former power station open drains

Earthen/unlined drains formerly received and directed overflow from oily waste water ponds at the former power station into Whaleback Creek. Following a diesel spill from the former power station in 1992, hydrocarbons were detected in surface sediment samples taken from the drainage channel 100m downstream of the spill. Drains were subsequently re-directed to the rail loop ponds by concrete diversion structures to prevent further discharge to Whaleback Creek.

12) Fuel farm and Rail Diesel Tank Unloading Facility

The bulk fuel storage facility for the mine operation and satellite orebodies, incorporates an unloading facility for diesel rail tankers. Diesel spills during unloading of rail tankers are known to have occurred, and a diesel leak from an underground pipeline in the vicinity of the rail unloading facility was also identified.

13) Landfill locations

The waste disposal facility receives general waste associated with the mine operation. A minor amount of asbestos piping is reported to have been disposed at the landfill. PFAS residues associated with firefighting training is reported as historically being deposited into landfills at the site.

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15) No. 2 Primary crusher sump

The No. 2 Primary Crusher sump is the collection point for oily wastewaters and washdown waters from the primary crushing plant (Line No. 2). The earthen/unlined sump collects hydrocarbon-containing discharges, that are thought to be captured from the plant transfer points, compressor washdown and spillage of coolant.

16) No. 2 Secondary crusher sump

The No. 2 Secondary Crusher sump is a collection point for oily wastewaters and washdown waters from the secondary crushing plant (Line No. 2). The sump is earthen/unlined and collects hydrocarbon-containing discharges captured from the plant transfer point, compressor washdown and spillage of coolant.

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20) Rail loop ponds

The rail loop ponds are the principal wastewater collection point for the mine operations and industrial area receiving oily wastewater discharge from the power station. Hydrocarbon contamination of underlying soils may have occurred due to the ponds being earthen/unlined and receiving discharges from diesel spillages, washdown of mining equipment and maintenance workshop runoff.

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PFAS was detected in soils and also found to be present in groundwater at concentrations exceeding health-based guidance values for drinking water, and guideline values for freshwater ecosystems, as published in the 'PFAS National Environmental Management Plan' (Heads of EPAs Australia and New Zealand, January 2018), and recreational water quality 'Guidance on Per and Polyfluoroalkyl (PFAS) in Recreational Water' (National Health and Medical Research Council, August 2019).

LNAPL and dissolved phase hydrocarbons (such as from diesel or oil) were found in groundwater beneath the rail loop ponds. However, no assessment levels are currently available for the compounds present relevant to potable and non-potable uses of groundwater or ecosystem protection.

Metals (boron, copper and manganese) and nutrients (nitrate) were present in groundwater at concentrations exceeding assessment levels for fresh waters, with metals (boron, copper and manganese) also exceeding drinking water and/or domestic non-potable use of groundwater, as published in the guideline 'Assessment and management of contaminated sites' (DER, 2014).

A tier 1 screening risk assessment indicates that concentrations of contaminants exceed adopted assessment levels for drinking water and ecological investigation, therefore further investigation is required to determine the risk to human health, the environment and environmental values in this area.

Remedial works for the rail loop ponds are being proposed for the site such as capping the ponds with an impervious cover.

21) Surface drainage network (unlined)

The open drain network at the site receives runoff from the mine operation industrial area. The drainage network is largely unlined and ultimately flows into the Rail Loop Ponds. Historical spillages of diesel at the checkpoint refuelling facility have resulted in diesel overflow to the open drain. Oily wastewater discharges and diesel spillages have also occurred from various other facilities throughout the industrial area. Contamination by hydrocarbons (such as from diesel) and other potential contaminants (such as chlorinated hydrocarbons and PFAS) of underlying soils may have occurred due to discharges from diesel spillages, washdown of mining equipment and maintenance workshop runoff.

Wash down of heavy vehicles associated with fire response training has resulted in discharge of PFAS residue to the workshop bay, the wastewater drainage network and oily water separator.

22) Train Load-out facility

Visual staining has been identified at the entrance to the iron-ore train load out tunnels. Oil residue is associated with compressed air used within the loadout tunnel that discharges via ports at the exits of the tunnels.

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:21PM, 25/03/2021

23) Water treatment plant

A build-up of sulphate-containing precipitant within the discharge drainage channel is known to have occurred and there has been visual evidence of backwash discharge infiltrating into soils before discharging into Whaleback Creek.

24) Whaleback open pit

There is evidence of pyritic material in the walls of the open pit. The pit has a low pH. Any pyritic material mined is encapsulated with inert material in overburden storage areas. Low pH water from the pit is pumped to the ARD dam and evaporation ponds.

Oxidation of metals (such as chromium, molybdenum, selenium and tungsten) in aquifer sediments may result from mine dewatering. Selenium concentrations in the Newman water supply wellfield periodically exceed drinking water guidelines.

Soil and groundwater investigations undertaken in areas 1 - 24 are limited, and the quality of soil and groundwater beneath across the site are unknown. Further soil and groundwater investigations are required to determine the contamination status of the soil and groundwater at the reported areas.

Limited sediment investigations in Whaleback Creek were reported as being conducted following the diesel spill in 1992. However the current quality of sediments on/off-site are unknown.

Risk assessment is currently limited to targeted portions of the site and has not yet been fully carried out to determine the potential risk posed by all substances of concern at the site or off-site, to human health, the environment or any environmental value.

Reporting of routine groundwater monitoring carried out to comply with Part V 'Environmental Protection Act 1986' licence conditions for the premises contains insufficient technical/hydrogeological information and/or documentation to enable an assessment of contamination to be carried out in accordance with the department's 'Contaminated Sites Guidelines' (2014) and the NEPM.

As hydrocarbons including LNAPL (such as from diesel, oil) and PFAS are present in the soil and groundwater at the power station and rail loop ponds (areas 1 and 20 above), which are acting as a significant source of dissolved-phase groundwater contamination, which presents a risk to human health, the environment, or environmental values, the site is classified as 'contaminated - remediation required'.

Once the results of further investigations and remedial works have been submitted to the department for areas 1 - 24, these will be reviewed and the site (or portions of the site) may be re-classified.

A memorial stating the site's classification has been placed on the certificate of title, and will trigger the need for further investigations and risk assessment should the site be proposed for a more sensitive land use.

The department, in consultation with the Department of Health, has classified this site based on the information available to the department at the time of classification. It is acknowledged that the contamination status of the site may have changed since the information was collated and/or submitted to the department, and as such, the usefulness of this information may be limited.

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In accordance with Department of Health advice, if groundwater is being, or is proposed to be abstracted, the department recommends that analytical testing should be carried out to determine whether the groundwater is suitable for its intended use.

Other Relevant Information:

Additional information included herein is relevant to the contamination status of the site and includes the department's expectations for action that should be taken to address potential or actual contamination described in the Reasons for Classification.

Action Required:

Further soil investigations, groundwater investigations and an appropriate risk assessment are required to adequately delineate and characterise the current nature and extent of soil and groundwater contamination. Groundwater investigations should fully characterise and delineate the lateral and vertical extent of the groundwater contamination beneath the site, capture seasonal variations and further characterise the hydrogeology at the site.

Soil, sediment and groundwater investigations should meet the standards outlined in the departments 'Contaminated Sites Guidelines' (2014) and the NEPM.

If further investigation identifies off-site impacts, future reports on investigation, assessment, monitoring or remediation of the site which are submitted to the department will need to be accompanied by a Mandatory Auditor's Report, in accordance with regulation 31(1)(b) of the Contaminated Sites Regulations 2006.

Further investigations are required to address PFAS, which are potential contaminants of concern at wastewater treatment facilities, landfills and fire-fighting training facilities, as specified in 'PFAS National Environmental Management Plan' (Heads of EPAs Australia and New Zealand, January 2018). PFAS investigations and assessment are to be carried out in accordance with the 'PFAS National Environmental Management Plan Version 2.0' (Heads of EPAs Australia and New Zealand, January 2020).

Asbestos investigations are required to determine the nature and extent of asbestos impacts in the former/current asbestos disposal areas, the general landfill and the potential for asbestos impact across the site. Investigations should be carried out in accordance with the 'Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia' (Department of Health, May 2009).

A risk assessment is required to determine potential risk to human health, the environment or any environmental value and should include an assessment of all potential receptors, including site users, down-gradient groundwater users and the risk assessment should be carried out in accordance with guidance in the department's Contaminated Sites Guidelines and the NEPM.

Particular emphasis should be placed on determining risk to: on-site workers, the P1 Public Drinking Water Supply Area, drinking water production bores (on-site or off-site), Ophthalmia Dam town water supply and the freshwater ecosystems of Whaleback Creek and Fortescue River.

Remediation of the site is required to mitigate potential risks to human health, the environment and/or any environmental value. Remedial options are required to be assessed and remediation action plans progressively developed for the site and submitted to the department or an auditor.

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Contaminated Sites Act 2003 Basic Summary of Records Search Response

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The department recommends that all areas of significant contamination in soils at the site, be either actively remediated or capped with an impervious barrier in order to achieve long term protection of the regional groundwater aquifer and freshwater ecosystems.

An interim site management plan for PFAS in soils and groundwater across the site including, but not limited to, fire training areas, wastewater disposal areas and the rail loop ponds should be submitted to the department by April 2021.

A remediation action plan for the rail loop ponds should be developed for the site and submitted to the department by July 2021.

Due to the presence of contaminants including hydrocarbons, PFAS and asbestos in soil and/or groundwater, a site-specific health and safety plan should be developed and implemented to address the risks to the health of any workers undertaking intrusive works until further notice.

Certificate of Title Memorial

Under the Contaminated Sites Act 2003, this site has been classified as "Contaminated - remediation required". For further information on the contamination status of this site, please contact the Contaminated Sites section of the Department of Environment & Conservation.

Current Regulatory Notice Issued

Type of Regulatory Notice: *Nil*

Date Issued: *Nil*

General

No other information relating to this parcel.

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Contaminated Sites Act 2003 Basic Summary of Records Search Response

Report generated at 04:33:35PM, 25/03/2021

Receipt No:

ID No: 75086

Search Results

This response relates to a search request received for:

Lot 556 On Plan 400578
Newman, WA, 6753

This parcel belongs to a site that contains 5 parcel(s).

According to Department of Water and Environmental Regulation records, this land has been reported as a known or suspected contaminated site.

Address	Lot 556 On Plan 400578 Newman, WA, 6753
Lot on Plan Address	Lot 556 On Plan 400578
Parcel Status	<p>Classification: 10/12/2020 - <i>Contaminated - remediation required</i></p> <p>Nature and Extent of Contamination:</p> <p>Soils and groundwater in the mine operations area are impacted by petroleum hydrocarbons (such as from diesel or oil), perfluoroalkyl and polyfluoroalkyl substances (PFAS) and asbestos.</p> <p>Petroleum hydrocarbons have been identified in surface and sub-surface soils to 45 meters below ground level, at the former power station site. Light non-aqueous phase liquid hydrocarbons (such as pure petrol or diesel) has been observed floating on the surface of the watertable beneath the former power station site.</p> <p>PFAS, associated with fire suppression foam application and disposal at the site, has been detected in groundwater beneath the site.</p> <p>Asbestos containing materials (ACM) are present in former and current asbestos waste disposal areas and in general landfill.</p> <p>Restrictions on Use:</p> <p>Please refer to Reasons for Classification for further information on the potential contamination present at the site.</p> <p>Reason for Classification:</p> <p>This site was originally reported to the Department of Water & Environmental Regulation (the department) prior to the commencement of the 'Contaminated Sites Act 2003' (the Act), and was reported again as per reporting obligations under section 11 of the Act in May 2007 and October 2019.</p> <p>The original site classification under section 13 of the Act was based on information submitted to the department by October 2004, with the 'reasons for classification' subsequently updated to reflect additional technical information submitted to the department by August 2012, and again by October</p>

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Contaminated Sites Act 2003

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2019.

The Mount Whaleback Iron Ore Mine (the mine operation) is situated in the Whaleback Creek, Ophthalmia Dam and Fortescue River catchment area and located within a Priority 1 Public Drinking Water Supply Area. The mine has operated since 1968.

The site comprises 4147 hectares of land and is used for mining of iron ore including the storage of chemicals and minerals associated with the operation of the iron ore mine. Mining and mineral processing are land uses that have the potential to cause contamination as specified in the guideline 'Assessment and management of contaminated sites' (Department of Environment Regulation [DER], 2014).

The site was originally reported because light non-aqueous phase liquid (LNAPL), such as pure hydrocarbon (diesel), was found to be floating on the surface of groundwater beneath the former power station, and significant hydrocarbon staining of soils were observed at the site. Additionally, known hydrocarbon leaks and contaminated discharges to Whaleback Creek have been recorded at the site.

A site inspection conducted by a department officer in July 2012, identified hydrocarbon leakage and staining within industrial/operational portions of the site.

The site was reported again in February 2019 because perfluoroalkyl and polyfluoroalkyl substances (PFAS), such as from fire-fighting foams or PFAS-containing waste were known to have been used at the site and had been detected in groundwater beneath the site associated with a number of fire training areas and wastewater treatment and discharge locations.

This mine site is divided into a number of areas used for industrial and operational purposes. Each of these areas are discussed below.

1) Former diesel fired power station

This area of the site was reported because it was used as a diesel fired power station for 44 years, between 1967 and 1994. A fuel leak occurred in 1992 from an underground fuel pipeline network, comprising the loss of an estimated 90,000L of diesel, and evidence of surface staining indicated hydrocarbon contamination at the site.

The former power station was decommissioned between 1996 and 2000. In 2007 the central portion of the site was redeveloped as a mine laboratory. The department understands that the development of the balance of the former power station site, for either open space or car parking is being considered.

Sub-surface soil and groundwater investigations in 2003 found hydrocarbons were present in sub-surface soils across the site between 1 meter and 45 meters below ground level, and in groundwater beneath the site. Testing of surface soils less than 1m below ground level was not included in this investigation. Hydrocarbon concentrations in soil had been found to exceed Ecological Investigation Levels as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment, 2003) which were the relevant guidelines at that time. LNAPL was detected floating on the surface of the groundwater beneath the central portion of the power station site. Dissolved hydrocarbons (such as from diesel or oil) were present in groundwater at concentrations that were found to exceed the Groundwater Intervention Values (Netherlands Ministry for Housing, Spatial Planning and Environment, 2000), which were the relevant groundwater guidelines at that time.

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A Health Risk Assessment in 2004 recommended that LNAPL be removed from groundwater beneath the former power station site prior to redevelopment for commercial use or open space. Soil remediation works have not been undertaken at the power station site, and sub-surface infrastructure such as fuel tanks and pipelines, concrete floors and bunds remain in-situ.

Groundwater remedial works, comprising the recovery of phase separated hydrocarbons (and reuse within the mine operation) have been carried out on the site and the department understands these are ongoing. Approximately 21,940 L of diesel has been reported to the department to date as recovered for re-use within the mine-site.

An accredited auditor was voluntarily appointed by the site operator on 24 May 2018 to provide an independent review of further contamination investigations being undertaken at the power station. An interim voluntary auditor's report (VAR) was submitted to the department in October 2019 reporting on the progress of investigations associated with the former power station. The auditor's interim advice found that the investigations were generally progressing in accordance with the department's 'Contaminated Sites Guidelines' (2014) and the 'National Environment Protection (Assessment of Site Contamination) Measure 1999' (the NEPM).

In 2019 a soil vapour investigation was undertaken at an adjoining laboratory building to the former power station site that found no health risk to indoor site users. Further contamination investigations and VARs are scheduled.

2) Ampress Facility

The Ampress facility is known to have had historical incidents of hydrocarbon waste water discharging into an unlined pond and/or Whaleback Creek. The facility treats hydrocarbon containing waste waters that are pumped from the rail loop ponds, by a flocculation process.

3) ANFO Ammonium Nitrate Storage Facility

The ANFO ammonium nitrate storage facility is known to have had spillages during unloading/storage of ammonium nitrate. Elevated levels of nutrients in receiving surface waters and elevated levels of ammonia in soils at the facility has been reported.

4) ANFO Fuel Facility

Surface staining has been observed outside of the bunded area of the fuel facility adjacent to the bowser and tank refill points. Limited soil sampling has been undertaken at this facility, which indicated no vertical migration of hydrocarbons through the soil profile had occurred.

5) Acid Rock Drainage Dam

The Acid Rock Drainage (ARD) Dam and evaporation ponds are clay lined to store ARD water associated with the mining operations. In 2000 it was reported that there was evidence of elevated sulphate levels and low pH water in the drain at the downstream perimeter of the ARD Dam, with groundwater monitoring having also identified elevated sulphates adjacent to the ARD Dam and the southern perimeter of the evaporation ponds. A geotechnical investigation undertaken in 2000 indicated that the ARD Dam was leaking at that time. The ARD Dam was upgraded in 2000 with additional work being carried out on the downstream wall. Further upgrades were carried out in 2001, including a clay compacted liner and division of the impoundment area. Groundwater monitoring is

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undertaken in the vicinity of the ARD facility. However, the results have not been provided to the Contaminated Sites Branch of the department.

6) Asbestos Waste Disposal Area - Former

The former asbestos mining waste disposal area previously received asbestos waste and has since been decommissioned and the surface rehabilitated. Buried asbestos waste remains contained at this location.

7) Asbestos Waste Disposal Area - Current

The current asbestos mining waste disposal area receives asbestos waste material.

8) Bioremediation Landfarm

The bioremediation landfarm is used to bioremediate hydrocarbon contaminated material from within the Mt Whaleback mine operations. Wastewater was historically collected from across the Operation and disposed at unlined evaporation ponds at the landfarm.

9) Checkpoint Refuelling Facilities

Diesel spillages have been reported at this facility and evidence of hydrocarbon staining has been observed adjacent to the hardstand areas.

10) Diesel Distribution Pipeline

Diesel has been transferred on-site through buried pipelines to the mobile equipment workshop and the lower checkpoint location. A diesel leak from a fuel line occurred on 17 December 1998. The extent of diesel contamination in the vicinity of the diesel leak was estimated to have spread 5m laterally and 27m along pipeline bedding material.

11) Former power station open drains

Earthen/unlined drains formerly received and directed overflow from oily waste water ponds at the former power station into Whaleback Creek. Following a diesel spill from the former power station in 1992, hydrocarbons were detected in surface sediment samples taken from the drainage channel 100m downstream of the spill. Drains were subsequently re-directed to the rail loop ponds by concrete diversion structures to prevent further discharge to Whaleback Creek.

12) Fuel farm and Rail Diesel Tank Unloading Facility

The bulk fuel storage facility for the mine operation and satellite orebodies, incorporates an unloading facility for diesel rail tankers. Diesel spills during unloading of rail tankers are known to have occurred, and a diesel leak from an underground pipeline in the vicinity of the rail unloading facility was also identified.

13) Landfill locations

The waste disposal facility receives general waste associated with the mine operation. A minor amount of asbestos piping is reported to have been disposed at the landfill. PFAS residues associated with firefighting training is reported as historically being deposited into landfills at the site.

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14) No. 1 Secondary crusher sump

This is a former collection sump that received oily wastes/washdown waters from the secondary crusher plant (Line No. 1). The sump is earthen/unlined and discharges containing hydrocarbons are thought to be captured from the plant transfer points, compressor washdown and spillage of coolant. The area has now been infilled with the quality of fill being unknown.

15) No. 2 Primary crusher sump

The No. 2 Primary Crusher sump is the collection point for oily wastewaters and washdown waters from the primary crushing plant (Line No. 2). The earthen/unlined sump collects hydrocarbon-containing discharges, that are thought to be captured from the plant transfer points, compressor washdown and spillage of coolant.

16) No. 2 Secondary crusher sump

The No. 2 Secondary Crusher sump is a collection point for oily wastewaters and washdown waters from the secondary crushing plant (Line No. 2). The sump is earthen/unlined and collects hydrocarbon-containing discharges captured from the plant transfer point, compressor washdown and spillage of coolant.

17) Overburden storage areas

Overburden waste dumps include designated areas identified for the disposal of net acid generating (NAG) material. Although specific management practices are in place to ensure NAG material is encapsulated, a small proportion of NAG material is misplaced in overburden storage areas for 'clean' material. Historic practices are also known to have resulted in NAG material being inter-dispersed with 'clean' material. The clean fill and misplaced NAG material is not encapsulated and is a potential source of contamination.

18) Ponderosa workshop

The Ponderosa workshop is used for maintenance of mining equipment. Surface staining from hydrocarbons has been observed adjacent to hardstand areas and bowser/tank refill points. Hydrocarbon contamination has been reported as having potentially occurred due to minor spillages during vehicle maintenance/servicing, refuelling and oil/waste transfer operations.

19) Fire response training areas

A number of areas at the site were reported in February 2019 as being used for fire response training. 2018 soil sampling results indicated that PFAS residues are present in soils at these locations. The department understands that PFAS contamination investigations are currently being undertaken across the site.

20) Rail loop ponds

The rail loop ponds are the principal wastewater collection point for the mine operations and industrial area receiving oily wastewater discharge from the power station. Hydrocarbon contamination of underlying soils may have occurred due to the ponds being earthen/unlined and receiving discharges from diesel spillages, washdown of mining equipment and maintenance workshop runoff.

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Residual fire suppressants are reported to have been discharged directly into unlined wastewater ponds (i.e.. such as the 'Rail Loop Ponds').

Soil and groundwater investigations were undertaken in 2018 in proximity to the Rail Loop Ponds and at down hydraulic gradient locations.

PFAS was detected in soils and also found to be present in groundwater at concentrations exceeding health-based guidance values for drinking water, and guideline values for freshwater ecosystems, as published in the 'PFAS National Environmental Management Plan' (Heads of EPAs Australia and New Zealand, January 2018), and recreational water quality 'Guidance on Per and Polyfluoroalkyl (PFAS) in Recreational Water' (National Health and Medical Research Council, August 2019).

LNAPL and dissolved phase hydrocarbons (such as from diesel or oil) were found in groundwater beneath the rail loop ponds. However, no assessment levels are currently available for the compounds present relevant to potable and non-potable uses of groundwater or ecosystem protection.

Metals (boron, copper and manganese) and nutrients (nitrate) were present in groundwater at concentrations exceeding assessment levels for fresh waters, with metals (boron, copper and manganese) also exceeding drinking water and/or domestic non-potable use of groundwater, as published in the guideline 'Assessment and management of contaminated sites' (DER, 2014).

A tier 1 screening risk assessment indicates that concentrations of contaminants exceed adopted assessment levels for drinking water and ecological investigation, therefore further investigation is required to determine the risk to human health, the environment and environmental values in this area.

Remedial works for the rail loop ponds are being proposed for the site such as capping the ponds with an impervious cover.

21) Surface drainage network (unlined)

The open drain network at the site receives runoff from the mine operation industrial area. The drainage network is largely unlined and ultimately flows into the Rail Loop Ponds. Historical spillages of diesel at the checkpoint refuelling facility have resulted in diesel overflow to the open drain. Oily wastewater discharges and diesel spillages have also occurred from various other facilities throughout the industrial area. Contamination by hydrocarbons (such as from diesel) and other potential contaminants (such as chlorinated hydrocarbons and PFAS) of underlying soils may have occurred due to discharges from diesel spillages, washdown of mining equipment and maintenance workshop runoff.

Wash down of heavy vehicles associated with fire response training has resulted in discharge of PFAS residue to the workshop bay, the wastewater drainage network and oily water separator.

22) Train Load-out facility

Visual staining has been identified at the entrance to the iron-ore train load out tunnels. Oil residue is associated with compressed air used within the loadout tunnel that discharges via ports at the exits of the tunnels.

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23) Water treatment plant

A build-up of sulphate-containing precipitant within the discharge drainage channel is known to have occurred and there has been visual evidence of backwash discharge infiltrating into soils before discharging into Whaleback Creek.

24) Whaleback open pit

There is evidence of pyritic material in the walls of the open pit. The pit has a low pH. Any pyritic material mined is encapsulated with inert material in overburden storage areas. Low pH water from the pit is pumped to the ARD dam and evaporation ponds.

Oxidation of metals (such as chromium, molybdenum, selenium and tungsten) in aquifer sediments may result from mine dewatering. Selenium concentrations in the Newman water supply wellfield periodically exceed drinking water guidelines.

Soil and groundwater investigations undertaken in areas 1 - 24 are limited, and the quality of soil and groundwater beneath across the site are unknown. Further soil and groundwater investigations are required to determine the contamination status of the soil and groundwater at the reported areas.

Limited sediment investigations in Whaleback Creek were reported as being conducted following the diesel spill in 1992. However the current quality of sediments on/off-site are unknown.

Risk assessment is currently limited to targeted portions of the site and has not yet been fully carried out to determine the potential risk posed by all substances of concern at the site or off-site, to human health, the environment or any environmental value.

Reporting of routine groundwater monitoring carried out to comply with Part V 'Environmental Protection Act 1986' licence conditions for the premises contains insufficient technical/hydrogeological information and/or documentation to enable an assessment of contamination to be carried out in accordance with the department's 'Contaminated Sites Guidelines' (2014) and the NEPM.

As hydrocarbons including LNAPL (such as from diesel, oil) and PFAS are present in the soil and groundwater at the power station and rail loop ponds (areas 1 and 20 above), which are acting as a significant source of dissolved-phase groundwater contamination, which presents a risk to human health, the environment, or environmental values, the site is classified as 'contaminated - remediation required'.

Once the results of further investigations and remedial works have been submitted to the department for areas 1 - 24, these will be reviewed and the site (or portions of the site) may be re-classified.

A memorial stating the site's classification has been placed on the certificate of title, and will trigger the need for further investigations and risk assessment should the site be proposed for a more sensitive land use.

The department, in consultation with the Department of Health, has classified this site based on the information available to the department at the time of classification. It is acknowledged that the contamination status of the site may have changed since the information was collated and/or submitted to the department, and as such, the usefulness of this information may be limited.

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Basic Summary of Records Search Response

Report generated at 04:33:36PM, 25/03/2021

In accordance with Department of Health advice, if groundwater is being, or is proposed to be abstracted, the department recommends that analytical testing should be carried out to determine whether the groundwater is suitable for its intended use.

Other Relevant Information:

Additional information included herein is relevant to the contamination status of the site and includes the department's expectations for action that should be taken to address potential or actual contamination described in the Reasons for Classification.

Action Required:

Further soil investigations, groundwater investigations and an appropriate risk assessment are required to adequately delineate and characterise the current nature and extent of soil and groundwater contamination. Groundwater investigations should fully characterise and delineate the lateral and vertical extent of the groundwater contamination beneath the site, capture seasonal variations and further characterise the hydrogeology at the site.

Soil, sediment and groundwater investigations should meet the standards outlined in the departments 'Contaminated Sites Guidelines' (2014) and the NEPM.

If further investigation identifies off-site impacts, future reports on investigation, assessment, monitoring or remediation of the site which are submitted to the department will need to be accompanied by a Mandatory Auditor's Report, in accordance with regulation 31(1)(b) of the Contaminated Sites Regulations 2006.

Further investigations are required to address PFAS, which are potential contaminants of concern at wastewater treatment facilities, landfills and fire-fighting training facilities, as specified in 'PFAS National Environmental Management Plan' (Heads of EPAs Australia and New Zealand, January 2018). PFAS investigations and assessment are to be carried out in accordance with the 'PFAS National Environmental Management Plan Version 2.0' (Heads of EPAs Australia and New Zealand, January 2020).

Asbestos investigations are required to determine the nature and extent of asbestos impacts in the former/current asbestos disposal areas, the general landfill and the potential for asbestos impact across the site. Investigations should be carried out in accordance with the 'Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia' (Department of Health, May 2009).

A risk assessment is required to determine potential risk to human health, the environment or any environmental value and should include an assessment of all potential receptors, including site users, down-gradient groundwater users and the risk assessment should be carried out in accordance with guidance in the department's Contaminated Sites Guidelines and the NEPM.

Particular emphasis should be placed on determining risk to: on-site workers, the P1 Public Drinking Water Supply Area, drinking water production bores (on-site or off-site), Ophthalmia Dam town water supply and the freshwater ecosystems of Whaleback Creek and Fortescue River.

Remediation of the site is required to mitigate potential risks to human health, the environment and/or any environmental value. Remedial options are required to be assessed and remediation action plans progressively developed for the site and submitted to the department or an auditor.

Disclaimer

This Summary of Records has been prepared by Department of Water and Environmental Regulation (DWER) as a requirement of the Contaminated Sites Act 2003. DWER makes every effort to ensure the accuracy, currency and reliability of this information at the time it was prepared, however advises that due to the ability of contamination to potentially change in nature and extent over time, circumstances may have changed since the information was originally provided. Users must exercise their own skill and care when interpreting the information contained within this Summary of Records and, where applicable, obtain independent professional advice appropriate to their circumstances. In no event will DWER, its agents or employees be held responsible for any loss or damage arising from any use of or reliance on this information. Additionally, the Summary of Records must not be reproduced or supplied to third parties except in full and unabridged form.



Contaminated Sites Act 2003 Basic Summary of Records Search Response

Report generated at 04:33:36PM, 25/03/2021

The department recommends that all areas of significant contamination in soils at the site, be either actively remediated or capped with an impervious barrier in order to achieve long term protection of the regional groundwater aquifer and freshwater ecosystems.

An interim site management plan for PFAS in soils and groundwater across the site including, but not limited to, fire training areas, wastewater disposal areas and the rail loop ponds should be submitted to the department by April 2021.

A remediation action plan for the rail loop ponds should be developed for the site and submitted to the department by July 2021.

Due to the presence of contaminants including hydrocarbons, PFAS and asbestos in soil and/or groundwater, a site-specific health and safety plan should be developed and implemented to address the risks to the health of any workers undertaking intrusive works until further notice.

Certificate of Title Memorial

Under the Contaminated Sites Act 2003, this site has been classified as "Contaminated - remediation required". For further information on the contamination status of this site, please contact the Contaminated Sites section of the Department of Environment & Conservation.

Current Regulatory Notice Issued

Type of Regulatory Notice: *Nil*

Date Issued: *Nil*

General

No other information relating to this parcel.

Disclaimer

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Contaminated Sites Act 2003 Basic Summary of Records Search Response

Report generated at 04:33:40PM, 25/03/2021

Receipt No:

ID No: 75087

Search Results

This response relates to a search request received for:

Lot 555 On Plan 400578
Newman, WA, 6753

This parcel belongs to a site that contains 5 parcel(s).

According to Department of Water and Environmental Regulation records, this land has been reported as a known or suspected contaminated site.

Address	Lot 555 On Plan 400578 Newman, WA, 6753
Lot on Plan Address	Lot 555 On Plan 400578
Parcel Status	<p>Classification: 10/12/2020 - Contaminated - remediation required</p> <p>Nature and Extent of Contamination:</p> <p>Soils and groundwater in the mine operations area are impacted by petroleum hydrocarbons (such as from diesel or oil), perfluoroalkyl and polyfluoroalkyl substances (PFAS) and asbestos.</p> <p>Petroleum hydrocarbons have been identified in surface and sub-surface soils to 45 meters below ground level, at the former power station site. Light non-aqueous phase liquid hydrocarbons (such as pure petrol or diesel) has been observed floating on the surface of the watertable beneath the former power station site.</p> <p>PFAS, associated with fire suppression foam application and disposal at the site, has been detected in groundwater beneath the site.</p> <p>Asbestos containing materials (ACM) are present in former and current asbestos waste disposal areas and in general landfill.</p> <p>Restrictions on Use:</p> <p>Please refer to Reasons for Classification for further information on the potential contamination present at the site.</p> <p>Reason for Classification:</p> <p>This site was originally reported to the Department of Water & Environmental Regulation (the department) prior to the commencement of the 'Contaminated Sites Act 2003' (the Act), and was reported again as per reporting obligations under section 11 of the Act in May 2007 and October 2019.</p> <p>The original site classification under section 13 of the Act was based on information submitted to the department by October 2004, with the 'reasons for classification' subsequently updated to reflect additional technical information submitted to the department by August 2012, and again by October</p>

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

Report generated at 04:33:41PM, 25/03/2021

2019.

The Mount Whaleback Iron Ore Mine (the mine operation) is situated in the Whaleback Creek, Ophalmia Dam and Fortescue River catchment area and located within a Priority 1 Public Drinking Water Supply Area. The mine has operated since 1968.

The site comprises 4147 hectares of land and is used for mining of iron ore including the storage of chemicals and minerals associated with the operation of the iron ore mine. Mining and mineral processing are land uses that have the potential to cause contamination as specified in the guideline 'Assessment and management of contaminated sites' (Department of Environment Regulation [DER], 2014).

The site was originally reported because light non-aqueous phase liquid (LNAPL), such as pure hydrocarbon (diesel), was found to be floating on the surface of groundwater beneath the former power station, and significant hydrocarbon staining of soils were observed at the site. Additionally, known hydrocarbon leaks and contaminated discharges to Whaleback Creek have been recorded at the site.

A site inspection conducted by a department officer in July 2012, identified hydrocarbon leakage and staining within industrial/operational portions of the site.

The site was reported again in February 2019 because perfluoroalkyl and polyfluoroalkyl substances (PFAS), such as from fire-fighting foams or PFAS-containing waste were known to have been used at the site and had been detected in groundwater beneath the site associated with a number of fire training areas and wastewater treatment and discharge locations.

This mine site is divided into a number of areas used for industrial and operational purposes. Each of these areas are discussed below.

1) Former diesel fired power station

This area of the site was reported because it was used as a diesel fired power station for 44 years, between 1967 and 1994. A fuel leak occurred in 1992 from an underground fuel pipeline network, comprising the loss of an estimated 90,000L of diesel, and evidence of surface staining indicated hydrocarbon contamination at the site.

The former power station was decommissioned between 1996 and 2000. In 2007 the central portion of the site was redeveloped as a mine laboratory. The department understands that the development of the balance of the former power station site, for either open space or car parking is being considered.

Sub-surface soil and groundwater investigations in 2003 found hydrocarbons were present in sub-surface soils across the site between 1 meter and 45 meters below ground level, and in groundwater beneath the site. Testing of surface soils less than 1m below ground level was not included in this investigation. Hydrocarbon concentrations in soil had been found to exceed Ecological Investigation Levels as published in 'Assessment Levels for Soil, Sediment and Water' (Department of Environment, 2003) which were the relevant guidelines at that time. LNAPL was detected floating on the surface of the groundwater beneath the central portion of the power station site. Dissolved hydrocarbons (such as from diesel or oil) were present in groundwater at concentrations that were found to exceed the Groundwater Intervention Values (Netherlands Ministry for Housing, Spatial Planning and Environment, 2000), which were the relevant groundwater guidelines at that time.

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Contaminated Sites Act 2003

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A Health Risk Assessment in 2004 recommended that LNAPL be removed from groundwater beneath the former power station site prior to redevelopment for commercial use or open space. Soil remediation works have not been undertaken at the power station site, and sub-surface infrastructure such as fuel tanks and pipelines, concrete floors and bunds remain in-situ.

Groundwater remedial works, comprising the recovery of phase separated hydrocarbons (and reuse within the mine operation) have been carried out on the site and the department understands these are ongoing. Approximately 21,940 L of diesel has been reported to the department to date as recovered for re-use within the mine-site.

An accredited auditor was voluntarily appointed by the site operator on 24 May 2018 to provide an independent review of further contamination investigations being undertaken at the power station. An interim voluntary auditor's report (VAR) was submitted to the department in October 2019 reporting on the progress of investigations associated with the former power station. The auditor's interim advice found that the investigations were generally progressing in accordance with the department's 'Contaminated Sites Guidelines' (2014) and the 'National Environment Protection (Assessment of Site Contamination) Measure 1999' (the NEPM).

In 2019 a soil vapour investigation was undertaken at an adjoining laboratory building to the former power station site that found no health risk to indoor site users. Further contamination investigations and VARs are scheduled.

2) Ampress Facility

The Ampress facility is known to have had historical incidents of hydrocarbon waste water discharging into an unlined pond and/or Whaleback Creek. The facility treats hydrocarbon containing waste waters that are pumped from the rail loop ponds, by a flocculation process.

3) ANFO Ammonium Nitrate Storage Facility

The ANFO ammonium nitrate storage facility is known to have had spillages during unloading/storage of ammonium nitrate. Elevated levels of nutrients in receiving surface waters and elevated levels of ammonia in soils at the facility has been reported.

4) ANFO Fuel Facility

Surface staining has been observed outside of the bunded area of the fuel facility adjacent to the bowser and tank refill points. Limited soil sampling has been undertaken at this facility, which indicated no vertical migration of hydrocarbons through the soil profile had occurred.

5) Acid Rock Drainage Dam

The Acid Rock Drainage (ARD) Dam and evaporation ponds are clay lined to store ARD water associated with the mining operations. In 2000 it was reported that there was evidence of elevated sulphate levels and low pH water in the drain at the downstream perimeter of the ARD Dam, with groundwater monitoring having also identified elevated sulphates adjacent to the ARD Dam and the southern perimeter of the evaporation ponds. A geotechnical investigation undertaken in 2000 indicated that the ARD Dam was leaking at that time. The ARD Dam was upgraded in 2000 with additional work being carried out on the downstream wall. Further upgrades were carried out in 2001, including a clay compacted liner and division of the impoundment area. Groundwater monitoring is

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undertaken in the vicinity of the ARD facility. However, the results have not been provided to the Contaminated Sites Branch of the department.

6) Asbestos Waste Disposal Area - Former

The former asbestos mining waste disposal area previously received asbestos waste and has since been decommissioned and the surface rehabilitated. Buried asbestos waste remains contained at this location.

7) Asbestos Waste Disposal Area - Current

The current asbestos mining waste disposal area receives asbestos waste material.

8) Bioremediation Landfarm

The bioremediation landfarm is used to bioremediate hydrocarbon contaminated material from within the Mt Whaleback mine operations. Wastewater was historically collected from across the Operation and disposed at unlined evaporation ponds at the landfarm.

9) Checkpoint Refuelling Facilities

Diesel spillages have been reported at this facility and evidence of hydrocarbon staining has been observed adjacent to the hardstand areas.

10) Diesel Distribution Pipeline

Diesel has been transferred on-site through buried pipelines to the mobile equipment workshop and the lower checkpoint location. A diesel leak from a fuel line occurred on 17 December 1998. The extent of diesel contamination in the vicinity of the diesel leak was estimated to have spread 5m laterally and 27m along pipeline bedding material.

11) Former power station open drains

Earthen/unlined drains formerly received and directed overflow from oily waste water ponds at the former power station into Whaleback Creek. Following a diesel spill from the former power station in 1992, hydrocarbons were detected in surface sediment samples taken from the drainage channel 100m downstream of the spill. Drains were subsequently re-directed to the rail loop ponds by concrete diversion structures to prevent further discharge to Whaleback Creek.

12) Fuel farm and Rail Diesel Tank Unloading Facility

The bulk fuel storage facility for the mine operation and satellite orebodies, incorporates an unloading facility for diesel rail tankers. Diesel spills during unloading of rail tankers are known to have occurred, and a diesel leak from an underground pipeline in the vicinity of the rail unloading facility was also identified.

13) Landfill locations

The waste disposal facility receives general waste associated with the mine operation. A minor amount of asbestos piping is reported to have been disposed at the landfill. PFAS residues associated with firefighting training is reported as historically being deposited into landfills at the site.

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14) No. 1 Secondary crusher sump

This is a former collection sump that received oily wastes/washdown waters from the secondary crusher plant (Line No. 1). The sump is earthen/unlined and discharges containing hydrocarbons are thought to be captured from the plant transfer points, compressor washdown and spillage of coolant. The area has now been infilled with the quality of fill being unknown.

15) No. 2 Primary crusher sump

The No. 2 Primary Crusher sump is the collection point for oily wastewaters and washdown waters from the primary crushing plant (Line No. 2). The earthen/unlined sump collects hydrocarbon-containing discharges, that are thought to be captured from the plant transfer points, compressor washdown and spillage of coolant.

16) No. 2 Secondary crusher sump

The No. 2 Secondary Crusher sump is a collection point for oily wastewaters and washdown waters from the secondary crushing plant (Line No. 2). The sump is earthen/unlined and collects hydrocarbon-containing discharges captured from the plant transfer point, compressor washdown and spillage of coolant.

17) Overburden storage areas

Overburden waste dumps include designated areas identified for the disposal of net acid generating (NAG) material. Although specific management practices are in place to ensure NAG material is encapsulated, a small proportion of NAG material is misplaced in overburden storage areas for 'clean' material. Historic practices are also known to have resulted in NAG material being inter-dispersed with 'clean' material. The clean fill and misplaced NAG material is not encapsulated and is a potential source of contamination.

18) Ponderosa workshop

The Ponderosa workshop is used for maintenance of mining equipment. Surface staining from hydrocarbons has been observed adjacent to hardstand areas and bowser/tank refill points. Hydrocarbon contamination has been reported as having potentially occurred due to minor spillages during vehicle maintenance/servicing, refuelling and oil/waste transfer operations.

19) Fire response training areas

A number of areas at the site were reported in February 2019 as being used for fire response training. 2018 soil sampling results indicated that PFAS residues are present in soils at these locations. The department understands that PFAS contamination investigations are currently being undertaken across the site.

20) Rail loop ponds

The rail loop ponds are the principal wastewater collection point for the mine operations and industrial area receiving oily wastewater discharge from the power station. Hydrocarbon contamination of underlying soils may have occurred due to the ponds being earthen/unlined and receiving discharges from diesel spillages, washdown of mining equipment and maintenance workshop runoff.

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Residual fire suppressants are reported to have been discharged directly into unlined wastewater ponds (i.e.. such as the 'Rail Loop Ponds').

Soil and groundwater investigations were undertaken in 2018 in proximity to the Rail Loop Ponds and at down hydraulic gradient locations.

PFAS was detected in soils and also found to be present in groundwater at concentrations exceeding health-based guidance values for drinking water, and guideline values for freshwater ecosystems, as published in the 'PFAS National Environmental Management Plan' (Heads of EPAs Australia and New Zealand, January 2018), and recreational water quality 'Guidance on Per and Polyfluoroalkyl (PFAS) in Recreational Water' (National Health and Medical Research Council, August 2019).

LNAPL and dissolved phase hydrocarbons (such as from diesel or oil) were found in groundwater beneath the rail loop ponds. However, no assessment levels are currently available for the compounds present relevant to potable and non-potable uses of groundwater or ecosystem protection.

Metals (boron, copper and manganese) and nutrients (nitrate) were present in groundwater at concentrations exceeding assessment levels for fresh waters, with metals (boron, copper and manganese) also exceeding drinking water and/or domestic non-potable use of groundwater, as published in the guideline 'Assessment and management of contaminated sites' (DER, 2014).

A tier 1 screening risk assessment indicates that concentrations of contaminants exceed adopted assessment levels for drinking water and ecological investigation, therefore further investigation is required to determine the risk to human health, the environment and environmental values in this area.

Remedial works for the rail loop ponds are being proposed for the site such as capping the ponds with an impervious cover.

21) Surface drainage network (unlined)

The open drain network at the site receives runoff from the mine operation industrial area. The drainage network is largely unlined and ultimately flows into the Rail Loop Ponds. Historical spillages of diesel at the checkpoint refuelling facility have resulted in diesel overflow to the open drain. Oily wastewater discharges and diesel spillages have also occurred from various other facilities throughout the industrial area. Contamination by hydrocarbons (such as from diesel) and other potential contaminants (such as chlorinated hydrocarbons and PFAS) of underlying soils may have occurred due to discharges from diesel spillages, washdown of mining equipment and maintenance workshop runoff.

Wash down of heavy vehicles associated with fire response training has resulted in discharge of PFAS residue to the workshop bay, the wastewater drainage network and oily water separator.

22) Train Load-out facility

Visual staining has been identified at the entrance to the iron-ore train load out tunnels. Oil residue is associated with compressed air used within the loadout tunnel that discharges via ports at the exits of the tunnels.

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Contaminated Sites Act 2003

Basic Summary of Records Search Response

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23) Water treatment plant

A build-up of sulphate-containing precipitant within the discharge drainage channel is known to have occurred and there has been visual evidence of backwash discharge infiltrating into soils before discharging into Whaleback Creek.

24) Whaleback open pit

There is evidence of pyritic material in the walls of the open pit. The pit has a low pH. Any pyritic material mined is encapsulated with inert material in overburden storage areas. Low pH water from the pit is pumped to the ARD dam and evaporation ponds.

Oxidation of metals (such as chromium, molybdenum, selenium and tungsten) in aquifer sediments may result from mine dewatering. Selenium concentrations in the Newman water supply wellfield periodically exceed drinking water guidelines.

Soil and groundwater investigations undertaken in areas 1 - 24 are limited, and the quality of soil and groundwater beneath across the site are unknown. Further soil and groundwater investigations are required to determine the contamination status of the soil and groundwater at the reported areas.

Limited sediment investigations in Whaleback Creek were reported as being conducted following the diesel spill in 1992. However the current quality of sediments on/off-site are unknown.

Risk assessment is currently limited to targeted portions of the site and has not yet been fully carried out to determine the potential risk posed by all substances of concern at the site or off-site, to human health, the environment or any environmental value.

Reporting of routine groundwater monitoring carried out to comply with Part V 'Environmental Protection Act 1986' licence conditions for the premises contains insufficient technical/hydrogeological information and/or documentation to enable an assessment of contamination to be carried out in accordance with the department's 'Contaminated Sites Guidelines' (2014) and the NEPM.

As hydrocarbons including LNAPL (such as from diesel, oil) and PFAS are present in the soil and groundwater at the power station and rail loop ponds (areas 1 and 20 above), which are acting as a significant source of dissolved-phase groundwater contamination, which presents a risk to human health, the environment, or environmental values, the site is classified as 'contaminated - remediation required'.

Once the results of further investigations and remedial works have been submitted to the department for areas 1 - 24, these will be reviewed and the site (or portions of the site) may be re-classified.

A memorial stating the site's classification has been placed on the certificate of title, and will trigger the need for further investigations and risk assessment should the site be proposed for a more sensitive land use.

The department, in consultation with the Department of Health, has classified this site based on the information available to the department at the time of classification. It is acknowledged that the contamination status of the site may have changed since the information was collated and/or submitted to the department, and as such, the usefulness of this information may be limited.

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Report generated at 04:33:41PM, 25/03/2021

In accordance with Department of Health advice, if groundwater is being, or is proposed to be abstracted, the department recommends that analytical testing should be carried out to determine whether the groundwater is suitable for its intended use.

Other Relevant Information:

Additional information included herein is relevant to the contamination status of the site and includes the department's expectations for action that should be taken to address potential or actual contamination described in the Reasons for Classification.

Action Required:

Further soil investigations, groundwater investigations and an appropriate risk assessment are required to adequately delineate and characterise the current nature and extent of soil and groundwater contamination. Groundwater investigations should fully characterise and delineate the lateral and vertical extent of the groundwater contamination beneath the site, capture seasonal variations and further characterise the hydrogeology at the site.

Soil, sediment and groundwater investigations should meet the standards outlined in the departments 'Contaminated Sites Guidelines' (2014) and the NEPM.

If further investigation identifies off-site impacts, future reports on investigation, assessment, monitoring or remediation of the site which are submitted to the department will need to be accompanied by a Mandatory Auditor's Report, in accordance with regulation 31(1)(b) of the Contaminated Sites Regulations 2006.

Further investigations are required to address PFAS, which are potential contaminants of concern at wastewater treatment facilities, landfills and fire-fighting training facilities, as specified in 'PFAS National Environmental Management Plan' (Heads of EPAs Australia and New Zealand, January 2018). PFAS investigations and assessment are to be carried out in accordance with the 'PFAS National Environmental Management Plan Version 2.0' (Heads of EPAs Australia and New Zealand, January 2020).

Asbestos investigations are required to determine the nature and extent of asbestos impacts in the former/current asbestos disposal areas, the general landfill and the potential for asbestos impact across the site. Investigations should be carried out in accordance with the 'Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia' (Department of Health, May 2009).

A risk assessment is required to determine potential risk to human health, the environment or any environmental value and should include an assessment of all potential receptors, including site users, down-gradient groundwater users and the risk assessment should be carried out in accordance with guidance in the department's Contaminated Sites Guidelines and the NEPM.

Particular emphasis should be placed on determining risk to: on-site workers, the P1 Public Drinking Water Supply Area, drinking water production bores (on-site or off-site), Ophthalmia Dam town water supply and the freshwater ecosystems of Whaleback Creek and Fortescue River.

Remediation of the site is required to mitigate potential risks to human health, the environment and/or any environmental value. Remedial options are required to be assessed and remediation action plans progressively developed for the site and submitted to the department or an auditor.

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Contaminated Sites Act 2003 Basic Summary of Records Search Response

Report generated at 04:33:41PM, 25/03/2021

The department recommends that all areas of significant contamination in soils at the site, be either actively remediated or capped with an impervious barrier in order to achieve long term protection of the regional groundwater aquifer and freshwater ecosystems.

An interim site management plan for PFAS in soils and groundwater across the site including, but not limited to, fire training areas, wastewater disposal areas and the rail loop ponds should be submitted to the department by April 2021.

A remediation action plan for the rail loop ponds should be developed for the site and submitted to the department by July 2021.

Due to the presence of contaminants including hydrocarbons, PFAS and asbestos in soil and/or groundwater, a site-specific health and safety plan should be developed and implemented to address the risks to the health of any workers undertaking intrusive works until further notice.

Certificate of Title Memorial

Under the Contaminated Sites Act 2003, this site has been classified as "Contaminated - remediation required". For further information on the contamination status of this site, please contact the Contaminated Sites section of the Department of Environment & Conservation.

Current Regulatory Notice Issued

Type of Regulatory Notice: *Nil*

Date Issued: *Nil*

General

No other information relating to this parcel.

Disclaimer

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Appendix B – Summary of Historical Investigations

Summary of previous environmental investigations

Investigation Background and Objectives	Scope of Work	Principal Data Findings	Report Conclusions and Recommendations (as presented by Author)
JBS&G (2014) Orebody 25 Former Fuel Farm Environmental Site Assessment: Stage 2 – Initial Groundwater Verification Sampling Program (ref: 43267-57631 Rev 1), August 2014, JBS&G (Australia) Pty Ltd			
<p>JBS&G (Australia) Pty Ltd was engaged by BHP Billiton Iron Ore to undertake an initial groundwater verification sampling program at the former fuel farm of the Orebody 25 mine (the site), which forms part of the wider Eastern Ridge Mine Site. A diesel fuel leak with an estimated volume of approximately 250 KL occurred at the site in 2002, which resulted in contamination of the surrounding soil and groundwater. An initial detailed site investigation (DSI) was undertaken following the incident, including the installation of extraction wells and a light non aqueous phase liquid (LNAPL) recovery system. These previous works were undertaken by other consultants, and the results of these assessments were insufficient to fully characterise the risks posed.</p> <p>The overall objective of the Orebody 25 Environmental Site Assessment program was to further characterise soil and groundwater hydrocarbon contamination at the site, and to draw conclusions regarding the risks posed to the identified sensitive receptors at the site, including the water supply well (currently isolated and not utilised) located to the south of the site, human health and the broader environment.</p> <p>The objectives of the Stage 2 initial groundwater verification sampling program were to:</p> <ul style="list-style-type: none"> • Provide a definitive baseline assessment of the presence, nature, extent, and magnitude of groundwater impacts underlying the site and in the vicinity of the water supply bore located to the south-east of the site; • Establish a reliable measurement of groundwater flow direction, and • Inform recommendations for the required works to be undertaken in Stage 3 of the project. 	<ul style="list-style-type: none"> • Completion of a well condition audit of all known groundwater monitoring wells installed at the site; • Gauging, sampling and laboratory analysis of all operational groundwater monitoring wells and the groundwater abstraction bore (PW1) located to the southeast of the site; • Completion of a bail down testing at the three monitoring wells (EW4, EW6, MW8) and subsequent data analysis using the American Petroleum Institute (API) Light Non-Aqueous Phase Liquid (LNAPL) transmissivity workbook; • Sampling of LNAPL from four monitoring wells (EW3, EW4, EW6 and MW8) and laboratory analysis for fingerprinting identification and characterisation of physical parameters; • Comparison of available groundwater data against the selected assessment criteria; • Assessment of data quality assurance, quality control and reliability; and • Preparation of a revised conceptual site model (CSM) for the site in accordance with <i>CRC Care Technical Report No. 11 Characterisation of Sites Impacted by Petroleum Hydrocarbons: National Guideline Document</i> (CRC Care, 2009). The CSM considers source release conditions, hydrogeological conditions, LNAPL composition and characteristics, receptors and potential exposure pathways, multiple-phase concentrations at the site boundary, and mobility/stability of the dissolved phase plume. 	<p>Groundwater</p> <p>Uncertainty remains as to the groundwater flow direction in the immediate locality of the site.</p> <p>Minor detections of dissolved phase TRH C6-C9 and BTEX constituents, intermittently exceeding the relevant drinking water assessment criteria, were reported in the sample obtained from EW1 only. EW1 is not considered to be representative of groundwater quality within the underlying aquifer and, is more likely to result from surface water run-off and infiltration into the well casing.</p> <p>In consideration of the above, the absence of dissolved phase hydrocarbon impacts within the monitoring network is considered noteworthy given the presence of significant thicknesses of LNAPL in nearby monitoring wells.</p> <p>A review of natural attenuation parameters including terminal electron acceptors and petroleum hydrocarbon degradation by-products data did not indicate that natural attenuation of hydrocarbons is occurring in the groundwater sampled at the site. The principal reason for the absence of natural attenuation indicators within the aquifer is considered to be due to the absence of dissolved phase hydrocarbon impacts within the sampled groundwater monitoring wells.</p> <p>LNAPL</p> <p>LNAPL was detected at four monitoring wells during the May and June gauging events (EW3, EW4, EW6 and MW8), with apparent thicknesses ranging from 0.002 m and 5.847 m at EW3 and MW8 respectively.</p> <p>LNAPL was detected at five monitoring wells (MW4, EW2, EW3, EW4 and EW6 (MW8 was not monitored)) in December 2012, with apparent thicknesses ranging from 0.032 m and 0.725 m at MW4 and EW6 respectively. It was noted that both MW4 (destroyed) and EW2 (dry) are no longer operational. Apparent LNAPL thickness had decreased slightly in both EW3 and EW6 between 2012 and 2014, by approximately 0.3 m. However, apparent LNAPL thickness had increased by approximately 1.3 m in the same period at EW4.</p>	<p>The conclusions of the report summarise the principal data findings of the investigation completed by JBS&G and the recommendations for ensuing works were to be presented within a SAP, subject to Auditor approval prior to implementation. The SAP has not been provided for review by BHP.</p>

		<p>Prior to 2012, LNAPL has only been gauged at the site sporadically over three monitoring events undertaken in October 2002, December 2004, and January 2009, with apparent thicknesses ranging from 0.05 and 4.97 m (observed at EW6 in December 2004).</p> <p>It was noted that the apparent thickness of LNAPL within a monitoring well (i.e. measured using an interface probe) is not considered to be representative of the true thickness of LNAPL present on the groundwater surface within the aquifer. However, LNAPL distribution within the subsurface is now understood to be highly complex and geology dependent, and as such, it is considered that a true thickness of LNAPL within the subsurface does not exist.</p> <p>Furthermore, ongoing dewatering within the mine site has depressed the water table at the site. This has resulted in the water table dropping below the base of a number of monitoring wells at the site making them unusable. Several wells where LNAPL was historically observed are now dry and unable to intercept any potential LNAPL. In addition, ongoing operations at the site have caused a number of monitoring wells where LNAPL was historically observed to be destroyed or lost.</p> <p>As such, the lateral extent of the LNAPL could not be adequately characterised at the current time based on the limitations of the current monitoring network.</p> <p>The transmissivity of the LNAPL observed underlying the site was therefore estimated to be low. However significant LNAPL recovery was observed in the wells in the days after the bail down testing, with recovery of up to 49% at MW8, indicating that although the transmissivity is low, the LNAPL is mobile.</p> <p>The LNAPL has been identified by fingerprinting analysis to be a slightly weathered diesel fuel.</p>	
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Coffey (2020) Eastern Ridge PFAS in Groundwater Investigation – Preliminary Findings (ref: 754-PEREN282113), December 2020, Coffey Services Australia Pty Ltd

<p>Following the initial identification of per- and polyfluoroalkyl substances (PFAS) at BHP’s Eastern Ridge mine in November 2020, BHP initiated an assessment of PFAS concentrations in groundwater, including a focus on water which may be abstracted during pit dewatering activities.</p> <p>The overarching objective of this investigation was to provide an initial and holistic understanding of the magnitude and extent of PFAS impacts in groundwater. This was then used to provide a preliminary understanding of risk and assess the likelihood that PFAS impacts will affect the ability of BHP to undertake</p>	<ul style="list-style-type: none"> • Development of a sampling plan based on the findings of an initial high-level desktop review of the following: <ul style="list-style-type: none"> ○ Potential sources of PFAS at Eastern Ridge; ○ The Eastern Ridge groundwater monitoring network, including well locations and construction details (including screen intervals); ○ Production bore locations; ○ Discharge locations; and ○ Locations of potentially sensitive receptors. • Collection of the following samples over a 1-week period: 	<p>The results of the investigation suggested that a broad distribution of low-level PFAS impacts marginally exceeding the FWG for 99% species protection level (for PFOS) is present across a significant portion of Eastern Ridge. Whilst the sampling programme was preliminary in nature, the initial results have not identified the presence of any clear point sources of gross PFAS contamination. However, higher concentrations of PFAS were generally associated with groundwater samples collected from the following areas:</p> <ul style="list-style-type: none"> • Eastern Ridge fuel farm • The Newman town wastewater treatment plant discharge area 	<p>Based on the preliminary findings of this investigation, Coffey made the following recommendations:</p> <ol style="list-style-type: none"> 1. An additional round of monitoring should be undertaken to confirm the results of this investigation. Where possible, this should include the following sampling locations: <ul style="list-style-type: none"> • Accessible and serviceable groundwater monitoring wells which were sampled during this investigation • Accessible and operational production bores • Accessible dewatering effluent discharge locations
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<p>dewatering and discharge groundwater in accordance with the proposed licence amendment.</p>	<ul style="list-style-type: none"> ○ 37 samples from existing groundwater monitoring wells ○ 15 from operational production bores ○ 4 from dewatering discharge locations and surface water bodies. ● Laboratory analysis for a full suite of PFAS compounds to super ultra-trace detection limits, ● Preparation of a memorandum which detailed the preliminary findings of the investigation. 	<ul style="list-style-type: none"> ● Recharge ponds, which are fed solely by dewatering effluent ● Homestead Creek <p>Preliminary assessment of the distribution of PFAS suggested that the results from samples collected from production bores and monitoring wells are generally comparable. However, it should be noted that limited well construction and lithological information had been reviewed.</p> <p>Based on the geological and hydrogeological information available to Coffey at the time of writing the memorandum it appeared that due to the presence of numerous intrusive dykes in the area and the extension of the Whaleback Faultline through the Eastern Ridge lithological profile, groundwater may be compartmentalised in areas and groundwater may exhibit radial flow characteristics away from the Faultline.</p>	<ul style="list-style-type: none"> ● Additional groundwater monitoring wells between the wastewater treatment plant discharge point and OB32. <p>2. Additional groundwater monitoring wells should be selected once a comprehensive review of the data has been undertaken. To optimise the selection of these additional wells, review of the following information would be beneficial if available:</p> <ul style="list-style-type: none"> ● Historical groundwater level data (in mAHD) ● Historical water quality data (both field and analytical), including sample depths ● Borelogs (preferably as excel or in interactive format), including screened intervals ● Pumping rates from extraction bores in area ● Discharge rates to surface water bodies ● Surface water flow rates for creeks ● Surveyed invert levels of water courses in area, and/or any topographical levels/surface ● Details of any models in the area; 3D geological or numerical models. i.e what type of model, area covered.
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Coffey (2020) Eastern Ridge PFAS in Groundwater Investigation – Phase 2 Preliminary Findings (ref: 754-PEREN282113), February 2020, Coffey Services Australia Pty Ltd

<p>In order to address the Department of Water and Environmental Regulation (DWER) concerns around the presence of PFAS in groundwater and provide BHP with a robust data set to support the dewatering licence amendment, in December 2020 BHP engaged Coffey Services Australia Pty Ltd (Coffey) to complete an initial sampling and analysis programme (Phase 1) to assess the magnitude and extent of PFAS in groundwater at Eastern Ridge. The findings of the Phase 1 investigation were presented to BHP in a memorandum finalised on 24th December 2020. These initial findings concluded that there appeared to be a broad distribution of low-level PFAS impacts marginally exceeding the PFAS National Environmental Management Plan (NEMP) version 2.0 (HEPA, 2020) freshwater guideline (FWG) for 99% species protection (for PFOS) across a significant portion of Eastern Ridge. However, higher concentrations of total PFAS compounds were generally associated with groundwater samples collected from the following areas:</p> <ul style="list-style-type: none"> ● Eastern Ridge fuel farm; ● The Newman town wastewater treatment plant discharge area; ● Recharge ponds, which are fed solely by dewatering effluent; and ● Homestead Creek. 	<ul style="list-style-type: none"> ● Development of a sampling plan based on the findings of Phase 1 and an initial high-level desktop review of the following: <ul style="list-style-type: none"> ○ Potential sources of PFAS at, or near to, the Eastern Ridge operations; ○ Results of Phase 1 sampling in terms of spatial distribution of PFAS and the relative proportions of different compounds identified; ○ Production bore locations, operating status, purpose and construction details; ○ Dewatering discharge locations and potential flow through effects at discharge points; ○ Well construction and lithology details; ○ Locations and nature of potentially sensitive receptors; and ○ The existing NPI monitoring programme. ● Collection of the following samples over a 12-day period: <ul style="list-style-type: none"> ○ 58 samples from 51 existing groundwater monitoring wells1 ○ 39 samples from 20 operational production bores ○ 10 surface water samples: <ul style="list-style-type: none"> ▪ One (1) from Ophthalmia Dam ▪ One (1) from the Newman wastewater treatment plant (WWTP) discharge point ▪ Four (4) from sumps in Ore Body (OB) 25 ▪ Four (4) from recharge ponds 	<p>The following findings were made based on a preliminary assessment of the data collected:</p> <ul style="list-style-type: none"> ● Consistent with Phase 1, the results of this investigation suggest that a broad distribution of low-level PFAS impacts marginally exceeding the FWG or 99% species protection level (for PFOS) is present across a significant portion of Eastern Ridge. ● Comparison of pre and post flush samples from production bores indicate that bore construction and headworks are unlikely to be contributors of PFAS. ● Samples from production bores tend to contain lower PFAS concentrations than nearby monitoring wells, suggesting a degree of dilution of PFAS during the dewatering process. ● It has been confirmed that a source of PFAS impact exists in the form of the WWTP. Additionally, there is evidence that impacts from Mt Whaleback have migrated towards Eastern Ridge. It is plausible that these two sources have formed a comingling plume. ● Other areas where current or historical activities may have contributed to PFAS impacts in groundwater include OB25/OB37 and OB23. ● Elevated PFAS concentrations have been recorded in wells along the alignment of Homestead Creek to the south of the recharge ponds. Given that 	<p>Actions to support OB32 dewatering application</p> <p>Based on the data collected to date, it is believed that there is sufficient information to allow BHP to progress with their application and regulator engagement. However, in parallel it may be beneficial to undertake limited additional investigation in the vicinity of those monitoring wells which have PFAS impacts to date. This investigation should be focussed on demonstrating that PFAS impacts are limited to shallow groundwater and are not present at depth (i.e. within production bore response zones).</p> <p>Additionally, groundwater contours should be plotted to confirm the assumption that groundwater flow is in a north-easterly direction from Whaleback but then splits to the east and west along the Whaleback fault.</p> <p>Other recommendations relevant to PFAS across the wider Eastern Ridge mine</p> <p>The following recommendations were made in respect to the assessment of PFAS impacts across the wider Eastern Ridge mine.</p> <ul style="list-style-type: none"> ● Hydrasleeves which could not be retrieved due to flooding should be retrieved as soon as possible
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<p>The Phase 1 memorandum made the following recommendations:</p> <ul style="list-style-type: none"> An additional round of monitoring should be undertaken to confirm the results of the initial investigation. Where possible, this should include the following sampling locations: <ul style="list-style-type: none"> Accessible and serviceable groundwater monitoring wells which were sampled during Phase 1; Accessible and operational production bores; Accessible dewatering effluent discharge locations; Additional groundwater monitoring wells between the wastewater treatment plant discharge point and OB32. Additional groundwater monitoring wells should be selected once a comprehensive review of the data has been undertaken. Furthermore, consideration should be given to targeting strata with the highest permeability, either through well selection or by installing hydrasleeves at targeted depths. <p>To progress these recommendations, BHP commissioned Coffey to complete a second round of sampling (Phase 2).</p> <p>The overarching objective Phase 1 and Phase 2 is to provide an initial and holistic understanding of the magnitude and extent of PFAS impacts in groundwater across Eastern Ridge. This will be used to provide a preliminary understanding of the potential likelihood that PFAS could be abstracted from the underlying aquifers and affect the ability of BHP to undertake dewatering and discharge groundwater in accordance with the proposed licence amendment.</p>	<ul style="list-style-type: none"> Laboratory analysis for a full suite of PFAS compounds to super ultra-trace detection limits, Preparation of this memorandum which details the preliminary findings of the investigation. 	<p>PFAS containing effluent is being discharged to these ponds it is likely that they are a contributor to this potential plume.</p> <ul style="list-style-type: none"> Elevated PFAS concentrations in the form of PFOS exceeding the 99% FWG were recorded in Ophthalmia Dam. Whilst it has not been possible to differentiate the contribution from Eastern Ridge from dewatering effluent discharged from Mt Whaleback, it is likely that discharges from Eastern Ridge are a contributor based on the concentrations measured in the recharge ponds, sumps and production bores. In the context of BHP's objective to obtain approval to dewater at OB32, no impacts were recorded in production bores in this area. However, isolated monitoring wells did contain PFAS indicating that the risk of PFAS impacts being present in future dewatering effluent cannot be eliminated at this stage. 	<p>given that a number are located in proximity to the WWTP.</p> <ul style="list-style-type: none"> Targeted investigation is required around the WTP to understand flow directions in this area, noting the present of geological faulting in the area. Additional laboratory analysis for Total Oxidisable Precursor Assay should be undertaken to determine likely future PFOS, PFHxS and PFOA contribution. Targeted investigation should be undertaken into potential sources of PFAS in Sump 1 and Sump 3 at OB25. Targeted investigation should be undertaken into the source of PFAS recorded to the south of OB23. A surface water sampling programme should be instigated to assess the effects of the following factors on PFAS distribution within Ophthalmia Dam: <ul style="list-style-type: none"> Distance from dewatering effluent discharge points (including the Mt Whaleback discharge) Season variations in rainfall and dilution of PFAS by runoff. Historical NPI results for HNPIOP0031P should be reviewed to determine if the observed result is anomalous or if there is a potential external source of PFAS located to the north-east of Eastern Ridge. Multi-level sampling should be undertaken in monitoring wells HEOP387M, HEOP388M, HEC0406M and HEOP798M to assess if lower PFOS concentrations in neighbouring production bores are the result of production bore water being abstracted from across a greater and/or deeper screen interval. Further consideration should be given to the relationship between monitoring wells located to the south/west of OB25 and the observed PFAS concentrations within the four sumps and nearby production bores. Further data assessment is required to determine the significance of PFAS impacts from Mt Whaleback which are likely to have migrated to Eastern Ridge.
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Appendix C – Newman Integration Water Supply Scheme Schematic Diagram

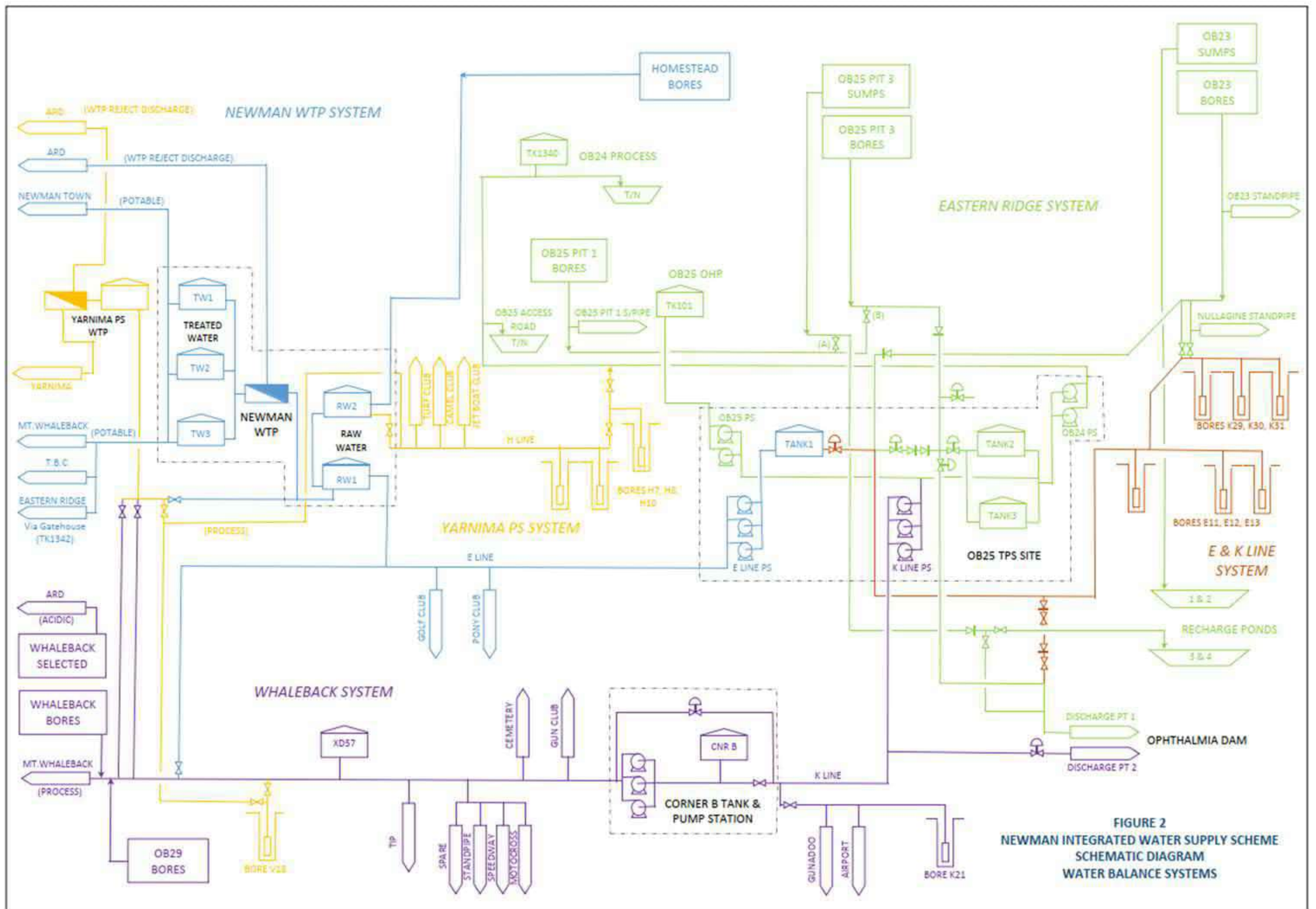


FIGURE 2
 NEWMAN INTEGRATED WATER SUPPLY SCHEME
 SCHEMATIC DIAGRAM
 WATER BALANCE SYSTEMS

Appendix D – Sensitive Ecological Receptors



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 07/05/21 18:47:29

[Summary](#)

[Details](#)

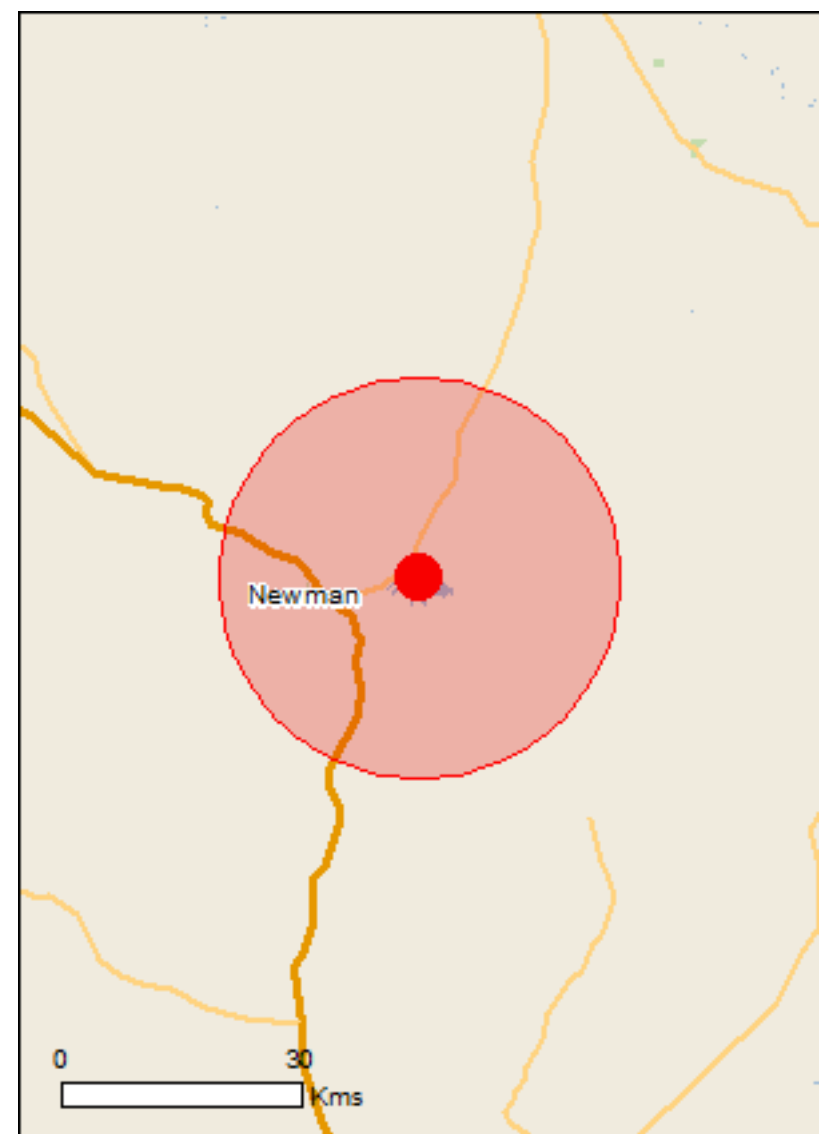
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

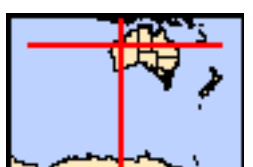
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 25.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	11
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	13
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	10
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species [\[Resource Information \]](#)

Name	Status	Type of Presence
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Birds

Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
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Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
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Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat likely to occur within area
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Polytelis alexandrae Princess Parrot, Alexandra's Parrot [758]	Vulnerable	Species or species habitat may occur within area
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Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
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Mammals

Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
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Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
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Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
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Rhinonictes aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat known to occur within area
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Plants

Pityrodia augustensis Mt Augustus Foxglove [4962]	Vulnerable	Species or species habitat likely to occur within area
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Reptiles

Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat likely to occur within area
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Listed Migratory Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Defence - NEWMAN TRAINING DEPOT

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	habitat may occur within area Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Invasive Species

[\[Resource Information \]](#)

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
<i>Columba livia</i> Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Mammals		
<i>Camelus dromedarius</i> Dromedary, Camel [7]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus asinus Donkey, Ass [4]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-23.34131 119.86284

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- [-Other groups and individuals](#)

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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Appendix E – Photography Log



Photograph 1: Storage of fire extinguishers at the Infrastructure – OHP Maintenance Workshop



Photograph 2: Storage of chemicals in IBCs at the Infrastructure – OHP Maintenance Workshop. Chemicals include cleaning products, petroleum products such as oils and lubricants, and coolants



Photograph 3: Reclaimed effluent pond



Photograph 4: One of many redundant vehicle laydown area



Photograph 5: Irrigation of lawn/turf around on-site offices



Photograph 6: Water processing system in front of OB24 OHP Workshop stores drop point



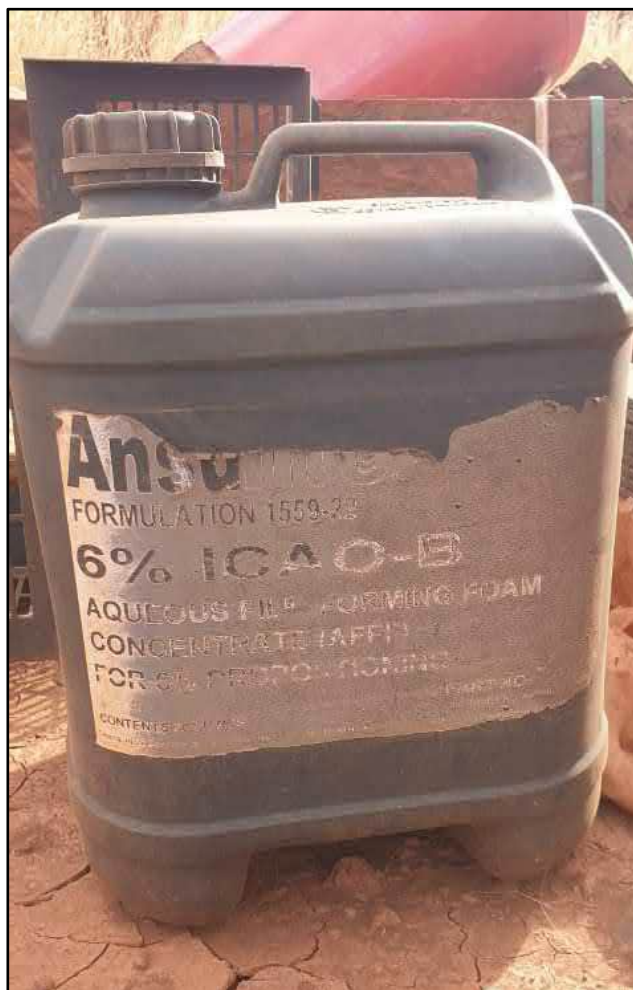
Photograph 7: Equipment cleaning area at the Infrastructure – OHP Maintenance Workshop



Photograph 8: Fuel farm with ASTs



Photograph 9: Redundant equipment and vehicle laydown area



Photograph 10: Unbunded Ansolite container located around redundant equipment



Photograph 11: Fuel farm with ASTs



Photograph 12: Mining plant and equipment washdown area



Photograph 13: Light vehicle washdown area



Photograph 14: RPSW02 recharge pond



Photograph 15: RPS04 recharge pond



Photograph 1: OB24 Fire Training Ground 2005 Aerial



Photograph 2: OB24 Fire Training Ground 2012 Aerial



Photograph 3: OB24 Fire Training Ground 2013 Aerial



Photograph 4: OB24 Fire Training Ground 2013 Aerial



Photograph 5: OB24 Fire Training Ground 2017 Aerial



Photograph 6: OB24 Fire Training Ground 2019 Aerial



**Photograph 1: OB24 Inert Landfill and
Used Tyre Dump at Former Dome
Facility 2005 Aerial**



**Photograph 2: OB24 Inert Landfill and
Used Tyre Dump at Former Dome
Facility 2012 Aerial**



Photograph 3: OB24 Inert Landfill and Used Tyre Dump at Former Dome Facility 2014 Aerial



Photograph 4: OB24 Inert Landfill and Used Tyre Dump at Former Dome Facility 2015 Aerial



Photograph 5: OB24 Inert Landfill and Used Tyre Dump at Former Dome Facility 2017 Aerial



Photograph 6: OB24 Inert Landfill and Used Tyre Dump at Former Dome Facility 2019 Aerial



**Photograph 1: OB24 Inert Landfill and
Used Tyre Dump Adjacent Valley Haul
Road 2005 Aerial**



**Photograph 2: OB24 Inert Landfill and
Used Tyre Dump Adjacent Valley Haul
Road 2012 Aerial**



Photograph 3: OB24 Inert Landfill and Used Tyre Dump Adjacent Valley Haul Road 2013 Aerial



Photograph 4: OB24 Inert Landfill and Used Tyre Dump Adjacent Valley Haul Road 2014 Aerial



**Photograph 5: Inert Landfill and
Used Tyre Dump Adjacent Valley
Haul Road 2014 Aerial**



**Photograph 6: OB24 Inert Landfill
and Used Tyre Dump Adjacent
Valley Haul Road 2019 Aerial**



Photograph 1: OB25 Land Farm and Surrounding Area 2005 Aerial



Photograph 2: OB25 Land Farm and Surrounding Area 2005 Aerial



Photograph 3: OB25 Land Farm and Surrounding Area 2005 Aerial



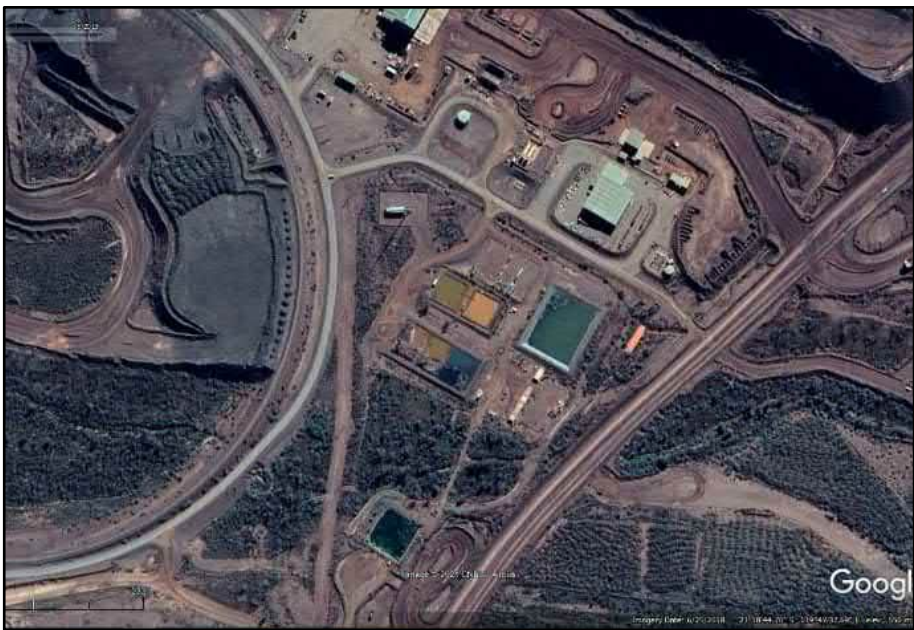
Photograph 4: OB25 Land Farm and Surrounding Area 2013 Aerial



Photograph 5: OB25 Land Farm and Surrounding Area 2014 Aerial



Photograph 6: OB25 Land Farm and Surrounding Area 2015 Aerial



Photograph 7: OB25 Land Farm and Surrounding Area 2017 Aerial



Photograph 8: OB25 Land Farm and Surrounding Area 2019 Aerial



Photograph 1: OB25 Former and Present Bioremediation Land Farm 2005 Aerial



Photograph 2: OB25 Former and Present Bioremediation Land Farm 2012 Aerial



Photograph 3: OB25 Former and Present Bioremediation Land Farm 2013 Aerial



Photograph 4: OB25 Former and Present Bioremediation Land Farm 2014 Aerial



Photograph 5: OB25 Former and Present Bioremediation Land Farm 2017 Aerial



Photograph 6: OB25 Former and Present Bioremediation Land Farm 2019 Aerial



Photograph 1: OB25 Historical Fuel Farm and Surrounding Area 2005 Aerial



Photograph 2: OB25 Historical Fuel Farm and Surrounding Area 2012 Aerial



Photograph 3: OB25 Historical Fuel Farm and Surrounding Area 2013 Aerial



Photograph 4: OB25 Historical Fuel Farm and Surrounding Area 2014 Aerial



Photograph 5: OB25 Historical Fuel Farm and Surrounding Area 2015 Aerial



Photograph 6: OB25 Historical Fuel Farm and Surrounding Area 2017 Aerial



Photograph 7: OB25 Historical Fuel Farm and Surrounding Area 2018 Aerial



Photograph 8: OB25 Historical Fuel Farm and Surrounding Area 2019 Aerial

Appendix F – Calibration Certificates

Multi Parameter Water Meter

Instrument **YSI Quatro Pro Plus**
Serial No. **18J 104 318**



Item	Test	Pass	Comments
Battery	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
	Seal		
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. ORP in mV	✓	
	3. EC/Temp.	✓	
	4. D.O.	✓	
Alarms	Beeper		
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

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

Sensor	Value	Standard		Instrument Reading
Temperature			<i>Checked</i>	23.1 °C
pH	pH 7	358580	Calibrated	7.01
pH	pH 4	357330	Calibrated	4.00
EC	Zero	Air	<i>Checked</i>	0.001 mS/cm
EC	2.76mS/cm	354263	Calibrated	2.76 mS/cm
ORP (mV)	240mV at 20°C	358011 / 358822	Calibrated	232.6 mV
DO Zero	Zero	Sodium sulphite sol 10640	<i>Checked</i>	0.0 %
DO 100%	100%	Water saturated air	Calibrated	100 %

Calibrated by:

Richard Tang

Calibration date:

22-Jan-21

Next calibration due

22-Feb-21

Daily Field Equipment Calibration Record



Job/Site Details	
Project Name: <u>CHP Eastern Ridge. P1A5</u>	Project Number: <u>754-MEREN 282113</u>
Todays Date: <u>05/02/21</u>	Work Completed By: <u>SM RM</u>
Type of Work (eg. ESA, GME, etc):	
Equipment Supplier Calibration Certificates Included? <u>Y</u> / N (circle result)	

Photoionisation Detector (PID)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Gas Standard:	Gas Batch #:	Gas Expiry date:
Field Fresh Air Calibration Performed? Y / N (circle result)	Bump Test Result (ppm):	Bump Test Result (ppm) (end of day):
Field Gas Calibration Required? Y / N (circle result) Performed? Y / N (circle result)		

Water Quality Meter (WQM)					
Equipment Description: <u>YS7</u>	Equipment ID (serial number): <u>187104318</u>				
Calibration Frequency Required by Manufacturer: <u>monthly</u>	Last Service Date: <u>22/01/21</u>	Calibrated by: <u>RT</u>			
Field Calibration Required? <u>Y</u> / N (circle result)	Field Bump Test Performed? <u>Y</u> / N (circle result)				
	DO Probe	Conductivity	pH 4.01	pH 7.00	Temperature
Calibration Solution Batch # / Expiry:	<u>1</u>	<u>358340 02/22</u>	<u>357330 01/22</u>	<u>358580 02/22</u>	<u>25.1</u>
Bump Test Result (start of day):		<u>12.3</u>	<u>4.01</u>	<u>7.02</u>	
Bump Test Result (end of day):					
Calibrated? (circle result)	<u>Y</u> / N	<u>Y</u> / N	<u>Y</u> / N	<u>Y</u> / N	<u>Y</u> / N

Interface Probe (IP)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Field Bump Test Results: Water: IP Worked? Y / N (circle result) Oil: IP Worked? Y / N (circle result) (if possible)		

Lower Explosive Level (LEL) Meter		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Mixture LEL% (refer side of cylinder):	Gas Batch #:	Gas Expiry date:
Fresh Air LEL% Result:	Challenge Gas LEL% Result:	Equipment Alarmed Levels:
Fresh Air LEL% Result (end of day):	Challenge Gas LEL% Result (end of day):	
Field Calibration Required? Y / N (circle result) Performed? Y / N (circle result)		

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Multi-gas Meter				
Equipment Description:	Equipment ID (serial number):			
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:		
Challenge Mixture: %O ₂ : _____ %LEL: _____ H ₂ S (ppm): _____ CO (ppm): _____	Gas Batch #:	Gas Expiry date:		
Field Calibration Required? Y / N (circle result)	Field Bump Test Performed? Y / N (circle result)			
	%O₂	%LEL	H₂S (ppm)	CO (ppm)
Bump Test Result:				
Bump Test Result (end of day):				
Calibrated? (circle result)	<u>Y</u> / N	<u>Y</u> / N	<u>Y</u> / N	<u>Y</u> / N

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Daily Field Equipment Calibration Record



Job/Site Details	
Project Name: <u>BHP Eastern Ridge PIFAS Assessment</u>	Project Number: <u>754-PEREN282113</u>
Today's Date: <u>04/02/21</u>	Work Completed By: <u>SM</u>
Type of Work (eg. ESA, GME, etc):	
Equipment Supplier Calibration Certificates Included? <u>Y</u> / N (circle result)	

Photoionisation Detector (PID)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Gas Standard:	Gas Batch #:	Gas Expiry date:
Field Fresh Air Calibration Performed? <u>Y</u> / N (circle result)	Bump Test Result (ppm):	Bump Test Result (ppm) (end of day):
Field Gas Calibration Required? <u>Y</u> / N (circle result)	Performed? <u>Y</u> / N (circle result)	

Water Quality Meter (WQM)					
Equipment Description: <u>YSI</u>		Equipment ID (serial number): <u>187104318</u>			
Calibration Frequency Required by Manufacturer: <u>monthly</u>		Last Service Date: <u>22/01/21</u>		Calibrated by: <u>SM</u>	
Field Calibration Required? <u>Y</u> / N (circle result)		Field Bump Test Performed? <u>Y</u> / N (circle result)			
	DO Probe	Conductivity	pH 4.01	pH 7.00	Temperature
Calibration Solution Batch # / Expiry:	<u>/</u>	<u>358340/04/22</u>	<u>357320/01/22</u>	<u>358520/04/22</u>	<u>24.7</u>
Bump Test Result (start of day):		<u>12.2</u>	<u>4.02</u>	<u>7.01</u>	
Bump Test Result (end of day):					
Calibrated? (circle result)	<u>Y</u> / N	<u>Y</u> / N	<u>Y</u> / N	<u>Y</u> / N	<u>Y</u> / N

Interface Probe (IP)	
Equipment Description:	Equipment ID (serial number):
Calibration Frequency Required by Manufacturer:	Last Service Date: Calibrated by:
Field Bump Test Results: Water: IP Worked? <u>Y</u> / N (circle result) Oil: IP Worked? <u>Y</u> / N (circle result) (if possible)	

Lower Explosive Level (LEL) Meter		
Equipment Description:		Equipment ID (serial number):
Calibration Frequency Required by Manufacturer:		Last Service Date: Calibrated by:
Challenge Mixture LEL% (refer side of cylinder):		Gas Batch #: Gas Expiry date:
Fresh Air LEL% Result:	Challenge Gas LEL% Result:	Equipment Alarmed Levels:
Fresh Air LEL% Result (end of day):	Challenge Gas LEL% Result (end of day):	
Field Calibration Required? <u>Y</u> / N (circle result) Performed? <u>Y</u> / N (circle result)		

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Multi-gas Meter				
Equipment Description:		Equipment ID (serial number):		
Calibration Frequency Required by Manufacturer:		Last Service Date:	Calibrated by:	
Challenge Mixture: %O ₂ : _____ %LEL: _____ H ₂ S (ppm): _____ CO (ppm): _____		Gas Batch #:	Gas Expiry date:	
Field Calibration Required? <u>Y</u> / N (circle result)		Field Bump Test Performed? <u>Y</u> / N (circle result)		
	%O₂	%LEL	H₂S (ppm)	CO (ppm)
Bump Test Result:				
Bump Test Result (end of day):				
Calibrated? (circle result)	<u>Y</u> / N	<u>Y</u> / N	<u>Y</u> / N	<u>Y</u> / N

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Daily Field Equipment Calibration Record



Job/Site Details	
Project Name: <u>BHP Eastern Ridge PFAS Assessment</u>	Project Number: <u>754-PEREN282113</u>
Today's Date: <u>3/2/21</u>	Work Completed By: <u>SM</u>
Type of Work (eg. ESA, GME, etc):	
Equipment Supplier Calibration Certificates Included? <input checked="" type="checkbox"/> Y / N (circle result)	

Photoionisation Detector (PID)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Gas Standard:	Gas Batch #:	Gas Expiry date:
Field Fresh Air Calibration Performed? Y / N (circle result)	Bump Test Result (ppm):	Bump Test Result (ppm) (end of day):
Field Gas Calibration Required? Y / N (circle result)	Performed? Y / N (circle result)	

Water Quality Meter (WQM)					
Equipment Description: <u>YSI</u>		Equipment ID (serial number): <u>187104318</u>			
Calibration Frequency Required by Manufacturer: <u>Monthly</u>		Last Service Date: <u>22/01/21</u>		Calibrated by: <u>SM</u>	
Field Calibration Required? <input checked="" type="checkbox"/> Y / N (circle result)		Field Bump Test Performed? <input checked="" type="checkbox"/> Y / N (circle result)			
	DO Probe	Conductivity	pH 4.01	pH 7.00	Temperature
Calibration Solution Batch # / Expiry:	<u>1</u>	<u>358340 / 02/12</u>	<u>357330 / 01/12</u>	<u>358580 / 02/22</u>	<u>20.6</u>
Bump Test Result (start of day):		<u>13.13</u>	<u>4.01</u>	<u>7.01</u>	
Bump Test Result (end of day):					
Calibrated? (circle result)	Y / N	<input checked="" type="checkbox"/> Y / N	<input checked="" type="checkbox"/> Y / N	<input checked="" type="checkbox"/> Y / N	Y / N

Interface Probe (IP)		
Equipment Description:		Equipment ID (serial number):
Calibration Frequency Required by Manufacturer:		Last Service Date: Calibrated by:
Field Bump Test Results: Water: IP Worked? Y / N (circle result) Oil: IP Worked? Y / N (circle result) (if possible)		

Lower Explosive Level (LEL) Meter		
Equipment Description:		Equipment ID (serial number):
Calibration Frequency Required by Manufacturer:		Last Service Date: Calibrated by:
Challenge Mixture LEL% (refer side of cylinder):		Gas Batch #: Gas Expiry date:
Fresh Air LEL% Result:	Challenge Gas LEL% Result:	Equipment Alarmed Levels:
Fresh Air LEL% Result (end of day):	Challenge Gas LEL% Result (end of day):	
Field Calibration Required? Y / N (circle result)		Performed? Y / N (circle result)

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Multi-gas Meter				
Equipment Description:		Equipment ID (serial number):		
Calibration Frequency Required by Manufacturer:		Last Service Date:		Calibrated by:
Challenge Mixture: %O ₂ : %LEL: H ₂ S (ppm): CO (ppm):		Gas Batch #:		Gas Expiry date:
Field Calibration Required? Y / N (circle result)		Field Bump Test Performed? Y / N (circle result)		
	%O₂	%LEL	H₂S (ppm)	CO (ppm)
Bump Test Result:				
Bump Test Result (end of day):				
Calibrated? (circle result)	Y / N	Y / N	Y / N	Y / N

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Daily Field Equipment Calibration Record



Job/Site Details	
Project Name: BHP Eastern Ridge PFAS Assessment	Project Number: 754-PERENZ82113
Today's Date: 21/2/21	Work Completed By: SM
Type of Work (eg. ESA, GME, etc):	
Equipment Supplier Calibration Certificates Included? <input checked="" type="radio"/> Y / N (circle result)	

Photoionisation Detector (PID)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Gas Standard:	Gas Batch #:	Gas Expiry date:
Field Fresh Air Calibration Performed? Y / N (circle result)	Bump Test Result (ppm):	Bump Test Result (ppm) (end of day):
Field Gas Calibration Required? Y / N (circle result) Performed? Y / N (circle result)		

Water Quality Meter (WQM)					
Equipment Description: YSI			Equipment ID (serial number): 18J104318		
Calibration Frequency Required by Manufacturer: Monthly			Last Service Date: 22/10/21	Calibrated by: SM	
Field Calibration Required? <input checked="" type="radio"/> Y / N (circle result)			Field Bump Test Performed? <input checked="" type="radio"/> Y / N (circle result)		
	DO Probe	Conductivity	pH 4.01	pH 7.00	Temperature
Calibration Solution Batch # / Expiry:	/	358340 02/12	357330 10/1/2	358580 10/2/22	25.7
Bump Test Result (start of day):		13.13	4.01	7.00	
Bump Test Result (end of day):					
Calibrated? (circle result)	Y / N	<input checked="" type="radio"/> Y / N	<input checked="" type="radio"/> Y / N	Y / <input checked="" type="radio"/> N	Y / N

Interface Probe (IP)		
Equipment Description:		Equipment ID (serial number):
Calibration Frequency Required by Manufacturer:		Last Service Date: Calibrated by:
Field Bump Test Results: Water: IP Worked? Y / N (circle result) Oil: IP Worked? Y / N (circle result) (if possible)		

Lower Explosive Level (LEL) Meter		
Equipment Description:		Equipment ID (serial number):
Calibration Frequency Required by Manufacturer:		Last Service Date: Calibrated by:
Challenge Mixture LEL% (refer side of cylinder):		Gas Batch #: Gas Expiry date:
Fresh Air LEL% Result:	Challenge Gas LEL% Result:	Equipment Alarmed Levels:
Fresh Air LEL% Result (end of day):	Challenge Gas LEL% Result (end of day):	
Field Calibration Required? Y / N (circle result) Performed? Y / N (circle result)		

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Multi-gas Meter				
Equipment Description:		Equipment ID (serial number):		
Calibration Frequency Required by Manufacturer:		Last Service Date:	Calibrated by:	
Challenge Mixture: %O ₂ : _____ %LEL: _____ H ₂ S (ppm): _____ CO (ppm): _____		Gas Batch #:	Gas Expiry date:	
Field Calibration Required? Y / N (circle result)		Field Bump Test Performed? Y / N (circle result)		
	%O₂	%LEL	H₂S (ppm)	CO (ppm)
Bump Test Result:				
Bump Test Result (end of day):				
Calibrated? (circle result)	Y / N	Y / N	Y / N	Y / N

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Daily Field Equipment Calibration Record



Job/Site Details	
Project Name: <u>Eastern Ridge PFAS Assessment</u>	Project Number: <u>754-PERENV282113</u>
Today's Date: <u>01/02/2021</u>	Work Completed By: <u>SM RM</u>
Type of Work (eg. ESA, GME, etc):	
Equipment Supplier Calibration Certificates Included? <u>(Y)</u> / N (circle result)	

Photoionisation Detector (PID)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Gas Standard:	Gas Batch #:	Gas Expiry date:
Field Fresh Air Calibration Performed? Y / N (circle result)	Bump Test Result (ppm):	Bump Test Result (ppm) (end of day):
Field Gas Calibration Required? Y / N (circle result) Performed? Y / N (circle result)		

Water Quality Meter (WQM)					
Equipment Description: <u>YSI Quatro Pro Plus</u>		Equipment ID (serial number): <u>187104318</u>			
Calibration Frequency Required by Manufacturer: <u>monthly</u>		Last Service Date: <u>22/01/21</u>		Calibrated by: <u>RT</u>	
Field Calibration Required? <u>(Y)</u> / N (circle result)		Field Bump Test Performed? <u>(Y)</u> / N (circle result)			
	DO Probe	Conductivity	pH 4.01	pH 7.00	Temperature
Calibration Solution Batch # / Expiry:	<u>/</u>	<u>358340 02/22</u>	<u>357330 01/22</u>	<u>358580 02/22</u>	<u>31.8</u>
Bump Test Result (start of day):		<u>15.15</u>	<u>4.02</u>	<u>7.02</u>	
Bump Test Result (end of day):					
Calibrated? (circle result)	Y / N	<u>(Y)</u> / N	Y / <u>(N)</u>	<u>(Y)</u> / N	Y / N

Interface Probe (IP)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Field Bump Test Results: Water: IP Worked? Y / N (circle result) Oil: IP Worked? Y / N (circle result) (if possible)		

Lower Explosive Level (LEL) Meter		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Mixture LEL% (refer side of cylinder):	Gas Batch #:	Gas Expiry date:
Fresh Air LEL% Result:	Challenge Gas LEL% Result:	Equipment Alarmed Levels:
Fresh Air LEL% Result (end of day):	Challenge Gas LEL% Result (end of day):	
Field Calibration Required? Y / N (circle result) Performed? Y / N (circle result)		

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Multi-gas Meter				
Equipment Description:		Equipment ID (serial number):		
Calibration Frequency Required by Manufacturer:		Last Service Date:		Calibrated by:
Challenge Mixture: %O ₂ : _____ %LEL: _____ H ₂ S (ppm): _____ CO (ppm): _____		Gas Batch #:		Gas Expiry date:
Field Calibration Required? Y / N (circle result)		Field Bump Test Performed? Y / N (circle result)		
	%O₂	%LEL	H₂S (ppm)	CO (ppm)
Bump Test Result:				
Bump Test Result (end of day):				
Calibrated? (circle result)	Y / N	Y / N	Y / N	Y / N

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Daily Field Equipment Calibration Record



Job/Site Details	
Project Name: <u>BHP Eastern Ridge PIAS Assessment</u>	Project Number: <u>754-PEREN28213</u>
Todays Date: <u>31/01/21</u>	Work Completed By: <u>SIM</u>
Type of Work (eg. ESA/GME, etc):	
Equipment Supplier Calibration Certificates Included? <input checked="" type="radio"/> Y / <input type="radio"/> N (circle result)	

Photoionisation Detector (PID)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Gas Standard:	Gas Batch #:	Gas Expiry date:
Field Fresh Air Calibration Performed? <input type="radio"/> Y / <input type="radio"/> N (circle result)	Bump Test Result (ppm):	Bump Test Result (ppm) (end of day):
Field Gas Calibration Required? <input type="radio"/> Y / <input type="radio"/> N (circle result) Performed? <input type="radio"/> Y / <input type="radio"/> N (circle result)		

Water Quality Meter (WQM)					
Equipment Description: <u>YSI Quatro Pro Plus.</u>		Equipment ID (serial number): <u>187104318</u>			
Calibration Frequency Required by Manufacturer: <u>monthly</u>		Last Service Date: <u>22/01/21</u>		Calibrated by: <u>SIM</u>	
Field Calibration Required? <input checked="" type="radio"/> Y / <input type="radio"/> N (circle result)		Field Bump Test Performed? <input checked="" type="radio"/> Y / <input type="radio"/> N (circle result)			
	DO Probe	Conductivity	pH 4.01	pH 7.00	Temperature
Calibration Solution Batch # / Expiry:	/	<u>358340 102/22</u>	<u>357330 01/22</u>	<u>358580 02/22</u>	<u>22.0</u>
Bump Test Result (start of day):		<u>12.4</u>	<u>4.01</u>	<u>7.01</u>	
Bump Test Result (end of day):					
Calibrated? (circle result)	<input type="radio"/> Y / <input type="radio"/> N	<input checked="" type="radio"/> Y / <input type="radio"/> N	<input checked="" type="radio"/> Y / <input type="radio"/> N	<input checked="" type="radio"/> Y / <input type="radio"/> N	<input type="radio"/> Y / <input type="radio"/> N

Interface Probe (IP)	
Equipment Description:	Equipment ID (serial number):
Calibration Frequency Required by Manufacturer:	Last Service Date: Calibrated by:
Field Bump Test Results: Water: IP Worked? <input type="radio"/> Y / <input type="radio"/> N (circle result) Oil: IP Worked? <input type="radio"/> Y / <input type="radio"/> N (circle result) (if possible)	

Lower Explosive Level (LEL) Meter		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Mixture LEL% (refer side of cylinder):	Gas Batch #:	Gas Expiry date:
Fresh Air LEL% Result:	Challenge Gas LEL% Result:	Equipment Alarmed Levels:
Fresh Air LEL% Result (end of day):	Challenge Gas LEL% Result (end of day):	
Field Calibration Required? <input type="radio"/> Y / <input type="radio"/> N (circle result) Performed? <input type="radio"/> Y / <input type="radio"/> N (circle result)		

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Multi-gas Meter				
Equipment Description:		Equipment ID (serial number):		
Calibration Frequency Required by Manufacturer:		Last Service Date:	Calibrated by:	
Challenge Mixture: %O ₂ : _____ %LEL: _____ H ₂ S (ppm): _____ CO (ppm): _____		Gas Batch #:	Gas Expiry date:	
Field Calibration Required? <input type="radio"/> Y / <input type="radio"/> N (circle result)		Field Bump Test Performed? <input type="radio"/> Y / <input type="radio"/> N (circle result)		
	%O₂	%LEL	H₂S (ppm)	CO (ppm)
Bump Test Result:				
Bump Test Result (end of day):				
Calibrated? (circle result)	<input type="radio"/> Y / <input type="radio"/> N	<input type="radio"/> Y / <input type="radio"/> N	<input type="radio"/> Y / <input type="radio"/> N	<input type="radio"/> Y / <input type="radio"/> N

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Daily Field Equipment Calibration Record



Job/Site Details	
Project Name: <u>Eastern Ridge</u>	Project Number: <u>754-1EREN 282113</u>
Today's Date: <u>30/01/21</u>	Work Completed By: <u>SM RM</u>
Type of Work (eg. ESA, GME, etc):	
Equipment Supplier Calibration Certificates Included? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N (circle result)	

Photoionisation Detector (PID)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Gas Standard:	Gas Batch #:	Gas Expiry date:
Field Fresh Air Calibration Performed? Y / N (circle result)	Bump Test Result (ppm):	Bump Test Result (ppm) (end of day):
Field Gas Calibration Required? Y / N (circle result) Performed? Y / N (circle result)		

Water Quality Meter (WQM)					
Equipment Description: <u>YSI Quatro Pro Plus</u>	Equipment ID (serial number): <u>181104318</u>				
Calibration Frequency Required by Manufacturer: <u>monthly</u>	Last Service Date: <u>22/01/21</u>	Calibrated by: <u>RT</u>			
Field Calibration Required? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N (circle result)	Field Bump Test Performed? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N (circle result)				
	DO Probe	Conductivity	pH 4.01	pH 7.00	Temperature
Calibration Solution Batch # / Expiry:	<u>/</u>	<u>358340 02/22</u>	<u>357330 01/22</u>	<u>358580 02/22</u>	<u>25.0</u>
Bump Test Result (start of day):		<u>13.18</u>	<u>6.00</u>	<u>7.02</u>	
Bump Test Result (end of day):					
Calibrated? (circle result)	Y / N	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	Y <input checked="" type="checkbox"/> N	Y <input checked="" type="checkbox"/> N	Y / N

Interface Probe (IP)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Field Bump Test Results: Water: IP Worked? Y / N (circle result) Oil: IP Worked? Y / N (circle result) (if possible)		

Lower Explosive Level (LEL) Meter		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Mixture LEL% (refer side of cylinder):	Gas Batch #:	Gas Expiry date:
Fresh Air LEL% Result:	Challenge Gas LEL% Result:	Equipment Alarmed Levels:
Fresh Air LEL% Result (end of day):	Challenge Gas LEL% Result (end of day):	
Field Calibration Required? Y / N (circle result) Performed? Y / N (circle result)		

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Multi-gas Meter				
Equipment Description:	Equipment ID (serial number):			
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:		
Challenge Mixture: %O ₂ : _____ %LEL: _____ H ₂ S (ppm): _____ CO (ppm): _____	Gas Batch #:	Gas Expiry date:		
Field Calibration Required? Y / N (circle result)	Field Bump Test Performed? Y / N (circle result)			
	%O₂	%LEL	H₂S (ppm)	CO (ppm)
Bump Test Result:				
Bump Test Result (end of day):				
Calibrated? (circle result)	Y / N	Y / N	Y / N	Y / N

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Daily Field Equipment Calibration Record



Job/Site Details	
Project Name: <u>Eastern Ridge PFAS Assessment</u>	Project Number: <u>754-PERENV282113</u>
Today's Date: <u>29/01/21</u>	Work Completed By: <u>SM RM</u>
Type of Work (eg. ESA, GME, etc):	
Equipment Supplier Calibration Certificates Included? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N (circle result)	

Photoionisation Detector (PID)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Gas Standard:	Gas Batch #:	Gas Expiry date:
Field Fresh Air Calibration Performed? <input type="checkbox"/> Y <input checked="" type="checkbox"/> N (circle result)	Bump Test Result (ppm):	Bump Test Result (ppm) (end of day):
Field Gas Calibration Required? <input type="checkbox"/> Y <input checked="" type="checkbox"/> N (circle result)	Performed? <input type="checkbox"/> Y <input checked="" type="checkbox"/> N (circle result)	

Water Quality Meter (WQM)					
Equipment Description: <u>YSI Quatro Pro Plus</u>		Equipment ID (serial number): <u>18T164318</u>			
Calibration Frequency Required by Manufacturer: <u>monthly</u>		Last Service Date: <u>22/01/21</u>		Calibrated by: <u>RT</u>	
Field Calibration Required? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N (circle result)		Field Bump Test Performed? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N (circle result)			
	DO Probe	Conductivity	pH 4.01	pH 7.00	Temperature
Calibration Solution Batch # / Expiry:	<u>/</u>	<u>358340 / 02/22</u>	<u>357330 / 01/22</u>	<u>358580 / 02/22</u>	<u>32.5</u>
Bump Test Result (start of day):		<u>15.30</u>	<u>4.01</u>	<u>7.01</u>	
Bump Test Result (end of day):					
Calibrated? (circle result)	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	<input checked="" type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N

Interface Probe (IP)	
Equipment Description:	Equipment ID (serial number):
Calibration Frequency Required by Manufacturer:	Last Service Date: Calibrated by:
Field Bump Test Results: Water: IP Worked? <input type="checkbox"/> Y <input type="checkbox"/> N (circle result) Oil: IP Worked? <input type="checkbox"/> Y <input type="checkbox"/> N (circle result) (if possible)	

Lower Explosive Level (LEL) Meter		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Mixture LEL% (refer side of cylinder):	Gas Batch #:	Gas Expiry date:
Fresh Air LEL% Result:	Challenge Gas LEL% Result:	Equipment Alarmed Levels:
Fresh Air LEL% Result (end of day):	Challenge Gas LEL% Result (end of day):	
Field Calibration Required? <input type="checkbox"/> Y <input checked="" type="checkbox"/> N (circle result)	Performed? <input type="checkbox"/> Y <input checked="" type="checkbox"/> N (circle result)	
<input type="checkbox"/> Tick if recorded elsewhere on Hot Work Permit (No. _____)		

Multi-gas Meter				
Equipment Description:		Equipment ID (serial number):		
Calibration Frequency Required by Manufacturer:		Last Service Date:	Calibrated by:	
Challenge Mixture: %O ₂ : _____ %LEL: _____ H ₂ S (ppm): _____ CO (ppm): _____		Gas Batch #:	Gas Expiry date:	
Field Calibration Required? <input type="checkbox"/> Y <input checked="" type="checkbox"/> N (circle result)		Field Bump Test Performed? <input type="checkbox"/> Y <input checked="" type="checkbox"/> N (circle result)		
	%O₂	%LEL	H₂S (ppm)	CO (ppm)
Bump Test Result:				
Bump Test Result (end of day):				
Calibrated? (circle result)	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N	<input type="checkbox"/> Y <input checked="" type="checkbox"/> N
<input type="checkbox"/> Tick if recorded elsewhere on Hot Work Permit (No. _____)				

Daily Field Equipment Calibration Record



Job/Site Details	
Project Name: <u>Eastern Ridge PFAS Assessment</u>	Project Number: <u>754-PEREN282113</u>
Today's Date: <u>28/01/21</u>	Work Completed By: <u>SM+RM</u>
Type of Work (eg. ESA, GME etc):	
Equipment Supplier Calibration Certificates Included? <input checked="" type="radio"/> Y <input type="radio"/> N (circle result)	

Photoionisation Detector (PID)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Gas Standard:	Gas Batch #:	Gas Expiry date:
Field Fresh Air Calibration Performed? <input type="radio"/> Y <input type="radio"/> N (circle result)	Bump Test Result (ppm):	Bump Test Result (ppm) (end of day):
Field Gas Calibration Required? <input type="radio"/> Y <input type="radio"/> N (circle result) Performed? <input type="radio"/> Y <input type="radio"/> N (circle result)		

Water Quality Meter (WQM)					
Equipment Description: <u>YSI Quatro Pro Plus</u>	Equipment ID (serial number): <u>18T104318</u>				
Calibration Frequency Required by Manufacturer: <u>Monthly</u>	Last Service Date: <u>22/01/21</u>	Calibrated by: <u>KT</u>			
Field Calibration Required? <input checked="" type="radio"/> Y <input type="radio"/> N (circle result)	Field Bump Test Performed? <input checked="" type="radio"/> Y <input type="radio"/> N (circle result)				
	DO Probe	Conductivity	pH 4.01	pH 7.00	Temperature
Calibration Solution Batch # / Expiry:	<u>/</u>	<u>358301 02/22</u>	<u>3573301 01/22</u>	<u>3585801 02/22</u>	<u>33.0</u>
Bump Test Result (start of day):	<u>15.34</u>	<u>4.01</u>	<u>7.01</u>		
Bump Test Result (end of day):					
Calibrated? (circle result)	<input type="radio"/> Y <input type="radio"/> N	<input checked="" type="radio"/> Y <input type="radio"/> N	<input checked="" type="radio"/> Y <input type="radio"/> N	<input checked="" type="radio"/> Y <input type="radio"/> N	<input type="radio"/> Y <input type="radio"/> N

Interface Probe (IP)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Field Bump Test Results: Water: IP Worked? <input type="radio"/> Y <input type="radio"/> N (circle result) Oil: IP Worked? <input type="radio"/> Y <input type="radio"/> N (circle result) (if possible)		

Lower Explosive Level (LEL) Meter		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Mixture LEL% (refer side of cylinder):	Gas Batch #:	Gas Expiry date:
Fresh Air LEL% Result:	Challenge Gas LEL% Result:	Equipment Alarmed Levels:
Fresh Air LEL% Result (end of day):	Challenge Gas LEL% Result (end of day):	
Field Calibration Required? <input type="radio"/> Y <input type="radio"/> N (circle result) Performed? <input type="radio"/> Y <input type="radio"/> N (circle result)		
<input type="checkbox"/> Tick if recorded elsewhere on Hot Work Permit (No. _____)		

Multi-gas Meter				
Equipment Description:	Equipment ID (serial number):			
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:		
Challenge Mixture: %O ₂ : _____ %LEL: _____ H ₂ S (ppm): _____ CO (ppm): _____	Gas Batch #:	Gas Expiry date:		
Field Calibration Required? <input type="radio"/> Y <input type="radio"/> N (circle result)	Field Bump Test Performed? <input type="radio"/> Y <input type="radio"/> N (circle result)			
	%O₂	%LEL	H₂S (ppm)	CO (ppm)
Bump Test Result:				
Bump Test Result (end of day):				
Calibrated? (circle result)	<input type="radio"/> Y <input type="radio"/> N	<input type="radio"/> Y <input type="radio"/> N	<input type="radio"/> Y <input type="radio"/> N	<input type="radio"/> Y <input type="radio"/> N
<input type="checkbox"/> Tick if recorded elsewhere on Hot Work Permit (No. _____)				

Daily Field Equipment Calibration Record



Job/Site Details	
Project Name: <u>Eastern Ridge</u>	Project Number: <u>754-PEREN282113</u>
Today's Date: <u>27/01/21</u>	Work Completed By: <u>SMT+RM</u>
Type of Work (eg. ESA, GME, etc):	
Equipment Supplier Calibration Certificates Included? <input checked="" type="checkbox"/> Y / N (circle result)	

Photoionisation Detector (PID)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Gas Standard:	Gas Batch #:	Gas Expiry date:
Field Fresh Air Calibration Performed? Y / N (circle result)	Bump Test Result (ppm):	Bump Test Result (ppm) (end of day):
Field Gas Calibration Required? Y / N (circle result)	Performed? Y / N (circle result)	

Water Quality Meter (WQM)					
Equipment Description: <u>YSI Quatro Pro Plus</u>	Equipment ID (serial number): <u>18J104318</u>				
Calibration Frequency Required by Manufacturer: <u>Monthly</u>	Last Service Date: <u>22/01/21</u>	Calibrated by: <u>RT</u>			
Field Calibration Required? <input checked="" type="checkbox"/> Y / N (circle result)	Field Bump Test Performed? <input checked="" type="checkbox"/> Y / N (circle result)				
	DO Probe	Conductivity	pH 4.01	pH 7.00	Temperature
Calibration Solution Batch # / Expiry:	<u>1</u>	<u>35830/02/22</u>	<u>35730/01/22</u>	<u>35830/02/22</u>	<u>32.5</u>
Bump Test Result (start of day):	<u>15.34</u>	<u>4.03</u>	<u>7.00</u>		
Bump Test Result (end of day):					
Calibrated? (circle result)	Y / N	<input checked="" type="checkbox"/> Y / N	Y / <input checked="" type="checkbox"/> N	<input checked="" type="checkbox"/> Y / N	Y / N

Interface Probe (IP)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Field Bump Test Results:	Water: IP Worked? Y / N (circle result)	Oil: IP Worked? Y / N (circle result) (if possible)

Lower Explosive Level (LEL) Meter		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Mixture LEL% (refer side of cylinder):	Gas Batch #:	Gas Expiry date:
Fresh Air LEL% Result:	Challenge Gas LEL% Result:	Equipment Alarmed Levels:
Fresh Air LEL% Result (end of day):	Challenge Gas LEL% Result (end of day):	
Field Calibration Required? Y / N (circle result)	Performed? Y / N (circle result)	
<input type="checkbox"/> Tick if recorded elsewhere on Hot Work Permit (No. _____)		

Multi-gas Meter				
Equipment Description:	Equipment ID (serial number):			
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:		
Challenge Mixture: %O ₂ : _____ %LEL: _____ H ₂ S (ppm): _____ CO (ppm): _____	Gas Batch #:	Gas Expiry date:		
Field Calibration Required? Y / N (circle result)	Field Bump Test Performed? Y / N (circle result)			
	%O₂	%LEL	H₂S (ppm)	CO (ppm)
Bump Test Result:				
Bump Test Result (end of day):				
Calibrated? (circle result)	Y / N	Y / N	Y / N	Y / N
<input type="checkbox"/> Tick if recorded elsewhere on Hot Work Permit (No. _____)				

Daily Field Equipment Calibration Record



Job/Site Details	
Project Name: <u>Eastern Ridge PPA's Assessment</u>	Project Number: <u>754-PEREIV282113</u>
Today's Date: <u>26/01/21</u>	Work Completed By: <u>SM + RM</u>
Type of Work (eg. ESA, GME, etc):	
Equipment Supplier Calibration Certificates Included? <u>Y</u> / N (circle result)	

Photoionisation Detector (PID)		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Gas Standard:	Gas Batch #:	Gas Expiry date:
Field Fresh Air Calibration Performed? <u>Y</u> / N (circle result)	Bump Test Result (ppm):	Bump Test Result (ppm) (end of day):
Field Gas Calibration Required? <u>Y</u> / N (circle result)	Performed? <u>Y</u> / N (circle result)	

Water Quality Meter (WQM)					
Equipment Description: <u>YSI Quatro Pro Plus</u>			Equipment ID (serial number): <u>87104318</u>		
Calibration Frequency Required by Manufacturer: <u>monthly</u>			Last Service Date: <u>22/01/21</u>		Calibrated by: <u>RT</u>
Field Calibration Required? <u>Y</u> / N (circle result)			Field Bump Test Performed? <u>Y</u> / N (circle result)		
	DO Probe	Conductivity	pH 4.01	pH 7.00	Temperature
Calibration Solution Batch # / Expiry:	<u>1</u>	<u>358340/02/22</u>	<u>357330/01/22</u>	<u>358580/02/22</u>	<u>28.0</u>
Bump Test Result (start of day):		<u>15.32</u>	<u>4.01</u>	<u>7.03</u>	
Bump Test Result (end of day):					
Calibrated? (circle result)	<u>Y</u> / N	<u>Y</u> / <u>N</u>	<u>Y</u> / N	<u>Y</u> / N	<u>Y</u> / N

Interface Probe (IP)	
Equipment Description:	Equipment ID (serial number):
Calibration Frequency Required by Manufacturer:	Last Service Date: Calibrated by:
Field Bump Test Results:	Water: IP Worked? <u>Y</u> / N (circle result) Oil: IP Worked? <u>Y</u> / N (circle result) (if possible)

Lower Explosive Level (LEL) Meter		
Equipment Description:	Equipment ID (serial number):	
Calibration Frequency Required by Manufacturer:	Last Service Date:	Calibrated by:
Challenge Mixture LEL% (refer side of cylinder):	Gas Batch #:	Gas Expiry date:
Fresh Air LEL% Result:	Challenge Gas LEL% Result:	Equipment Alarmed Levels:
Fresh Air LEL% Result (end of day):	Challenge Gas LEL% Result (end of day):	
Field Calibration Required? <u>Y</u> / N (circle result)	Performed? <u>Y</u> / N (circle result)	

Tick if recorded elsewhere on Hot Work Permit (No. _____)

Multi-gas Meter				
Equipment Description:		Equipment ID (serial number):		
Calibration Frequency Required by Manufacturer:		Last Service Date:	Calibrated by:	
Challenge Mixture: %O ₂ : _____ %LEL: _____ H ₂ S (ppm): _____ CO (ppm): _____		Gas Batch #:	Gas Expiry date:	
Field Calibration Required? <u>Y</u> / N (circle result)		Field Bump Test Performed? <u>Y</u> / N (circle result)		
	%O₂	%LEL	H₂S (ppm)	CO (ppm)
Bump Test Result:				
Bump Test Result (end of day):				
Calibrated? (circle result)	<u>Y</u> / N	<u>Y</u> / N	<u>Y</u> / N	<u>Y</u> / N

Tick if recorded elsewhere on Hot Work Permit (No. _____)



Environmental monitoring
& sampling equipment
Rentals and sales.

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EQUIPMENT INFORMATION

Instrument: H1001
Serial Number: 0742-T2

Equipment Check

	Enclosed	Returned	Comment
Heron Water Level Meter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Heron Carry Bag	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Spare battery 9v	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Inspection Details

	Pass	Fail	Comment
De-con wash of tape (100m)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
De-con wash of reel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Inspection for faults, corrosion, damage	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Meter in good working order, clean and ready for use	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

This is to certify that where possible this instrument has been cleaned in accordance with the manufacturer's general maintenance procedure as recommended in the instrument service manual.

ECO Standard Rental Terms & Conditions apply to all equipment calibrations.

Regards,

Paul Goodgame

Equipment Specialist
ECO Environmental

Date: 04.01.2021

Multi Parameter Water Meter

Instrument YSI Quatro Pro Plus
Serial No. 14D 101 792



Item	Test	Pass	Comments
Battery	Capacity	✓	
Switch/keypad	Operation	✓	
Display	Intensity	✓	
	Operation (segments)	✓	
	Seal	✓	
Connectors	Condition	✓	
Sensor	1. pH	✓	
	2. ORP in mV	✓	
	3. EC/Temp.	✓	
	4. D.O.	✓	
Alarms	Beeper	✓	
Software	Version		
Data logger	Operation		
Download	Operation		
Other tests:			

Certificate of Calibration

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


Sensor	Value	Standard		Instrument Reading
Temperature			Checked	20.7 °C
pH	pH 7	358580	Calibrated	7.01
pH	pH 4	357330	Calibrated	4.00
EC	Zero	Air	Checked	0.001 mS/cm
EC	2.76mS/cm	354263	Calibrated	2.76 mS/cm
ORP (mV)	240mV at 20°C	358011 / 358822	Calibrated	246.6 mV
DO Zero	Zero	10640	Calibrated	0 %
DO 100%	100%	Water saturated air	Calibrated	100.0 %

Calibrated by: Emma Bentley

Calibration date: **30-Mar-21**

Next calibration due **30-Apr-21**

Appendix G – Laboratory Reports

 <p>TETRA TECH COMPANY</p>		Consigning Office:		Report Results to: <u>Wesley Alport</u>		Mobile: <u>0413 414371</u>		Email: <u>wesley.alport@coffey.com</u>	
		Invoices to: <u>accounts@coffey.com</u>		Phone: <u>6218 2100</u>		Email: <u>@coffey.com</u>			
Project No: <u>754-PEREN282113</u>		Task No: <u>Fieldwork/Expenses</u>		Analysis Request Section					
Project Name: <u>Eastern Ridge PFAS Investigation</u>		Laboratory: <u>ALS</u>		See Quote PFAS ONLY					
Sampler's Name: <u>Rajan McDonald + Steven Modillion</u>		Project Manager: <u>Wesley Alport</u>							
Special Instructions: <u>See Quote: EP/19/1/20_V2</u>									
				NOTES					
Lab No.	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)			
1	WB25-47	30/11/20	15:32	water	2xP, PWP, V-S	std	X		
2	WB25-430		14:30				XX		
3	WB25-44		14:45				XX		
4	WB25-18		14:55				XX		
5	WB25-27		15:02				XX		
6	WB25-28		15:07				XX		
7	WB25-22		15:21				XX		
8	WB 335 335		12:52				XX		
9	WB 336		13:20				XX		
10	WB24-348		13:37				XX		
11	WB24-346		14:04				XX		
12	WB24-347		13:55				XX		
13	QC01		17:00		2xP		XX		
14	QC02		17:10		I		XX		
15	HNPIH50048	01/12/20	15:08		2xP, PWP, V-S		XX		
16	H10		12:20				XX		
17	HNPIH50039		14:10				XX		
18	QC03 QC03		17:10		2xP		X		
19	QC04		17:00				X		
Name: <u>Steven Modillion</u>		Date: <u>3/12/20</u>	Name: <u>Wesley Alport</u>		Date: <u>01/12/20</u>	Sample Receipt Advice: (Lab Use Only) All Samples Received in Good Condition <input type="checkbox"/> All Documentation is in Proper Order <input type="checkbox"/> Samples Received Properly Chilled <input type="checkbox"/> Lab. Ref/Batch No. <input style="width: 50px; height: 20px;" type="text"/>			
Coffey Environments		Time: <u>8:30</u>	Company: <u>Wesley Alport</u>		Time: <u>16:00</u>				
Name:		Date:	Name:		Date:				
Company:		Time:	Company:		Time:				
*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative									

Environmental Division
 Perth
 Work Order Reference
EP2013567



Telephone 61-8-9406 1301



CERTIFICATE OF ANALYSIS

Work Order : EP2013567
Client : COFFEY ENVIRONMENTS PTY LTD
Contact : WESLEY ALPORT
Address : Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000
Telephone : 61 8 6218 2100
Project : 754-PEREN282113 Eastern Ridge PFAS Investigation
Order number : ----
C-O-C number : ----
Sampler : Regan MacDonald
Site : ----
Quote number : EP/991/20_V2
No. of samples received : 19
No. of samples analysed : 19

Page : 1 of 15
Laboratory : Environmental Division Perth
Contact : Lauren Biagioni
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : 08 9406 1307
Date Samples Received : 04-Dec-2020 14:50
Date Analysis Commenced : 08-Dec-2020
Issue Date : 15-Dec-2020 17:41



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This 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.

Table with 3 columns: Signatories, Position, Accreditation Category. Rows include Canhuang Ke, Chris Lemaitre, Efua Wilson, and Franco Lentini with their respective roles and accreditation categories.



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
∅ = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X-SUT conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- 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.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB25-47	WB25-430	WB25-44	WB25-18	WB25-27
Sampling date / time				30-Nov-2020 15:32	30-Nov-2020 14:30	30-Nov-2020 14:45	30-Nov-2020 14:55	30-Nov-2020 15:02	
Compound	CAS Number	LOR	Unit	EP2013567-001	EP2013567-002	EP2013567-003	EP2013567-004	EP2013567-005	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	670	590	719	728	749	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	293	309	308	304	314	
Total Alkalinity as CaCO3	----	1	mg/L	293	309	308	304	314	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	124	83	111	104	110	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	145	119	193	182	191	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	69	63	71	70	75	
Magnesium	7439-95-4	1	mg/L	78	68	76	72	77	
Sodium	7440-23-5	1	mg/L	82	73	104	97	105	
Potassium	7440-09-7	1	mg/L	10	8	8	7	8	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	12.5	11.2	13.9	13.4	14.0	
∅ Total Cations	----	0.01	meq/L	13.7	12.1	14.5	13.8	14.8	
∅ Ionic Balance	----	0.01	%	4.42	3.68	2.17	1.63	3.12	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	4	5	5	6	6	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0002	0.0005	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB25-47	WB25-430	WB25-44	WB25-18	WB25-27
Sampling date / time					30-Nov-2020 15:32	30-Nov-2020 14:30	30-Nov-2020 14:45	30-Nov-2020 14:55	30-Nov-2020 15:02
Compound	CAS Number	LOR	Unit		EP2013567-001	EP2013567-002	EP2013567-003	EP2013567-004	EP2013567-005
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L		<0.0020	<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	<0.0005
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L		<0.0005	<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	<0.0005
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L		<0.0005	<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	<0.0005
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L		<0.0005	<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	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L		<0.0005	<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	<0.0005
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L		<0.0005	<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	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L		<0.001	<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	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L		<0.001	<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	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB25-47	WB25-430	WB25-44	WB25-18	WB25-27
Sampling date / time					30-Nov-2020 15:32	30-Nov-2020 14:30	30-Nov-2020 14:45	30-Nov-2020 14:55	30-Nov-2020 15:02
Compound	CAS Number	LOR	Unit	EP2013567-001	EP2013567-002	EP2013567-003	EP2013567-004	EP2013567-005	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0005	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0002	0.0005	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0002	0.0005	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	79.3	85.9	89.4	82.8	97.9	
13C8-PFOA	----	0.0005	%	98.4	96.0	99.9	96.0	107	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB25-28	WB25-22	WB335	WB336	WB24-348
Sampling date / time				30-Nov-2020 15:07	30-Nov-2020 15:21	30-Nov-2020 12:52	30-Nov-2020 13:20	30-Nov-2020 13:37	
Compound	CAS Number	LOR	Unit	EP2013567-006	EP2013567-007	EP2013567-008	EP2013567-009	EP2013567-010	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	800	740	354	432	466	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	338	286	100	186	276	
Total Alkalinity as CaCO3	----	1	mg/L	338	286	100	186	276	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	126	146	42	60	63	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	205	177	123	112	95	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	76	78	15	48	60	
Magnesium	7439-95-4	1	mg/L	81	83	38	42	48	
Sodium	7440-23-5	1	mg/L	107	95	67	63	62	
Potassium	7440-09-7	1	mg/L	8	9	14	14	15	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	15.2	13.7	6.34	8.12	9.50	
∅ Total Cations	----	0.01	meq/L	15.3	15.1	7.15	8.95	10.0	
∅ Ionic Balance	----	0.01	%	0.52	4.64	5.98	4.83	2.66	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	12	5	2	4	4	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB25-28	WB25-22	WB335	WB336	WB24-348
Sampling date / time					30-Nov-2020 15:07	30-Nov-2020 15:21	30-Nov-2020 12:52	30-Nov-2020 13:20	30-Nov-2020 13:37
Compound	CAS Number	LOR	Unit		EP2013567-006	EP2013567-007	EP2013567-008	EP2013567-009	EP2013567-010
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L		<0.0020	<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	<0.0005
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L		<0.0005	<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	<0.0005
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L		<0.0005	<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	<0.0005
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L		<0.0005	<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	<0.0005
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L		<0.0005	<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	<0.0005
EP231C: Perfluoroalkyl Sulfonylamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L		<0.0005	<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	<0.001
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L		<0.001	<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	<0.001
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L		<0.001	<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	<0.0005
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB25-28	WB25-22	WB335	WB336	WB24-348
Sampling date / time					30-Nov-2020 15:07	30-Nov-2020 15:21	30-Nov-2020 12:52	30-Nov-2020 13:20	30-Nov-2020 13:37
Compound	CAS Number	LOR	Unit		EP2013567-006	EP2013567-007	EP2013567-008	EP2013567-009	EP2013567-010
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<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	<0.001
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L		0.0004	<0.0002	<0.0002	<0.0002	<0.0002
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L		0.0004	<0.0002	<0.0002	<0.0002	<0.0002
^ Sum of PFAS	----	0.0002	µg/L		0.0004	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%		86.3	93.0	87.1	88.7	69.8
13C8-PFOA	----	0.0005	%		96.0	100	102	101	79.6



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB24-346	WB24-347	QC01	QC02	HNPIHS0048
Sampling date / time				30-Nov-2020 14:04	30-Nov-2020 13:55	30-Nov-2020 17:00	30-Nov-2020 17:10	01-Dec-2020 15:08	
Compound	CAS Number	LOR	Unit	EP2013567-011	EP2013567-012	EP2013567-013	EP2013567-014	EP2013567-015	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	502	500	----	----	675	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	227	254	----	----	412	
Total Alkalinity as CaCO3	----	1	mg/L	227	254	----	----	412	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	67	63	----	----	68	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	114	102	----	----	132	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	62	62	----	----	72	
Magnesium	7439-95-4	1	mg/L	50	49	----	----	75	
Sodium	7440-23-5	1	mg/L	63	62	----	----	97	
Potassium	7440-09-7	1	mg/L	16	15	----	----	8	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	9.15	9.26	----	----	13.4	
∅ Total Cations	----	0.01	meq/L	10.4	10.2	----	----	14.2	
∅ Ionic Balance	----	0.01	%	6.22	4.84	----	----	2.97	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	3	5	----	----	15	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB24-346	WB24-347	QC01	QC02	HNPIHS0048
Sampling date / time					30-Nov-2020 14:04	30-Nov-2020 13:55	30-Nov-2020 17:00	30-Nov-2020 17:10	01-Dec-2020 15:08
Compound	CAS Number	LOR	Unit	EP2013567-011	EP2013567-012	EP2013567-013	EP2013567-014	EP2013567-015	EP2013567-015
				Result	Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<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	<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	<0.0002	<0.0002
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	84.0	82.7	85.8	74.1	71.6	71.6
13C8-PFOA	----	0.0005	%	76.3	76.0	78.4	70.6	73.1	73.1



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	H10	HNPIHS0039	QC03	QC04	----
Sampling date / time				01-Dec-2020 12:20	01-Dec-2020 14:10	01-Dec-2020 17:10	01-Dec-2020 17:00	----	----
Compound	CAS Number	LOR	Unit	EP2013567-016	EP2013567-017	EP2013567-018	EP2013567-019	-----	-----
				Result	Result	Result	Result	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	810	680	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	366	416	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	366	416	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	69	67	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	169	121	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	93	81	----	----	----	----
Magnesium	7439-95-4	1	mg/L	86	78	----	----	----	----
Sodium	7440-23-5	1	mg/L	77	84	----	----	----	----
Potassium	7440-09-7	1	mg/L	7	7	----	----	----	----
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	13.5	13.1	----	----	----	----
∅ Total Cations	----	0.01	meq/L	15.2	14.3	----	----	----	----
∅ Ionic Balance	----	0.01	%	6.02	4.28	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	6	9	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
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	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	H10	HNPIHS0039	QC03	QC04	----
Sampling date / time				01-Dec-2020 12:20	01-Dec-2020 14:10	01-Dec-2020 17:10	01-Dec-2020 17:00	----	
Compound	CAS Number	LOR	Unit	EP2013567-016	EP2013567-017	EP2013567-018	EP2013567-019	-----	
				Result	Result	Result	Result	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<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	<0.0002	<0.0002	----	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	----	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	94.5	81.1	80.2	75.6	----	
13C8-PFOA	----	0.0005	%	86.2	77.1	74.8	70.8	----	



Surrogate Control Limits

Sub-Matrix: WATER		<i>Recovery Limits (%)</i>	
<i>Compound</i>	<i>CAS Number</i>	<i>Low</i>	<i>High</i>
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120



QUALITY CONTROL REPORT

Work Order : EP2013567
Client : COFFEY ENVIRONMENTS PTY LTD
Contact : WESLEY ALPORT
Address : Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000
Telephone : 61 8 6218 2100
Project : 754-PEREN282113 Eastern Ridge PFAS Investigation
Order number : ----
C-O-C number : ----
Sampler : Regan MacDonald
Site : ----
Quote number : EP/991/20_V2
No. of samples received : 19
No. of samples analysed : 19

Page : 1 of 7
Laboratory : Environmental Division Perth
Contact : Lauren Biagioni
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : 08 9406 1307
Date Samples Received : 04-Dec-2020
Date Analysis Commenced : 08-Dec-2020
Issue Date : 15-Dec-2020



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This Quality Control Report contains the following information:

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

Signatories

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

Table with 3 columns: Signatories, Position, Accreditation Category. Rows include Canhuang Ke, Chris Lemaitre, Efua Wilson, and Franco Lentini.



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 Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3407087)									
EP2013567-001	WB25-47	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	670	678	1.19	0% - 20%
EP2013567-009	WB336	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	432	424	1.99	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3415984)									
EP2013567-002	WB25-430	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	309	306	1.02	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	309	306	1.02	0% - 20%
EP2013567-012	WB24-347	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	254	253	0.437	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	254	253	0.437	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3406151)									
EP2013567-001	WB25-47	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	124	124	0.00	0% - 20%
EP2013567-011	WB24-346	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	67	67	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3406152)									
EP2013567-001	WB25-47	ED045G: Chloride	16887-00-6	1	mg/L	145	147	1.44	0% - 20%
EP2013567-011	WB24-346	ED045G: Chloride	16887-00-6	1	mg/L	114	114	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3407494)									
EP2013522-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	42	42	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	61	62	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	304	314	3.24	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
EP2013567-006	WB25-28	ED093F: Calcium	7440-70-2	1	mg/L	76	82	7.03	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	81	86	6.03	0% - 20%

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 Work Order : EP2013567
 Client : COFFEY ENVIRONMENTS PTY LTD
 Project : 754-PEREN282113 Eastern Ridge PFAS Investigation



Sub-Matrix: **WATER**

				<i>Laboratory Duplicate (DUP) Report</i>					
<i>Laboratory sample ID</i>	<i>Sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD (%)</i>	<i>Recovery Limits (%)</i>
ED093F: Dissolved Major Cations (QC Lot: 3407494) - continued									
EP2013567-006	WB25-28	ED093F: Sodium	7440-23-5	1	mg/L	107	112	3.88	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	8	8	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3408419)									
EP2013097-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.00	No Limit
EP2013567-010	WB24-348	EP005: Total Organic Carbon	----	1	mg/L	4	4	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (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 Spike (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: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3407087)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10 <10	2000 mg/L 1000 mg/L	100 103	88.1 88.1	114 114
ED037P: Alkalinity by PC Titrator (QCLot: 3415984)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1 <1	20 mg/L 200 mg/L	104 98.8	81.2 90.0	126 110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3406151)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1 <1	25 mg/L 500 mg/L	97.3 100	87.7 87.7	113 113
ED045G: Chloride by Discrete Analyser (QCLot: 3406152)								
ED045G: Chloride	16887-00-6	1	mg/L	<1 <1	10 mg/L 1000 mg/L	97.9 97.9	87.9 87.9	114 114
ED093F: Dissolved Major Cations (QCLot: 3407494)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	106	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	106	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	100	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	100	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3408419)								
EP005: Total Organic Carbon	----	1	mg/L	<1 <1	10 mg/L 100 mg/L	114 109	87.2 87.2	116 116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3411036)								
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	79.6	72.0	130
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	73.2	71.0	127
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	73.2	68.0	131
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	74.8	69.0	134
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	76.4	65.0	140
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	54.4	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3411996)								
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	74.0	72.0	130
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	75.2	71.0	127
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	80.0	68.0	131



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3411996) - continued									
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	81.2	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	76.4	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	99.6	53.0	142	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3411036)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	84.2	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	72.4	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	74.8	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	72.0	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	73.2	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	72.8	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	73.2	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	84.4	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	82.8	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	68.8	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	74.9	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3411996)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	73.1	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	79.6	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	78.0	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	79.6	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	74.0	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	87.6	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	75.2	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	85.2	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	88.0	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	75.6	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	103	71.0	132	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3411036)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	74.8	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	87.8	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	60.8	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	69.0	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	63.4	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	72.8	65.0	136	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3411036) - continued									
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	65.2	61.0	135	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3411996)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	77.2	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	92.3	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	92.0	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	87.8	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	86.6	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	72.0	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	97.2	61.0	135	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3411036)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	64.4	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	78.8	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	77.6	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	76.4	60.9	136	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3411996)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	89.2	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	87.6	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	82.4	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	101	60.9	136	
EP231P: PFAS Sums (QCLot: 3411036)									
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	----	----	----	----	
EP231P: PFAS Sums (QCLot: 3411996)									
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	----	----	----	----	



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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Recovery Limits (%)	
				Low	High		
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3406151)							
EP2013567-001	WB25-47	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	112	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3406152)							
EP2013567-001	WB25-47	ED045G: Chloride	16887-00-6	1000 mg/L	91.9	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3408419)							
EP2013567-001	WB25-47	EP005: Total Organic Carbon	----	100 mg/L	109	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2013567	Page	: 1 of 9
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Telephone	: 08 9406 1307
Project	: 754-PEREN282113 Eastern Ridge PFAS Investigation	Date Samples Received	: 04-Dec-2020
Site	: ----	Issue Date	: 15-Dec-2020
Sampler	: Regan MacDonald	No. of samples received	: 19
Order number	: ----	No. of samples analysed	: 19

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **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

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

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



Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural							
WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346,	WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	----	----	----	08-Dec-2020	07-Dec-2020	1
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346,	WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	----	----	----	08-Dec-2020	07-Dec-2020	1

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	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 **VOC in soils** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
		Container / Client Sample ID(s)	Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis



Matrix: **WATER** Evaluation: ✘ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) HNPIHS0048, H10, HNPIHS0039	01-Dec-2020	----	----	----	08-Dec-2020	08-Dec-2020	✔
Clear Plastic Bottle - Natural (EA015H) WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346, WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	30-Nov-2020	----	----	----	08-Dec-2020	07-Dec-2020	✘
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) HNPIHS0048, H10, HNPIHS0039	01-Dec-2020	----	----	----	11-Dec-2020	15-Dec-2020	✔
Clear Plastic Bottle - Natural (ED037-P) WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346, WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	30-Nov-2020	----	----	----	11-Dec-2020	14-Dec-2020	✔
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) HNPIHS0048, H10, HNPIHS0039	01-Dec-2020	----	----	----	15-Dec-2020	29-Dec-2020	✔
Clear Plastic Bottle - Natural (ED041G) WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346, WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	30-Nov-2020	----	----	----	15-Dec-2020	28-Dec-2020	✔



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) HNPIHS0048, H10, HNPIHS0039	01-Dec-2020	----	----	----	15-Dec-2020	29-Dec-2020	✓
Clear Plastic Bottle - Natural (ED045G) WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346, WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	30-Nov-2020	----	----	----	15-Dec-2020	28-Dec-2020	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F) HNPIHS0048, H10, HNPIHS0039	01-Dec-2020	----	----	----	08-Dec-2020	08-Dec-2020	✓
Clear Plastic Bottle - Natural (ED093F) WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346, WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	30-Nov-2020	----	----	----	08-Dec-2020	07-Dec-2020	*
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005) HNPIHS0048, H10, HNPIHS0039	01-Dec-2020	----	----	----	08-Dec-2020	29-Dec-2020	✓
Amber TOC Vial - Sulfuric Acid (EP005) WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346, WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	30-Nov-2020	----	----	----	08-Dec-2020	28-Dec-2020	✓



Matrix: WATER

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) HNPIHS0048, H10, HNPIHS0039, QC03, QC04	01-Dec-2020	10-Dec-2020	30-May-2021	✓	11-Dec-2020	30-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB25-47, WB25-430, WB25-44, WB25-18, WB25-27, WB25-28, WB25-22, WB335, WB336, WB24-348	30-Nov-2020	10-Dec-2020	29-May-2021	✓	10-Dec-2020	29-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB24-346, WB24-347, QC01, QC02	30-Nov-2020	10-Dec-2020	29-May-2021	✓	11-Dec-2020	29-May-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-SUT) HNPIHS0048, H10, HNPIHS0039, QC03, QC04	01-Dec-2020	10-Dec-2020	30-May-2021	✓	11-Dec-2020	30-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB25-47, WB25-430, WB25-44, WB25-18, WB25-27, WB25-28, WB25-22, WB335, WB336, WB24-348	30-Nov-2020	10-Dec-2020	29-May-2021	✓	10-Dec-2020	29-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB24-346, WB24-347, QC01, QC02	30-Nov-2020	10-Dec-2020	29-May-2021	✓	11-Dec-2020	29-May-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-SUT) HNPIHS0048, H10, HNPIHS0039, QC03, QC04	01-Dec-2020	10-Dec-2020	30-May-2021	✓	11-Dec-2020	30-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB25-47, WB25-430, WB25-44, WB25-18, WB25-27, WB25-28, WB25-22, WB335, WB336, WB24-348	30-Nov-2020	10-Dec-2020	29-May-2021	✓	10-Dec-2020	29-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB24-346, WB24-347, QC01, QC02	30-Nov-2020	10-Dec-2020	29-May-2021	✓	11-Dec-2020	29-May-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) HNPIHS0048, H10, HNPIHS0039, QC03, QC04	01-Dec-2020	10-Dec-2020	30-May-2021	✓	11-Dec-2020	30-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB25-47, WB25-430, WB25-44, WB25-18, WB25-27, WB25-28, WB25-22, WB335, WB336, WB24-348	30-Nov-2020	10-Dec-2020	29-May-2021	✓	10-Dec-2020	29-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB24-346, WB24-347, QC01, QC02	30-Nov-2020	10-Dec-2020	29-May-2021	✓	11-Dec-2020	29-May-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-SUT) HNPIHS0048, H10, HNPIHS0039, QC03, QC04	01-Dec-2020	10-Dec-2020	30-May-2021	✓	11-Dec-2020	30-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB25-47, WB25-430, WB25-44, WB25-18, WB25-27, WB25-28, WB25-22, WB335, WB336, WB24-348	30-Nov-2020	10-Dec-2020	29-May-2021	✓	10-Dec-2020	29-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB24-346, WB24-347, QC01, QC02	30-Nov-2020	10-Dec-2020	29-May-2021	✓	11-Dec-2020	29-May-2021	✓



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	19	0.00	10.00	✖	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	15	13.33	10.53	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	19	10.53	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	15	13.33	10.53	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	19	10.53	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	15	6.67	5.26	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	19	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard



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
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with 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
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Page : 9 of 9
Work Order : EP2013567
Client : COFFEY ENVIRONMENTS PTY LTD
Project : 754-PEREN282113 Eastern Ridge PFAS Investigation




<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.

TETRA TECH COMPANY		Consigning Office:		Report Results to: <u>Wesley Alport</u>		Mobile: <u>0413414371</u>		Email: <u>wesley.alport@coffey.com</u>	
		Invoices to: <u>accounts@coffey.com</u>		Phone: <u>0481860634</u>		Email: <u>Steven Middleton</u>		@coffey.com	
Project No: <u>754-SPEREN/28213</u>		Task No:		Analysis Request Section					
Project Name: <u>BHP Eastern Ridge</u>		Laboratory: <u>ALS</u>		NOTES					
Sampler's Name: <u>Steven + Ramin</u>		Project Manager: <u>Wesley Alport</u>							
Special Instructions: <u>Quote: EP/99/20_v2</u> <u>If bottles are present please run "Additional Water Quality"</u>									
Lab No.	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	A-T (specify)	See Quote		
	HEC0448M	5/12/20	17:00	water	vac	STOL			
1	HEC0448M	5/12/20	12:00	water	vac	STOL			
SNR	HEC0448M	5/12/20	12:10	water	vac	STOL			
SNR	HEC0448M	5/12/20	14:10	water	vac	STOL			
2	HEC0448M	5/12/20	9:35	water	vac	STOL			
3	HEC0448M	5/12/20	9:35	water	vac	STOL			
3	<u>HEC0448M</u>	<u>6/12/20</u>	<u>7:45</u>	<u>water</u>	<u>vac</u>	<u>STOL</u>			
4	<u>HST1063RM</u>	<u>6/12/20</u>	<u>7:25</u>	<u>water</u>	<u>vac</u>	<u>STOL</u>			
5	<u>EA0478RM</u>	<u>4/12</u>	<u>12:01</u>	<u>water</u>	<u>vac</u>	<u>STOL</u>			
6	<u>HEOP0386M</u>	<u>4/12</u>	<u>15:57</u>	<u>water</u>	<u>vac</u>	<u>STOL</u>			
7	<u>HEC0407M</u>	<u>5/12</u>	<u>11:25</u>	<u>water</u>	<u>vac</u>	<u>STOL</u>			
8	<u>HEA123M</u>	<u>5/12</u>	<u>12:36</u>	<u>water</u>	<u>vac</u>	<u>STOL</u>			
9	<u>HEA0134M</u>	<u>"</u>	<u>12:50</u>	<u>water</u>	<u>vac</u>	<u>STOL</u>			
10	<u>HEA0125M</u>	<u>"</u>	<u>13:06</u>	<u>water</u>	<u>vac</u>	<u>STOL</u>			
11	<u>HEA0141M</u>	<u>"</u>	<u>13:25</u>	<u>water</u>	<u>vac</u>	<u>STOL</u>			
12	<u>HEOP0430M</u>	<u>"</u>	<u>14:24</u>	<u>water</u>	<u>vac</u>	<u>STOL</u>			
13	<u>HHS0085M</u>	<u>"</u>	<u>15:21</u>	<u>water</u>	<u>vac</u>	<u>STOL</u>			
RELINQUISHED BY				RECEIVED BY				Sample Receipt Advice: (Lab Use Only) All Samples Received in Good Condition <input type="checkbox"/> All Documentation is in Proper Order <input type="checkbox"/> Samples Received Properly Chilled <input type="checkbox"/> Lab. Ref/Batch No. 	
Name: <u>Steven Middleton</u>		Date: <u>07/12/20</u>		Name: <u>Ramin</u>		Date: <u>7/12/20</u>			
Coffey Environments		Time:		Company:		Time: <u>1625</u>			
Name:		Date:		Name:		Date:			
Company:		Time:		Company:		Time:			
*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative									

Environmental Division
 Perth
 Work Order Reference
EP2013633

 Telephone: +61-8-9406 1301

Steven Middleton

		Consigning Office:		Report Results to: Wesley Alport		Mobile: 043414371		Email: Wesley Alport		@coffey.com	
		Invoices to: accounts@coffey.com		Phone: 0481860634		Email: Wesley Alport		@coffey.com			
Project No: 754-PEREN282113		Task No:		Analysis Request Section							
Project Name: BHP Eastern Ridge		Laboratory: ALS		<div style="border: 1px solid black; padding: 5px; display: inline-block;">NOTES</div>							
Sampler's Name: Shawn + Rangan		Project Manager: Wesley Alport									
Special Instructions:											
Lab No.	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	See Quote				
14	QC05	4/12		water	vial	std.	X				
15	QC06	11					X				
16	QC07	5/12	8:19				X				
17	QC08 QC09						X				
18	QC10						X				
19	QC11		9:35				X				
20	QC13		13:50				X				
21	QC15	6/12					X				
22	QC16	11					X				
23	SWR HHS0082M	5/12	15:37				X				
24	23 HHS0023M		16:28				X				
25	24 HHS0055M		16:52				X				
26	25 HEV0006M	6/12	9:40				X				
27	26 HEOP0387M		9:56				X				
28	27 HEC0406M		10:15				X				
29	28 HEOP0314M		11:34				X				
30	HEAO149M		14:36				X				
30	HHS0042M		9:25				X				
RELINQUISHED BY				RECEIVED BY				Sample Receipt Advice: (Lab Use Only)			
Name:		Date: 07/12/20		Name:		Date: 07/12/20		All Samples Received in Good Condition <input type="checkbox"/>			
Coffey Environments		Time:		Company: Rangan		Time: 16:25		All Documentation is in Proper Order <input type="checkbox"/>			
Name:		Date:		Name:		Date:		Samples Received Properly Chilled <input type="checkbox"/>			
Company:		Time:		Company:		Time:		Lab. Ref/Batch No. <div style="border: 1px solid black; width: 100px; height: 20px; display: inline-block;"></div>			
<p>*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative</p>											



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.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X: PFAS results for sample #5, #7, #8, #20 confirmed by re-extraction and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- 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.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW01a	HHS0027M	HEC0448M	HST1063RM	EA0978RM
Sampling date / time				05-Dec-2020 12:00	05-Dec-2020 09:35	06-Dec-2020 07:45	06-Dec-2020 07:25	04-Dec-2020 12:01	
Compound	CAS Number	LOR	Unit	EP2013633-001	EP2013633-002	EP2013633-003	EP2013633-004	EP2013633-005	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	640	----	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	328	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	328	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	80	----	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	119	----	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	71	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	67	----	----	----	----	
Sodium	7440-23-5	1	mg/L	76	----	----	----	----	
Potassium	7440-09-7	1	mg/L	10	----	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	11.6	----	----	----	----	
∅ Total Cations	----	0.01	meq/L	12.6	----	----	----	----	
∅ Ionic Balance	----	0.01	%	4.31	----	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	8	----	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0008	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	0.0075	0.0025	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	0.0011	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0006	<0.0002	0.0231	0.0213	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW01a	HHS0027M	HEC0448M	HST1063RM	EA0978RM
Sampling date / time					05-Dec-2020 12:00	05-Dec-2020 09:35	06-Dec-2020 07:45	06-Dec-2020 07:25	04-Dec-2020 12:01
Compound	CAS Number	LOR	Unit	EP2013633-001	EP2013633-002	EP2013633-003	EP2013633-004	EP2013633-005	EP2013633-005
				Result	Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	0.011	<0.001	0.006	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.002	<0.001	0.005	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<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	0.0006	<0.0002	0.0306	0.0238	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0006	<0.0002	0.102	0.0333	0.0110	
^ Sum of PFAS	----	0.0002	µg/L	0.0006	<0.0002	0.105	0.0333	0.0110	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	76.8	78.4	73.0	84.9	72.1	
13C8-PFOA	----	0.0005	%	76.4	75.8	69.2	81.4	70.7	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0386M	HEC0407M	HEA123M	HEA0134M	HEA0125M
Sampling date / time				04-Dec-2020 15:57	05-Dec-2020 11:25	05-Dec-2020 12:36	05-Dec-2020 12:50	05-Dec-2020 13:06	
Compound	CAS Number	LOR	Unit	EP2013633-006	EP2013633-007	EP2013633-008	EP2013633-009	EP2013633-010	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	574	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	420	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	420	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	<1	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	115	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	67	----	----	----	
Magnesium	7439-95-4	1	mg/L	----	67	----	----	----	
Sodium	7440-23-5	1	mg/L	----	74	----	----	----	
Potassium	7440-09-7	1	mg/L	----	9	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	11.6	----	----	----	
∅ Total Cations	----	0.01	meq/L	----	12.3	----	----	----	
∅ Ionic Balance	----	0.01	%	----	2.80	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	25	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0014	0.0006	0.0013	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0386M	HEC0407M	HEA123M	HEA0134M	HEA0125M
Sampling date / time				04-Dec-2020 15:57	05-Dec-2020 11:25	05-Dec-2020 12:36	05-Dec-2020 12:50	05-Dec-2020 13:06	
Compound	CAS Number	LOR	Unit	EP2013633-006	EP2013633-007	EP2013633-008	EP2013633-009	EP2013633-010	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	0.278	<0.0020	0.0041	0.120	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0021	0.0381	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0016	0.0077	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0008	0.0063	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.0054	<0.0005	0.0028	0.0060	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0007	0.0028	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0013	0.0021	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0386M	HEC0407M	HEA123M	HEA0134M	HEA0125M
Sampling date / time				04-Dec-2020 15:57	05-Dec-2020 11:25	05-Dec-2020 12:36	05-Dec-2020 12:50	05-Dec-2020 13:06	
Compound	CAS Number	LOR	Unit	EP2013633-006	EP2013633-007	EP2013633-008	EP2013633-009	EP2013633-010	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.002	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	0.002	<0.001	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	0.003	0.002	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0014	0.0006	0.0018	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	0.285	0.0014	0.0140	0.181	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	0.285	0.0014	0.0190	0.188	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	64.2	92.2	93.5	78.3	78.6	
13C8-PFOA	----	0.0005	%	68.7	82.3	94.1	74.7	76.6	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0141M	HEOP0430M	HHS0085M	QC05	QC06
Sampling date / time				05-Dec-2020 13:25	05-Dec-2020 14:24	05-Dec-2020 15:21	04-Dec-2020 00:00	04-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-011	EP2013633-012	EP2013633-013	EP2013633-014	EP2013633-015	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.0009	0.0007	<0.0005	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0006	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0015	0.0009	0.0002	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	0.0021	<0.0020	<0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0013	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0141M	HEOP0430M	HHS0085M	QC05	QC06
Sampling date / time				05-Dec-2020 13:25	05-Dec-2020 14:24	05-Dec-2020 15:21	04-Dec-2020 00:00	04-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-011	EP2013633-012	EP2013633-013	EP2013633-014	EP2013633-015	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0021	0.0009	0.0002	<0.0002	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0039	0.0018	0.0030	<0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	0.0044	0.0018	0.0030	<0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	76.8	87.7	77.7	76.6	80.9	
13C8-PFOA	----	0.0005	%	71.9	82.5	75.5	77.6	82.4	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC07	QC09	QC10	QC11	QC13
Sampling date / time				05-Dec-2020 08:19	05-Dec-2020 00:00	05-Dec-2020 00:00	05-Dec-2020 09:35	05-Dec-2020 13:50	
Compound	CAS Number	LOR	Unit	EP2013633-016	EP2013633-017	EP2013633-018	EP2013633-019	EP2013633-020	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	783	----	----	----	638	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	93	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	470	----	----	----	38	
Total Alkalinity as CaCO3	----	1	mg/L	470	----	----	----	131	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	84	----	----	----	100	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	138	----	----	----	261	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	85	----	----	----	12	
Magnesium	7439-95-4	1	mg/L	85	----	----	----	65	
Sodium	7440-23-5	1	mg/L	86	----	----	----	131	
Potassium	7440-09-7	1	mg/L	10	----	----	----	19	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	15.0	----	----	----	12.1	
∅ Total Cations	----	0.01	meq/L	15.2	----	----	----	12.1	
∅ Ionic Balance	----	0.01	%	0.67	----	----	----	0.29	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	6	----	----	----	8	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0020	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC07	QC09	QC10	QC11	QC13
Sampling date / time				05-Dec-2020 08:19	05-Dec-2020 00:00	05-Dec-2020 00:00	05-Dec-2020 09:35	05-Dec-2020 13:50	
Compound	CAS Number	LOR	Unit	EP2013633-016	EP2013633-017	EP2013633-018	EP2013633-019	EP2013633-020	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0020	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0020	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0020	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	75.7	75.6	84.0	75.3	81.9	
13C8-PFOA	----	0.0005	%	78.3	78.4	86.8	76.8	74.5	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC15	QC16	HHS0023M	HHS0055M	HEV0006M
Sampling date / time				06-Dec-2020 00:00	06-Dec-2020 15:37	05-Dec-2020 16:28	05-Dec-2020 16:52	06-Dec-2020 09:40	
Compound	CAS Number	LOR	Unit	EP2013633-021	EP2013633-022	EP2013633-023	EP2013633-024	EP2013633-025	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	----	885	758	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	<1	<1	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	<1	<1	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	398	402	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	----	398	402	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	156	69	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	----	170	148	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	----	87	89	----	
Magnesium	7439-95-4	1	mg/L	----	----	94	80	----	
Sodium	7440-23-5	1	mg/L	----	----	104	76	----	
Potassium	7440-09-7	1	mg/L	----	----	10	8	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	----	16.0	13.6	----	
∅ Total Cations	----	0.01	meq/L	----	----	16.8	14.5	----	
∅ Ionic Balance	----	0.01	%	----	----	2.62	3.17	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	----	7	8	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<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	0.0006	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC15	QC16	HHS0023M	HHS0055M	HEV0006M
Sampling date / time				06-Dec-2020 00:00	06-Dec-2020 15:37	05-Dec-2020 16:28	05-Dec-2020 16:52	06-Dec-2020 09:40	
Compound	CAS Number	LOR	Unit	EP2013633-021	EP2013633-022	EP2013633-023	EP2013633-024	EP2013633-025	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0006	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0022	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0022	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	77.7	85.9	80.3	81.9	77.3	
13C8-PFOA	----	0.0005	%	87.3	90.5	86.4	89.6	88.1	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0387M	HEC0406M	HEOPO314M	HEA0149M	HHS0042M
Sampling date / time				06-Dec-2020 09:56	06-Dec-2020 10:15	06-Dec-2020 11:34	06-Dec-2020 14:36	06-Dec-2020 09:25	
Compound	CAS Number	LOR	Unit	EP2013633-026	EP2013633-027	EP2013633-028	EP2013633-029	EP2013633-030	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	742	830	694	----	280	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	279	311	68	----	170	
Total Alkalinity as CaCO3	----	1	mg/L	279	311	68	----	170	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	120	105	<1	----	12	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	172	195	280	----	42	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	38	88	30	----	39	
Magnesium	7439-95-4	1	mg/L	44	68	57	----	23	
Sodium	7440-23-5	1	mg/L	165	106	67	----	31	
Potassium	7440-09-7	1	mg/L	7	7	4	----	4	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	12.9	13.9	9.26	----	4.83	
∅ Total Cations	----	0.01	meq/L	12.9	14.8	9.20	----	5.29	
∅ Ionic Balance	----	0.01	%	0.20	3.06	0.28	----	4.53	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	6	6	1	6	6	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0006	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0009	0.0010	0.0003	0.0005	0.0008	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0387M	HEC0406M	HEOPO314M	HEA0149M	HHS0042M
Sampling date / time				06-Dec-2020 09:56	06-Dec-2020 10:15	06-Dec-2020 11:34	06-Dec-2020 14:36	06-Dec-2020 09:25	
Compound	CAS Number	LOR	Unit	EP2013633-026	EP2013633-027	EP2013633-028	EP2013633-029	EP2013633-030	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0387M	HEC0406M	HEOPO314M	HEA0149M	HHS0042M
Sampling date / time				06-Dec-2020 09:56	06-Dec-2020 10:15	06-Dec-2020 11:34	06-Dec-2020 14:36	06-Dec-2020 09:25	
Compound	CAS Number	LOR	Unit	EP2013633-026	EP2013633-027	EP2013633-028	EP2013633-029	EP2013633-030	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0015	0.0010	0.0003	0.0005	0.0008	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0015	0.0010	0.0003	0.0005	0.0008	
^ Sum of PFAS	----	0.0002	µg/L	0.0015	0.0010	0.0003	0.0005	0.0008	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	77.7	83.7	78.7	77.7	76.2	
13C8-PFOA	----	0.0005	%	86.7	91.8	93.1	88.6	89.1	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIHS0013	HNPIOP0029	OPSW 1	RPSW 1	RPSW 2
Sampling date / time				05-Dec-2020 08:19	05-Dec-2020 13:30	05-Dec-2020 13:50	06-Dec-2020 10:44	06-Dec-2020 10:55	
Compound	CAS Number	LOR	Unit	EP2013633-031	EP2013633-032	EP2013633-033	EP2013633-034	EP2013633-035	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	760	1150	670	1320	1320	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	88	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	472	319	42	248	254	
Total Alkalinity as CaCO3	----	1	mg/L	472	319	130	248	254	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	85	199	103	268	267	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	139	364	265	453	448	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	87	93	12	94	96	
Magnesium	7439-95-4	1	mg/L	85	100	64	107	107	
Sodium	7440-23-5	1	mg/L	84	184	131	214	212	
Potassium	7440-09-7	1	mg/L	9	12	19	14	14	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	15.1	20.8	12.2	23.3	23.3	
∅ Total Cations	----	0.01	meq/L	15.2	21.2	12.0	23.2	23.2	
∅ Ionic Balance	----	0.01	%	0.33	0.94	0.69	0.32	0.20	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	5	4	7	5	4	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.0004	0.0022	0.0009	0.0006	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIHS0013	HNPIOP0029	OPSW 1	RPSW 1	RPSW 2
Sampling date / time				05-Dec-2020 08:19	05-Dec-2020 13:30	05-Dec-2020 13:50	06-Dec-2020 10:44	06-Dec-2020 10:55	
Compound	CAS Number	LOR	Unit	EP2013633-031	EP2013633-032	EP2013633-033	EP2013633-034	EP2013633-035	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIHS0013	HNPIOP0029	OPSW 1	RPSW 1	RPSW 2
Sampling date / time				05-Dec-2020 08:19	05-Dec-2020 13:30	05-Dec-2020 13:50	06-Dec-2020 10:44	06-Dec-2020 10:55	
Compound	CAS Number	LOR	Unit	EP2013633-031	EP2013633-032	EP2013633-033	EP2013633-034	EP2013633-035	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	0.0004	0.0022	0.0009	0.0006	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	0.0004	0.0022	0.0009	0.0006	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	0.0004	0.0022	0.0009	0.0006	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	78.0	88.4	83.1	75.8	76.1	
13C8-PFOA	----	0.0005	%	86.3	86.9	84.2	85.6	83.8	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RPSW 3	ECO754RM	MB03	HEOP0388M	HEOP0524M
Sampling date / time				06-Dec-2020 11:10	04-Dec-2020 14:06	04-Dec-2020 15:20	04-Dec-2020 16:12	04-Dec-2020 16:26	
Compound	CAS Number	LOR	Unit	EP2013633-036	EP2013633-037	EP2013633-038	EP2013633-039	EP2013633-040	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	1330	----	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	253	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	253	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	265	----	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	449	----	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	94	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	106	----	----	----	----	
Sodium	7440-23-5	1	mg/L	211	----	----	----	----	
Potassium	7440-09-7	1	mg/L	14	----	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	23.2	----	----	----	----	
∅ Total Cations	----	0.01	meq/L	23.0	----	----	----	----	
∅ Ionic Balance	----	0.01	%	0.62	----	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	5	----	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.0009	<0.0005	0.0015	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0007	0.0033	<0.0002	0.0015	0.0010	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RPSW 3	ECO754RM	MB03	HEOP0388M	HEOP0524M
Sampling date / time					06-Dec-2020 11:10	04-Dec-2020 14:06	04-Dec-2020 15:20	04-Dec-2020 16:12	04-Dec-2020 16:26
Compound	CAS Number	LOR	Unit	EP2013633-036	EP2013633-037	EP2013633-038	EP2013633-039	EP2013633-040	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0007	0.0042	<0.0002	0.0030	0.0010	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0007	0.123	0.0046	0.0030	0.0095	
^ Sum of PFAS	----	0.0002	µg/L	0.0007	0.130	0.0046	0.0030	0.0095	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	90.1	72.2	86.1	69.5	82.7	
13C8-PFOA	----	0.0005	%	94.3	84.5	87.8	76.8	87.5	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEQ0002M	EC1775RDGM	HEQ0020M	HEQ0008	HEOP0815M
Sampling date / time				04-Dec-2020 16:40	04-Dec-2020 13:30	04-Dec-2020 14:35	04-Dec-2020 00:00	04-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-041	EP2013633-042	EP2013633-043	EP2013633-044	EP2013633-045	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	0.0069	<0.0005	0.0006	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	0.0007	0.0005	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0016	<0.0002	0.0015	0.0004	0.0009	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	0.0030	<0.0020	<0.0020	0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0007	0.0014	0.0015	<0.0005	0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.0037	<0.0005	0.0007	<0.0005	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0007	<0.0005	0.0007	<0.0005	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0026	<0.0005	0.0044	<0.0005	0.0016	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	0.0007	<0.0005	<0.0005	<0.0005	0.0006	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	0.0009	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEQ0002M	EC1775RDGM	HEQ0020M	HEQ0008	HEOP0815M
Sampling date / time				04-Dec-2020 16:40	04-Dec-2020 13:30	04-Dec-2020 14:35	04-Dec-2020 00:00	04-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-041	EP2013633-042	EP2013633-043	EP2013633-044	EP2013633-045	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	0.002	<0.001	<0.001	0.004	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0016	<0.0002	0.0022	0.0009	0.0009	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0093	0.0064	0.0164	0.0009	0.0096	
^ Sum of PFAS	----	0.0002	µg/L	0.0109	0.0064	0.0164	0.0009	0.0102	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	86.5	80.9	89.5	96.1	84.1	
13C8-PFOA	----	0.0005	%	87.4	88.4	87.6	90.9	83.8	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0368M	MW07	MW06	HEC0318M1	HST1782RM
Sampling date / time				04-Dec-2020 00:00	05-Dec-2020 11:37	05-Dec-2020 11:47	05-Dec-2020 00:00	05-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-046	EP2013633-047	EP2013633-048	EP2013633-049	EP2013633-050	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	660	773	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	<1	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	<1	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	361	272	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	361	272	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	73	159	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	136	139	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	81	67	----	----	
Magnesium	7439-95-4	1	mg/L	----	76	51	----	----	
Sodium	7440-23-5	1	mg/L	----	74	128	----	----	
Potassium	7440-09-7	1	mg/L	----	9	17	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	12.6	12.7	----	----	
∅ Total Cations	----	0.01	meq/L	----	13.7	13.5	----	----	
∅ Ionic Balance	----	0.01	%	----	4.47	3.35	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	7	5	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.0021	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.0065	0.0004	0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0368M	MW07	MW06	HEC0318M1	HST1782RM
Sampling date / time				04-Dec-2020 00:00	05-Dec-2020 11:37	05-Dec-2020 11:47	05-Dec-2020 00:00	05-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-046	EP2013633-047	EP2013633-048	EP2013633-049	EP2013633-050	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0368M	MW07	MW06	HEC0318M1	HST1782RM
Sampling date / time				04-Dec-2020 00:00	05-Dec-2020 11:37	05-Dec-2020 11:47	05-Dec-2020 00:00	05-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-046	EP2013633-047	EP2013633-048	EP2013633-049	EP2013633-050	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.036	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	0.0086	0.0004	0.0002	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	0.0446	0.0004	0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	0.0446	0.0004	0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	86.6	81.4	91.1	87.8	85.8	
13C8-PFOA	----	0.0005	%	84.2	96.3	89.2	89.1	84.6	



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120



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
∅ = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X: PFAS results for sample #5, #7, #8, #20 confirmed by re-extraction and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- 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.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW01a	HHS0027M	HEC0448M	HST1063RM	EA0978RM
Sampling date / time				05-Dec-2020 12:00	05-Dec-2020 09:35	06-Dec-2020 07:45	06-Dec-2020 07:25	04-Dec-2020 12:01	
Compound	CAS Number	LOR	Unit	EP2013633-001	EP2013633-002	EP2013633-003	EP2013633-004	EP2013633-005	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	640	----	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	328	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	328	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	80	----	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	119	----	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	71	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	67	----	----	----	----	
Sodium	7440-23-5	1	mg/L	76	----	----	----	----	
Potassium	7440-09-7	1	mg/L	10	----	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	11.6	----	----	----	----	
∅ Total Cations	----	0.01	meq/L	12.6	----	----	----	----	
∅ Ionic Balance	----	0.01	%	4.31	----	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	8	----	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0008	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	0.0075	0.0025	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	0.0011	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0006	<0.0002	0.0231	0.0213	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW01a	HHS0027M	HEC0448M	HST1063RM	EA0978RM
Sampling date / time					05-Dec-2020 12:00	05-Dec-2020 09:35	06-Dec-2020 07:45	06-Dec-2020 07:25	04-Dec-2020 12:01
Compound	CAS Number	LOR	Unit	EP2013633-001	EP2013633-002	EP2013633-003	EP2013633-004	EP2013633-005	EP2013633-005
				Result	Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	0.011	<0.001	0.006	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.002	<0.001	0.005	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<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	0.0006	<0.0002	0.0306	0.0238	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0006	<0.0002	0.102	0.0333	0.0110	
^ Sum of PFAS	----	0.0002	µg/L	0.0006	<0.0002	0.105	0.0333	0.0110	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	76.8	78.4	73.0	84.9	72.1	
13C8-PFOA	----	0.0005	%	76.4	75.8	69.2	81.4	70.7	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0386M	HEC0407M	HEA123M	HEA0134M	HEA0125M
Sampling date / time				04-Dec-2020 15:57	05-Dec-2020 11:25	05-Dec-2020 12:36	05-Dec-2020 12:50	05-Dec-2020 13:06	
Compound	CAS Number	LOR	Unit	EP2013633-006	EP2013633-007	EP2013633-008	EP2013633-009	EP2013633-010	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	574	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	420	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	420	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	<1	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	115	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	67	----	----	----	
Magnesium	7439-95-4	1	mg/L	----	67	----	----	----	
Sodium	7440-23-5	1	mg/L	----	74	----	----	----	
Potassium	7440-09-7	1	mg/L	----	9	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	11.6	----	----	----	
∅ Total Cations	----	0.01	meq/L	----	12.3	----	----	----	
∅ Ionic Balance	----	0.01	%	----	2.80	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	25	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0014	0.0006	0.0013	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0386M	HEC0407M	HEA123M	HEA0134M	HEA0125M
Sampling date / time				04-Dec-2020 15:57	05-Dec-2020 11:25	05-Dec-2020 12:36	05-Dec-2020 12:50	05-Dec-2020 13:06	
Compound	CAS Number	LOR	Unit	EP2013633-006	EP2013633-007	EP2013633-008	EP2013633-009	EP2013633-010	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	0.278	<0.0020	0.0041	0.120	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0021	0.0381	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0016	0.0077	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0008	0.0063	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.0054	<0.0005	0.0028	0.0060	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0007	0.0028	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0013	0.0021	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0386M	HEC0407M	HEA123M	HEA0134M	HEA0125M
Sampling date / time				04-Dec-2020 15:57	05-Dec-2020 11:25	05-Dec-2020 12:36	05-Dec-2020 12:50	05-Dec-2020 13:06	
Compound	CAS Number	LOR	Unit	EP2013633-006	EP2013633-007	EP2013633-008	EP2013633-009	EP2013633-010	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.002	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	0.002	<0.001	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	0.003	0.002	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0014	0.0006	0.0018	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	0.285	0.0014	0.0140	0.181	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	0.285	0.0014	0.0190	0.188	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	64.2	92.2	93.5	78.3	78.6	
13C8-PFOA	----	0.0005	%	68.7	82.3	94.1	74.7	76.6	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0141M	HEOP0430M	HHS0085M	QC05	QC06
Sampling date / time				05-Dec-2020 13:25	05-Dec-2020 14:24	05-Dec-2020 15:21	04-Dec-2020 00:00	04-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-011	EP2013633-012	EP2013633-013	EP2013633-014	EP2013633-015	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.0009	0.0007	<0.0005	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0006	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0015	0.0009	0.0002	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	0.0021	<0.0020	<0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0013	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0141M	HEOP0430M	HHS0085M	QC05	QC06
Sampling date / time				05-Dec-2020 13:25	05-Dec-2020 14:24	05-Dec-2020 15:21	04-Dec-2020 00:00	04-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-011	EP2013633-012	EP2013633-013	EP2013633-014	EP2013633-015	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0021	0.0009	0.0002	<0.0002	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0039	0.0018	0.0030	<0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	0.0044	0.0018	0.0030	<0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	76.8	87.7	77.7	76.6	80.9	
13C8-PFOA	----	0.0005	%	71.9	82.5	75.5	77.6	82.4	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC07	QC09	QC10	QC11	QC13
Sampling date / time				05-Dec-2020 08:19	05-Dec-2020 00:00	05-Dec-2020 00:00	05-Dec-2020 09:35	05-Dec-2020 13:50	
Compound	CAS Number	LOR	Unit	EP2013633-016	EP2013633-017	EP2013633-018	EP2013633-019	EP2013633-020	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	783	----	----	----	638	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	93	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	470	----	----	----	38	
Total Alkalinity as CaCO3	----	1	mg/L	470	----	----	----	131	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	84	----	----	----	100	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	138	----	----	----	261	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	85	----	----	----	12	
Magnesium	7439-95-4	1	mg/L	85	----	----	----	65	
Sodium	7440-23-5	1	mg/L	86	----	----	----	131	
Potassium	7440-09-7	1	mg/L	10	----	----	----	19	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	15.0	----	----	----	12.1	
∅ Total Cations	----	0.01	meq/L	15.2	----	----	----	12.1	
∅ Ionic Balance	----	0.01	%	0.67	----	----	----	0.29	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	6	----	----	----	8	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0020	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC07	QC09	QC10	QC11	QC13
Sampling date / time					05-Dec-2020 08:19	05-Dec-2020 00:00	05-Dec-2020 00:00	05-Dec-2020 09:35	05-Dec-2020 13:50
Compound	CAS Number	LOR	Unit	EP2013633-016	EP2013633-017	EP2013633-018	EP2013633-019	EP2013633-020	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0020	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0020	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0020	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	75.7	75.6	84.0	75.3	81.9	
13C8-PFOA	----	0.0005	%	78.3	78.4	86.8	76.8	74.5	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC15	QC16	HHS0023M	HHS0055M	HEV0006M
Sampling date / time				06-Dec-2020 00:00	06-Dec-2020 15:37	05-Dec-2020 16:28	05-Dec-2020 16:52	06-Dec-2020 09:40	
Compound	CAS Number	LOR	Unit	EP2013633-021	EP2013633-022	EP2013633-023	EP2013633-024	EP2013633-025	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	----	885	758	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	<1	<1	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	<1	<1	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	398	402	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	----	398	402	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	156	69	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	----	170	148	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	----	87	89	----	
Magnesium	7439-95-4	1	mg/L	----	----	94	80	----	
Sodium	7440-23-5	1	mg/L	----	----	104	76	----	
Potassium	7440-09-7	1	mg/L	----	----	10	8	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	----	16.0	13.6	----	
∅ Total Cations	----	0.01	meq/L	----	----	16.8	14.5	----	
∅ Ionic Balance	----	0.01	%	----	----	2.62	3.17	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	----	7	8	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<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	0.0006	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC15	QC16	HHS0023M	HHS0055M	HEV0006M
Sampling date / time				06-Dec-2020 00:00	06-Dec-2020 15:37	05-Dec-2020 16:28	05-Dec-2020 16:52	06-Dec-2020 09:40	
Compound	CAS Number	LOR	Unit	EP2013633-021	EP2013633-022	EP2013633-023	EP2013633-024	EP2013633-025	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0006	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0022	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0022	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	77.7	85.9	80.3	81.9	77.3	
13C8-PFOA	----	0.0005	%	87.3	90.5	86.4	89.6	88.1	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0387M	HEC0406M	HEOPO314M	HEA0149M	HHS0042M
Sampling date / time				06-Dec-2020 09:56	06-Dec-2020 10:15	06-Dec-2020 11:34	06-Dec-2020 14:36	06-Dec-2020 09:25	
Compound	CAS Number	LOR	Unit	EP2013633-026	EP2013633-027	EP2013633-028	EP2013633-029	EP2013633-030	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	742	830	694	----	280	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	279	311	68	----	170	
Total Alkalinity as CaCO3	----	1	mg/L	279	311	68	----	170	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	120	105	<1	----	12	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	172	195	280	----	42	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	38	88	30	----	39	
Magnesium	7439-95-4	1	mg/L	44	68	57	----	23	
Sodium	7440-23-5	1	mg/L	165	106	67	----	31	
Potassium	7440-09-7	1	mg/L	7	7	4	----	4	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	12.9	13.9	9.26	----	4.83	
∅ Total Cations	----	0.01	meq/L	12.9	14.8	9.20	----	5.29	
∅ Ionic Balance	----	0.01	%	0.20	3.06	0.28	----	4.53	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	6	6	1	6	6	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0006	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0009	0.0010	0.0003	0.0005	0.0008	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0387M	HEC0406M	HEOPO314M	HEA0149M	HHS0042M
Sampling date / time				06-Dec-2020 09:56	06-Dec-2020 10:15	06-Dec-2020 11:34	06-Dec-2020 14:36	06-Dec-2020 09:25	
Compound	CAS Number	LOR	Unit	EP2013633-026	EP2013633-027	EP2013633-028	EP2013633-029	EP2013633-030	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0387M	HEC0406M	HEOPO314M	HEA0149M	HHS0042M
Sampling date / time				06-Dec-2020 09:56	06-Dec-2020 10:15	06-Dec-2020 11:34	06-Dec-2020 14:36	06-Dec-2020 09:25	
Compound	CAS Number	LOR	Unit	EP2013633-026	EP2013633-027	EP2013633-028	EP2013633-029	EP2013633-030	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0015	0.0010	0.0003	0.0005	0.0008	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0015	0.0010	0.0003	0.0005	0.0008	
^ Sum of PFAS	----	0.0002	µg/L	0.0015	0.0010	0.0003	0.0005	0.0008	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	77.7	83.7	78.7	77.7	76.2	
13C8-PFOA	----	0.0005	%	86.7	91.8	93.1	88.6	89.1	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIHS0013	HNPIOP0029	OPSW 1	RPSW 1	RPSW 2
Sampling date / time				05-Dec-2020 08:19	05-Dec-2020 13:30	05-Dec-2020 13:50	06-Dec-2020 10:44	06-Dec-2020 10:55	
Compound	CAS Number	LOR	Unit	EP2013633-031	EP2013633-032	EP2013633-033	EP2013633-034	EP2013633-035	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	760	1150	670	1320	1320	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	88	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	472	319	42	248	254	
Total Alkalinity as CaCO3	----	1	mg/L	472	319	130	248	254	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	85	199	103	268	267	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	139	364	265	453	448	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	87	93	12	94	96	
Magnesium	7439-95-4	1	mg/L	85	100	64	107	107	
Sodium	7440-23-5	1	mg/L	84	184	131	214	212	
Potassium	7440-09-7	1	mg/L	9	12	19	14	14	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	15.1	20.8	12.2	23.3	23.3	
∅ Total Cations	----	0.01	meq/L	15.2	21.2	12.0	23.2	23.2	
∅ Ionic Balance	----	0.01	%	0.33	0.94	0.69	0.32	0.20	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	5	4	7	5	4	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.0004	0.0022	0.0009	0.0006	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIHS0013	HNPIOP0029	OPSW 1	RPSW 1	RPSW 2
Sampling date / time				05-Dec-2020 08:19	05-Dec-2020 13:30	05-Dec-2020 13:50	06-Dec-2020 10:44	06-Dec-2020 10:55	
Compound	CAS Number	LOR	Unit	EP2013633-031	EP2013633-032	EP2013633-033	EP2013633-034	EP2013633-035	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIHS0013	HNPIOP0029	OPSW 1	RPSW 1	RPSW 2
Sampling date / time				05-Dec-2020 08:19	05-Dec-2020 13:30	05-Dec-2020 13:50	06-Dec-2020 10:44	06-Dec-2020 10:55	
Compound	CAS Number	LOR	Unit	EP2013633-031	EP2013633-032	EP2013633-033	EP2013633-034	EP2013633-035	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	0.0004	0.0022	0.0009	0.0006	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	0.0004	0.0022	0.0009	0.0006	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	0.0004	0.0022	0.0009	0.0006	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	78.0	88.4	83.1	75.8	76.1	
13C8-PFOA	----	0.0005	%	86.3	86.9	84.2	85.6	83.8	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RPSW 3	ECO754RM	MB03	HEOP0388M	HEOP0524M
Sampling date / time				06-Dec-2020 11:10	04-Dec-2020 14:06	04-Dec-2020 15:20	04-Dec-2020 16:12	04-Dec-2020 16:26	
Compound	CAS Number	LOR	Unit	EP2013633-036	EP2013633-037	EP2013633-038	EP2013633-039	EP2013633-040	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	1330	----	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	253	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	253	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	265	----	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	449	----	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	94	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	106	----	----	----	----	
Sodium	7440-23-5	1	mg/L	211	----	----	----	----	
Potassium	7440-09-7	1	mg/L	14	----	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	23.2	----	----	----	----	
∅ Total Cations	----	0.01	meq/L	23.0	----	----	----	----	
∅ Ionic Balance	----	0.01	%	0.62	----	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	5	----	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.0009	<0.0005	0.0015	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0007	0.0033	<0.0002	0.0015	0.0010	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RPSW 3	ECO754RM	MB03	HEOP0388M	HEOP0524M
Sampling date / time					06-Dec-2020 11:10	04-Dec-2020 14:06	04-Dec-2020 15:20	04-Dec-2020 16:12	04-Dec-2020 16:26
Compound	CAS Number	LOR	Unit	EP2013633-036	EP2013633-037	EP2013633-038	EP2013633-039	EP2013633-040	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0007	0.0042	<0.0002	0.0030	0.0010	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0007	0.123	0.0046	0.0030	0.0095	
^ Sum of PFAS	----	0.0002	µg/L	0.0007	0.130	0.0046	0.0030	0.0095	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	90.1	72.2	86.1	69.5	82.7	
13C8-PFOA	----	0.0005	%	94.3	84.5	87.8	76.8	87.5	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEQ0002M	EC1775RDGM	HEQ0020M	HEQ0008	HEOP0815M
Sampling date / time				04-Dec-2020 16:40	04-Dec-2020 13:30	04-Dec-2020 14:35	04-Dec-2020 00:00	04-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-041	EP2013633-042	EP2013633-043	EP2013633-044	EP2013633-045	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	0.0069	<0.0005	0.0006	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	0.0007	0.0005	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0016	<0.0002	0.0015	0.0004	0.0009	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	0.0030	<0.0020	<0.0020	0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0007	0.0014	0.0015	<0.0005	0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.0037	<0.0005	0.0007	<0.0005	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0007	<0.0005	0.0007	<0.0005	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0026	<0.0005	0.0044	<0.0005	0.0016	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	0.0007	<0.0005	<0.0005	<0.0005	0.0006	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	0.0009	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEQ0002M	EC1775RDGM	HEQ0020M	HEQ0008	HEOP0815M
Sampling date / time				04-Dec-2020 16:40	04-Dec-2020 13:30	04-Dec-2020 14:35	04-Dec-2020 00:00	04-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-041	EP2013633-042	EP2013633-043	EP2013633-044	EP2013633-045	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	0.002	<0.001	<0.001	0.004	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0016	<0.0002	0.0022	0.0009	0.0009	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0093	0.0064	0.0164	0.0009	0.0096	
^ Sum of PFAS	----	0.0002	µg/L	0.0109	0.0064	0.0164	0.0009	0.0102	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	86.5	80.9	89.5	96.1	84.1	
13C8-PFOA	----	0.0005	%	87.4	88.4	87.6	90.9	83.8	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0368M	MW07	MW06	HEC0318M1	HST1782RM
Sampling date / time				04-Dec-2020 00:00	05-Dec-2020 11:37	05-Dec-2020 11:47	05-Dec-2020 00:00	05-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-046	EP2013633-047	EP2013633-048	EP2013633-049	EP2013633-050	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	660	773	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	<1	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	<1	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	361	272	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	361	272	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	73	159	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	136	139	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	81	67	----	----	
Magnesium	7439-95-4	1	mg/L	----	76	51	----	----	
Sodium	7440-23-5	1	mg/L	----	74	128	----	----	
Potassium	7440-09-7	1	mg/L	----	9	17	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	12.6	12.7	----	----	
∅ Total Cations	----	0.01	meq/L	----	13.7	13.5	----	----	
∅ Ionic Balance	----	0.01	%	----	4.47	3.35	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	7	5	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.0021	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.0065	0.0004	0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0368M	MW07	MW06	HEC0318M1	HST1782RM
Sampling date / time				04-Dec-2020 00:00	05-Dec-2020 11:37	05-Dec-2020 11:47	05-Dec-2020 00:00	05-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-046	EP2013633-047	EP2013633-048	EP2013633-049	EP2013633-050	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonylamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0368M	MW07	MW06	HEC0318M1	HST1782RM
Sampling date / time				04-Dec-2020 00:00	05-Dec-2020 11:37	05-Dec-2020 11:47	05-Dec-2020 00:00	05-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-046	EP2013633-047	EP2013633-048	EP2013633-049	EP2013633-050	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.036	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	0.0086	0.0004	0.0002	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	0.0446	0.0004	0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	0.0446	0.0004	0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	86.6	81.4	91.1	87.8	85.8	
13C8-PFOA	----	0.0005	%	84.2	96.3	89.2	89.1	84.6	



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120



QUALITY CONTROL REPORT

Work Order : EP2013633
Client : COFFEY ENVIRONMENTS PTY LTD
Contact : WESLEY ALPORT
Address : Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000
Telephone : 61 8 6218 2100
Project : 754-PEREN282113 BHP Eastern Ridge
Order number : ----
C-O-C number : ----
Sampler : Regan MacDonald, Steven Middleton
Site : ----
Quote number : EP/991/20_V2
No. of samples received : 50
No. of samples analysed : 50

Page : 1 of 14
Laboratory : Environmental Division Perth
Contact : Lauren Biagioni
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : 08 9406 1307
Date Samples Received : 07-Dec-2020
Date Analysis Commenced : 09-Dec-2020
Issue Date : 16-Dec-2020



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This Quality Control Report contains the following information:

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

Signatories

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

Table with 3 columns: Signatories, Position, Accreditation Category. Rows include Chris Lemaitre (Laboratory Manager), Efua Wilson (Metals Chemist), and Franco Lentini (LCMS Coordinator).



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 Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3414877)									
EP2013633-001	MW01a	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	640	636	0.470	0% - 20%
EP2013825-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	31400	29600	6.03	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3414885)									
EP2013633-028	HEOPO314M	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	694	678	2.26	0% - 20%
EP2013633-047	MW07	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	660	662	0.227	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3419192)									
EP2013592-032	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1940	1910	1.65	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1940	1910	1.65	0% - 20%
EP2013592-042	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3419193)									
EP2013633-030	HHS0042M	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	170	170	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	170	170	0.00	0% - 20%
EP2013660-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	366	333	9.33	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	366	333	9.33	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3411439)									



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3411439) - continued									
EP2013633-007	HEC0407M	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
EP2013633-030	HHS0042M	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	12	12	0.00	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 3411440)									
EP2013633-007	HEC0407M	ED045G: Chloride	16887-00-6	1	mg/L	115	119	3.00	0% - 20%
EP2013633-030	HHS0042M	ED045G: Chloride	16887-00-6	1	mg/L	42	42	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3410110)									
EP2013633-001	MW01a	ED093F: Calcium	7440-70-2	1	mg/L	71	70	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	67	67	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	76	76	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	10	10	0.00	No Limit
EP2013633-031	HNPIHS0013	ED093F: Calcium	7440-70-2	1	mg/L	87	86	1.21	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	85	83	1.82	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	84	83	1.70	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	9	9	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3411467)									
EP2013633-001	MW01a	EP005: Total Organic Carbon	----	1	mg/L	8	5	34.6	No Limit
EP2013633-030	HHS0042M	EP005: Total Organic Carbon	----	1	mg/L	6	7	25.7	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3416269)									
EP2013633-016	QC07	EP005: Total Organic Carbon	----	1	mg/L	6	4	37.4	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3412952)									
EP2013633-008	HEA123M	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0014	0.0014	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
EP2013633-010	HEA0125M	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0013	0.0012	0.00	No Limit
		EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0007	0.0006	17.7	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



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3412952) - continued									
EP2013633-010	HEA0125M	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
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3414547)									
EP2013633-050	HST1782RM	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: Perfluoroalkyl Carboxylic Acids (QC Lot: 3412952)									
EP2013633-008	HEA123M	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	<0.0005	<0.0005	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
EP2013633-010	HEA0125M	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	<0.0020	0.00	No Limit
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0381	0.0319	17.7	0% - 20%
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0063	0.0054	13.9	0% - 50%
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.0077	0.0064	18.5	0% - 50%
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0060	0.0052	13.7	0% - 50%
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	0.0028	0.0021	25.6	No Limit
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	0.0021	0.0018	15.4	No Limit
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit		



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3412952) - continued									
EP2013633-010	HEA0125M	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	0.120	0.103	15.6	0% - 20%
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3414547)									
EP2013633-050	HST1782RM	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	<0.0005	<0.0005	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: Perfluoroalkyl Sulfonamides (QC Lot: 3412952)									
EP2013633-008	HEA123M	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
		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
EP2013633-010	HEA0125M	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



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3412952) - continued									
EP2013633-010	HEA0125M	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
		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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3414547)									
EP2013633-050	HST1782RM	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
		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) Fluorotelomer Sulfonic Acids (QC Lot: 3412952)									
EP2013633-008	HEA123M	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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
EP2013633-010	HEA0125M	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3412952) - continued									
EP2013633-010	HEA0125M	EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	0.002	0.002	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3414547)									
EP2013633-050	HST1782RM	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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 Sums (QC Lot: 3412952)									
EP2013633-008	HEA123M	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0014	0.0014	0.00	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0014	0.0014	0.00	No Limit
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.0014	0.0014	0.00	No Limit
EP2013633-010	HEA0125M	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0018	0.0012	40.0	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.181	0.154	16.1	0% - 20%
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.188	0.160	16.1	0% - 20%
EP231P: PFAS Sums (QC Lot: 3414547)									
EP2013633-050	HST1782RM	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	<0.0002	<0.0002	0.00	No Limit
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (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 Spike (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: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3414877)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	88.1	114
				<10	1000 mg/L	99.8	88.1	114
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3414885)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	88.1	114
				<10	1000 mg/L	104	88.1	114
ED037P: Alkalinity by PC Titrator (QCLot: 3419192)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	108	81.2	126
				<1	200 mg/L	98.7	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 3419193)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	114	81.2	126
				<1	200 mg/L	96.6	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3411439)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113
				<1	500 mg/L	104	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 3411440)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	87.9	114
				<1	1000 mg/L	103	87.9	114
ED093F: Dissolved Major Cations (QCLot: 3410110)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	101	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	103	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3411467)								
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	112	87.2	116
				<1	100 mg/L	108	87.2	116
EP005: Total Organic Carbon (TOC) (QCLot: 3416269)								



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP005: Total Organic Carbon (TOC) (QCLot: 3416269) - continued									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	112	87.2	116	
				<1	100 mg/L	106	87.2	116	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3412952)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	82.8	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	88.0	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	94.0	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	90.8	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	89.6	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	88.8	53.0	142	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3413610)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	77.2	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	76.0	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	69.6	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	70.0	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	74.8	53.0	142	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3414547)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	74.0	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	76.0	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	73.2	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	75.6	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	68.4	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	58.8	53.0	142	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3412952)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	96.8	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	96.8	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	97.2	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	93.6	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	97.6	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	100	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	101	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	112	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	117	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	83.6	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	98.6	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3413610)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	81.4	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	115	72.0	129	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3413610) - continued									
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	76.8	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	78.0	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	74.8	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	74.4	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	78.8	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	73.6	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	75.2	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	65.2	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	82.6	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3414547)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	94.1	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	78.0	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	84.4	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	74.8	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	73.6	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	70.4	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	74.8	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	78.8	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	73.2	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	70.0	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	81.6	71.0	132	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3412952)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	99.6	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	103	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	90.7	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	95.5	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	87.7	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	96.4	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	93.6	61.0	135	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3413610)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	71.6	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	72.5	68.0	141	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
				Result		LCS	Low	High	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3413610) - continued									
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	64.2	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	66.7	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	65.3	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	76.8	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	74.4	61.0	135	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3414547)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	79.2	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	90.1	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	72.8	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	112	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	103	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	91.2	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	118	61.0	135	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3412952)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	91.2	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	132	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	96.4	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	77.2	60.9	136	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3413610)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	70.4	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	91.6	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	72.8	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	65.6	60.9	136	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3414547)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	69.2	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	87.2	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	95.2	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	61.6	60.9	136	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
EP231P: PFAS Sums (QCLot: 3412952)								
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	----	----	----	----
EP231P: PFAS Sums (QCLot: 3413610)								
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	----	----	----	----
EP231P: PFAS Sums (QCLot: 3414547)								
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

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%)	Recovery Limits (%)	
					MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3411439)							
EP2013633-001	MW01a	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	114	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3411440)							
EP2013633-001	MW01a	ED045G: Chloride	16887-00-6	1000 mg/L	98.8	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3411467)							
EP2013633-007	HEC0407M	EP005: Total Organic Carbon	----	100 mg/L	108	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3416269)							
EP2013633-023	HHS0023M	EP005: Total Organic Carbon	----	100 mg/L	107	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3412952)							
EP2013633-009	HEA0134M	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	92.0	72.0	130
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	94.0	71.0	127
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	121	68.0	131
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	119	69.0	134
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	84.0	65.0	140
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	70.0	53.0	142



Sub-Matrix: WATER

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report					
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)			
				Low	High				
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3414547)									
EP2013633-032	HNPIOP0029	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	76.8	72.0	130		
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	91.2	71.0	127		
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	80.4	68.0	131		
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	83.6	69.0	134		
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	88.0	65.0	140		
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	70.8	53.0	142		
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3412952)									
EP2013633-009	HEA0134M	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	97.8	73.0	129		
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	93.6	72.0	129		
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	93.2	72.0	129		
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	88.0	72.0	130		
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	99.6	71.0	133		
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	94.4	69.0	130		
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	98.8	71.0	129		
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	105	69.0	133		
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	113	72.0	134		
		EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.004 µg/L		65.0	144		
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	92.5	71.0	132		
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3414547)									
EP2013633-032	HNPIOP0029	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	75.9	73.0	129		
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	87.6	72.0	129		
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	108	72.0	129		
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	88.8	72.0	130		
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	78.8	71.0	133		
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	88.8	69.0	130		
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	88.8	71.0	129		
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	88.8	69.0	133		
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	76.8	72.0	134		
		EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.004 µg/L	104	65.0	144		
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	95.7	71.0	132		
		EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3412952)							
		EP2013633-009	HEA0134M	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	85.6	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8			0.01 µg/L	104	68.0	141		
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2			0.01 µg/L	84.0	56.6	136		
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7			0.01 µg/L	88.5	61.9	129		



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3412952) - continued							
EP2013633-009	HEA0134M	EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 µg/L	80.2	52.8	135
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	85.6	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	91.6	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3414547)							
EP2013633-032	HNPIOP0029	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	94.8	67.0	137
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.01 µg/L	103	68.0	141
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.01 µg/L	80.0	56.6	136
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.01 µg/L	75.2	61.9	129
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 µg/L	69.8	52.8	135
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	83.6	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	95.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3412952)							
EP2013633-009	HEA0134M	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	73.6	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	95.6	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	82.4	67.0	138
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	69.6	60.9	136
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3414547)							
EP2013633-032	HNPIOP0029	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	74.4	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	103	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	103	67.0	138
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	61.6	60.9	136

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2013633	Page	: 1 of 12
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Telephone	: 08 9406 1307
Project	: 754-PEREN282113 BHP Eastern Ridge	Date Samples Received	: 07-Dec-2020
Site	: ----	Issue Date	: 16-Dec-2020
Sampler	: Regan MacDonald, Steven Middleton	No. of samples received	: 50
Order number	: ----	No. of samples analysed	: 50

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **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.



Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	3	50	6.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	50	4.00	5.00	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 VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
MW01a, QC07, HHS0023M, HNPIHS0013, OPSW 1, MW06	HEC0407M, QC13, HHS0055M, HNPIOP0029, MW07,	05-Dec-2020	----	----	----	11-Dec-2020	12-Dec-2020	✔
Clear Plastic Bottle - Natural (EA015H)								
HEOP0387M, HEOP0314M, RPSW 1, RPSW 3	HEC0406M, HHS0042M, RPSW 2,	06-Dec-2020	----	----	----	11-Dec-2020	13-Dec-2020	✔



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) MW01a, QC07, HHS0023M, HNPIHS0013, OPSW 1, MW06	HEC0407M, QC13, HHS0055M, HNPIOP0029, MW07,	05-Dec-2020	----	----	----	14-Dec-2020	19-Dec-2020	✓
Clear Plastic Bottle - Natural (ED037-P) HEOP0387M, HEOPO314M, RPSW 1, RPSW 3	HEC0406M, HHS0042M, RPSW 2,	06-Dec-2020	----	----	----	14-Dec-2020	20-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) MW01a, QC07, HHS0023M, HNPIHS0013, OPSW 1, MW06	HEC0407M, QC13, HHS0055M, HNPIOP0029, MW07,	05-Dec-2020	----	----	----	15-Dec-2020	02-Jan-2021	✓
Clear Plastic Bottle - Natural (ED041G) HEOP0387M, HEOPO314M, RPSW 1, RPSW 3	HEC0406M, HHS0042M, RPSW 2,	06-Dec-2020	----	----	----	15-Dec-2020	03-Jan-2021	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) MW01a, QC07, HHS0023M, HNPIHS0013, OPSW 1, MW06	HEC0407M, QC13, HHS0055M, HNPIOP0029, MW07,	05-Dec-2020	----	----	----	15-Dec-2020	02-Jan-2021	✓
Clear Plastic Bottle - Natural (ED045G) HEOP0387M, HEOPO314M, RPSW 1, RPSW 3	HEC0406M, HHS0042M, RPSW 2,	06-Dec-2020	----	----	----	15-Dec-2020	03-Jan-2021	✓



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) MW01a, QC07, HHS0023M, HNPIHS0013, OPSW 1, MW06	HEC0407M, QC13, HHS0055M, HNPIOP0029, MW07,	05-Dec-2020	----	----	----	09-Dec-2020	12-Dec-2020	✓
Clear Plastic Bottle - Natural (ED093F) HEOP0387M, HEOPO314M, RPSW 1, RPSW 3	HEC0406M, HHS0042M, RPSW 2,	06-Dec-2020	----	----	----	09-Dec-2020	13-Dec-2020	✓
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005) MW01a, QC07, HHS0023M, HNPIHS0013, OPSW 1, MW06	HEC0407M, QC13, HHS0055M, HNPIOP0029, MW07,	05-Dec-2020	----	----	----	09-Dec-2020	02-Jan-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005) HEOP0387M, HEOPO314M, HHS0042M, RPSW 2,	HEC0406M, HEA0149M, RPSW 1, RPSW 3	06-Dec-2020	----	----	----	09-Dec-2020	03-Jan-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT) EA0978RM, QC05,	HEOP0386M, QC06	04-Dec-2020	11-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) ECO754RM, HEOP0388M, HEQ0002M, HEQ0020M, HEOP0815M,	MB03, HEOP0524M, EC1775RDGM, HEQ0008, HEOP0368M	04-Dec-2020	14-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0023M,	HHS0055M	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	11-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) MW01a, HEC0407M, HEA0134M, HEA0141M, HHS0085M, QC09, QC11,	HHS0027M, HEA123M, HEA0125M, HEOP0430M, QC07, QC10, QC13	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIHS0013, OPSW 1, MW06, HST1782RM	HNPIOP0029, MW07, HEC0318M1,	05-Dec-2020	14-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC15, HEV0006M, HEC0406M, HEA0149M,	QC16, HEOP0387M, HEOPO314M, HHS0042M	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	11-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEC0448M,	HST1063RM	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) RPSW 1, RPSW 3	RPSW 2,	06-Dec-2020	14-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X-SUT) EA0978RM, QC05,	HEOP0386M, QC06	04-Dec-2020	11-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) ECO754RM, HEOP0388M, HEQ0002M, HEQ0020M, HEOP0815M,	MB03, HEOP0524M, EC1775RDGM, HEQ0008, HEOP0368M	04-Dec-2020	14-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0023M,	HHS0055M	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	11-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) MW01a, HEC0407M, HEA0134M, HEA0141M, HHS0085M, QC09, QC11,	HHS0027M, HEA123M, HEA0125M, HEOP0430M, QC07, QC10, QC13	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIHS0013, OPSW 1, MW06, HST1782RM	HNPIOP0029, MW07, HEC0318M1,	05-Dec-2020	14-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC15, HEV0006M, HEC0406M, HEA0149M,	QC16, HEOP0387M, HEOPO314M, HHS0042M	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	11-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEC0448M,	HST1063RM	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) RPSW 1, RPSW 3	RPSW 2,	06-Dec-2020	14-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X-SUT) EA0978RM, QC05,	HEOP0386M, QC06	04-Dec-2020	11-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) ECO754RM, HEOP0388M, HEQ0002M, HEQ0020M, HEOP0815M,	MB03, HEOP0524M, EC1775RDGM, HEQ0008, HEOP0368M	04-Dec-2020	14-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0023M,	HHS0055M	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	11-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) MW01a, HEC0407M, HEA0134M, HEA0141M, HHS0085M, QC09, QC11,	HHS0027M, HEA123M, HEA0125M, HEOP0430M, QC07, QC10, QC13	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIHS0013, OPSW 1, MW06, HST1782RM	HNPIOP0029, MW07, HEC0318M1,	05-Dec-2020	14-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC15, HEV0006M, HEC0406M, HEA0149M,	QC16, HEOP0387M, HEOPO314M, HHS0042M	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	11-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEC0448M,	HST1063RM	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) RPSW 1, RPSW 3	RPSW 2,	06-Dec-2020	14-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT) EA0978RM, QC05,	HEOP0386M, QC06	04-Dec-2020	11-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) ECO754RM, HEOP0388M, HEQ0002M, HEQ0020M, HEOP0815M,	MB03, HEOP0524M, EC1775RDGM, HEQ0008, HEOP0368M	04-Dec-2020	14-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0023M,	HHS0055M	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	11-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) MW01a, HEC0407M, HEA0134M, HEA0141M, HHS0085M, QC09, QC11,	HHS0027M, HEA123M, HEA0125M, HEOP0430M, QC07, QC10, QC13	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIHS0013, OPSW 1, MW06, HST1782RM	HNPIOP0029, MW07, HEC0318M1,	05-Dec-2020	14-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC15, HEV0006M, HEC0406M, HEA0149M,	QC16, HEOP0387M, HEOPO314M, HHS0042M	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	11-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEC0448M,	HST1063RM	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) RPSW 1, RPSW 3	RPSW 2,	06-Dec-2020	14-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis				
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation		
EP231P: PFAS Sums									
HDPE (no PTFE) (EP231X-SUT) EA0978RM, QC05,	HEOP0386M, QC06	04-Dec-2020	11-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓	
HDPE (no PTFE) (EP231X-SUT) ECO754RM, HEOP0388M, HEQ0002M, HEQ0020M, HEOP0815M,	MB03, HEOP0524M, EC1775RDGM, HEQ0008, HEOP0368M	04-Dec-2020	14-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HHS0023M,	HHS0055M	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	11-Dec-2020	03-Jun-2021	✓	
HDPE (no PTFE) (EP231X-SUT) MW01a, HEC0407M, HEA0134M, HEA0141M, HHS0085M, QC09, QC11,	HHS0027M, HEA123M, HEA0125M, HEOP0430M, QC07, QC10, QC13	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIHS0013, OPSW 1, MW06, HST1782RM	HNPIOP0029, MW07, HEC0318M1,	05-Dec-2020	14-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓	
HDPE (no PTFE) (EP231X-SUT) QC15, HEV0006M, HEC0406M, HEA0149M,	QC16, HEOP0387M, HEOPO314M, HHS0042M	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	11-Dec-2020	04-Jun-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HEC0448M,	HST1063RM	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓	
HDPE (no PTFE) (EP231X-SUT) RPSW 1, RPSW 3	RPSW 2,	06-Dec-2020	14-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓	



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER** Evaluation: ✘ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	3	50	6.00	10.00	✘	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	10.53	10.53	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	3	21	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	3	50	6.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	10.53	10.53	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	21	19.05	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	3	50	6.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	38	5.26	5.26	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	21	9.52	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	50	4.00	5.00	✘	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	21	9.52	5.00	✔	NEPM 2013 B3 & ALS QC Standard



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
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with 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
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<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.



CERTIFICATE OF ANALYSIS

Work Order : EP2013567
Client : COFFEY ENVIRONMENTS PTY LTD
Contact : WESLEY ALPORT
Address : Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000
Telephone : 61 8 6218 2100
Project : 754-PEREN282113 Eastern Ridge PFAS Investigation
Order number : ----
C-O-C number : ----
Sampler : Regan MacDonald
Site : ----
Quote number : EP/991/20_V2
No. of samples received : 19
No. of samples analysed : 19

Page : 1 of 15
Laboratory : Environmental Division Perth
Contact : Lauren Biagioni
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : 08 9406 1307
Date Samples Received : 04-Dec-2020 14:50
Date Analysis Commenced : 08-Dec-2020
Issue Date : 15-Dec-2020 17:41



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This 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.

Table with 3 columns: Signatories, Position, Accreditation Category. Rows include Canhuang Ke, Chris Lemaitre, Efua Wilson, and Franco Lentini with their respective roles and accreditation categories.



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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X-SUT conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- 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.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB25-47	WB25-430	WB25-44	WB25-18	WB25-27
Sampling date / time				30-Nov-2020 15:32	30-Nov-2020 14:30	30-Nov-2020 14:45	30-Nov-2020 14:55	30-Nov-2020 15:02	
Compound	CAS Number	LOR	Unit	EP2013567-001	EP2013567-002	EP2013567-003	EP2013567-004	EP2013567-005	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	670	590	719	728	749	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	293	309	308	304	314	
Total Alkalinity as CaCO3	----	1	mg/L	293	309	308	304	314	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	124	83	111	104	110	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	145	119	193	182	191	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	69	63	71	70	75	
Magnesium	7439-95-4	1	mg/L	78	68	76	72	77	
Sodium	7440-23-5	1	mg/L	82	73	104	97	105	
Potassium	7440-09-7	1	mg/L	10	8	8	7	8	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	12.5	11.2	13.9	13.4	14.0	
∅ Total Cations	----	0.01	meq/L	13.7	12.1	14.5	13.8	14.8	
∅ Ionic Balance	----	0.01	%	4.42	3.68	2.17	1.63	3.12	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	4	5	5	6	6	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0002	0.0005	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB25-47	WB25-430	WB25-44	WB25-18	WB25-27
Sampling date / time					30-Nov-2020 15:32	30-Nov-2020 14:30	30-Nov-2020 14:45	30-Nov-2020 14:55	30-Nov-2020 15:02
Compound	CAS Number	LOR	Unit	EP2013567-001	EP2013567-002	EP2013567-003	EP2013567-004	EP2013567-005	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB25-47	WB25-430	WB25-44	WB25-18	WB25-27
Sampling date / time				30-Nov-2020 15:32	30-Nov-2020 14:30	30-Nov-2020 14:45	30-Nov-2020 14:55	30-Nov-2020 15:02	
Compound	CAS Number	LOR	Unit	EP2013567-001	EP2013567-002	EP2013567-003	EP2013567-004	EP2013567-005	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0005	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0002	0.0005	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0002	0.0005	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	79.3	85.9	89.4	82.8	97.9	
13C8-PFOA	----	0.0005	%	98.4	96.0	99.9	96.0	107	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB25-28	WB25-22	WB335	WB336	WB24-348
Sampling date / time				30-Nov-2020 15:07	30-Nov-2020 15:21	30-Nov-2020 12:52	30-Nov-2020 13:20	30-Nov-2020 13:37	
Compound	CAS Number	LOR	Unit	EP2013567-006	EP2013567-007	EP2013567-008	EP2013567-009	EP2013567-010	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	800	740	354	432	466	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	338	286	100	186	276	
Total Alkalinity as CaCO3	----	1	mg/L	338	286	100	186	276	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	126	146	42	60	63	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	205	177	123	112	95	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	76	78	15	48	60	
Magnesium	7439-95-4	1	mg/L	81	83	38	42	48	
Sodium	7440-23-5	1	mg/L	107	95	67	63	62	
Potassium	7440-09-7	1	mg/L	8	9	14	14	15	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	15.2	13.7	6.34	8.12	9.50	
∅ Total Cations	----	0.01	meq/L	15.3	15.1	7.15	8.95	10.0	
∅ Ionic Balance	----	0.01	%	0.52	4.64	5.98	4.83	2.66	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	12	5	2	4	4	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0004	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB25-28	WB25-22	WB335	WB336	WB24-348
Sampling date / time					30-Nov-2020 15:07	30-Nov-2020 15:21	30-Nov-2020 12:52	30-Nov-2020 13:20	30-Nov-2020 13:37
Compound	CAS Number	LOR	Unit		EP2013567-006	EP2013567-007	EP2013567-008	EP2013567-009	EP2013567-010
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<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	<0.001
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L		0.0004	<0.0002	<0.0002	<0.0002	<0.0002
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L		0.0004	<0.0002	<0.0002	<0.0002	<0.0002
^ Sum of PFAS	----	0.0002	µg/L		0.0004	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%		86.3	93.0	87.1	88.7	69.8
13C8-PFOA	----	0.0005	%		96.0	100	102	101	79.6



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB24-346	WB24-347	QC01	QC02	HNPIHS0048
Sampling date / time				30-Nov-2020 14:04	30-Nov-2020 13:55	30-Nov-2020 17:00	30-Nov-2020 17:10	01-Dec-2020 15:08	
Compound	CAS Number	LOR	Unit	EP2013567-011	EP2013567-012	EP2013567-013	EP2013567-014	EP2013567-015	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	502	500	----	----	675	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	227	254	----	----	412	
Total Alkalinity as CaCO3	----	1	mg/L	227	254	----	----	412	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	67	63	----	----	68	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	114	102	----	----	132	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	62	62	----	----	72	
Magnesium	7439-95-4	1	mg/L	50	49	----	----	75	
Sodium	7440-23-5	1	mg/L	63	62	----	----	97	
Potassium	7440-09-7	1	mg/L	16	15	----	----	8	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	9.15	9.26	----	----	13.4	
∅ Total Cations	----	0.01	meq/L	10.4	10.2	----	----	14.2	
∅ Ionic Balance	----	0.01	%	6.22	4.84	----	----	2.97	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	3	5	----	----	15	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	WB24-346	WB24-347	QC01	QC02	HNPIHS0048
Sampling date / time					30-Nov-2020 14:04	30-Nov-2020 13:55	30-Nov-2020 17:00	30-Nov-2020 17:10	01-Dec-2020 15:08
Compound	CAS Number	LOR	Unit	EP2013567-011	EP2013567-012	EP2013567-013	EP2013567-014	EP2013567-015	EP2013567-015
				Result	Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<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	<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	<0.0002	<0.0002
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	84.0	82.7	85.8	74.1	71.6	71.6
13C8-PFOA	----	0.0005	%	76.3	76.0	78.4	70.6	73.1	73.1



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	H10	HNPIHS0039	QC03	QC04	----
Sampling date / time				01-Dec-2020 12:20	01-Dec-2020 14:10	01-Dec-2020 17:10	01-Dec-2020 17:00	----	----
Compound	CAS Number	LOR	Unit	EP2013567-016	EP2013567-017	EP2013567-018	EP2013567-019	-----	-----
				Result	Result	Result	Result	----	----
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	810	680	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	366	416	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	366	416	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	69	67	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	169	121	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	93	81	----	----	----	----
Magnesium	7439-95-4	1	mg/L	86	78	----	----	----	----
Sodium	7440-23-5	1	mg/L	77	84	----	----	----	----
Potassium	7440-09-7	1	mg/L	7	7	----	----	----	----
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	13.5	13.1	----	----	----	----
∅ Total Cations	----	0.01	meq/L	15.2	14.3	----	----	----	----
∅ Ionic Balance	----	0.01	%	6.02	4.28	----	----	----	----
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	6	9	----	----	----	----
EP231A: Perfluoroalkyl Sulfonic Acids									
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	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	H10	HNPIHS0039	QC03	QC04	----
Sampling date / time				01-Dec-2020 12:20	01-Dec-2020 14:10	01-Dec-2020 17:10	01-Dec-2020 17:00	----	
Compound	CAS Number	LOR	Unit	EP2013567-016	EP2013567-017	EP2013567-018	EP2013567-019	-----	
				Result	Result	Result	Result	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<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	<0.0002	<0.0002	----	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	----	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	94.5	81.1	80.2	75.6	----	
13C8-PFOA	----	0.0005	%	86.2	77.1	74.8	70.8	----	



Surrogate Control Limits

Sub-Matrix: WATER		<i>Recovery Limits (%)</i>	
<i>Compound</i>	<i>CAS Number</i>	<i>Low</i>	<i>High</i>
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120



QUALITY CONTROL REPORT

Work Order : EP2013567
Client : COFFEY ENVIRONMENTS PTY LTD
Contact : WESLEY ALPORT
Address : Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000
Telephone : 61 8 6218 2100
Project : 754-PEREN282113 Eastern Ridge PFAS Investigation
Order number : ----
C-O-C number : ----
Sampler : Regan MacDonald
Site : ----
Quote number : EP/991/20_V2
No. of samples received : 19
No. of samples analysed : 19

Page : 1 of 7
Laboratory : Environmental Division Perth
Contact : Lauren Biagioni
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : 08 9406 1307
Date Samples Received : 04-Dec-2020
Date Analysis Commenced : 08-Dec-2020
Issue Date : 15-Dec-2020



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This Quality Control Report contains the following information:

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

Signatories

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

Table with 3 columns: Signatories, Position, Accreditation Category. Rows include Canhuang Ke, Chris Lemaitre, Efua Wilson, and Franco Lentini.



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 Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3407087)									
EP2013567-001	WB25-47	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	670	678	1.19	0% - 20%
EP2013567-009	WB336	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	432	424	1.99	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3415984)									
EP2013567-002	WB25-430	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	309	306	1.02	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	309	306	1.02	0% - 20%
EP2013567-012	WB24-347	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	254	253	0.437	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	254	253	0.437	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3406151)									
EP2013567-001	WB25-47	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	124	124	0.00	0% - 20%
EP2013567-011	WB24-346	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	67	67	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3406152)									
EP2013567-001	WB25-47	ED045G: Chloride	16887-00-6	1	mg/L	145	147	1.44	0% - 20%
EP2013567-011	WB24-346	ED045G: Chloride	16887-00-6	1	mg/L	114	114	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3407494)									
EP2013522-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	42	42	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	61	62	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	304	314	3.24	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	6	6	0.00	No Limit
EP2013567-006	WB25-28	ED093F: Calcium	7440-70-2	1	mg/L	76	82	7.03	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	81	86	6.03	0% - 20%

Page : 3 of 7
 Work Order : EP2013567
 Client : COFFEY ENVIRONMENTS PTY LTD
 Project : 754-PEREN282113 Eastern Ridge PFAS Investigation



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 3407494) - continued									
EP2013567-006	WB25-28	ED093F: Sodium	7440-23-5	1	mg/L	107	112	3.88	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	8	8	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3408419)									
EP2013097-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.00	No Limit
EP2013567-010	WB24-348	EP005: Total Organic Carbon	----	1	mg/L	4	4	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (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 Spike (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: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3407087)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10 <10	2000 mg/L 1000 mg/L	100 103	88.1 88.1	114 114
ED037P: Alkalinity by PC Titrator (QCLot: 3415984)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1 <1	20 mg/L 200 mg/L	104 98.8	81.2 90.0	126 110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3406151)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1 <1	25 mg/L 500 mg/L	97.3 100	87.7 87.7	113 113
ED045G: Chloride by Discrete Analyser (QCLot: 3406152)								
ED045G: Chloride	16887-00-6	1	mg/L	<1 <1	10 mg/L 1000 mg/L	97.9 97.9	87.9 87.9	114 114
ED093F: Dissolved Major Cations (QCLot: 3407494)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	106	85.9	113
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	106	88.0	110
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	100	87.3	118
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	100	89.7	108
EP005: Total Organic Carbon (TOC) (QCLot: 3408419)								
EP005: Total Organic Carbon	----	1	mg/L	<1 <1	10 mg/L 100 mg/L	114 109	87.2 87.2	116 116
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3411036)								
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	79.6	72.0	130
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	73.2	71.0	127
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	73.2	68.0	131
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	74.8	69.0	134
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	76.4	65.0	140
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	54.4	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3411996)								
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	74.0	72.0	130
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	75.2	71.0	127
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	80.0	68.0	131



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3411996) - continued									
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	81.2	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	76.4	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	99.6	53.0	142	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3411036)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	84.2	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	72.4	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	74.8	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	72.0	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	73.2	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	72.8	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	73.2	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	84.4	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	82.8	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	68.8	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	74.9	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3411996)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	73.1	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	79.6	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	78.0	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	79.6	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	74.0	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	87.6	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	75.2	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	85.2	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	88.0	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	75.6	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	103	71.0	132	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3411036)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	74.8	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	87.8	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	60.8	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	69.0	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	63.4	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	72.8	65.0	136	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3411036) - continued									
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	65.2	61.0	135	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3411996)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	77.2	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	92.3	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	92.0	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	87.8	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	86.6	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	72.0	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	97.2	61.0	135	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3411036)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	64.4	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	78.8	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	77.6	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	76.4	60.9	136	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3411996)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	89.2	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	87.6	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	82.4	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	101	60.9	136	
EP231P: PFAS Sums (QCLot: 3411036)									
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	----	----	----	----	
EP231P: PFAS Sums (QCLot: 3411996)									
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	----	----	----	----	



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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Recovery Limits (%)	
				Low	High		
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3406151)							
EP2013567-001	WB25-47	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	112	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3406152)							
EP2013567-001	WB25-47	ED045G: Chloride	16887-00-6	1000 mg/L	91.9	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3408419)							
EP2013567-001	WB25-47	EP005: Total Organic Carbon	----	100 mg/L	109	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2013567	Page	: 1 of 9
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Telephone	: 08 9406 1307
Project	: 754-PEREN282113 Eastern Ridge PFAS Investigation	Date Samples Received	: 04-Dec-2020
Site	: ----	Issue Date	: 15-Dec-2020
Sampler	: Regan MacDonald	No. of samples received	: 19
Order number	: ----	No. of samples analysed	: 19

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **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

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

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



Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method	Extraction / Preparation			Analysis			
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural							
WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346,	WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	----	----	----	08-Dec-2020	07-Dec-2020	1
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural							
WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346,	WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	----	----	----	08-Dec-2020	07-Dec-2020	1

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	0	19	0.00	5.00	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 **VOC in soils** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
		Container / Client Sample ID(s)	Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) HNPIHS0048, H10, HNPIHS0039	01-Dec-2020	----	----	----	08-Dec-2020	08-Dec-2020	✓
Clear Plastic Bottle - Natural (EA015H) WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346, WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	30-Nov-2020	----	----	----	08-Dec-2020	07-Dec-2020	*
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) HNPIHS0048, H10, HNPIHS0039	01-Dec-2020	----	----	----	11-Dec-2020	15-Dec-2020	✓
Clear Plastic Bottle - Natural (ED037-P) WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346, WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	30-Nov-2020	----	----	----	11-Dec-2020	14-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) HNPIHS0048, H10, HNPIHS0039	01-Dec-2020	----	----	----	15-Dec-2020	29-Dec-2020	✓
Clear Plastic Bottle - Natural (ED041G) WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346, WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	30-Nov-2020	----	----	----	15-Dec-2020	28-Dec-2020	✓



Matrix: WATER

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G) HNPIHS0048, H10, HNPIHS0039	01-Dec-2020	----	----	----	15-Dec-2020	29-Dec-2020	✓
Clear Plastic Bottle - Natural (ED045G) WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346, WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	30-Nov-2020	----	----	----	15-Dec-2020	28-Dec-2020	✓
ED093F: Dissolved Major Cations							
Clear Plastic Bottle - Natural (ED093F) HNPIHS0048, H10, HNPIHS0039	01-Dec-2020	----	----	----	08-Dec-2020	08-Dec-2020	✓
Clear Plastic Bottle - Natural (ED093F) WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346, WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	30-Nov-2020	----	----	----	08-Dec-2020	07-Dec-2020	*
EP005: Total Organic Carbon (TOC)							
Amber TOC Vial - Sulfuric Acid (EP005) HNPIHS0048, H10, HNPIHS0039	01-Dec-2020	----	----	----	08-Dec-2020	29-Dec-2020	✓
Amber TOC Vial - Sulfuric Acid (EP005) WB25-47, WB25-44, WB25-27, WB25-22, WB336, WB24-346, WB25-430, WB25-18, WB25-28, WB335, WB24-348, WB24-347	30-Nov-2020	----	----	----	08-Dec-2020	28-Dec-2020	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) HNPIHS0048, H10, HNPIHS0039, QC03, QC04	01-Dec-2020	10-Dec-2020	30-May-2021	✓	11-Dec-2020	30-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB25-47, WB25-430, WB25-44, WB25-18, WB25-27, WB25-28, WB25-22, WB335, WB336, WB24-348	30-Nov-2020	10-Dec-2020	29-May-2021	✓	10-Dec-2020	29-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB24-346, WB24-347, QC01, QC02	30-Nov-2020	10-Dec-2020	29-May-2021	✓	11-Dec-2020	29-May-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-SUT) HNPIHS0048, H10, HNPIHS0039, QC03, QC04	01-Dec-2020	10-Dec-2020	30-May-2021	✓	11-Dec-2020	30-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB25-47, WB25-430, WB25-44, WB25-18, WB25-27, WB25-28, WB25-22, WB335, WB336, WB24-348	30-Nov-2020	10-Dec-2020	29-May-2021	✓	10-Dec-2020	29-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB24-346, WB24-347, QC01, QC02	30-Nov-2020	10-Dec-2020	29-May-2021	✓	11-Dec-2020	29-May-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-SUT) HNPIHS0048, H10, HNPIHS0039, QC03, QC04	01-Dec-2020	10-Dec-2020	30-May-2021	✓	11-Dec-2020	30-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB25-47, WB25-430, WB25-44, WB25-18, WB25-27, WB25-28, WB25-22, WB335, WB336, WB24-348	30-Nov-2020	10-Dec-2020	29-May-2021	✓	10-Dec-2020	29-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB24-346, WB24-347, QC01, QC02	30-Nov-2020	10-Dec-2020	29-May-2021	✓	11-Dec-2020	29-May-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) HNPIHS0048, H10, HNPIHS0039, QC03, QC04	01-Dec-2020	10-Dec-2020	30-May-2021	✓	11-Dec-2020	30-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB25-47, WB25-430, WB25-44, WB25-18, WB25-27, WB25-28, WB25-22, WB335, WB336, WB24-348	30-Nov-2020	10-Dec-2020	29-May-2021	✓	10-Dec-2020	29-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB24-346, WB24-347, QC01, QC02	30-Nov-2020	10-Dec-2020	29-May-2021	✓	11-Dec-2020	29-May-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-SUT) HNPIHS0048, H10, HNPIHS0039, QC03, QC04	01-Dec-2020	10-Dec-2020	30-May-2021	✓	11-Dec-2020	30-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB25-47, WB25-430, WB25-44, WB25-18, WB25-27, WB25-28, WB25-22, WB335, WB336, WB24-348	30-Nov-2020	10-Dec-2020	29-May-2021	✓	10-Dec-2020	29-May-2021	✓
HDPE (no PTFE) (EP231X-SUT) WB24-346, WB24-347, QC01, QC02	30-Nov-2020	10-Dec-2020	29-May-2021	✓	11-Dec-2020	29-May-2021	✓



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER** Evaluation: ✘ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	19	0.00	10.00	✘	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	15	13.33	10.53	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	19	10.53	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	15	13.33	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	15	13.33	10.53	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	19	10.53	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	15	6.67	5.26	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	19	0.00	5.00	✘	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	15	6.67	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard



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
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with 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.

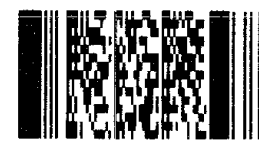
Preparation Methods	Method	Matrix	Method Descriptions
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<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Solid Phase Extraction (SPE) for PFAS in water	ORG72	WATER	In-house: Isotopically labelled analogues of target analytes 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.


TETRA TECH COMPANY		Consigning Office:					
		Report Results to: <u>Wesley Alport</u>	Mobile: <u>0413414371</u> Email: <u>wesley.alport@coffey.com</u>				
Project No: <u>754-EP/EN/28213</u>		Invoices to: <u>accounts@coffey.com</u>					
Project Name: <u>BHP Eastern Ridge</u>		Phone: <u>0481860634</u> Email: <u>Steven.Middleton@coffey.com</u>					
Sampler's Name: <u>Steven + Ramin</u>		Project Manager: <u>Wesley Alport</u>					
Special Instructions: <u>Quote: EP/99/20_v2</u>							
<u>If bottles are present please run "Additional Water Quality"</u>							
NOTES							
Lab No.	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	A-T (specify)	
	HEC0448M	5/12/20	17:00	water	vac	Stol.	X
1	<u>HW01a</u>	<u>5/12</u>	<u>12:00</u>				<u>X</u>
SNR	<u>H10</u>	<u>"</u>	<u>12:10</u>				<u>X</u>
SNR	<u>HNPTHS0039</u>	<u>"</u>	<u>14:10</u>				<u>X</u>
2	<u>HHS0027M</u>	<u>5/12/20</u>	<u>9:35</u>				<u>X</u>
-	HNPTHS0040						X
3	<u>HEC0448M</u>	<u>6/12/20</u>	<u>7:45</u>				<u>X</u>
4	<u>HST1063RM</u>	<u>6/12/20</u>	<u>7:25</u>				<u>X</u>
5	<u>EA0478RM</u>	<u>4/12</u>	<u>12:01</u>				<u>X</u>
6	<u>HEOP0386M</u>	<u>4/12</u>	<u>15:57</u>				<u>X</u>
7	<u>HEC0407M</u>	<u>5/12</u>	<u>11:25</u>				<u>X</u>
8	<u>HEA123M</u>	<u>5/12</u>	<u>12:36</u>				<u>X</u>
9	<u>HEA0134M</u>	<u>"</u>	<u>12:50</u>				<u>X</u>
10	<u>HEA0125M</u>	<u>"</u>	<u>13:06</u>				<u>X</u>
11	<u>HEA0141M</u>	<u>"</u>	<u>13:25</u>				<u>X</u>
12	<u>HEOP0430M</u>	<u>"</u>	<u>14:24</u>				<u>X</u>
13	<u>HHS0085M</u>	<u>"</u>	<u>15:21</u>				<u>X</u>
RELINQUISHED BY				RECEIVED BY			
Name: <u>Steven Middleton</u>		Date: <u>07/12/20</u>		Name: <u>Ramin</u>		Date: <u>7/12/20</u>	
Coffey Environments		Time:		Company:		Time: <u>1625</u>	
Name:		Date:		Name:		Date:	
Company:		Time:		Company:		Time:	
*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative				Sample Receipt Advice: (Lab Use Only) <ul style="list-style-type: none"> All Samples Received in Good Condition <input type="checkbox"/> All Documentation is in Proper Order <input type="checkbox"/> Samples Received Properly Chilled <input type="checkbox"/> Lab. Ref/Batch No. 			

Environmental Division
Perth
Work Order Reference
EP2013633




Telephone: +61-8-9406 1301

Middleton

		Consigning Office:		Report Results to: Wesley Alport		Mobile: 043414371		Email: Wesley Alport		@coffey.com	
		Invoices to: accounts@coffey.com		Phone: 0481860634		Email: Wesley Alport		@coffey.com			
Project No: 754-PEREN282113		Task No:		Analysis Request Section							
Project Name: BHP Eastern Ridge		Laboratory: ALS		<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;">NOTES</div>							
Sampler's Name: Shawn + Rangan		Project Manager: Wesley Alport									
Special Instructions:											
Lab No.	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	See Quote				
14	QC05	4/12		water	vial	std.	X				
15	QC06	4/12					X				
16	QC07	5/12	8:19				X				
17	QC08 QC09						X				
18	QC10						X				
19	QC11		9:35				X				
20	QC13		13:50				X				
21	QC15	6/12					X				
22	QC16						X				
23	SWR HHS0082M	5/12	15:37				X				
24	23 HHS0023M		16:28				X				
25	24 HHS0055M		16:52				X				
26	25 HEV0006M	6/12	9:40				X				
27	26 HEOP0387M		9:56				X				
28	27 HEC0406M		10:15				X				
29	28 HEOP0314M		11:34				X				
30	HEAO149M		14:36				X				
	HHS0042M		9:25				X				
RELINQUISHED BY				RECEIVED BY				Sample Receipt Advice: (Lab Use Only)			
Name:		Date: 07/12/20		Name:		Date: 07/12/20		All Samples Received in Good Condition <input type="checkbox"/>			
Coffey Environments		Time:		Company: Rangan		Time: 16:25		All Documentation is in Proper Order <input type="checkbox"/>			
Name:		Date:		Name:		Date:		Samples Received Properly Chilled <input type="checkbox"/>			
Company:		Time:		Company:		Time:		Lab. Ref/Batch No. <div style="border: 1px solid black; width: 100px; height: 20px; display: inline-block;"></div>			
<p>*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative</p>											

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

 <p><small>TETRA TECH COMPANY</small></p>		Consigning Office: _____ Report Results to: <u>Wesley Alport</u> Mobile: <u>043414371</u> Email: <u>Wesley.Alport@coffey.com</u> Invoices to: <u>accounts@coffey.com</u> Phone: <u>0481860634</u> Email: _____ @coffey.com						
		Project No: <u>754-PEREN/282113</u> Task No: _____ Project Name: <u>BHP Eastern Ridge</u> Laboratory: <u>ALS</u> Sampler's Name: <u>Steven + Reagon</u> Project Manager: <u>Wesley Alport</u> Special Instructions: _____						
Analysis Request Section							NOTES	
Lab No.	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)		See Quote
31	HNPIH50013	5/12	8:19	water	var	ST		X
32	HNPIOP0029	—	13:30	—	—	—		X
33	OPSW1	—	13:50	—	—	—		X
34	RPSW1	6/12	10:44	—	—	—		X
35	RPSW2	—	10:55	—	—	—		X
36	RPSW3	—	11:10	—	—	—		X
37	EC0754RM	4/12	14:06	—	—	—		X
38	Mb03	—	15:20	—	—	—		X
39	HEOP0388M	—	16:12	—	—	—	X	
40	HEOP0524M	—	16:26	—	—	—	X	
41	HEQ0002M	—	16:40	—	—	—	X	
42	EC1775RDM	—	13:30	—	—	—	X	
43	HEQ0020M	—	14:535	—	—	—	X	
44	HEQ0008	—	14:52	—	—	—	X	
45	HEOP0815M	—	14:21	—	—	—	X	
46	HEOP0368M	—	15:05	—	—	—	X	
47	MW07	5/12	11:37	—	—	—	X	
48	MW06	—	11:47	—	—	—	X	
RELINQUISHED BY				RECEIVED BY				Sample Receipt Advice: (Lab Use Only) All Samples Received in Good Condition <input type="checkbox"/> All Documentation is in Proper Order <input type="checkbox"/> Samples Received Properly Chilled <input type="checkbox"/> Lab. Ref/Batch No.
Name:	Date:	7/12/20	→	Name:	Date:	7/12/20		
Coffey Environments	Time:			Company:	Time:	1625		
Name:	Date:		→	Name:	Date:			
Company:	Time:			Company:	Time:			

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

49 - HEC0318M
50 - HST1782RM



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.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X: PFAS results for sample #5, #7, #8, #20 confirmed by re-extraction and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- 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.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW01a	HHS0027M	HEC0448M	HST1063RM	EA0978RM
Sampling date / time				05-Dec-2020 12:00	05-Dec-2020 09:35	06-Dec-2020 07:45	06-Dec-2020 07:25	04-Dec-2020 12:01	
Compound	CAS Number	LOR	Unit	EP2013633-001	EP2013633-002	EP2013633-003	EP2013633-004	EP2013633-005	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	640	----	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	328	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	328	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	80	----	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	119	----	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	71	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	67	----	----	----	----	
Sodium	7440-23-5	1	mg/L	76	----	----	----	----	
Potassium	7440-09-7	1	mg/L	10	----	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	11.6	----	----	----	----	
∅ Total Cations	----	0.01	meq/L	12.6	----	----	----	----	
∅ Ionic Balance	----	0.01	%	4.31	----	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	8	----	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0008	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	0.0075	0.0025	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	0.0011	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0006	<0.0002	0.0231	0.0213	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	MW01a	HHS0027M	HEC0448M	HST1063RM	EA0978RM
Sampling date / time					05-Dec-2020 12:00	05-Dec-2020 09:35	06-Dec-2020 07:45	06-Dec-2020 07:25	04-Dec-2020 12:01
Compound	CAS Number	LOR	Unit	EP2013633-001	EP2013633-002	EP2013633-003	EP2013633-004	EP2013633-005	EP2013633-005
				Result	Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	0.011	<0.001	0.006	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.002	<0.001	0.005	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<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	0.0006	<0.0002	0.0306	0.0238	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0006	<0.0002	0.102	0.0333	0.0110	
^ Sum of PFAS	----	0.0002	µg/L	0.0006	<0.0002	0.105	0.0333	0.0110	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	76.8	78.4	73.0	84.9	72.1	
13C8-PFOA	----	0.0005	%	76.4	75.8	69.2	81.4	70.7	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0386M	HEC0407M	HEA123M	HEA0134M	HEA0125M
Sampling date / time				04-Dec-2020 15:57	05-Dec-2020 11:25	05-Dec-2020 12:36	05-Dec-2020 12:50	05-Dec-2020 13:06	
Compound	CAS Number	LOR	Unit	EP2013633-006	EP2013633-007	EP2013633-008	EP2013633-009	EP2013633-010	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	574	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	420	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	420	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	<1	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	115	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	67	----	----	----	
Magnesium	7439-95-4	1	mg/L	----	67	----	----	----	
Sodium	7440-23-5	1	mg/L	----	74	----	----	----	
Potassium	7440-09-7	1	mg/L	----	9	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	11.6	----	----	----	
∅ Total Cations	----	0.01	meq/L	----	12.3	----	----	----	
∅ Ionic Balance	----	0.01	%	----	2.80	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	25	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0014	0.0006	0.0013	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0386M	HEC0407M	HEA123M	HEA0134M	HEA0125M
Sampling date / time				04-Dec-2020 15:57	05-Dec-2020 11:25	05-Dec-2020 12:36	05-Dec-2020 12:50	05-Dec-2020 13:06	
Compound	CAS Number	LOR	Unit	EP2013633-006	EP2013633-007	EP2013633-008	EP2013633-009	EP2013633-010	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	0.278	<0.0020	0.0041	0.120	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0021	0.0381	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0016	0.0077	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0008	0.0063	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.0054	<0.0005	0.0028	0.0060	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0007	0.0028	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0013	0.0021	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0386M	HEC0407M	HEA123M	HEA0134M	HEA0125M
Sampling date / time				04-Dec-2020 15:57	05-Dec-2020 11:25	05-Dec-2020 12:36	05-Dec-2020 12:50	05-Dec-2020 13:06	
Compound	CAS Number	LOR	Unit	EP2013633-006	EP2013633-007	EP2013633-008	EP2013633-009	EP2013633-010	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.002	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	0.002	<0.001	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	0.003	0.002	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0014	0.0006	0.0018	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	0.285	0.0014	0.0140	0.181	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	0.285	0.0014	0.0190	0.188	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	64.2	92.2	93.5	78.3	78.6	
13C8-PFOA	----	0.0005	%	68.7	82.3	94.1	74.7	76.6	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0141M	HEOP0430M	HHS0085M	QC05	QC06
Sampling date / time				05-Dec-2020 13:25	05-Dec-2020 14:24	05-Dec-2020 15:21	04-Dec-2020 00:00	04-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-011	EP2013633-012	EP2013633-013	EP2013633-014	EP2013633-015	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.0009	0.0007	<0.0005	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0006	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0015	0.0009	0.0002	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	0.0021	<0.0020	<0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0013	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0141M	HEOP0430M	HHS0085M	QC05	QC06
Sampling date / time					05-Dec-2020 13:25	05-Dec-2020 14:24	05-Dec-2020 15:21	04-Dec-2020 00:00	04-Dec-2020 00:00
Compound	CAS Number	LOR	Unit	EP2013633-011	EP2013633-012	EP2013633-013	EP2013633-014	EP2013633-015	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0021	0.0009	0.0002	<0.0002	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0039	0.0018	0.0030	<0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	0.0044	0.0018	0.0030	<0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	76.8	87.7	77.7	76.6	80.9	
13C8-PFOA	----	0.0005	%	71.9	82.5	75.5	77.6	82.4	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC07	QC09	QC10	QC11	QC13
Sampling date / time				05-Dec-2020 08:19	05-Dec-2020 00:00	05-Dec-2020 00:00	05-Dec-2020 09:35	05-Dec-2020 13:50	
Compound	CAS Number	LOR	Unit	EP2013633-016	EP2013633-017	EP2013633-018	EP2013633-019	EP2013633-020	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	783	----	----	----	638	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	93	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	470	----	----	----	38	
Total Alkalinity as CaCO3	----	1	mg/L	470	----	----	----	131	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	84	----	----	----	100	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	138	----	----	----	261	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	85	----	----	----	12	
Magnesium	7439-95-4	1	mg/L	85	----	----	----	65	
Sodium	7440-23-5	1	mg/L	86	----	----	----	131	
Potassium	7440-09-7	1	mg/L	10	----	----	----	19	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	15.0	----	----	----	12.1	
∅ Total Cations	----	0.01	meq/L	15.2	----	----	----	12.1	
∅ Ionic Balance	----	0.01	%	0.67	----	----	----	0.29	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	6	----	----	----	8	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0020	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC07	QC09	QC10	QC11	QC13
Sampling date / time					05-Dec-2020 08:19	05-Dec-2020 00:00	05-Dec-2020 00:00	05-Dec-2020 09:35	05-Dec-2020 13:50
Compound	CAS Number	LOR	Unit	EP2013633-016	EP2013633-017	EP2013633-018	EP2013633-019	EP2013633-020	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0020	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0020	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0020	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	75.7	75.6	84.0	75.3	81.9	
13C8-PFOA	----	0.0005	%	78.3	78.4	86.8	76.8	74.5	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC15	QC16	HHS0023M	HHS0055M	HEV0006M
Sampling date / time				06-Dec-2020 00:00	06-Dec-2020 15:37	05-Dec-2020 16:28	05-Dec-2020 16:52	06-Dec-2020 09:40	
Compound	CAS Number	LOR	Unit	EP2013633-021	EP2013633-022	EP2013633-023	EP2013633-024	EP2013633-025	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	----	885	758	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	<1	<1	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	<1	<1	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	398	402	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	----	398	402	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	156	69	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	----	170	148	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	----	87	89	----	
Magnesium	7439-95-4	1	mg/L	----	----	94	80	----	
Sodium	7440-23-5	1	mg/L	----	----	104	76	----	
Potassium	7440-09-7	1	mg/L	----	----	10	8	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	----	16.0	13.6	----	
∅ Total Cations	----	0.01	meq/L	----	----	16.8	14.5	----	
∅ Ionic Balance	----	0.01	%	----	----	2.62	3.17	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	----	7	8	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<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	0.0006	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC15	QC16	HHS0023M	HHS0055M	HEV0006M
Sampling date / time				06-Dec-2020 00:00	06-Dec-2020 15:37	05-Dec-2020 16:28	05-Dec-2020 16:52	06-Dec-2020 09:40	
Compound	CAS Number	LOR	Unit	EP2013633-021	EP2013633-022	EP2013633-023	EP2013633-024	EP2013633-025	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0006	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0022	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0022	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	77.7	85.9	80.3	81.9	77.3	
13C8-PFOA	----	0.0005	%	87.3	90.5	86.4	89.6	88.1	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0387M	HEC0406M	HEOPO314M	HEA0149M	HHS0042M
Sampling date / time				06-Dec-2020 09:56	06-Dec-2020 10:15	06-Dec-2020 11:34	06-Dec-2020 14:36	06-Dec-2020 09:25	
Compound	CAS Number	LOR	Unit	EP2013633-026	EP2013633-027	EP2013633-028	EP2013633-029	EP2013633-030	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	742	830	694	----	280	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	279	311	68	----	170	
Total Alkalinity as CaCO3	----	1	mg/L	279	311	68	----	170	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	120	105	<1	----	12	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	172	195	280	----	42	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	38	88	30	----	39	
Magnesium	7439-95-4	1	mg/L	44	68	57	----	23	
Sodium	7440-23-5	1	mg/L	165	106	67	----	31	
Potassium	7440-09-7	1	mg/L	7	7	4	----	4	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	12.9	13.9	9.26	----	4.83	
∅ Total Cations	----	0.01	meq/L	12.9	14.8	9.20	----	5.29	
∅ Ionic Balance	----	0.01	%	0.20	3.06	0.28	----	4.53	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	6	6	1	6	6	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0006	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0009	0.0010	0.0003	0.0005	0.0008	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0387M	HEC0406M	HEOPO314M	HEA0149M	HHS0042M
Sampling date / time				06-Dec-2020 09:56	06-Dec-2020 10:15	06-Dec-2020 11:34	06-Dec-2020 14:36	06-Dec-2020 09:25	
Compound	CAS Number	LOR	Unit	EP2013633-026	EP2013633-027	EP2013633-028	EP2013633-029	EP2013633-030	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0387M	HEC0406M	HEOPO314M	HEA0149M	HHS0042M
Sampling date / time				06-Dec-2020 09:56	06-Dec-2020 10:15	06-Dec-2020 11:34	06-Dec-2020 14:36	06-Dec-2020 09:25	
Compound	CAS Number	LOR	Unit	EP2013633-026	EP2013633-027	EP2013633-028	EP2013633-029	EP2013633-030	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0015	0.0010	0.0003	0.0005	0.0008	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0015	0.0010	0.0003	0.0005	0.0008	
^ Sum of PFAS	----	0.0002	µg/L	0.0015	0.0010	0.0003	0.0005	0.0008	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	77.7	83.7	78.7	77.7	76.2	
13C8-PFOA	----	0.0005	%	86.7	91.8	93.1	88.6	89.1	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIHS0013	HNPIOP0029	OPSW 1	RPSW 1	RPSW 2
Sampling date / time				05-Dec-2020 08:19	05-Dec-2020 13:30	05-Dec-2020 13:50	06-Dec-2020 10:44	06-Dec-2020 10:55	
Compound	CAS Number	LOR	Unit	EP2013633-031	EP2013633-032	EP2013633-033	EP2013633-034	EP2013633-035	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	760	1150	670	1320	1320	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	88	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	472	319	42	248	254	
Total Alkalinity as CaCO3	----	1	mg/L	472	319	130	248	254	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	85	199	103	268	267	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	139	364	265	453	448	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	87	93	12	94	96	
Magnesium	7439-95-4	1	mg/L	85	100	64	107	107	
Sodium	7440-23-5	1	mg/L	84	184	131	214	212	
Potassium	7440-09-7	1	mg/L	9	12	19	14	14	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	15.1	20.8	12.2	23.3	23.3	
∅ Total Cations	----	0.01	meq/L	15.2	21.2	12.0	23.2	23.2	
∅ Ionic Balance	----	0.01	%	0.33	0.94	0.69	0.32	0.20	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	5	4	7	5	4	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.0004	0.0022	0.0009	0.0006	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIHS0013	HNPIOP0029	OPSW 1	RPSW 1	RPSW 2
Sampling date / time				05-Dec-2020 08:19	05-Dec-2020 13:30	05-Dec-2020 13:50	06-Dec-2020 10:44	06-Dec-2020 10:55	
Compound	CAS Number	LOR	Unit	EP2013633-031	EP2013633-032	EP2013633-033	EP2013633-034	EP2013633-035	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIHS0013	HNPIOP0029	OPSW 1	RPSW 1	RPSW 2
Sampling date / time				05-Dec-2020 08:19	05-Dec-2020 13:30	05-Dec-2020 13:50	06-Dec-2020 10:44	06-Dec-2020 10:55	
Compound	CAS Number	LOR	Unit	EP2013633-031	EP2013633-032	EP2013633-033	EP2013633-034	EP2013633-035	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	0.0004	0.0022	0.0009	0.0006	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	0.0004	0.0022	0.0009	0.0006	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	0.0004	0.0022	0.0009	0.0006	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	78.0	88.4	83.1	75.8	76.1	
13C8-PFOA	----	0.0005	%	86.3	86.9	84.2	85.6	83.8	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RPSW 3	ECO754RM	MB03	HEOP0388M	HEOP0524M
Sampling date / time				06-Dec-2020 11:10	04-Dec-2020 14:06	04-Dec-2020 15:20	04-Dec-2020 16:12	04-Dec-2020 16:26	
Compound	CAS Number	LOR	Unit	EP2013633-036	EP2013633-037	EP2013633-038	EP2013633-039	EP2013633-040	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	1330	----	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	253	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	253	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	265	----	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	449	----	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	94	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	106	----	----	----	----	
Sodium	7440-23-5	1	mg/L	211	----	----	----	----	
Potassium	7440-09-7	1	mg/L	14	----	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	23.2	----	----	----	----	
∅ Total Cations	----	0.01	meq/L	23.0	----	----	----	----	
∅ Ionic Balance	----	0.01	%	0.62	----	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	5	----	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.0009	<0.0005	0.0015	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0007	0.0033	<0.0002	0.0015	0.0010	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RPSW 3	ECO754RM	MB03	HEOP0388M	HEOP0524M
Sampling date / time				06-Dec-2020 11:10	04-Dec-2020 14:06	04-Dec-2020 15:20	04-Dec-2020 16:12	04-Dec-2020 16:26	
Compound	CAS Number	LOR	Unit	EP2013633-036	EP2013633-037	EP2013633-038	EP2013633-039	EP2013633-040	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0007	0.0042	<0.0002	0.0030	0.0010	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0007	0.123	0.0046	0.0030	0.0095	
^ Sum of PFAS	----	0.0002	µg/L	0.0007	0.130	0.0046	0.0030	0.0095	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	90.1	72.2	86.1	69.5	82.7	
13C8-PFOA	----	0.0005	%	94.3	84.5	87.8	76.8	87.5	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEQ0002M	EC1775RDGM	HEQ0020M	HEQ0008	HEOP0815M
Sampling date / time				04-Dec-2020 16:40	04-Dec-2020 13:30	04-Dec-2020 14:35	04-Dec-2020 00:00	04-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-041	EP2013633-042	EP2013633-043	EP2013633-044	EP2013633-045	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	0.0069	<0.0005	0.0006	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	0.0007	0.0005	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0016	<0.0002	0.0015	0.0004	0.0009	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	0.0030	<0.0020	<0.0020	0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0007	0.0014	0.0015	<0.0005	0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.0037	<0.0005	0.0007	<0.0005	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0007	<0.0005	0.0007	<0.0005	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0026	<0.0005	0.0044	<0.0005	0.0016	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	0.0007	<0.0005	<0.0005	<0.0005	0.0006	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	0.0009	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEQ0002M	EC1775RDGM	HEQ0020M	HEQ0008	HEOP0815M
Sampling date / time				04-Dec-2020 16:40	04-Dec-2020 13:30	04-Dec-2020 14:35	04-Dec-2020 00:00	04-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-041	EP2013633-042	EP2013633-043	EP2013633-044	EP2013633-045	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	0.002	<0.001	<0.001	0.004	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0016	<0.0002	0.0022	0.0009	0.0009	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0093	0.0064	0.0164	0.0009	0.0096	
^ Sum of PFAS	----	0.0002	µg/L	0.0109	0.0064	0.0164	0.0009	0.0102	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	86.5	80.9	89.5	96.1	84.1	
13C8-PFOA	----	0.0005	%	87.4	88.4	87.6	90.9	83.8	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0368M	MW07	MW06	HEC0318M1	HST1782RM
Sampling date / time				04-Dec-2020 00:00	05-Dec-2020 11:37	05-Dec-2020 11:47	05-Dec-2020 00:00	05-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-046	EP2013633-047	EP2013633-048	EP2013633-049	EP2013633-050	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	660	773	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	<1	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	<1	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	361	272	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	361	272	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	73	159	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	136	139	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	81	67	----	----	
Magnesium	7439-95-4	1	mg/L	----	76	51	----	----	
Sodium	7440-23-5	1	mg/L	----	74	128	----	----	
Potassium	7440-09-7	1	mg/L	----	9	17	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	12.6	12.7	----	----	
∅ Total Cations	----	0.01	meq/L	----	13.7	13.5	----	----	
∅ Ionic Balance	----	0.01	%	----	4.47	3.35	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	7	5	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.0021	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.0065	0.0004	0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0368M	MW07	MW06	HEC0318M1	HST1782RM
Sampling date / time				04-Dec-2020 00:00	05-Dec-2020 11:37	05-Dec-2020 11:47	05-Dec-2020 00:00	05-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-046	EP2013633-047	EP2013633-048	EP2013633-049	EP2013633-050	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonylamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0368M	MW07	MW06	HEC0318M1	HST1782RM
Sampling date / time				04-Dec-2020 00:00	05-Dec-2020 11:37	05-Dec-2020 11:47	05-Dec-2020 00:00	05-Dec-2020 00:00	
Compound	CAS Number	LOR	Unit	EP2013633-046	EP2013633-047	EP2013633-048	EP2013633-049	EP2013633-050	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	0.036	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	0.0086	0.0004	0.0002	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	0.0446	0.0004	0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	0.0446	0.0004	0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	86.6	81.4	91.1	87.8	85.8	
13C8-PFOA	----	0.0005	%	84.2	96.3	89.2	89.1	84.6	



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120



QUALITY CONTROL REPORT

Work Order : EP2013633
Client : COFFEY ENVIRONMENTS PTY LTD
Contact : WESLEY ALPORT
Address : Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000
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Project : 754-PEREN282113 BHP Eastern Ridge
Order number : ----
C-O-C number : ----
Sampler : Regan MacDonald, Steven Middleton
Site : ----
Quote number : EP/991/20_V2
No. of samples received : 50
No. of samples analysed : 50

Page : 1 of 14
Laboratory : Environmental Division Perth
Contact : Lauren Biagioni
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : 08 9406 1307
Date Samples Received : 07-Dec-2020
Date Analysis Commenced : 09-Dec-2020
Issue Date : 16-Dec-2020



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This Quality Control Report contains the following information:

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

Signatories

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

Table with 3 columns: Signatories, Position, Accreditation Category. Rows include Chris Lemaitre (Laboratory Manager), Efua Wilson (Metals Chemist), and Franco Lentini (LCMS Coordinator).



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 Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3414877)									
EP2013633-001	MW01a	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	640	636	0.470	0% - 20%
EP2013825-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	31400	29600	6.03	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3414885)									
EP2013633-028	HEOPO314M	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	694	678	2.26	0% - 20%
EP2013633-047	MW07	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	660	662	0.227	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3419192)									
EP2013592-032	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1940	1910	1.65	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1940	1910	1.65	0% - 20%
EP2013592-042	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3419193)									
EP2013633-030	HHS0042M	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	170	170	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	170	170	0.00	0% - 20%
EP2013660-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	366	333	9.33	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	366	333	9.33	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3411439)									



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3411439) - continued									
EP2013633-007	HEC0407M	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.00	No Limit
EP2013633-030	HHS0042M	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	12	12	0.00	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 3411440)									
EP2013633-007	HEC0407M	ED045G: Chloride	16887-00-6	1	mg/L	115	119	3.00	0% - 20%
EP2013633-030	HHS0042M	ED045G: Chloride	16887-00-6	1	mg/L	42	42	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3410110)									
EP2013633-001	MW01a	ED093F: Calcium	7440-70-2	1	mg/L	71	70	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	67	67	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	76	76	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	10	10	0.00	No Limit
EP2013633-031	HNPIHS0013	ED093F: Calcium	7440-70-2	1	mg/L	87	86	1.21	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	85	83	1.82	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	84	83	1.70	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	9	9	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3411467)									
EP2013633-001	MW01a	EP005: Total Organic Carbon	----	1	mg/L	8	5	34.6	No Limit
EP2013633-030	HHS0042M	EP005: Total Organic Carbon	----	1	mg/L	6	7	25.7	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3416269)									
EP2013633-016	QC07	EP005: Total Organic Carbon	----	1	mg/L	6	4	37.4	No Limit
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3412952)									
EP2013633-008	HEA123M	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0014	0.0014	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
EP2013633-010	HEA0125M	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0013	0.0012	0.00	No Limit
		EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0007	0.0006	17.7	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



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3412952) - continued									
EP2013633-010	HEA0125M	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
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3414547)									
EP2013633-050	HST1782RM	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: Perfluoroalkyl Carboxylic Acids (QC Lot: 3412952)									
EP2013633-008	HEA123M	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	<0.0005	<0.0005	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
EP2013633-010	HEA0125M	EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0381	0.0319	17.7	0% - 20%
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0063	0.0054	13.9	0% - 50%
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.0077	0.0064	18.5	0% - 50%
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0060	0.0052	13.7	0% - 50%
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	0.0028	0.0021	25.6	No Limit
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	0.0021	0.0018	15.4	No Limit
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3412952) - continued									
EP2013633-010	HEA0125M	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	0.120	0.103	15.6	0% - 20%
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3414547)									
EP2013633-050	HST1782RM	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	<0.0005	<0.0005	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: Perfluoroalkyl Sulfonamides (QC Lot: 3412952)									
EP2013633-008	HEA123M	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
		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
EP2013633-010	HEA0125M	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



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3412952) - continued									
EP2013633-010	HEA0125M	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
		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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3414547)									
EP2013633-050	HST1782RM	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
		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) Fluorotelomer Sulfonic Acids (QC Lot: 3412952)									
EP2013633-008	HEA123M	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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
EP2013633-010	HEA0125M	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3412952) - continued									
EP2013633-010	HEA0125M	EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	0.002	0.002	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3414547)									
EP2013633-050	HST1782RM	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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 Sums (QC Lot: 3412952)									
EP2013633-008	HEA123M	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0014	0.0014	0.00	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0014	0.0014	0.00	No Limit
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.0014	0.0014	0.00	No Limit
EP2013633-010	HEA0125M	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0018	0.0012	40.0	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.181	0.154	16.1	0% - 20%
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.188	0.160	16.1	0% - 20%
EP231P: PFAS Sums (QC Lot: 3414547)									
EP2013633-050	HST1782RM	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	<0.0002	<0.0002	0.00	No Limit
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (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 Spike (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: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3414877)									
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	88.1	114	
				<10	1000 mg/L	99.8	88.1	114	
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3414885)									
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	88.1	114	
				<10	1000 mg/L	104	88.1	114	
ED037P: Alkalinity by PC Titrator (QCLot: 3419192)									
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----	
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----	
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	108	81.2	126	
				<1	200 mg/L	98.7	90.0	110	
ED037P: Alkalinity by PC Titrator (QCLot: 3419193)									
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----	
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----	
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	114	81.2	126	
				<1	200 mg/L	96.6	90.0	110	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3411439)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	87.7	113	
				<1	500 mg/L	104	87.7	113	
ED045G: Chloride by Discrete Analyser (QCLot: 3411440)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	87.9	114	
				<1	1000 mg/L	103	87.9	114	
ED093F: Dissolved Major Cations (QCLot: 3410110)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	102	85.9	113	
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	101	88.0	110	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	103	87.3	118	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	89.7	108	
EP005: Total Organic Carbon (TOC) (QCLot: 3411467)									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	112	87.2	116	
				<1	100 mg/L	108	87.2	116	
EP005: Total Organic Carbon (TOC) (QCLot: 3416269)									



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
EP005: Total Organic Carbon (TOC) (QCLot: 3416269) - continued									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	112	87.2	116	
				<1	100 mg/L	106	87.2	116	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3412952)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	82.8	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	88.0	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	94.0	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	90.8	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	89.6	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	88.8	53.0	142	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3413610)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	77.2	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	76.0	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	69.6	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	70.0	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	74.8	53.0	142	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3414547)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	74.0	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	76.0	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	73.2	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	75.6	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	68.4	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	58.8	53.0	142	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3412952)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	96.8	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	96.8	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	97.2	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	93.6	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	97.6	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	100	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	101	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	112	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	117	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	83.6	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	98.6	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3413610)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	81.4	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	115	72.0	129	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3413610) - continued									
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	76.8	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	78.0	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	74.8	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	74.4	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	78.8	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	73.6	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	75.2	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	65.2	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	82.6	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3414547)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	94.1	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	78.0	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	84.4	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	74.8	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	73.6	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	70.4	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	74.8	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	78.8	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	73.2	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	70.0	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	81.6	71.0	132	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3412952)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	99.6	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	103	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	90.7	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	95.5	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	87.7	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	96.4	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	93.6	61.0	135	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3413610)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	71.6	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	72.5	68.0	141	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
					LCS	Low	High		
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3413610) - continued									
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	64.2	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	66.7	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	65.3	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	76.8	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	74.4	61.0	135	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3414547)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	79.2	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	90.1	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	72.8	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	112	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	103	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	91.2	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	118	61.0	135	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3412952)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	91.2	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	132	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	96.4	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	77.2	60.9	136	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3413610)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	70.4	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	91.6	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	72.8	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	65.6	60.9	136	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3414547)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	69.2	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	87.2	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	95.2	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	61.6	60.9	136	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike	Spike Recovery (%)	Recovery Limits (%)	
					Concentration	LCS	Low	High
EP231P: PFAS Sums (QCLot: 3412952)								
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	----	----	----	----
EP231P: PFAS Sums (QCLot: 3413610)								
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	----	----	----	----
EP231P: PFAS Sums (QCLot: 3414547)								
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

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike	Spike Recovery (%)	Recovery Limits (%)	
				Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3411439)							
EP2013633-001	MW01a	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	114	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3411440)							
EP2013633-001	MW01a	ED045G: Chloride	16887-00-6	1000 mg/L	98.8	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3411467)							
EP2013633-007	HEC0407M	EP005: Total Organic Carbon	----	100 mg/L	108	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3416269)							
EP2013633-023	HHS0023M	EP005: Total Organic Carbon	----	100 mg/L	107	70.0	130
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3412952)							
EP2013633-009	HEA0134M	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	92.0	72.0	130
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	94.0	71.0	127
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	121	68.0	131
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	119	69.0	134
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	84.0	65.0	140
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	70.0	53.0	142



Sub-Matrix: WATER

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report					
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)			
						Low	High		
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3414547)									
EP2013633-032	HNPIOP0029	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	76.8	72.0	130		
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	91.2	71.0	127		
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	80.4	68.0	131		
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	83.6	69.0	134		
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	88.0	65.0	140		
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	70.8	53.0	142		
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3412952)									
EP2013633-009	HEA0134M	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	97.8	73.0	129		
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	93.6	72.0	129		
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	93.2	72.0	129		
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	88.0	72.0	130		
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	99.6	71.0	133		
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	94.4	69.0	130		
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	98.8	71.0	129		
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	105	69.0	133		
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	113	72.0	134		
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.004 µg/L		65.0	144		
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	92.5	71.0	132		
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3414547)									
EP2013633-032	HNPIOP0029	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	75.9	73.0	129		
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	87.6	72.0	129		
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	108	72.0	129		
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	88.8	72.0	130		
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	78.8	71.0	133		
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	88.8	69.0	130		
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	88.8	71.0	129		
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	88.8	69.0	133		
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	76.8	72.0	134		
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.004 µg/L	104	65.0	144		
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	95.7	71.0	132		
		EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3412952)							
		EP2013633-009	HEA0134M	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	85.6	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8			0.01 µg/L	104	68.0	141		
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2			0.01 µg/L	84.0	56.6	136		
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7			0.01 µg/L	88.5	61.9	129		



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3412952) - continued							
EP2013633-009	HEA0134M	EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 µg/L	80.2	52.8	135
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	85.6	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	91.6	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3414547)							
EP2013633-032	HNPIOP0029	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	94.8	67.0	137
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.01 µg/L	103	68.0	141
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.01 µg/L	80.0	56.6	136
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.01 µg/L	75.2	61.9	129
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 µg/L	69.8	52.8	135
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	83.6	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	95.2	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3412952)							
EP2013633-009	HEA0134M	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	73.6	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	95.6	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	82.4	67.0	138
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	69.6	60.9	136
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3414547)							
EP2013633-032	HNPIOP0029	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	74.4	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	103	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	103	67.0	138
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	61.6	60.9	136

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2013633	Page	: 1 of 12
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Telephone	: 08 9406 1307
Project	: 754-PEREN282113 BHP Eastern Ridge	Date Samples Received	: 07-Dec-2020
Site	: ----	Issue Date	: 16-Dec-2020
Sampler	: Regan MacDonald, Steven Middleton	No. of samples received	: 50
Order number	: ----	No. of samples analysed	: 50

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **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.**



Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	3	50	6.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	50	4.00	5.00	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 VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
MW01a, QC07, HHS0023M, HNPIHS0013, OPSW 1, MW06	HEC0407M, QC13, HHS0055M, HNPIOP0029, MW07,	05-Dec-2020	----	----	----	11-Dec-2020	12-Dec-2020	✔
Clear Plastic Bottle - Natural (EA015H)								
HEOP0387M, HEOP0314M, RPSW 1, RPSW 3	HEC0406M, HHS0042M, RPSW 2,	06-Dec-2020	----	----	----	11-Dec-2020	13-Dec-2020	✔



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) MW01a, QC07, HHS0023M, HNPIHS0013, OPSW 1, MW06	HEC0407M, QC13, HHS0055M, HNPIOP0029, MW07,	05-Dec-2020	----	----	----	14-Dec-2020	19-Dec-2020	✓
Clear Plastic Bottle - Natural (ED037-P) HEOP0387M, HEOPO314M, RPSW 1, RPSW 3	HEC0406M, HHS0042M, RPSW 2,	06-Dec-2020	----	----	----	14-Dec-2020	20-Dec-2020	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) MW01a, QC07, HHS0023M, HNPIHS0013, OPSW 1, MW06	HEC0407M, QC13, HHS0055M, HNPIOP0029, MW07,	05-Dec-2020	----	----	----	15-Dec-2020	02-Jan-2021	✓
Clear Plastic Bottle - Natural (ED041G) HEOP0387M, HEOPO314M, RPSW 1, RPSW 3	HEC0406M, HHS0042M, RPSW 2,	06-Dec-2020	----	----	----	15-Dec-2020	03-Jan-2021	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) MW01a, QC07, HHS0023M, HNPIHS0013, OPSW 1, MW06	HEC0407M, QC13, HHS0055M, HNPIOP0029, MW07,	05-Dec-2020	----	----	----	15-Dec-2020	02-Jan-2021	✓
Clear Plastic Bottle - Natural (ED045G) HEOP0387M, HEOPO314M, RPSW 1, RPSW 3	HEC0406M, HHS0042M, RPSW 2,	06-Dec-2020	----	----	----	15-Dec-2020	03-Jan-2021	✓



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) MW01a, QC07, HHS0023M, HNPIHS0013, OPSW 1, MW06	HEC0407M, QC13, HHS0055M, HNPIOP0029, MW07,	05-Dec-2020	----	----	----	09-Dec-2020	12-Dec-2020	✓
Clear Plastic Bottle - Natural (ED093F) HEOP0387M, HEOPO314M, RPSW 1, RPSW 3	HEC0406M, HHS0042M, RPSW 2,	06-Dec-2020	----	----	----	09-Dec-2020	13-Dec-2020	✓
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005) MW01a, QC07, HHS0023M, HNPIHS0013, OPSW 1, MW06	HEC0407M, QC13, HHS0055M, HNPIOP0029, MW07,	05-Dec-2020	----	----	----	09-Dec-2020	02-Jan-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005) HEOP0387M, HEOPO314M, HHS0042M, RPSW 2,	HEC0406M, HEA0149M, RPSW 1, RPSW 3	06-Dec-2020	----	----	----	09-Dec-2020	03-Jan-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT) EA0978RM, QC05,	HEOP0386M, QC06	04-Dec-2020	11-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) ECO754RM, HEOP0388M, HEQ0002M, HEQ0020M, HEOP0815M,	MB03, HEOP0524M, EC1775RDGM, HEQ0008, HEOP0368M	04-Dec-2020	14-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0023M,	HHS0055M	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	11-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) MW01a, HEC0407M, HEA0134M, HEA0141M, HHS0085M, QC09, QC11,	HHS0027M, HEA123M, HEA0125M, HEOP0430M, QC07, QC10, QC13	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIHS0013, OPSW 1, MW06, HST1782RM	HNPIOP0029, MW07, HEC0318M1,	05-Dec-2020	14-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC15, HEV0006M, HEC0406M, HEA0149M,	QC16, HEOP0387M, HEOPO314M, HHS0042M	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	11-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEC0448M,	HST1063RM	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) RPSW 1, RPSW 3	RPSW 2,	06-Dec-2020	14-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X-SUT) EA0978RM, QC05,	HEOP0386M, QC06	04-Dec-2020	11-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) ECO754RM, HEOP0388M, HEQ0002M, HEQ0020M, HEOP0815M,	MB03, HEOP0524M, EC1775RDGM, HEQ0008, HEOP0368M	04-Dec-2020	14-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0023M,	HHS0055M	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	11-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) MW01a, HEC0407M, HEA0134M, HEA0141M, HHS0085M, QC09, QC11,	HHS0027M, HEA123M, HEA0125M, HEOP0430M, QC07, QC10, QC13	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIHS0013, OPSW 1, MW06, HST1782RM	HNPIOP0029, MW07, HEC0318M1,	05-Dec-2020	14-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC15, HEV0006M, HEC0406M, HEA0149M,	QC16, HEOP0387M, HEOPO314M, HHS0042M	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	11-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEC0448M,	HST1063RM	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) RPSW 1, RPSW 3	RPSW 2,	06-Dec-2020	14-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X-SUT) EA0978RM, QC05,	HEOP0386M, QC06	04-Dec-2020	11-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) ECO754RM, HEOP0388M, HEQ0002M, HEQ0020M, HEOP0815M,	MB03, HEOP0524M, EC1775RDGM, HEQ0008, HEOP0368M	04-Dec-2020	14-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0023M,	HHS0055M	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	11-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) MW01a, HEC0407M, HEA0134M, HEA0141M, HHS0085M, QC09, QC11,	HHS0027M, HEA123M, HEA0125M, HEOP0430M, QC07, QC10, QC13	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIHS0013, OPSW 1, MW06, HST1782RM	HNPIOP0029, MW07, HEC0318M1,	05-Dec-2020	14-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC15, HEV0006M, HEC0406M, HEA0149M,	QC16, HEOP0387M, HEOPO314M, HHS0042M	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	11-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEC0448M,	HST1063RM	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) RPSW 1, RPSW 3	RPSW 2,	06-Dec-2020	14-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT) EA0978RM, QC05,	HEOP0386M, QC06	04-Dec-2020	11-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) ECO754RM, HEOP0388M, HEQ0002M, HEQ0020M, HEOP0815M,	MB03, HEOP0524M, EC1775RDGM, HEQ0008, HEOP0368M	04-Dec-2020	14-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0023M,	HHS0055M	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	11-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) MW01a, HEC0407M, HEA0134M, HEA0141M, HHS0085M, QC09, QC11,	HHS0027M, HEA123M, HEA0125M, HEOP0430M, QC07, QC10, QC13	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIHS0013, OPSW 1, MW06, HST1782RM	HNPIOP0029, MW07, HEC0318M1,	05-Dec-2020	14-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC15, HEV0006M, HEC0406M, HEA0149M,	QC16, HEOP0387M, HEOPO314M, HHS0042M	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	11-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEC0448M,	HST1063RM	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓
HDPE (no PTFE) (EP231X-SUT) RPSW 1, RPSW 3	RPSW 2,	06-Dec-2020	14-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis				
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation		
EP231P: PFAS Sums									
HDPE (no PTFE) (EP231X-SUT) EA0978RM, QC05,	HEOP0386M, QC06	04-Dec-2020	11-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓	
HDPE (no PTFE) (EP231X-SUT) ECO754RM, HEOP0388M, HEQ0002M, HEQ0020M, HEOP0815M,	MB03, HEOP0524M, EC1775RDGM, HEQ0008, HEOP0368M	04-Dec-2020	14-Dec-2020	02-Jun-2021	✓	14-Dec-2020	02-Jun-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HHS0023M,	HHS0055M	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	11-Dec-2020	03-Jun-2021	✓	
HDPE (no PTFE) (EP231X-SUT) MW01a, HEC0407M, HEA0134M, HEA0141M, HHS0085M, QC09, QC11,	HHS0027M, HEA123M, HEA0125M, HEOP0430M, QC07, QC10, QC13	05-Dec-2020	11-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIHS0013, OPSW 1, MW06, HST1782RM	HNPIOP0029, MW07, HEC0318M1,	05-Dec-2020	14-Dec-2020	03-Jun-2021	✓	14-Dec-2020	03-Jun-2021	✓	
HDPE (no PTFE) (EP231X-SUT) QC15, HEV0006M, HEC0406M, HEA0149M,	QC16, HEOP0387M, HEOPO314M, HHS0042M	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	11-Dec-2020	04-Jun-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HEC0448M,	HST1063RM	06-Dec-2020	11-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓	
HDPE (no PTFE) (EP231X-SUT) RPSW 1, RPSW 3	RPSW 2,	06-Dec-2020	14-Dec-2020	04-Jun-2021	✓	14-Dec-2020	04-Jun-2021	✓	



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER** Evaluation: ✘ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	3	50	6.00	10.00	✘	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	10.53	10.53	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	3	21	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	3	50	6.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	38	10.53	10.53	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	21	19.05	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	3	50	6.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	38	5.26	5.26	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	21	9.52	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	50	4.00	5.00	✘	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	21	9.52	5.00	✔	NEPM 2013 B3 & ALS QC Standard



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
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with 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
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<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

Reference No. _____



Consigning Office: _____
 Report Results to: Wesley Alport Mobile: 043414371 Email: Wesley.Alport@coffey.com
 Invoices to: accounts@coffey.com Phone: 0481860634 Email: @coffey.com

Project No: 754-PERENV282113 Task No: _____
 Project Name: BHP Eastern Ridge Laboratory: Envofins.
 Sampler's Name: Stuart + Regan Project Manager: Wesley Alport
 Special Instructions: _____

Analysis Request Section

Lab No.	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS	TOC	TDS	AIX	Cadmium	Vogel	K	504	NOTES
	<u>QC08</u>	<u>5/12/20</u>	<u>8:19</u>	<u>water</u>	<u>150ml Var</u>	<u>STP</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>* Super Ultra trace metals Long Suite (28 analytes)</u>
	<u>QC12</u>	<u>1</u>	<u>9:35</u>	<u>I</u>	<u>I</u>	<u>I</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>		
	<u>QC14</u>	<u>1</u>	<u>13:50</u>	<u>I</u>	<u>I</u>	<u>I</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>	<u>X</u>		

RELINQUISHED BY

Name: _____ Date: 8/12/20
 Coffey Environments Time: 12:00

RECEIVED BY

Name: Rob Johnston Date: 8/12/20
 Company: Envofins Time: 15:30

Sample Receipt Advice: (Lab Use Only)

All Samples Received in Good Condition
 All Documentation is in Proper Order
 Samples Received Properly Chilled
 Lab. Ref/Batch No. 762494

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Date/Time: 8/12/20 15:30
 Chilled: No
 Temp: 15.3
16.3
18.8
 Correction: -0.2
 Final Temp: 16.6°C

Coffey Services Australia Pty Ltd
Bishops See Level 1, 235 St Georges Terrace
Perth
WA 6000



NATA Accredited
Accreditation Number 1261
Site Number 23736

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

Attention: **Wesley Alport**

Report **762494-W**
 Project name **BHP EASTERN RIDGE**
 Project ID **754-PEREN282116**
 Received Date **Dec 08, 2020**

Client Sample ID			QC08	QC12	QC14
Sample Matrix			Water	Water	Water
Eurofins Sample No.			P20-De19852	P20-De19853	P20-De19854
Date Sampled			Dec 05, 2020	Dec 05, 2020	Dec 05, 2020
Test/Reference	LOR	Unit			
Chloride	1	mg/L	160	-	210
Sulphate (as SO4)	5	mg/L	90	-	110
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	800	-	690
Total Organic Carbon	5	mg/L	< 5	-	< 5
Alkalinity (speciated)					
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	460	-	57
Carbonate Alkalinity (as CaCO3)	10	mg/L	12	-	85
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	-	< 20
Total Alkalinity (as CaCO3)	20	mg/L	470	-	140
Eurofins Suite B11C: Na/K/Ca/Mg					
Calcium	0.5	mg/L	58	-	15
Magnesium	0.5	mg/L	65	-	50
Potassium	0.5	mg/L	6.9	-	13
Sodium	0.5	mg/L	73	-	120
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace					
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotridecanoic acid (PFTTrDA) ^{N15}	0.01	ug/L	< 0.01	< 0.01	< 0.01
Perfluorotetradecanoic acid (PFTTeDA) ^{N11}	0.01	ug/L	< 0.01	< 0.01	< 0.01
13C4-PFBA (surr.)	1	%	INT	157	45
13C5-PFPeA (surr.)	1	%	174	135	67
13C5-PFHxA (surr.)	1	%	148	123	141
13C4-PFHpA (surr.)	1	%	110	93	111
13C8-PFOA (surr.)	1	%	149	132	152
13C5-PFNA (surr.)	1	%	91	88	113
13C6-PFDA (surr.)	1	%	79	76	103
13C2-PFUnDA (surr.)	1	%	60	53	80
13C2-PFDoDA (surr.)	1	%	79	69	104
13C2-PFTTeDA (surr.)	1	%	55	43	45

Client Sample ID			QC08 Water P20-De19852 Dec 05, 2020	QC12 Water P20-De19853 Dec 05, 2020	QC14 Water P20-De19854 Dec 05, 2020
Sample Matrix					
Eurofins Sample No.					
Date Sampled					
Test/Reference	LOR	Unit			
Perfluoroalkyl sulfonic acids (PFASs)- Ultra Trace					
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.001	ug/L	< 0.001	< 0.001	< 0.001
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.001	ug/L	< 0.001	< 0.001	< 0.001
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.001	ug/L	< 0.001	< 0.001	< 0.001
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.001	ug/L	< 0.001	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.0001	ug/L	< 0.0001	< 0.0001	0.0015
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.001	ug/L	< 0.001	< 0.001	< 0.001
13C3-PFBS (surr.)	1	%	114	107	100
18O2-PFHxS (surr.)	1	%	103	99	102
13C8-PFOS (surr.)	1	%	90	90	107
Perfluoroalkyl sulfonamido substances- Ultra Trace					
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 0.05	< 0.05	< 0.05
13C8-FOSA (surr.)	1	%	152	141	198
D3-N-MeFOSA (surr.)	1	%	123	92	178
D5-N-EtFOSA (surr.)	1	%	105	75	139
D7-N-MeFOSE (surr.)	1	%	153	124	139
D9-N-EtFOSE (surr.)	1	%	149	121	129
D5-N-EtFOSAA (surr.)	1	%	18	10	12
D3-N-MeFOSAA (surr.)	1	%	17	INT	10
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)- Ultra Trace					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.005	ug/L	< 0.005	< 0.005	< 0.005
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001
13C2-4:2 FTS (surr.)	1	%	94	76	129
13C2-6:2 FTSA (surr.)	1	%	INT	192	INT
13C2-8:2 FTSA (surr.)	1	%	75	71	INT
13C2-10:2 FTSA (surr.)	1	%	63	66	126
PFASs Summations					
Sum (PFHxS + PFOS)*	0.001	ug/L	< 0.001	< 0.001	0.0015
Sum of US EPA PFAS (PFOS + PFOA)*	0.001	ug/L	< 0.001	< 0.001	0.0015
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.001	ug/L	< 0.001	< 0.001	0.0015
Sum of WA DWER PFAS (n=10)*	0.005	ug/L	< 0.005	< 0.005	< 0.005
Sum of PFASs (n=30)*	0.005	ug/L	< 0.005	< 0.005	< 0.005

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B11E: Cl/SO₄/Alkalinity			
Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Dec 10, 2020	28 Days
Sulphate (as SO ₄) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Dec 10, 2020	28 Days
Alkalinity (speciated) - Method: LTM-INO-4250 Alkalinity by Electrometric Titration	Melbourne	Dec 10, 2020	14 Days
Total Dissolved Solids Dried at 180°C ± 2°C - Method: LTM-INO-4170 Total Dissolved Solids in Water	Melbourne	Dec 10, 2020	7 Days
Total Organic Carbon - Method: LTM-INO-4060 Total Organic Carbon in water and soil	Melbourne	Dec 10, 2020	28 Days
Eurofins Suite B11C: Na/K/Ca/Mg - Method: LTM-MET-3010 Alkali Metals by ICP-AES	Melbourne	Dec 10, 2020	180 Days
Per- and Polyfluoroalkyl Substances (PFASs) - Ultra Trace			
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Dec 10, 2020	14 Days
Perfluoroalkyl sulfonic acids (PFASs)- Ultra Trace - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Dec 10, 2020	14 Days
Perfluoroalkyl sulfonamido substances- Ultra Trace - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) Ultra trace	Brisbane	Dec 10, 2020	14 Days
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Ultra Trace - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Dec 10, 2020	14 Days
PFASs Summations - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level	Brisbane	Dec 10, 2020	

Australia

Melbourne
 6 Monterey Road
 Dandenong South VIC 3175
 Phone : +61 3 8564 5000
 NATA # 1261
 Site # 1254 & 14271

Sydney
 Unit F3, Building F
 16 Mars Road
 Lane Cove West NSW 2066
 Phone : +61 2 9900 8400
 NATA # 1261 Site # 18217

Brisbane
 1/21 Smallwood Place
 Murarrie QLD 4172
 Phone : +61 7 3902 4600
 NATA # 1261 Site # 20794

Perth
 2/91 Leach Highway
 Kewdale WA 6105
 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

New Zealand

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

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

Company Name:	Coffey Services Australia Pty Ltd	Order No.:		Received:	Dec 8, 2020 3:30 PM
Address:	Bishops See Level 1, 235 St Georges Terrace Perth WA 6000	Report #:	762494	Due:	Dec 15, 2020
Project Name:	BHP EASTERN RIDGE	Phone:	08 9355 7100	Priority:	5 Day
Project ID:	754-PEREN282116	Fax:	08 9470 8601	Contact Name:	Wesley Alport

Eurofins Analytical Services Manager : Rhys Thomas

Sample Detail						Total Organic Carbon	Eurofins Suite B11E: Cl/SO4/Alkalinity	Per- and Polyfluoroalkyl Substances (PFASs) - Ultra Trace	Eurofins Suite B11C: Na/K/Ca/Mg	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X		X	X
Sydney Laboratory - NATA Site # 18217										
Brisbane Laboratory - NATA Site # 20794								X		
Perth Laboratory - NATA Site # 23736										
Mayfield Laboratory										
External Laboratory										
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID					
1	QC08	Dec 05, 2020	8:19AM	Water	P20-De19852	X	X	X	X	X
2	QC12	Dec 05, 2020	9:35AM	Water	P20-De19853			X		
3	QC14	Dec 05, 2020	1:50PM	Water	P20-De19854	X	X	X	X	X
Test Counts						2	2	3	2	2

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.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

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

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

QC Data General Comments

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- 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.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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							
Chloride	mg/L	< 1			1	Pass	
Sulphate (as SO ₄)	mg/L	< 5			5	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	< 10			10	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO ₃)	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Method Blank							
Eurofins Suite B11C: Na/K/Ca/Mg							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace							
Perfluorobutanoic acid (PFBA)	ug/L	< 0.05			0.05	Pass	
Perfluoropentanoic acid (PFPeA)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanoic acid (PFHxA)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanoic acid (PFHpA)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanoic acid (PFOA)	ug/L	< 0.01			0.01	Pass	
Perfluorononanoic acid (PFNA)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanoic acid (PFDA)	ug/L	< 0.01			0.01	Pass	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.01			0.01	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/L	< 0.01			0.01	Pass	
Perfluorotetradecanoic acid (PFTTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSA)- Ultra Trace							
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	< 0.0001			0.0001	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.001			0.001	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances- Ultra Trace							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Ultra Trace							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
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	
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							
Chloride	%	103			70-130	Pass	
Sulphate (as SO4)	%	106			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	98			70-130	Pass	
Total Organic Carbon	%	90			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	77			70-130	Pass	
Total Alkalinity (as CaCO3)	%	89			70-130	Pass	
LCS - % Recovery							
Eurofins Suite B11C: Na/K/Ca/Mg							
Calcium	%	95			80-120	Pass	
Magnesium	%	90			80-120	Pass	
Potassium	%	88			80-120	Pass	
Sodium	%	97			80-120	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace							
Perfluorobutanoic acid (PFBA)	%	150			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	127			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	130			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	123			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	127			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	134			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	126			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	120			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	120			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	102			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	127			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFASs)- Ultra Trace							
Perfluorobutanesulfonic acid (PFBS)	%	107			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	117			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	74			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	112			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	114			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	131			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	119			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	110			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances- Ultra Trace							
Perfluorooctane sulfonamide (FOSA)	%	129			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	132			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	107			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	127			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	116			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	119			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	113			50-150	Pass	
LCS - % Recovery							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)- Ultra Trace							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	%	120			50-150	Pass	

Test			Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	124		50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	135		50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)			%	108		50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
				Result 1				
Sulphate (as SO ₄)	P20-De19739	NCP	%	99		70-130	Pass	
Total Organic Carbon	M20-De20264	NCP	%	90		70-130	Pass	
Spike - % Recovery								
				Result 1				
Carbonate Alkalinity (as CaCO ₃)	M20-De20273	NCP	%	108		70-130	Pass	
Total Alkalinity (as CaCO ₃)	S20-De18747	NCP	%	125		70-130	Pass	
Spike - % Recovery								
Eurofins Suite B11C: Na/K/Ca/Mg				Result 1				
Calcium	B20-De12166	NCP	%	106		75-125	Pass	
Magnesium	B20-De12166	NCP	%	106		75-125	Pass	
Potassium	B20-De12166	NCP	%	90		75-125	Pass	
Sodium	B20-De12166	NCP	%	106		75-125	Pass	
Spike - % Recovery								
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace				Result 1				
Perfluorobutanoic acid (PFBA)	S20-De16961	NCP	%	144		50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S20-De16961	NCP	%	128		50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S20-De16961	NCP	%	129		50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S20-De16961	NCP	%	120		50-150	Pass	
Perfluorooctanoic acid (PFOA)	S20-De16961	NCP	%	138		50-150	Pass	
Perfluorononanoic acid (PFNA)	S20-De16961	NCP	%	136		50-150	Pass	
Perfluorodecanoic acid (PFDA)	S20-De16961	NCP	%	130		50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	S20-De16961	NCP	%	123		50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	S20-De16961	NCP	%	116		50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	S20-De16961	NCP	%	123		50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S20-De16961	NCP	%	109		50-150	Pass	
Spike - % Recovery								
Perfluoroalkyl sulfonamido substances- Ultra Trace				Result 1				
Perfluorooctane sulfonamide (FOSA)	S20-De16961	NCP	%	127		50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S20-De16961	NCP	%	122		50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S20-De16961	NCP	%	103		50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S20-De16961	NCP	%	129		50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S20-De16961	NCP	%	105		50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S20-De16961	NCP	%	131		50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S20-De16961	NCP	%	116		50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Chloride	P20-De19739	NCP	mg/L	270	280	5.0	30%	Pass	
Sulphate (as SO ₄)	P20-De19739	NCP	mg/L	210	190	9.0	30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	P20-De22180	NCP	mg/L	2600	2500	3.8	30%	Pass	
Total Organic Carbon	B20-De24052	NCP	mg/L	< 5	< 5	<1	30%	Pass	
Duplicate									
Alkalinity (speciated)				Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO ₃)	S20-De20759	NCP	mg/L	150	130	10	30%	Pass	
Carbonate Alkalinity (as CaCO ₃)	S20-De20759	NCP	mg/L	< 10	< 10	<1	30%	Pass	
Hydroxide Alkalinity (as CaCO ₃)	S20-De20759	NCP	mg/L	< 20	< 20	<1	30%	Pass	
Total Alkalinity (as CaCO ₃)	S20-De20759	NCP	mg/L	150	140	9.0	30%	Pass	
Duplicate									
Eurofins Suite B11C: Na/K/Ca/Mg				Result 1	Result 2	RPD			
Calcium	B20-De12166	NCP	mg/L	120	130	6.0	30%	Pass	
Magnesium	B20-De12166	NCP	mg/L	210	200	3.0	30%	Pass	
Potassium	B20-De12166	NCP	mg/L	43	43	<1	30%	Pass	
Sodium	B20-De12166	NCP	mg/L	550	570	3.0	30%	Pass	
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	S20-De19499	NCP	ug/L	0.13	0.13	4.0	30%	Pass	
Perfluoropentanoic acid (PFPeA)	S20-De19499	NCP	ug/L	0.21	0.23	6.0	30%	Pass	
Perfluorohexanoic acid (PFHxA)	S20-De19499	NCP	ug/L	0.51	0.55	8.0	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	S20-De19499	NCP	ug/L	0.08	0.09	6.0	30%	Pass	
Perfluorooctanoic acid (PFOA)	S20-De19499	NCP	ug/L	0.15	0.16	6.0	30%	Pass	
Perfluorononanoic acid (PFNA)	S20-De19499	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorodecanoic acid (PFDA)	S20-De19499	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	S20-De19499	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	S20-De19499	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	S20-De19499	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S20-De19499	NCP	ug/L	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Perfluoroalkyl sulfonamido substances- Ultra Trace				Result 1	Result 2	RPD			
Perfluorooctane sulfonamide (FOSA)	S20-De19499	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S20-De19499	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S20-De19499	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	S20-De19499	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	S20-De19499	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S20-De19499	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S20-De19499	NCP	ug/L	< 0.05	< 0.05	<1	30%	Pass	

Comments
Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).

Authorised By

Rhys Thomas	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Sarah McCallion	Senior Analyst-PFAS (QLD)
Scott Beddoes	Senior Analyst-Inorganic (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](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : **EP2100985**

Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: wesley.alport@coffey.com	E-mail	: Lauren.biagioni@alsglobal.com
Telephone	: 61 8 6218 2100	Telephone	: 08 9406 1307
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: 754-PEREN282113 BHP Eastern Ridge PFAS	Page	: 1 of 3
Order number	: ----	Quote number	: EP2020COFENVWA0039_V2 (EP/991/20_V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Regan MacDonald, Steven Middleton		

Dates

Date Samples Received	: 29-Jan-2021 14:30	Issue Date	: 01-Feb-2021
Client Requested Due Date	: 10-Feb-2021	Scheduled Reporting Date	: 10-Feb-2021

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 24.1 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 43 / 43

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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: 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.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **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.



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

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EP005 Total Organic Carbon (TOC)	WATER - EP231X-SUT PFAS - Super Ultra Trace Waters Long Suite (29)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - W-18 TRH(C6 - C9)/BTEXN
EP2100985-001	26-Jan-2021 12:00	HEC0027P-A			✓		
EP2100985-002	26-Jan-2021 12:05	HEC0027P-B	✓	✓	✓	✓	
EP2100985-003	26-Jan-2021 12:50	Sump 4	✓	✓	✓	✓	
EP2100985-004	26-Jan-2021 13:30	Sump 1	✓	✓	✓	✓	
EP2100985-005	26-Jan-2021 13:40	Sump 2	✓	✓	✓	✓	
EP2100985-006	26-Jan-2021 15:40	HEA0347P-A			✓		
EP2100985-007	26-Jan-2021 15:45	HEA0347P-B	✓	✓	✓	✓	
EP2100985-008	26-Jan-2021 16:15	HEA0348P-A			✓		
EP2100985-009	26-Jan-2021 16:20	HEA0348P-B	✓	✓	✓	✓	
EP2100985-010	26-Jan-2021 15:55	HEA0346P-A			✓		
EP2100985-011	26-Jan-2021 16:00	HEA0346P-B	✓	✓	✓	✓	
EP2100985-012	27-Jan-2021 09:55	HNPIHS0039-A			✓		
EP2100985-013	27-Jan-2021 10:00	HNPIHS0039-B	✓	✓	✓	✓	
EP2100985-014	27-Jan-2021 13:35	HNPIHS0048-A			✓		
EP2100985-015	27-Jan-2021 13:40	HNPIHS0048-B	✓	✓	✓	✓	
EP2100985-016	27-Jan-2021 14:10	HNPIHS0013-B	✓	✓	✓	✓	
EP2100985-017	27-Jan-2021 14:05	HNPIHS0013-A			✓		
EP2100985-018	25-Jan-2021 00:00	QC01			✓		
EP2100985-019	25-Jan-2021 00:00	QC02			✓		
EP2100985-020	25-Jan-2021 00:00	HEC0022P-A			✓		
EP2100985-021	25-Jan-2021 00:00	HEC0022P-B	✓	✓	✓	✓	
EP2100985-022	25-Jan-2021 00:00	HEC0047P-A			✓		
EP2100985-023	25-Jan-2021 00:00	HEC0047P-B	✓	✓	✓	✓	
EP2100985-024	25-Jan-2021 00:00	HEC0028P-A			✓		
EP2100985-025	25-Jan-2021 00:00	HEC0028P-B	✓	✓	✓	✓	
EP2100985-026	25-Jan-2021 00:00	HEC0044P-A			✓		
EP2100985-027	25-Jan-2021 00:00	HEC0044P-B	✓	✓	✓	✓	
EP2100985-028	26-Jan-2021 00:00	QC03			✓		
EP2100985-029	26-Jan-2021 00:00	QC04			✓		
EP2100985-030	27-Jan-2021 00:00	QC05			✓		
EP2100985-031	27-Jan-2021 00:00	QC06			✓		
EP2100985-032	28-Jan-2021 00:00	QC07			✓		
EP2100985-033	28-Jan-2021 00:00	QC08			✓		
EP2100985-034	28-Jan-2021 00:00	QC09					✓
EP2100985-035	28-Jan-2021 00:00	QC10					✓



CERTIFICATE OF ANALYSIS

Work Order : EP2100985
Client : COFFEY ENVIRONMENTS PTY LTD
Contact : WESLEY ALPORT
Address : Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000
Telephone : 61 8 6218 2100
Project : 754-PEREN282113 BHP Eastern Ridge PFAS
Order number : ----
C-O-C number : ----
Sampler : Regan MacDonald, Steven Middleton
Site : ----
Quote number : EP/991/20_V2
No. of samples received : 43
No. of samples analysed : 43

Page : 1 of 30
Laboratory : Environmental Division Perth
Contact : Lauren Biagioni
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : 08 9406 1307
Date Samples Received : 29-Jan-2021 14:30
Date Analysis Commenced : 01-Feb-2021
Issue Date : 11-Feb-2021 16:44



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This 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.

Table with 3 columns: Signatories, Position, Accreditation Category. Rows include Chris Lemaitre, Daniel Fisher, David Viner, Efua Wilson, and Franco Lentini.



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.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP231X-SUT: Positive results for analyte Perfluorooctane sulfonic acid (PFOS) on samples EP2100985_020, ES2100985_021 & EP2100985_024 have been confirmed by re-extraction and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- 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.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0027P-A	HEC0027P-B	Sump 4	Sump 1	Sump 2
Sampling date / time				26-Jan-2021 12:00	26-Jan-2021 12:05	26-Jan-2021 12:50	26-Jan-2021 13:30	26-Jan-2021 13:40	
Compound	CAS Number	LOR	Unit	EP2100985-001	EP2100985-002	EP2100985-003	EP2100985-004	EP2100985-005	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	748	610	738	755	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	17	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	312	225	342	347	
Total Alkalinity as CaCO3	----	1	mg/L	----	312	242	342	347	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	128	106	125	124	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	195	169	170	176	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	67	51	80	80	
Magnesium	7439-95-4	1	mg/L	----	69	62	79	82	
Sodium	7440-23-5	1	mg/L	----	98	89	79	77	
Potassium	7440-09-7	1	mg/L	----	7	6	7	7	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	14.4	11.8	14.2	14.5	
∅ Total Cations	----	0.01	meq/L	----	13.5	11.7	14.1	14.3	
∅ Ionic Balance	----	0.01	%	----	3.36	0.58	0.43	0.73	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	2	2	2	3	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0007	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0007	0.0006	0.0006	0.0002	0.0005	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0027P-A	HEC0027P-B	Sump 4	Sump 1	Sump 2
Sampling date / time				26-Jan-2021 12:00	26-Jan-2021 12:05	26-Jan-2021 12:50	26-Jan-2021 13:30	26-Jan-2021 13:40	
Compound	CAS Number	LOR	Unit	EP2100985-001	EP2100985-002	EP2100985-003	EP2100985-004	EP2100985-005	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0012	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0007	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0027P-A	HEC0027P-B	Sump 4	Sump 1	Sump 2
Sampling date / time				26-Jan-2021 12:00	26-Jan-2021 12:05	26-Jan-2021 12:50	26-Jan-2021 13:30	26-Jan-2021 13:40	
Compound	CAS Number	LOR	Unit	EP2100985-001	EP2100985-002	EP2100985-003	EP2100985-004	EP2100985-005	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0007	0.0006	0.0006	0.0009	0.0005	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0007	0.0006	0.0006	0.0028	0.0005	
^ Sum of PFAS	----	0.0002	µg/L	0.0007	0.0006	0.0006	0.0028	0.0005	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	118	120	110	116	118	
13C8-PFOA	----	0.0005	%	114	116	112	112	116	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0347P-A	HEA0347P-B	HEA0348P-A	HEA0348P-B	HEA0346P-A
Sampling date / time				26-Jan-2021 15:40	26-Jan-2021 15:45	26-Jan-2021 16:15	26-Jan-2021 16:20	26-Jan-2021 15:55	
Compound	CAS Number	LOR	Unit	EP2100985-006	EP2100985-007	EP2100985-008	EP2100985-009	EP2100985-010	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	468	----	446	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	----	<1	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	----	<1	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	244	----	239	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	244	----	239	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	64	----	62	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	102	----	107	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	54	----	56	----	
Magnesium	7439-95-4	1	mg/L	----	43	----	45	----	
Sodium	7440-23-5	1	mg/L	----	58	----	59	----	
Potassium	7440-09-7	1	mg/L	----	14	----	15	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	9.08	----	9.08	----	
∅ Total Cations	----	0.01	meq/L	----	9.11	----	9.45	----	
∅ Ionic Balance	----	0.01	%	----	0.16	----	1.96	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	4	----	1	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0347P-A	HEA0347P-B	HEA0348P-A	HEA0348P-B	HEA0346P-A
Sampling date / time				26-Jan-2021 15:40	26-Jan-2021 15:45	26-Jan-2021 16:15	26-Jan-2021 16:20	26-Jan-2021 15:55	
Compound	CAS Number	LOR	Unit	EP2100985-006	EP2100985-007	EP2100985-008	EP2100985-009	EP2100985-010	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0347P-A	HEA0347P-B	HEA0348P-A	HEA0348P-B	HEA0346P-A
Sampling date / time				26-Jan-2021 15:40	26-Jan-2021 15:45	26-Jan-2021 16:15	26-Jan-2021 16:20	26-Jan-2021 15:55	
Compound	CAS Number	LOR	Unit	EP2100985-006	EP2100985-007	EP2100985-008	EP2100985-009	EP2100985-010	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	114	119	112	98.5	113	
13C8-PFOA	----	0.0005	%	113	118	111	116	115	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0346P-B	HNPIHS0039-A	HNPIHS0039-B	HNPIHS0048-A	HNPIHS0048-B
Sampling date / time				26-Jan-2021 16:00	27-Jan-2021 09:55	27-Jan-2021 10:00	27-Jan-2021 13:35	27-Jan-2021 13:40	
Compound	CAS Number	LOR	Unit	EP2100985-011	EP2100985-012	EP2100985-013	EP2100985-014	EP2100985-015	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	471	----	652	----	646	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	<1	----	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	<1	----	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	222	----	401	----	402	
Total Alkalinity as CaCO3	----	1	mg/L	222	----	401	----	402	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	69	----	73	----	66	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	117	----	137	----	139	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	56	----	72	----	78	
Magnesium	7439-95-4	1	mg/L	44	----	73	----	77	
Sodium	7440-23-5	1	mg/L	60	----	94	----	97	
Potassium	7440-09-7	1	mg/L	15	----	8	----	8	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	9.17	----	13.4	----	13.3	
∅ Total Cations	----	0.01	meq/L	9.41	----	13.9	----	14.6	
∅ Ionic Balance	----	0.01	%	1.27	----	1.82	----	4.74	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	2	----	6	----	7	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0346P-B	HNPIHS0039-A	HNPIHS0039-B	HNPIHS0048-A	HNPIHS0048-B
Sampling date / time				26-Jan-2021 16:00	27-Jan-2021 09:55	27-Jan-2021 10:00	27-Jan-2021 13:35	27-Jan-2021 13:40	
Compound	CAS Number	LOR	Unit	EP2100985-011	EP2100985-012	EP2100985-013	EP2100985-014	EP2100985-015	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	118	116	114	116	114	
13C8-PFOA	----	0.0005	%	115	118	113	112	115	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIHS0013-B	HNPIHS0013-A	QC01	QC02	HEC0022P-A
Sampling date / time				27-Jan-2021 14:10	27-Jan-2021 14:05	25-Jan-2021 00:00	25-Jan-2021 00:00	25-Jan-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2100985-016	EP2100985-017	EP2100985-018	EP2100985-019	EP2100985-020	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIHS0013-B	HNPIHS0013-A	QC01	QC02	HEC0022P-A
Sampling date / time				27-Jan-2021 14:10	27-Jan-2021 14:05	25-Jan-2021 00:00	25-Jan-2021 00:00	25-Jan-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2100985-016	EP2100985-017	EP2100985-018	EP2100985-019	EP2100985-020	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	117	114	112	104	105	
13C8-PFOA	----	0.0005	%	117	112	113	101	103	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0022P-B	HEC0047P-A	HEC0047P-B	HEC0028P-A	HEC0028P-B
Sampling date / time				25-Jan-2021 00:00	25-Jan-2021 00:00	25-Jan-2021 00:00	25-Jan-2021 00:00	25-Jan-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2100985-021	EP2100985-022	EP2100985-023	EP2100985-024	EP2100985-025	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	718	----	682	----	794	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	<1	----	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	<1	----	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	280	----	282	----	329	
Total Alkalinity as CaCO3	----	1	mg/L	280	----	282	----	329	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	140	----	133	----	132	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	178	----	142	----	206	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	69	----	64	----	74	
Magnesium	7439-95-4	1	mg/L	73	----	70	----	78	
Sodium	7440-23-5	1	mg/L	89	----	76	----	105	
Potassium	7440-09-7	1	mg/L	8	----	9	----	8	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	13.5	----	12.4	----	15.1	
∅ Total Cations	----	0.01	meq/L	13.5	----	12.5	----	14.9	
∅ Ionic Balance	----	0.01	%	0.01	----	0.33	----	0.83	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	2	----	2	----	2	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0002	<0.0002	<0.0002	0.0005	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0022P-B	HEC0047P-A	HEC0047P-B	HEC0028P-A	HEC0028P-B
Sampling date / time				25-Jan-2021 00:00	25-Jan-2021 00:00	25-Jan-2021 00:00	25-Jan-2021 00:00	25-Jan-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2100985-021	EP2100985-022	EP2100985-023	EP2100985-024	EP2100985-025	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0022P-B	HEC0047P-A	HEC0047P-B	HEC0028P-A	HEC0028P-B
Sampling date / time				25-Jan-2021 00:00	25-Jan-2021 00:00	25-Jan-2021 00:00	25-Jan-2021 00:00	25-Jan-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2100985-021	EP2100985-022	EP2100985-023	EP2100985-024	EP2100985-025	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0005	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0002	<0.0002	<0.0002	0.0005	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	0.0002	<0.0002	<0.0002	0.0005	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	106	113	93.7	102	105	
13C8-PFOA	----	0.0005	%	99.0	95.0	84.8	100	99.9	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0044P-A	HEC0044P-B	QC03	QC04	QC05
Sampling date / time				25-Jan-2021 00:00	25-Jan-2021 00:00	26-Jan-2021 00:00	26-Jan-2021 00:00	27-Jan-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2100985-026	EP2100985-027	EP2100985-028	EP2100985-029	EP2100985-030	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	716	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	300	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	300	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	117	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	193	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	67	----	----	----	
Magnesium	7439-95-4	1	mg/L	----	70	----	----	----	
Sodium	7440-23-5	1	mg/L	----	99	----	----	----	
Potassium	7440-09-7	1	mg/L	----	8	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	13.9	----	----	----	
∅ Total Cations	----	0.01	meq/L	----	13.6	----	----	----	
∅ Ionic Balance	----	0.01	%	----	0.94	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	1	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0044P-A	HEC0044P-B	QC03	QC04	QC05
Sampling date / time				25-Jan-2021 00:00	25-Jan-2021 00:00	26-Jan-2021 00:00	26-Jan-2021 00:00	27-Jan-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2100985-026	EP2100985-027	EP2100985-028	EP2100985-029	EP2100985-030	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0044P-A	HEC0044P-B	QC03	QC04	QC05
Sampling date / time				25-Jan-2021 00:00	25-Jan-2021 00:00	26-Jan-2021 00:00	26-Jan-2021 00:00	27-Jan-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2100985-026	EP2100985-027	EP2100985-028	EP2100985-029	EP2100985-030	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	105	108	101	98.6	82.4	
13C8-PFOA	----	0.0005	%	94.3	103	111	120	116	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC06	QC07	QC08	QC09	QC10
Sampling date / time				27-Jan-2021 00:00	28-Jan-2021 00:00	28-Jan-2021 00:00	28-Jan-2021 00:00	28-Jan-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2100985-031	EP2100985-032	EP2100985-033	EP2100985-034	EP2100985-035	
				Result	Result	Result	Result	Result	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	----	----	----	<20	<20	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	----	<20	<20	
[^] C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	----	----	----	<20	<20	
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	----	----	----	<1	<1	
Toluene	108-88-3	2	µg/L	----	----	----	<2	<2	
Ethylbenzene	100-41-4	2	µg/L	----	----	----	<2	<2	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	----	<2	<2	
ortho-Xylene	95-47-6	2	µg/L	----	----	----	<2	<2	
[^] Total Xylenes	----	2	µg/L	----	----	----	<2	<2	
[^] Sum of BTEX	----	1	µg/L	----	----	----	<1	<1	
Naphthalene	91-20-3	5	µg/L	----	----	----	<5	<5	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	----	----	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	<0.0020	----	----	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC06	QC07	QC08	QC09	QC10
Sampling date / time					27-Jan-2021 00:00	28-Jan-2021 00:00	28-Jan-2021 00:00	28-Jan-2021 00:00	28-Jan-2021 00:00
Compound	CAS Number	LOR	Unit		EP2100985-031	EP2100985-032	EP2100985-033	EP2100985-034	EP2100985-035
					Result	Result	Result	Result	Result
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
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									
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	<0.001	<0.001	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<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									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC06	QC07	QC08	QC09	QC10
Sampling date / time					27-Jan-2021 00:00	28-Jan-2021 00:00	28-Jan-2021 00:00	28-Jan-2021 00:00	28-Jan-2021 00:00
Compound	CAS Number	LOR	Unit	EP2100985-031	EP2100985-032	EP2100985-033	EP2100985-034	EP2100985-035	
				Result	Result	Result	Result	Result	
EP231P: PFAS Sums - Continued									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	----	----	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	----	----	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	----	----	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	----	----	----	91.6	90.2	
Toluene-D8	2037-26-5	2	%	----	----	----	100	103	
4-Bromofluorobenzene	460-00-4	2	%	----	----	----	86.3	85.2	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	87.3	93.1	107	----	----	
13C8-PFOA	----	0.0005	%	113	114	104	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIOP0008P-A	HNPIOP0008P-B	HEA0335P-A	HEA0335P-B	HEA0336P-A
Sampling date / time				28-Jan-2021 12:55	28-Jan-2021 13:00	26-Jan-2021 00:00	26-Jan-2021 00:00	26-Jan-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2100985-036	EP2100985-037	EP2100985-038	EP2100985-039	EP2100985-040	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	656	344	348	438	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	372	104	103	191	
Total Alkalinity as CaCO3	----	1	mg/L	----	372	104	103	191	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	90	41	40	57	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	110	120	119	113	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	72	14	14	46	
Magnesium	7439-95-4	1	mg/L	----	69	35	35	38	
Sodium	7440-23-5	1	mg/L	----	74	62	63	60	
Potassium	7440-09-7	1	mg/L	----	5	13	13	13	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	12.4	6.32	6.25	8.19	
∅ Total Cations	----	0.01	meq/L	----	12.6	6.61	6.65	8.36	
∅ Ionic Balance	----	0.01	%	----	0.84	2.26	3.14	1.06	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	4	<1	1	2	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0023	0.0010	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIOP0008P-A	HNPIOP0008P-B	HEA0335P-A	HEA0335P-B	HEA0336P-A
Sampling date / time				28-Jan-2021 12:55	28-Jan-2021 13:00	26-Jan-2021 00:00	26-Jan-2021 00:00	26-Jan-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2100985-036	EP2100985-037	EP2100985-038	EP2100985-039	EP2100985-040	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIOP0008P-A	HNPIOP0008P-B	HEA0335P-A	HEA0335P-B	HEA0336P-A
Sampling date / time				28-Jan-2021 12:55	28-Jan-2021 13:00	26-Jan-2021 00:00	26-Jan-2021 00:00	26-Jan-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2100985-036	EP2100985-037	EP2100985-038	EP2100985-039	EP2100985-040	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0023	0.0010	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0023	0.0010	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0023	0.0010	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	108	105	112	106	108	
13C8-PFOA	----	0.0005	%	103	100	104	104	102	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0336P-B	HEA0349P-A	HEA0349P-B	----	----
Sampling date / time				26-Jan-2021 00:00	26-Jan-2021 00:00	26-Jan-2021 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2100985-041	EP2100985-042	EP2100985-043	-----	-----	
				Result	Result	Result	----	----	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	433	482	490	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	183	249	245	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	183	249	245	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	59	62	64	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	113	103	105	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	44	56	56	----	----	
Magnesium	7439-95-4	1	mg/L	38	44	44	----	----	
Sodium	7440-23-5	1	mg/L	60	59	59	----	----	
Potassium	7440-09-7	1	mg/L	13	14	14	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	8.07	9.17	9.19	----	----	
∅ Total Cations	----	0.01	meq/L	8.26	9.34	9.34	----	----	
∅ Ionic Balance	----	0.01	%	1.18	0.91	0.81	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	1	20	4	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	----	----	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0336P-B	HEA0349P-A	HEA0349P-B	----	----
Sampling date / time				26-Jan-2021 00:00	26-Jan-2021 00:00	26-Jan-2021 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2100985-041	EP2100985-042	EP2100985-043	-----	-----	
				Result	Result	Result	----	----	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	<0.0020	----	----	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<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	----	----	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	<0.001	----	----	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	----	----	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	<0.001	----	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<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	----	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0336P-B	HEA0349P-A	HEA0349P-B	----	----
Sampling date / time				26-Jan-2021 00:00	26-Jan-2021 00:00	26-Jan-2021 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2100985-041	EP2100985-042	EP2100985-043	-----	-----	
				Result	Result	Result	----	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	----	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	----	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<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	----	----	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	----	----	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	----	----	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	106	112	110	----	----	
13C8-PFOA	----	0.0005	%	104	104	101	----	----	



Surrogate Control Limits

Sub-Matrix: WATER		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) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

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

(WATER) EP231C: Perfluoroalkyl Sulfonamides

QUALITY CONTROL REPORT

Work Order	: EP2100985	Page	: 1 of 10
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 61 8 6218 2100	Telephone	: 08 9406 1307
Project	: 754-PEREN282113 BHP Eastern Ridge PFAS	Date Samples Received	: 29-Jan-2021
Order number	: ----	Date Analysis Commenced	: 01-Feb-2021
C-O-C number	: ----	Issue Date	: 11-Feb-2021
Sampler	: Regan MacDonald, Steven Middleton		
Site	: ----		
Quote number	: EP/991/20_V2		
No. of samples received	: 43		
No. of samples analysed	: 43		



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth Inorganics, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



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 Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3488652)									
EP2100985-021	HEC0022P-B	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	718	710	1.19	0% - 20%
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3489410)									
EP2100985-002	HEC0027P-B	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	748	736	1.62	0% - 20%
EP2100985-015	HNPIHS0048-B	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	646	639	1.09	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3488462)									
EP2100985-002	HEC0027P-B	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	312	318	2.18	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	312	318	2.18	0% - 20%
EP2100985-021	HEC0022P-B	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	280	311	10.4	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	280	311	10.4	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3488463)									
EP2100985-043	HEA0349P-B	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	245	247	0.573	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	245	247	0.573	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3488179)									
EP2100985-003	Sump 4	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	106	104	2.62	0% - 20%
EP2100985-004	Sump 1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	125	124	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3488330)									
EP2100985-041	HEA0336P-B	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	59	66	11.1	0% - 20%
EP2100985-015	HNPIHS0048-B	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	66	67	1.60	0% - 20%



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED045G: Chloride by Discrete Analyser (QC Lot: 3488178)									
EP2100985-003	Sump 4	ED045G: Chloride	16887-00-6	1	mg/L	169	175	3.80	0% - 20%
EP2100985-004	Sump 1	ED045G: Chloride	16887-00-6	1	mg/L	170	170	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3488329)									
EP2100985-041	HEA0336P-B	ED045G: Chloride	16887-00-6	1	mg/L	113	124	9.51	0% - 20%
EP2100985-015	HNPIHS0048-B	ED045G: Chloride	16887-00-6	1	mg/L	139	132	5.23	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3489449)									
EP2100943-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	15	14	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	153	146	4.46	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	5	5	0.00	No Limit
EP2100959-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	47	47	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	43	44	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	134	135	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	25	25	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3489450)									
EP2100985-007	HEA0347P-B	ED093F: Calcium	7440-70-2	1	mg/L	54	58	6.47	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	43	46	7.26	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	58	60	4.12	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	14	15	0.00	0% - 50%
EP2100985-037	HNPIOP0008P-B	ED093F: Calcium	7440-70-2	1	mg/L	72	72	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	69	70	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	74	74	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	5	5	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3495209)									
EP2100985-039	HEA0335P-B	EP005: Total Organic Carbon	----	1	mg/L	1	1	0.00	No Limit
EP2100985-021	HEC0022P-B	EP005: Total Organic Carbon	----	1	mg/L	2	1	0.00	No Limit
EP005: Total Organic Carbon (TOC) (QC Lot: 3495253)									
EP2100985-043	HEA0349P-B	EP005: Total Organic Carbon	----	1	mg/L	4	4	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3497245)									
EP2100985-034	QC09	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3497245)									
EP2100985-034	QC09	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 3497245)									
EP2100985-034	QC09	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
		EP080: ortho-Xylene	106-42-3	2	µg/L	<2	<2	0.00	No Limit

Page : 4 of 10
 Work Order : EP2100985
 Client : COFFEY ENVIRONMENTS PTY LTD
 Project : 754-PEREN282113 BHP Eastern Ridge PFAS



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP080: BTEXN (QC Lot: 3497245) - continued									
EP2100985-034	QC09	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (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 Spike (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: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3488652)									
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10 <10	2000 mg/L 1000 mg/L	99.9 100	88.1 88.1	114 114	
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3489410)									
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10 <10	2000 mg/L 1000 mg/L	101 99.0	88.1 88.1	114 114	
ED037P: Alkalinity by PC Titrator (QCLot: 3488462)									
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----	
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----	
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1 <1	20 mg/L 200 mg/L	103 104	81.2 90.0	126 110	
ED037P: Alkalinity by PC Titrator (QCLot: 3488463)									
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----	
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----	
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1 <1	20 mg/L 200 mg/L	107 110	81.2 90.0	126 110	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3488179)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1 <1	25 mg/L 500 mg/L	101 97.1	87.7 87.7	113 113	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3488330)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1 <1	25 mg/L 500 mg/L	98.1 93.1	87.7 87.7	113 113	
ED045G: Chloride by Discrete Analyser (QCLot: 3488178)									
ED045G: Chloride	16887-00-6	1	mg/L	<1 <1	10 mg/L 1000 mg/L	102 100	87.9 87.9	114 114	
ED045G: Chloride by Discrete Analyser (QCLot: 3488329)									
ED045G: Chloride	16887-00-6	1	mg/L	<1 <1	10 mg/L 1000 mg/L	98.8 98.1	87.9 87.9	114 114	
ED093F: Dissolved Major Cations (QCLot: 3489449)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.4	85.9	113	
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.8	88.0	110	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
ED093F: Dissolved Major Cations (QCLot: 3489449) - continued									
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.3	87.3	118	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.3	89.7	108	
ED093F: Dissolved Major Cations (QCLot: 3489450)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.8	85.9	113	
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.3	88.0	110	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	97.2	87.3	118	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.6	89.7	108	
EP005: Total Organic Carbon (TOC) (QCLot: 3495209)									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	112	87.2	116	
				<1	100 mg/L	106	87.2	116	
EP005: Total Organic Carbon (TOC) (QCLot: 3495253)									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	111	87.2	116	
				<1	100 mg/L	105	87.2	116	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3497245)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	93.5	73.6	113	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3497245)									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	94.5	73.9	115	
EP080: BTEXN (QCLot: 3497245)									
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	97.2	84.1	114	
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	102	81.0	115	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	98.7	84.4	113	
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	94.8	84.3	114	
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	89.8	86.5	111	
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	109	77.0	118	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3491245)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	77.2	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	78.4	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	83.2	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	86.4	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	82.0	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	61.6	53.0	142	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3491893)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	82.4	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	99.6	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	91.2	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	116	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	93.6	65.0	140	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3491893) - continued									
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	85.6	53.0	142	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3494196)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	83.2	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	79.2	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	88.0	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	89.6	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	82.0	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	73.2	53.0	142	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3491245)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	86.0	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	90.8	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	97.2	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	88.0	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	91.6	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	92.8	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	90.4	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	92.0	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	93.2	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	66.0	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	84.3	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3491893)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	99.5	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	101	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	107	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	93.6	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	100	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	96.8	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	97.6	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	109	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	116	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	87.6	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	89.8	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3494196)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	82.4	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	85.2	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	92.4	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	81.6	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	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3494196) - continued									
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	81.2	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	83.6	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	89.6	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	101	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	83.6	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	72.8	71.0	132	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3491245)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	88.4	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	99.4	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	87.7	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	80.8	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	80.5	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	88.4	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	84.0	61.0	135	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3491893)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	105	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	107	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	81.0	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	96.0	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	98.2	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	101	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	99.2	61.0	135	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3494196)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	82.0	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	101	68.0	141	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
				Result		LCS	Low	High	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3494196) - continued									
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	86.4	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	77.6	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	90.6	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	80.4	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	82.4	61.0	135	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3491245)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	76.8	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	91.6	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	100	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	68.0	60.9	136	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3491893)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	80.8	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	95.6	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	89.2	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	98.4	60.9	136	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3494196)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	93.6	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	85.6	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	111	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	82.8	60.9	136	
EP231P: PFAS Sums (QCLot: 3491245)									
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	----	----	----	----	
EP231P: PFAS Sums (QCLot: 3491893)									
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	----	----	----	----	
EP231P: PFAS Sums (QCLot: 3494196)									
EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/17 63-23-1	0.0002	µg/L	<0.0002	----	----	----	----	



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231P: PFAS Sums (QCLot: 3494196) - continued									
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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low High	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3488179)							
EP2100985-002	HEC0027P-B	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	109	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3488330)							
EP2100985-015	HNPIHS0048-B	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	115	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3488178)							
EP2100985-002	HEC0027P-B	ED045G: Chloride	16887-00-6	1000 mg/L	97.5	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3488329)							
EP2100985-015	HNPIHS0048-B	ED045G: Chloride	16887-00-6	1000 mg/L	95.4	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3495209)							
EP2100985-003	Sump 4	EP005: Total Organic Carbon	----	100 mg/L	102	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3495253)							
EP2101113-009	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	114	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3497245)							
EP2100985-035	QC10	EP080: C6 - C9 Fraction	----	240 µg/L	93.9	77.0	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3497245)							
EP2100985-035	QC10	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	85.4	77.0	137
EP080: BTEXN (QCLot: 3497245)							
EP2100985-035	QC10	EP080: Benzene	71-43-2	20 µg/L	99.8	77.0	122
		EP080: Toluene	108-88-3	20 µg/L	106	73.5	126

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2100985	Page	: 1 of 13
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Telephone	: 08 9406 1307
Project	: 754-PEREN282113 BHP Eastern Ridge PFAS	Date Samples Received	: 29-Jan-2021
Site	: ----	Issue Date	: 11-Feb-2021
Sampler	: Regan MacDonald, Steven Middleton	No. of samples received	: 43
Order number	: ----	No. of samples analysed	: 43

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **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

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

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



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C - Continued							
Clear Plastic Bottle - Natural (EA015H) HNPIOP0008P-B	28-Jan-2021	----	----	----	02-Feb-2021	04-Feb-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) HEC0022P-B, HEC0028P-B, HEC0047P-B, HEC0044P-B	25-Jan-2021	----	----	----	01-Feb-2021	08-Feb-2021	✓
Clear Plastic Bottle - Natural (ED037-P) HEC0027P-B, Sump 1, HEA0347P-B, HEA0346P-B, HEA0335P-B, HEA0336P-B, HEA0349P-B Sump 4, Sump 2, HEA0348P-B, HEA0335P-A, HEA0336P-A, HEA0349P-A,	26-Jan-2021	----	----	----	01-Feb-2021	09-Feb-2021	✓
Clear Plastic Bottle - Natural (ED037-P) HNPIHS0039-B, HNPIHS0013-B HNPIHS0048-B,	27-Jan-2021	----	----	----	01-Feb-2021	10-Feb-2021	✓
Clear Plastic Bottle - Natural (ED037-P) HNPIOP0008P-B	28-Jan-2021	----	----	----	01-Feb-2021	11-Feb-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) HEC0022P-B, HEC0028P-B, HEC0047P-B, HEC0044P-B	25-Jan-2021	----	----	----	02-Feb-2021	22-Feb-2021	✓
Clear Plastic Bottle - Natural (ED041G) HEC0027P-B, Sump 1, HEA0347P-B, HEA0346P-B Sump 4, Sump 2, HEA0348P-B,	26-Jan-2021	----	----	----	01-Feb-2021	23-Feb-2021	✓
Clear Plastic Bottle - Natural (ED041G) HEA0335P-A, HEA0336P-A, HEA0349P-A, HEA0335P-B, HEA0336P-B, HEA0349P-B	26-Jan-2021	----	----	----	02-Feb-2021	23-Feb-2021	✓
Clear Plastic Bottle - Natural (ED041G) HNPIHS0039-B	27-Jan-2021	----	----	----	01-Feb-2021	24-Feb-2021	✓
Clear Plastic Bottle - Natural (ED041G) HNPIHS0048-B, HNPIHS0013-B	27-Jan-2021	----	----	----	02-Feb-2021	24-Feb-2021	✓
Clear Plastic Bottle - Natural (ED041G) HNPIOP0008P-B	28-Jan-2021	----	----	----	02-Feb-2021	25-Feb-2021	✓



Matrix: WATER

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) HEC0022P-B, HEC0028P-B,	HEC0047P-B, HEC0044P-B	25-Jan-2021	----	----	----	02-Feb-2021	22-Feb-2021	✓
Clear Plastic Bottle - Natural (ED045G) HEC0027P-B, Sump 1, HEA0347P-B, HEA0346P-B	Sump 4, Sump 2, HEA0348P-B,	26-Jan-2021	----	----	----	01-Feb-2021	23-Feb-2021	✓
Clear Plastic Bottle - Natural (ED045G) HEA0335P-A, HEA0336P-A, HEA0349P-A,	HEA0335P-B, HEA0336P-B, HEA0349P-B	26-Jan-2021	----	----	----	02-Feb-2021	23-Feb-2021	✓
Clear Plastic Bottle - Natural (ED045G) HNPIHS0039-B		27-Jan-2021	----	----	----	01-Feb-2021	24-Feb-2021	✓
Clear Plastic Bottle - Natural (ED045G) HNPIHS0048-B,	HNPIHS0013-B	27-Jan-2021	----	----	----	02-Feb-2021	24-Feb-2021	✓
Clear Plastic Bottle - Natural (ED045G) HNPIOP0008P-B		28-Jan-2021	----	----	----	02-Feb-2021	25-Feb-2021	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) HEC0022P-B, HEC0028P-B,	HEC0047P-B, HEC0044P-B	25-Jan-2021	----	----	----	02-Feb-2021	01-Feb-2021	*
Clear Plastic Bottle - Natural (ED093F) HEC0027P-B, Sump 1, HEA0347P-B, HEA0346P-B, HEA0335P-B, HEA0336P-B, HEA0349P-B	Sump 4, Sump 2, HEA0348P-B, HEA0335P-A, HEA0336P-A, HEA0349P-A,	26-Jan-2021	----	----	----	02-Feb-2021	02-Feb-2021	✓
Clear Plastic Bottle - Natural (ED093F) HNPIHS0039-B, HNPIHS0013-B	HNPIHS0048-B,	27-Jan-2021	----	----	----	02-Feb-2021	03-Feb-2021	✓
Clear Plastic Bottle - Natural (ED093F) HNPIOP0008P-B		28-Jan-2021	----	----	----	02-Feb-2021	04-Feb-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005) HEC0022P-B, HEC0028P-B,	HEC0047P-B, HEC0044P-B	25-Jan-2021	----	----	----	04-Feb-2021	22-Feb-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005) HEC0027P-B, Sump 1, HEA0347P-B, HEA0346P-B, HEA0335P-B, HEA0336P-B,	Sump 4, Sump 2, HEA0348P-B, HEA0335P-A, HEA0336P-A, HEA0349P-A	26-Jan-2021	----	----	----	04-Feb-2021	23-Feb-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005) HEA0349P-B		26-Jan-2021	----	----	----	10-Feb-2021	23-Feb-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005) HNPIHS0039-B, HNPIHS0013-B	HNPIHS0048-B,	27-Jan-2021	----	----	----	04-Feb-2021	24-Feb-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005) HNPIOP0008P-B		28-Jan-2021	----	----	----	04-Feb-2021	25-Feb-2021	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080) QC09,	QC10	28-Jan-2021	08-Feb-2021	11-Feb-2021	✓	08-Feb-2021	11-Feb-2021	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080) QC09,	QC10	28-Jan-2021	08-Feb-2021	11-Feb-2021	✓	08-Feb-2021	11-Feb-2021	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) QC09,	QC10	28-Jan-2021	08-Feb-2021	11-Feb-2021	✓	08-Feb-2021	11-Feb-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT) QC02, HEC0022P-B, HEC0047P-B, HEC0028P-B, HEC0044P-B	HEC0022P-A, HEC0047P-A, HEC0028P-A, HEC0044P-A,	25-Jan-2021	03-Feb-2021	24-Jul-2021	✓	03-Feb-2021	24-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC01		25-Jan-2021	03-Feb-2021	24-Jul-2021	✓	04-Feb-2021	24-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC03,	QC04	26-Jan-2021	03-Feb-2021	25-Jul-2021	✓	03-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEC0027P-A, Sump 4, Sump 2, HEA0347P-B, HEA0348P-B, HEA0346P-B	HEC0027P-B, Sump 1, HEA0347P-A, HEA0348P-A, HEA0346P-A,	26-Jan-2021	03-Feb-2021	25-Jul-2021	✓	04-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEA0335P-A, HEA0336P-A, HEA0349P-A,	HEA0335P-B, HEA0336P-B, HEA0349P-B	26-Jan-2021	04-Feb-2021	25-Jul-2021	✓	05-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC05,	QC06	27-Jan-2021	03-Feb-2021	26-Jul-2021	✓	03-Feb-2021	26-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIHS0039-A, HNPIHS0048-A, HNPIHS0013-B,	HNPIHS0039-B, HNPIHS0048-B, HNPIHS0013-A	27-Jan-2021	03-Feb-2021	26-Jul-2021	✓	04-Feb-2021	26-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC07		28-Jan-2021	03-Feb-2021	27-Jul-2021	✓	03-Feb-2021	27-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC08, HNPIOP0008P-B	HNPIOP0008P-A,	28-Jan-2021	04-Feb-2021	27-Jul-2021	✓	05-Feb-2021	27-Jul-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X-SUT) QC02, HEC0022P-B, HEC0047P-B, HEC0028P-B, HEC0044P-B	HEC0022P-A, HEC0047P-A, HEC0028P-A, HEC0044P-A,	25-Jan-2021	03-Feb-2021	24-Jul-2021	✓	03-Feb-2021	24-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC01		25-Jan-2021	03-Feb-2021	24-Jul-2021	✓	04-Feb-2021	24-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC03,	QC04	26-Jan-2021	03-Feb-2021	25-Jul-2021	✓	03-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEC0027P-A, Sump 4, Sump 2, HEA0347P-B, HEA0348P-B, HEA0346P-B	HEC0027P-B, Sump 1, HEA0347P-A, HEA0348P-A, HEA0346P-A,	26-Jan-2021	03-Feb-2021	25-Jul-2021	✓	04-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEA0335P-A, HEA0336P-A, HEA0349P-A,	HEA0335P-B, HEA0336P-B, HEA0349P-B	26-Jan-2021	04-Feb-2021	25-Jul-2021	✓	05-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC05,	QC06	27-Jan-2021	03-Feb-2021	26-Jul-2021	✓	03-Feb-2021	26-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIHS0039-A, HNPIHS0048-A, HNPIHS0013-B,	HNPIHS0039-B, HNPIHS0048-B, HNPIHS0013-A	27-Jan-2021	03-Feb-2021	26-Jul-2021	✓	04-Feb-2021	26-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC07		28-Jan-2021	03-Feb-2021	27-Jul-2021	✓	03-Feb-2021	27-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC08, HNPIOP0008P-B	HNPIOP0008P-A,	28-Jan-2021	04-Feb-2021	27-Jul-2021	✓	05-Feb-2021	27-Jul-2021	✓



Matrix: WATER

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X-SUT) QC02, HEC0022P-B, HEC0047P-B, HEC0028P-B, HEC0044P-B	HEC0022P-A, HEC0047P-A, HEC0028P-A, HEC0044P-A,	25-Jan-2021	03-Feb-2021	24-Jul-2021	✓	03-Feb-2021	24-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC01		25-Jan-2021	03-Feb-2021	24-Jul-2021	✓	04-Feb-2021	24-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC03,	QC04	26-Jan-2021	03-Feb-2021	25-Jul-2021	✓	03-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEC0027P-A, Sump 4, Sump 2, HEA0347P-B, HEA0348P-B, HEA0346P-B	HEC0027P-B, Sump 1, HEA0347P-A, HEA0348P-A, HEA0346P-A,	26-Jan-2021	03-Feb-2021	25-Jul-2021	✓	04-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEA0335P-A, HEA0336P-A, HEA0349P-A,	HEA0335P-B, HEA0336P-B, HEA0349P-B	26-Jan-2021	04-Feb-2021	25-Jul-2021	✓	05-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC05,	QC06	27-Jan-2021	03-Feb-2021	26-Jul-2021	✓	03-Feb-2021	26-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIHS0039-A, HNPIHS0048-A, HNPIHS0013-B,	HNPIHS0039-B, HNPIHS0048-B, HNPIHS0013-A	27-Jan-2021	03-Feb-2021	26-Jul-2021	✓	04-Feb-2021	26-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC07		28-Jan-2021	03-Feb-2021	27-Jul-2021	✓	03-Feb-2021	27-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC08, HNPIOP0008P-B	HNPIOP0008P-A,	28-Jan-2021	04-Feb-2021	27-Jul-2021	✓	05-Feb-2021	27-Jul-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT) QC02, HEC0022P-B, HEC0047P-B, HEC0028P-B, HEC0044P-B	HEC0022P-A, HEC0047P-A, HEC0028P-A, HEC0044P-A,	25-Jan-2021	03-Feb-2021	24-Jul-2021	✓	03-Feb-2021	24-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC01		25-Jan-2021	03-Feb-2021	24-Jul-2021	✓	04-Feb-2021	24-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC03,	QC04	26-Jan-2021	03-Feb-2021	25-Jul-2021	✓	03-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEC0027P-A, Sump 4, Sump 2, HEA0347P-B, HEA0348P-B, HEA0346P-B	HEC0027P-B, Sump 1, HEA0347P-A, HEA0348P-A, HEA0346P-A,	26-Jan-2021	03-Feb-2021	25-Jul-2021	✓	04-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEA0335P-A, HEA0336P-A, HEA0349P-A,	HEA0335P-B, HEA0336P-B, HEA0349P-B	26-Jan-2021	04-Feb-2021	25-Jul-2021	✓	05-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC05,	QC06	27-Jan-2021	03-Feb-2021	26-Jul-2021	✓	03-Feb-2021	26-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIHS0039-A, HNPIHS0048-A, HNPIHS0013-B,	HNPIHS0039-B, HNPIHS0048-B, HNPIHS0013-A	27-Jan-2021	03-Feb-2021	26-Jul-2021	✓	04-Feb-2021	26-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC07		28-Jan-2021	03-Feb-2021	27-Jul-2021	✓	03-Feb-2021	27-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC08, HNPIOP0008P-B	HNPIOP0008P-A,	28-Jan-2021	04-Feb-2021	27-Jul-2021	✓	05-Feb-2021	27-Jul-2021	✓



Matrix: WATER

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X-SUT) QC02, HEC0022P-B, HEC0047P-B, HEC0028P-B, HEC0044P-B	HEC0022P-A, HEC0047P-A, HEC0028P-A, HEC0044P-A,	25-Jan-2021	03-Feb-2021	24-Jul-2021	✓	03-Feb-2021	24-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC01		25-Jan-2021	03-Feb-2021	24-Jul-2021	✓	04-Feb-2021	24-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC03,	QC04	26-Jan-2021	03-Feb-2021	25-Jul-2021	✓	03-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEC0027P-A, Sump 4, Sump 2, HEA0347P-B, HEA0348P-B, HEA0346P-B	HEC0027P-B, Sump 1, HEA0347P-A, HEA0348P-A, HEA0346P-A,	26-Jan-2021	03-Feb-2021	25-Jul-2021	✓	04-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEA0335P-A, HEA0336P-A, HEA0349P-A,	HEA0335P-B, HEA0336P-B, HEA0349P-B	26-Jan-2021	04-Feb-2021	25-Jul-2021	✓	05-Feb-2021	25-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC05,	QC06	27-Jan-2021	03-Feb-2021	26-Jul-2021	✓	03-Feb-2021	26-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIHS0039-A, HNPIHS0048-A, HNPIHS0013-B,	HNPIHS0039-B, HNPIHS0048-B, HNPIHS0013-A	27-Jan-2021	03-Feb-2021	26-Jul-2021	✓	04-Feb-2021	26-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC07		28-Jan-2021	03-Feb-2021	27-Jul-2021	✓	03-Feb-2021	27-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC08, HNPIOP0008P-B	HNPIOP0008P-A,	28-Jan-2021	04-Feb-2021	27-Jul-2021	✓	05-Feb-2021	27-Jul-2021	✓



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	3	21	14.29	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	32	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	4	38	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	41	0.00	10.00	✖	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	29	13.79	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	3	21	14.29	10.53	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	3	22	13.64	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	21	19.05	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	4	32	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	38	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	3	41	7.32	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	4	29	13.79	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	4	21	19.05	10.53	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	4	22	18.18	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	21	9.52	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	32	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	38	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	3	41	7.32	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	29	6.90	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	21	9.52	5.26	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	22	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	32	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	0	41	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	29	6.90	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	22	9.09	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



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
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with 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.

Page : 13 of 13
Work Order : EP2100985
Client : COFFEY ENVIRONMENTS PTY LTD
Project : 754-PEREN282113 BHP Eastern Ridge PFAS



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST



Consigning Office:

Report Results to:

Invoices to:

Mobile:

Email:

@coffey.com

Phone:

Email:

@coffey.com

Project No: 754-PERENV282113

Task No:

Project Name: BHP Eastern Ridge PPHS Assessment

Laboratory: ALS

Sampler's Name: SM RM

Project Manager: Mosley Alpert

Quote number (if different to current quoted prices):

Special Instructions:

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	Quart.	PPHS ONLY	Quote (no nutrients)	NOTES
17	QC19	31/01/21	7:15	water	various	stol.				
18	QC20		7:15							
19	QC21		13:30							
20	HNP10P0018P-B		10:25							
21	HNP10P0018P-A		10:20							(no nutrients)
22	OPHSW01		13:30					X		
23	RPSW01		14:30					X		
24	RPSW02		14:30					X		Lab Prep
25	RPSW03		14:35					X		
26	RPSW04		14:45					X		
27	HECO318M1	01/02/21	11:47					X		
28	HHS0106P		11:14					X		
29	HST1536RM		11:00					X		
30	HHS0042M		10:13					X		Lab Prep
31	HST1782RM		11:00					X		
32	MW06		7:40 7:50					X		

RELINQUISHED BY

RECEIVED BY

Name: _____ Date: 01/02/21 →
 Coffey
 Name: _____ Date: _____ →
 Company: _____ Time: _____

Name: R Stone Date: 2/2/21
 Company: _____ Time: 1150
 Name: _____ Date: _____
 Company: _____ Time: _____

Sample Receipt Advice: (Lab Use Only)

- All Samples Received in Good Condition
- All Documentation is in Proper Order
- Samples Received Properly Chilled

Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2101036

Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: wesley.alport@coffey.com	E-mail	: Lauren.biagioni@alsglobal.com
Telephone	: 61 8 6218 2100	Telephone	: 08 9406 1307
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: 754-PEREN282113 BHP Eastern Ridge PFAS Assessment	Page	: 1 of 3
Order number	: ----	Quote number	: EP2020COFENVWA0039_V2 (EP/991/20_V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Regan MacDonald, Steven Middleton		

Dates

Date Samples Received	: 02-Feb-2021 11:50	Issue Date	: 02-Feb-2021
Client Requested Due Date	: 10-Feb-2021	Scheduled Reporting Date	: 10-Feb-2021

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 26.5 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 42 / 42

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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: 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.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **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.



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

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EP005 Total Organic Carbon (TOC)	WATER - EP231X-SUT PFAS - Super Ultra Trace Waters Long Suite (29 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - W-18 TRH(C6 - C9)/BTEXN
EP2101036-001	28-Jan-2021 14:55	HNPIOP0011P-A			✓	
EP2101036-002	28-Jan-2021 15:00	HNPIOP0011P-B	✓	✓	✓	✓
EP2101036-003	29-Jan-2021 10:30	HNPIOP0030P-A			✓	
EP2101036-004	29-Jan-2021 10:35	HNPIOP0030P-B	✓	✓	✓	✓
EP2101036-005	29-Jan-2021 10:55	HNPIOP0031P-A			✓	
EP2101036-006	29-Jan-2021 11:00	HNPIOP0031P-B	✓	✓	✓	✓
EP2101036-007	29-Jan-2021 14:10	HHS0052M	✓	✓	✓	✓
EP2101036-008	29-Jan-2021 13:50	HHS0053M			✓	
EP2101036-009	29-Jan-2021 10:35	QC11	✓	✓	✓	✓
EP2101036-010	29-Jan-2021 17:00	QC13			✓	
EP2101036-011	29-Jan-2021 17:00	QC14			✓	
EP2101036-012	30-Jan-2021 12:00	HNPIOP0012P-A			✓	
EP2101036-013	30-Jan-2021 12:05	HNPIOP0012P-B	✓	✓	✓	✓
EP2101036-014	30-Jan-2021 11:50	QC15	✓	✓	✓	✓
EP2101036-015	30-Jan-2021 17:30	QC17			✓	
EP2101036-016	30-Jan-2021 17:30	QC18			✓	
EP2101036-017	31-Jan-2021 07:15	QC19			✓	
EP2101036-018	31-Jan-2021 07:15	QC20			✓	
EP2101036-019	31-Jan-2021 13:30	QC21			✓	
EP2101036-020	31-Jan-2021 10:25	HNPIOP0018P-B	✓	✓	✓	✓
EP2101036-021	31-Jan-2021 10:20	HNPIOP0018P-A			✓	
EP2101036-022	31-Jan-2021 13:30	OPHSW01	✓	✓	✓	✓
EP2101036-023	31-Jan-2021 14:30	RPSW01			✓	
EP2101036-024	31-Jan-2021 14:30	RPSW02			✓	
EP2101036-025	31-Jan-2021 14:35	RPSW03			✓	
EP2101036-026	31-Jan-2021 14:45	RPSW04			✓	
EP2101036-027	01-Feb-2021 11:47	HECO318M1			✓	
EP2101036-028	01-Feb-2021 11:14	HHS0106P			✓	
EP2101036-029	01-Feb-2021 11:00	HST1536RM			✓	
EP2101036-030	01-Feb-2021 10:13	HHS0042M	✓	✓	✓	✓
EP2101036-031	01-Feb-2021 11:00	HST1782RM			✓	
EP2101036-032	01-Feb-2021 07:50	MW06	✓	✓	✓	✓
EP2101036-033	01-Feb-2021 07:40	MW01a	✓	✓	✓	✓
EP2101036-034	01-Feb-2021 08:00	MW07	✓	✓	✓	✓
EP2101036-035	01-Feb-2021 09:35	QC23			✓	



			WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EP005 Total Organic Carbon (TOC)	WATER - EP231X-SUT PFAS - Super Ultra Trace Waters Long Suite (29)	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - W-18 TRH(C6 - C9)/BTEXN
EP2101036-036	01-Feb-2021 11:50	QC25			✓		
EP2101036-037	01-Feb-2021 13:10	QC27			✓		
EP2101036-038	01-Feb-2021 13:15	QC28			✓		
EP2101036-039	01-Feb-2021 13:20	QC29					✓
EP2101036-040	01-Feb-2021 13:20	QC30					✓
EP2101036-041	01-Feb-2021 09:30	HHS0027M			✓		
EP2101036-042	01-Feb-2021 09:50	HHS0029M			✓		

Proactive Holding Time Report

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

Requested Deliverables

ACCOUNTS PAYABLE (BURSWOOD)

- A4 - AU Tax Invoice (INV) Email accounts.burb@coffey.com

Accounts Perth

- A4 - AU Tax Invoice (INV) Email Accounts.Perth@coffey.com

Regan MacDonald

- *AU Certificate of Analysis - NATA (COA) Email regan.macdonald@coffey.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email regan.macdonald@coffey.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email regan.macdonald@coffey.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email regan.macdonald@coffey.com
- Chain of Custody (CoC) (COC) Email regan.macdonald@coffey.com
- EDI Format - ENMRG (ENMRG) Email regan.macdonald@coffey.com
- EDI Format - ESDAT (ESDAT) Email regan.macdonald@coffey.com
- EDI Format - XTab (XTAB) Email regan.macdonald@coffey.com

Steven Middleton

- *AU Certificate of Analysis - NATA (COA) Email Steven.Middleton@coffey.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email Steven.Middleton@coffey.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email Steven.Middleton@coffey.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email Steven.Middleton@coffey.com
- Chain of Custody (CoC) (COC) Email Steven.Middleton@coffey.com
- EDI Format - ENMRG (ENMRG) Email Steven.Middleton@coffey.com
- EDI Format - ESDAT (ESDAT) Email Steven.Middleton@coffey.com
- EDI Format - XTab (XTAB) Email Steven.Middleton@coffey.com

WESLEY ALPORT

- *AU Certificate of Analysis - NATA (COA) Email wesley.alport@coffey.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email wesley.alport@coffey.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email wesley.alport@coffey.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email wesley.alport@coffey.com
- Chain of Custody (CoC) (COC) Email wesley.alport@coffey.com
- EDI Format - ENMRG (ENMRG) Email wesley.alport@coffey.com
- EDI Format - ESDAT (ESDAT) Email wesley.alport@coffey.com
- EDI Format - XTab (XTAB) Email wesley.alport@coffey.com

CERTIFICATE OF ANALYSIS

Work Order : **EP2101036**
Client : **COFFEY ENVIRONMENTS PTY LTD**
Contact : WESLEY ALPORT
Address : Level 1, Bishop See 235 St Georges Terrace
 Perth WA, AUSTRALIA 6000
Telephone : 61 8 6218 2100
Project : 754-PEREN282113 BHP Eastern Ridge PFAS Assessment
Order number : ----
C-O-C number : ----
Sampler : Regan MacDonald, Steven Middleton
Site : ----
Quote number : EP/991/20_V2
No. of samples received : 42
No. of samples analysed : 42

Page : 1 of 29
Laboratory : Environmental Division Perth
Contact : Lauren Biagioni
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : 08 9406 1307
Date Samples Received : 02-Feb-2021 11:50
Date Analysis Commenced : 02-Feb-2021
Issue Date : 10-Feb-2021 08:20



Accreditation No. 825
 Accredited for compliance with
 ISO/IEC 17025 - Testing

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

This 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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



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.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP231X: PFAS results for sample #35, #36 confirmed by re-extraction and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- 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.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIOP0011P-A	HNPIOP0011P-B	HNPIOP0030P-A	HNPIOP0030P-B	HNPIOP0031P-A
Sampling date / time				28-Jan-2021 14:55	28-Jan-2021 15:00	29-Jan-2021 10:30	29-Jan-2021 10:35	29-Jan-2021 10:55	
Compound	CAS Number	LOR	Unit	EP2101036-001	EP2101036-002	EP2101036-003	EP2101036-004	EP2101036-005	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	773	----	1230	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	----	<1	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	----	<1	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	302	----	340	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	302	----	340	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	137	----	227	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	177	----	354	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	62	----	80	----	
Magnesium	7439-95-4	1	mg/L	----	70	----	96	----	
Sodium	7440-23-5	1	mg/L	----	102	----	188	----	
Potassium	7440-09-7	1	mg/L	----	6	----	9	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	13.9	----	21.5	----	
∅ Total Cations	----	0.01	meq/L	----	13.4	----	20.3	----	
∅ Ionic Balance	----	0.01	%	----	1.59	----	2.88	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	4	----	3	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0009	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0006	0.0007	<0.0002	<0.0002	0.0012	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIOP0011P-A	HNPIOP0011P-B	HNPIOP0030P-A	HNPIOP0030P-B	HNPIOP0031P-A
Sampling date / time				28-Jan-2021 14:55	28-Jan-2021 15:00	29-Jan-2021 10:30	29-Jan-2021 10:35	29-Jan-2021 10:55	
Compound	CAS Number	LOR	Unit	EP2101036-001	EP2101036-002	EP2101036-003	EP2101036-004	EP2101036-005	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonylamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIOP0011P-A	HNPIOP0011P-B	HNPIOP0030P-A	HNPIOP0030P-B	HNPIOP0031P-A
Sampling date / time				28-Jan-2021 14:55	28-Jan-2021 15:00	29-Jan-2021 10:30	29-Jan-2021 10:35	29-Jan-2021 10:55	
Compound	CAS Number	LOR	Unit	EP2101036-001	EP2101036-002	EP2101036-003	EP2101036-004	EP2101036-005	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0006	0.0007	<0.0002	<0.0002	0.0012	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0006	0.0007	<0.0002	<0.0002	0.0021	
^ Sum of PFAS	----	0.0002	µg/L	0.0006	0.0007	<0.0002	<0.0002	0.0021	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	113	116	108	108	115	
13C8-PFOA	----	0.0005	%	114	110	118	111	119	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIOP0031P-B	HHS0052M	HHS0053M	QC11	QC13
Sampling date / time				29-Jan-2021 11:00	29-Jan-2021 14:10	29-Jan-2021 13:50	29-Jan-2021 10:35	29-Jan-2021 17:00	
Compound	CAS Number	LOR	Unit	EP2101036-006	EP2101036-007	EP2101036-008	EP2101036-009	EP2101036-010	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	1220	820	----	1180	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	<1	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	<1	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	310	385	----	331	----	
Total Alkalinity as CaCO3	----	1	mg/L	310	385	----	331	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	235	100	----	229	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	392	199	----	349	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	55	80	----	76	----	
Magnesium	7439-95-4	1	mg/L	72	83	----	95	----	
Sodium	7440-23-5	1	mg/L	272	98	----	188	----	
Potassium	7440-09-7	1	mg/L	9	9	----	9	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	22.1	15.4	----	21.2	----	
∅ Total Cations	----	0.01	meq/L	20.7	15.3	----	20.0	----	
∅ Ionic Balance	----	0.01	%	3.29	0.23	----	2.93	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	7	7	----	2	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0010	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0010	<0.0002	0.0010	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIOP0031P-B	HHS0052M	HHS0053M	QC11	QC13
Sampling date / time				29-Jan-2021 11:00	29-Jan-2021 14:10	29-Jan-2021 13:50	29-Jan-2021 10:35	29-Jan-2021 17:00	
Compound	CAS Number	LOR	Unit	EP2101036-006	EP2101036-007	EP2101036-008	EP2101036-009	EP2101036-010	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonylamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIOP0031P-B	HHS0052M	HHS0053M	QC11	QC13
Sampling date / time				29-Jan-2021 11:00	29-Jan-2021 14:10	29-Jan-2021 13:50	29-Jan-2021 10:35	29-Jan-2021 17:00	
Compound	CAS Number	LOR	Unit	EP2101036-006	EP2101036-007	EP2101036-008	EP2101036-009	EP2101036-010	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0010	<0.0002	0.0010	<0.0002	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0020	<0.0002	0.0010	<0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	0.0020	<0.0002	0.0010	<0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	112	118	115	112	106	
13C8-PFOA	----	0.0005	%	115	114	119	113	117	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC14	HNPIOP0012P-A	HNPIOP0012P-B	QC15	QC17
Sampling date / time				29-Jan-2021 17:00	30-Jan-2021 12:00	30-Jan-2021 12:05	30-Jan-2021 11:50	30-Jan-2021 17:30	
Compound	CAS Number	LOR	Unit	EP2101036-011	EP2101036-012	EP2101036-013	EP2101036-014	EP2101036-015	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	----	945	936	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	<1	<1	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	<1	<1	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	304	277	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	----	304	277	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	156	157	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	----	268	269	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	----	75	74	----	
Magnesium	7439-95-4	1	mg/L	----	----	75	74	----	
Sodium	7440-23-5	1	mg/L	----	----	130	128	----	
Potassium	7440-09-7	1	mg/L	----	----	8	8	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	----	16.9	16.4	----	
∅ Total Cations	----	0.01	meq/L	----	----	15.8	15.6	----	
∅ Ionic Balance	----	0.01	%	----	----	3.39	2.62	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	----	2	3	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.0007	0.0008	0.0008	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC14	HNPIOP0012P-A	HNPIOP0012P-B	QC15	QC17
Sampling date / time					29-Jan-2021 17:00	30-Jan-2021 12:00	30-Jan-2021 12:05	30-Jan-2021 11:50	30-Jan-2021 17:30
Compound	CAS Number	LOR	Unit		EP2101036-011	EP2101036-012	EP2101036-013	EP2101036-014	EP2101036-015
					Result	Result	Result	Result	Result
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L		<0.001	<0.001	<0.001	<0.001	<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	<0.001
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L		<0.0002	0.0007	0.0008	0.0008	<0.0002
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L		<0.0002	0.0007	0.0008	0.0008	<0.0002
^ Sum of PFAS	----	0.0002	µg/L		<0.0002	0.0007	0.0008	0.0008	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%		103	106	118	116	120
13C8-PFOA	----	0.0005	%		115	115	114	110	107



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC18	QC19	QC20	QC21	HNPIOP0018P-B
Sampling date / time				30-Jan-2021 17:30	31-Jan-2021 07:15	31-Jan-2021 07:15	31-Jan-2021 13:30	31-Jan-2021 10:25	
Compound	CAS Number	LOR	Unit	EP2101036-016	EP2101036-017	EP2101036-018	EP2101036-019	EP2101036-020	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	----	871	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	----	----	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	----	----	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	----	----	347	
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	----	347	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	----	151	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	----	----	----	217	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	----	----	----	85	
Magnesium	7439-95-4	1	mg/L	----	----	----	----	88	
Sodium	7440-23-5	1	mg/L	----	----	----	----	98	
Potassium	7440-09-7	1	mg/L	----	----	----	----	7	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	----	----	----	16.2	
∅ Total Cations	----	0.01	meq/L	----	----	----	----	15.9	
∅ Ionic Balance	----	0.01	%	----	----	----	----	0.85	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	----	----	----	6	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0008	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0048	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<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	0.0027	0.0046	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC18	QC19	QC20	QC21	HNPIOP0018P-B
Sampling date / time				30-Jan-2021 17:30	31-Jan-2021 07:15	31-Jan-2021 07:15	31-Jan-2021 13:30	31-Jan-2021 10:25	
Compound	CAS Number	LOR	Unit	EP2101036-016	EP2101036-017	EP2101036-018	EP2101036-019	EP2101036-020	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0027	0.0094	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0027	0.0107	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0027	0.0114	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	120	119	120	114	115	
13C8-PFOA	----	0.0005	%	111	110	111	115	109	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIOP0018P-A	OPHSW01	RPSW01	RPSW02	RPSW03
Sampling date / time				31-Jan-2021 10:20	31-Jan-2021 13:30	31-Jan-2021 14:30	31-Jan-2021 14:30	31-Jan-2021 14:35	
Compound	CAS Number	LOR	Unit	EP2101036-021	EP2101036-022	EP2101036-023	EP2101036-024	EP2101036-025	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	448	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	17	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	122	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	139	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	57	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	154	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	21	----	----	----	
Magnesium	7439-95-4	1	mg/L	----	40	----	----	----	
Sodium	7440-23-5	1	mg/L	----	78	----	----	----	
Potassium	7440-09-7	1	mg/L	----	14	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	8.31	----	----	----	
∅ Total Cations	----	0.01	meq/L	----	8.09	----	----	----	
∅ Ionic Balance	----	0.01	%	----	1.32	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	8	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0006	<0.0005	<0.0005	0.0006	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0045	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0046	0.0024	0.0007	0.0010	0.0022	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIOP0018P-A	OPHSW01	RPSW01	RPSW02	RPSW03
Sampling date / time				31-Jan-2021 10:20	31-Jan-2021 13:30	31-Jan-2021 14:30	31-Jan-2021 14:30	31-Jan-2021 14:35	
Compound	CAS Number	LOR	Unit	EP2101036-021	EP2101036-022	EP2101036-023	EP2101036-024	EP2101036-025	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0091	0.0024	0.0007	0.0010	0.0022	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0097	0.0024	0.0007	0.0016	0.0022	
^ Sum of PFAS	----	0.0002	µg/L	0.0103	0.0024	0.0007	0.0016	0.0022	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	104	103	102	111	101	
13C8-PFOA	----	0.0005	%	95.8	107	90.1	95.1	89.3	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RPSW04	HECO318M1	HHS0106P	HST1536RM	HHS0042M
Sampling date / time				31-Jan-2021 14:45	01-Feb-2021 11:47	01-Feb-2021 11:14	01-Feb-2021 11:00	01-Feb-2021 10:13	
Compound	CAS Number	LOR	Unit	EP2101036-026	EP2101036-027	EP2101036-028	EP2101036-029	EP2101036-030	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.0013	<0.0005	<0.0005	<0.0005	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.002	<0.001	<0.001	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.003	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RPSW04	HECO318M1	HHS0106P	HST1536RM	HHS0042M
Sampling date / time					31-Jan-2021 14:45	01-Feb-2021 11:47	01-Feb-2021 11:14	01-Feb-2021 11:00	01-Feb-2021 10:13
Compound	CAS Number	LOR	Unit	EP2101036-026	EP2101036-027	EP2101036-028	EP2101036-029	EP2101036-030	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<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	<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	<0.0002	<0.0002
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	0.0013	<0.0002	<0.0002	<0.0002	<0.0002
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	0.0063	<0.0002	<0.0002	<0.0002	<0.0002
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	114	86.8	116	103	110	
13C8-PFOA	----	0.0005	%	90.2	107	95.2	85.9	99.7	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HST1782RM	MW06	MW01a	MW07	QC23
Sampling date / time				01-Feb-2021 11:00	01-Feb-2021 07:50	01-Feb-2021 07:40	01-Feb-2021 08:00	01-Feb-2021 09:35	
Compound	CAS Number	LOR	Unit	EP2101036-031	EP2101036-032	EP2101036-033	EP2101036-034	EP2101036-035	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	817	638	702	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	<1	<1	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	<1	<1	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	276	317	346	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	276	317	346	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	184	87	88	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	161	132	149	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	65	63	67	----	
Magnesium	7439-95-4	1	mg/L	----	53	67	72	----	
Sodium	7440-23-5	1	mg/L	----	128	75	70	----	
Potassium	7440-09-7	1	mg/L	----	16	9	8	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	13.9	11.9	12.9	----	
∅ Total Cations	----	0.01	meq/L	----	13.6	12.2	12.5	----	
∅ Ionic Balance	----	0.01	%	----	1.11	1.17	1.69	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	3	4	12	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.0002	0.0008	0.0002	0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HST1782RM	MW06	MW01a	MW07	QC23
Sampling date / time				01-Feb-2021 11:00	01-Feb-2021 07:50	01-Feb-2021 07:40	01-Feb-2021 08:00	01-Feb-2021 09:35	
Compound	CAS Number	LOR	Unit	EP2101036-031	EP2101036-032	EP2101036-033	EP2101036-034	EP2101036-035	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	0.0002	0.0008	0.0002	0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	0.0002	0.0008	0.0039	0.0002	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	0.0002	0.0008	0.0039	0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	117	116	117	120	115	
13C8-PFOA	----	0.0005	%	113	111	111	109	110	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC25	QC27	QC28	QC29	QC30
Sampling date / time				01-Feb-2021 11:50	01-Feb-2021 13:10	01-Feb-2021 13:15	01-Feb-2021 13:20	01-Feb-2021 13:20	
Compound	CAS Number	LOR	Unit	EP2101036-036	EP2101036-037	EP2101036-038	EP2101036-039	EP2101036-040	
				Result	Result	Result	Result	Result	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	----	----	----	<20	<20	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	----	<20	<20	
[^] C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	----	----	----	<20	<20	
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	----	----	----	<1	<1	
Toluene	108-88-3	2	µg/L	----	----	----	<2	<2	
Ethylbenzene	100-41-4	2	µg/L	----	----	----	<2	<2	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	----	<2	<2	
ortho-Xylene	95-47-6	2	µg/L	----	----	----	<2	<2	
[^] Total Xylenes	----	2	µg/L	----	----	----	<2	<2	
[^] Sum of BTEX	----	1	µg/L	----	----	----	<1	<1	
Naphthalene	91-20-3	5	µg/L	----	----	----	<5	<5	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	----	----	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	<0.0020	----	----	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0016	<0.0005	<0.0005	----	----	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC25	QC27	QC28	QC29	QC30
Sampling date / time					01-Feb-2021 11:50	01-Feb-2021 13:10	01-Feb-2021 13:15	01-Feb-2021 13:20	01-Feb-2021 13:20
Compound	CAS Number	LOR	Unit	EP2101036-036	EP2101036-037	EP2101036-038	EP2101036-039	EP2101036-040	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<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	----	----	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	<0.001	----	----	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	----	----	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	<0.001	----	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<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	----	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<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	<0.001	----	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	----	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	----	----	
EP231P: PFAS Sums									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC25	QC27	QC28	QC29	QC30
Sampling date / time				01-Feb-2021 11:50	01-Feb-2021 13:10	01-Feb-2021 13:15	01-Feb-2021 13:20	01-Feb-2021 13:20	
Compound	CAS Number	LOR	Unit	EP2101036-036	EP2101036-037	EP2101036-038	EP2101036-039	EP2101036-040	
				Result	Result	Result	Result	Result	
EP231P: PFAS Sums - Continued									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	----	----	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0016	<0.0002	<0.0002	----	----	
^ Sum of PFAS	----	0.0002	µg/L	0.0016	<0.0002	<0.0002	----	----	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	----	----	----	89.3	88.8	
Toluene-D8	2037-26-5	2	%	----	----	----	104	102	
4-Bromofluorobenzene	460-00-4	2	%	----	----	----	85.4	83.8	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	114	120	114	----	----	
13C8-PFOA	----	0.0005	%	107	115	112	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HHS0027M	HHS0029M	----	----	----
				Sampling date / time	01-Feb-2021 09:30	01-Feb-2021 09:50	----	----	----
Compound	CAS Number	LOR	Unit	EP2101036-041	EP2101036-042	-----	-----	-----	
				Result	Result	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.0417	----	----	----	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0002	0.0007	----	----	----	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	----	----	----	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.0026	----	----	----	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.0017	----	----	----	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.0018	----	----	----	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.0015	----	----	----	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.0005	----	----	----	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.0007	----	----	----	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	----	----	----	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	----	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HHS0027M	HHS0029M	----	----	----
Sampling date / time				01-Feb-2021 09:30	01-Feb-2021 09:50	----	----	----	
Compound	CAS Number	LOR	Unit	EP2101036-041	EP2101036-042	-----	-----	-----	
				Result	Result	----	----	----	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	----	----	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	----	----	----	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	----	----	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	----	----	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	----	----	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	----	----	----	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0002	0.0007	----	----	----	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0002	0.0500	----	----	----	
^ Sum of PFAS	----	0.0002	µg/L	0.0002	0.0512	----	----	----	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	114	115	----	----	----	
13C8-PFOA	----	0.0005	%	109	108	----	----	----	



Surrogate Control Limits

Sub-Matrix: WATER		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) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

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



QUALITY CONTROL REPORT

Work Order	: EP2101036	Page	: 1 of 14
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 61 8 6218 2100	Telephone	: 08 9406 1307
Project	: 754-PEREN282113 BHP Eastern Ridge PFAS Assessment	Date Samples Received	: 02-Feb-2021
Order number	: ----	Date Analysis Commenced	: 02-Feb-2021
C-O-C number	: ----	Issue Date	: 10-Feb-2021
Sampler	: Regan MacDonald, Steven Middleton		
Site	: ----		
Quote number	: EP/991/20_V2		
No. of samples received	: 42		
No. of samples analysed	: 42		



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
David Viner	SENIOR LAB TECH	Perth Organics, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



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 Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3491730)									
EP2100990-003	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	604	612	1.32	0% - 20%
EP2101036-013	HNPIOP0012P-B	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	945	942	0.318	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3490732)									
EP2101036-014	QC15	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	277	272	1.64	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	277	272	1.64	0% - 20%
EP2101017-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	14	17	17.0	0% - 50%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	302	297	1.41	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	316	315	0.488	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3490554)									
EP2101036-004	HNPIOP0030P-B	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	227	228	0.571	0% - 20%
EP2101036-020	HNPIOP0018P-B	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	151	151	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3490555)									
EP2101036-004	HNPIOP0030P-B	ED045G: Chloride	16887-00-6	1	mg/L	354	355	0.289	0% - 20%
EP2101036-020	HNPIOP0018P-B	ED045G: Chloride	16887-00-6	1	mg/L	217	217	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3491776)									
EP2100990-003	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	49	50	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	48	48	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	88	89	1.84	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	12	12	0.00	0% - 50%
EP2101036-022	OPHSW01	ED093F: Calcium	7440-70-2	1	mg/L	21	22	5.65	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	40	42	3.07	0% - 20%



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)	
ED093F: Dissolved Major Cations (QC Lot: 3491776) - continued										
EP2101036-022	OPHSW01	ED093F: Sodium	7440-23-5	1	mg/L	78	79	0.00	0% - 20%	
		ED093F: Potassium	7440-09-7	1	mg/L	14	14	0.00	0% - 50%	
EP005: Total Organic Carbon (TOC) (QC Lot: 3493062)										
EP2100882-001	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	2	2	0.00	No Limit	
EP2101036-009	QC11	EP005: Total Organic Carbon	----	1	mg/L	2	3	42.0	No Limit	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3497245)										
EP2100985-034	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3497245)										
EP2100985-034	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit	
EP080: BTEXN (QC Lot: 3497245)										
EP2100985-034	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		
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3495159)										
EP2101036-001	HNPIOP0011P-A	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0006	0.0007	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	
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3496136)										
EP2101036-029	HST1536RM	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	



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3496136) - continued									
EP2101036-029	HST1536RM	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: Perfluoroalkyl Carboxylic Acids (QC Lot: 3495159)									
EP2101036-001	HNPIOP0011P-A	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	<0.0005	<0.0005	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		
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3496136)									
EP2101036-029	HST1536RM	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	<0.0005	<0.0005	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: Perfluoroalkyl Sulfonamides (QC Lot: 3495159)									
EP2101036-001	HNPIOP0011P-A	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



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3495159) - continued									
EP2101036-001	HNPIOP0011P-A	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
		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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3496136)									
EP2101036-029	HST1536RM	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
		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) Fluorotelomer Sulfonic Acids (QC Lot: 3495159)									
EP2101036-001	HNPIOP0011P-A	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3496136)									
EP2101036-029	HST1536RM	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.00	No Limit

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 Work Order : EP2101036
 Client : COFFEY ENVIRONMENTS PTY LTD
 Project : 754-PEREN282113 BHP Eastern Ridge PFAS Assessment



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3496136) - continued									
EP2101036-029	HST1536RM	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 Sums (QC Lot: 3495159)									
EP2101036-001	HNPIOP0011P-A	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0006	0.0007	15.4	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0006	0.0007	15.4	No Limit
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.0006	0.0007	15.4	No Limit
EP231P: PFAS Sums (QC Lot: 3496136)									
EP2101036-029	HST1536RM	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	<0.0002	<0.0002	0.00	No Limit
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	0.00	No Limit



Method Blank (MB) and Laboratory Control Spike (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 Spike (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: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3491730)									
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	100	88.1	114	
				<10	1000 mg/L	100	88.1	114	
ED037P: Alkalinity by PC Titrator (QCLot: 3490732)									
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----	
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----	
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	89.2	81.2	126	
				<1	200 mg/L	96.6	90.0	110	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3490554)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.5	87.7	113	
				<1	500 mg/L	96.6	87.7	113	
ED045G: Chloride by Discrete Analyser (QCLot: 3490555)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.1	87.9	114	
				<1	1000 mg/L	99.8	87.9	114	
ED093F: Dissolved Major Cations (QCLot: 3491776)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	92.6	85.9	113	
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.9	88.0	110	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.7	87.3	118	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	93.6	89.7	108	
EP005: Total Organic Carbon (TOC) (QCLot: 3493062)									
EP005: Total Organic Carbon	----	1	mg/L	<1	10 mg/L	100	87.2	116	
				<1	100 mg/L	108	87.2	116	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3497245)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	93.5	73.6	113	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3497245)									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	94.5	73.9	115	
EP080: BTEXN (QCLot: 3497245)									
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	97.2	84.1	114	
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	102	81.0	115	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	98.7	84.4	113	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	40 µg/L	94.8	84.3	114	
	106-42-3								
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	89.8	86.5	111	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP080: BTEXN (QCLot: 3497245) - continued									
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	109	77.0	118	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3495159)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	92.4	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	92.8	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	86.0	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	98.0	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	85.6	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	90.4	53.0	142	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3496136)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	76.3	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	88.4	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	83.7	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	88.2	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	89.1	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	76.6	53.0	142	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3497327)									
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	79.6	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	82.8	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	80.0	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	84.8	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	63.2	53.0	142	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3495159)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	88.6	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	94.8	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	103	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	107	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	95.6	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	94.8	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	99.2	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	93.2	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	84.8	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	115	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	90.4	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3496136)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	82.7	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	88.0	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	93.2	72.0	129	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3496136) - continued									
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	99.7	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	89.9	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	87.6	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	84.3	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	84.0	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	78.1	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	86.3	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	88.5	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3497327)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	100	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	90.8	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	94.0	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	88.0	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	90.4	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	88.0	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	93.2	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	98.8	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	88.8	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	78.0	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	77.1	71.0	132	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3495159)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	81.2	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	111	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	98.4	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	76.8	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	93.3	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	81.6	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	92.0	61.0	135	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3496136)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	85.4	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	109	68.0	141	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3496136) - continued									
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	89.7	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	83.8	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	105	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	83.7	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	88.0	61.0	135	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3497327)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	90.8	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	104	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	92.0	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	89.9	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	83.5	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	90.4	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	90.8	61.0	135	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3495159)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	83.6	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	78.0	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	85.2	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	97.2	60.9	136	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3496136)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	83.4	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	87.2	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	85.8	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	86.8	60.9	136	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3497327)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	79.2	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	84.0	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	99.2	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	77.6	60.9	136	



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	High
EP231P: PFAS Sums (QCLot: 3495159)									
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	----	----	----	----	
EP231P: PFAS Sums (QCLot: 3496136)									
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	----	----	----	----	
EP231P: PFAS Sums (QCLot: 3497327)									
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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Recovery Limits (%)	
						Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3490554)							
EP2101036-002	HNPIOP0011P-B	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	113	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3490555)							
EP2101036-002	HNPIOP0011P-B	ED045G: Chloride	16887-00-6	1000 mg/L	94.7	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3493062)							
EP2100905-015	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	94.4	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3497245)							
EP2100985-035	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	93.9	77.0	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3497245)							
EP2100985-035	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	85.4	77.0	137
EP080: BTEXN (QCLot: 3497245)							
EP2100985-035	Anonymous	EP080: Benzene	71-43-2	20 µg/L	99.8	77.0	122
		EP080: Toluene	108-88-3	20 µg/L	106	73.5	126
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3495159)							



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3495159) - continued							
EP2101036-002	HNPIOP0011P-B	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	88.0	72.0	130
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	102	71.0	127
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	88.0	68.0	131
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	92.0	69.0	134
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	98.0	65.0	140
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	85.2	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3496136)							
EP2101036-023	RPSW01	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	83.2	72.0	130
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	83.6	71.0	127
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	75.6	68.0	131
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	76.8	69.0	134
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	99.6	65.0	140
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	62.4	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3495159)							
EP2101036-002	HNPIOP0011P-B	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	85.3	73.0	129
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	96.0	72.0	129
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	99.2	72.0	129
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	110	72.0	130
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	94.8	71.0	133
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	90.8	69.0	130
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	88.0	71.0	129
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	92.4	69.0	133
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	82.4	72.0	134
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.004 µg/L	118	65.0	144
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	88.5	71.0	132
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3496136)							
EP2101036-023	RPSW01	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	73.4	73.0	129
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	79.6	72.0	129
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	89.2	72.0	129
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	115	72.0	130
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	84.0	71.0	133
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	90.4	69.0	130
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	99.2	71.0	129
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	85.2	69.0	133
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	72.0	72.0	134
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.004 µg/L	66.8	65.0	144
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	84.8	71.0	132
		EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3495159)					



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3495159) - continued							
EP2101036-002	HNPIOP0011P-B	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	83.6	67.0	137
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.01 µg/L	120	68.0	141
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.01 µg/L	93.3	56.6	136
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.01 µg/L	86.2	61.9	129
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 µg/L	93.1	52.8	135
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	88.4	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	90.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3496136)							
EP2101036-023	RPSW01	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	71.6	67.0	137
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.01 µg/L	115	68.0	141
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.01 µg/L	98.9	56.6	136
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.01 µg/L	69.6	61.9	129
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 µg/L	96.5	52.8	135
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	84.8	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	78.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3495159)							
EP2101036-002	HNPIOP0011P-B	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	74.8	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	80.0	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	87.2	67.0	138
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	90.4	60.9	136
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3496136)							
EP2101036-023	RPSW01	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	70.8	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	74.4	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	85.2	67.0	138
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	62.4	60.9	136



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2101036	Page	: 1 of 12
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Telephone	: 08 9406 1307
Project	: 754-PEREN282113 BHP Eastern Ridge PFAS Assessment	Date Samples Received	: 02-Feb-2021
Site	: ----	Issue Date	: 10-Feb-2021
Sampler	: Regan MacDonald, Steven Middleton	No. of samples received	: 42
Order number	: ----	No. of samples analysed	: 42

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **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.



Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	41	4.88	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	41	4.88	5.00	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 VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H) HHS0042M, MW01a,	MW06, MW07	01-Feb-2021	----	----	----	03-Feb-2021	08-Feb-2021	✓
Clear Plastic Bottle - Natural (EA015H) HNPIOP0011P-B		28-Jan-2021	----	----	----	03-Feb-2021	04-Feb-2021	✓
Clear Plastic Bottle - Natural (EA015H) HNPIOP0030P-B, HHS0052M,	HNPIOP0031P-B, QC11	29-Jan-2021	----	----	----	03-Feb-2021	05-Feb-2021	✓
Clear Plastic Bottle - Natural (EA015H) HNPIOP0012P-B,	QC15	30-Jan-2021	----	----	----	03-Feb-2021	06-Feb-2021	✓
Clear Plastic Bottle - Natural (EA015H) HNPIOP0018P-B,	OPHSW01	31-Jan-2021	----	----	----	03-Feb-2021	07-Feb-2021	✓



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P) HHS0042M, MW01a,	MW06, MW07	01-Feb-2021	----	----	----	02-Feb-2021	15-Feb-2021	✓
Clear Plastic Bottle - Natural (ED037-P) HNPIOP0011P-B		28-Jan-2021	----	----	----	02-Feb-2021	11-Feb-2021	✓
Clear Plastic Bottle - Natural (ED037-P) HNPIOP0030P-B, HHS0052M,	HNPIOP0031P-B, QC11	29-Jan-2021	----	----	----	02-Feb-2021	12-Feb-2021	✓
Clear Plastic Bottle - Natural (ED037-P) HNPIOP0012P-B,	QC15	30-Jan-2021	----	----	----	02-Feb-2021	13-Feb-2021	✓
Clear Plastic Bottle - Natural (ED037-P) HNPIOP0018P-B,	OPHSW01	31-Jan-2021	----	----	----	02-Feb-2021	14-Feb-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G) HHS0042M, MW01a,	MW06, MW07	01-Feb-2021	----	----	----	02-Feb-2021	01-Mar-2021	✓
Clear Plastic Bottle - Natural (ED041G) HNPIOP0011P-B		28-Jan-2021	----	----	----	02-Feb-2021	25-Feb-2021	✓
Clear Plastic Bottle - Natural (ED041G) HNPIOP0030P-B, HHS0052M,	HNPIOP0031P-B, QC11	29-Jan-2021	----	----	----	02-Feb-2021	26-Feb-2021	✓
Clear Plastic Bottle - Natural (ED041G) HNPIOP0012P-B,	QC15	30-Jan-2021	----	----	----	02-Feb-2021	27-Feb-2021	✓
Clear Plastic Bottle - Natural (ED041G) HNPIOP0018P-B,	OPHSW01	31-Jan-2021	----	----	----	02-Feb-2021	28-Feb-2021	✓
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) HHS0042M, MW01a,	MW06, MW07	01-Feb-2021	----	----	----	02-Feb-2021	01-Mar-2021	✓
Clear Plastic Bottle - Natural (ED045G) HNPIOP0011P-B		28-Jan-2021	----	----	----	02-Feb-2021	25-Feb-2021	✓
Clear Plastic Bottle - Natural (ED045G) HNPIOP0030P-B, HHS0052M,	HNPIOP0031P-B, QC11	29-Jan-2021	----	----	----	02-Feb-2021	26-Feb-2021	✓
Clear Plastic Bottle - Natural (ED045G) HNPIOP0012P-B,	QC15	30-Jan-2021	----	----	----	02-Feb-2021	27-Feb-2021	✓
Clear Plastic Bottle - Natural (ED045G) HNPIOP0018P-B,	OPHSW01	31-Jan-2021	----	----	----	02-Feb-2021	28-Feb-2021	✓



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) HHS0042M, MW01a,	MW06, MW07	01-Feb-2021	----	----	----	03-Feb-2021	08-Feb-2021	✓
Clear Plastic Bottle - Natural (ED093F) HNPIOP0011P-B		28-Jan-2021	----	----	----	03-Feb-2021	04-Feb-2021	✓
Clear Plastic Bottle - Natural (ED093F) HNPIOP0030P-B, HHS0052M,	HNPIOP0031P-B, QC11	29-Jan-2021	----	----	----	03-Feb-2021	05-Feb-2021	✓
Clear Plastic Bottle - Natural (ED093F) HNPIOP0012P-B,	QC15	30-Jan-2021	----	----	----	03-Feb-2021	06-Feb-2021	✓
Clear Plastic Bottle - Natural (ED093F) HNPIOP0018P-B,	OPHSW01	31-Jan-2021	----	----	----	03-Feb-2021	07-Feb-2021	✓
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005) HHS0042M, MW01a,	MW06, MW07	01-Feb-2021	----	----	----	03-Feb-2021	01-Mar-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005) HNPIOP0011P-B		28-Jan-2021	----	----	----	03-Feb-2021	25-Feb-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005) HNPIOP0030P-B, HHS0052M,	HNPIOP0031P-B, QC11	29-Jan-2021	----	----	----	03-Feb-2021	26-Feb-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005) HNPIOP0012P-B,	QC15	30-Jan-2021	----	----	----	03-Feb-2021	27-Feb-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005) HNPIOP0018P-B,	OPHSW01	31-Jan-2021	----	----	----	03-Feb-2021	28-Feb-2021	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080) QC29,	QC30	01-Feb-2021	08-Feb-2021	15-Feb-2021	✓	08-Feb-2021	15-Feb-2021	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080) QC29,	QC30	01-Feb-2021	08-Feb-2021	15-Feb-2021	✓	08-Feb-2021	15-Feb-2021	✓
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080) QC29,	QC30	01-Feb-2021	08-Feb-2021	15-Feb-2021	✓	08-Feb-2021	15-Feb-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis				
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation		
EP231A: Perfluoroalkyl Sulfonic Acids									
HDPE (no PTFE) (EP231X-SUT) HECO318M1, HST1536RM,	HHS0106P, HHS0042M	01-Feb-2021	05-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HST1782RM, MW01a, QC23, QC27, HHS0027M,	MW06, MW07, QC25, QC28, HHS0029M	01-Feb-2021	08-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0011P-A,	HNPIOP0011P-B	28-Jan-2021	05-Feb-2021	27-Jul-2021	✓	05-Feb-2021	27-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0030P-A, HNPIOP0031P-A, HHS0052M, QC11, QC14	HNPIOP0030P-B, HNPIOP0031P-B, HHS0053M, QC13,	29-Jan-2021	05-Feb-2021	28-Jul-2021	✓	05-Feb-2021	28-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0012P-A, QC15, QC18	HNPIOP0012P-B, QC17,	30-Jan-2021	05-Feb-2021	29-Jul-2021	✓	05-Feb-2021	29-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) QC19, QC21,	QC20, HNPIOP0018P-B	31-Jan-2021	05-Feb-2021	30-Jul-2021	✓	05-Feb-2021	30-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0018P-A, RPSW01, RPSW03,	OPHSW01, RPSW02, RPSW04	31-Jan-2021	05-Feb-2021	30-Jul-2021	✓	08-Feb-2021	30-Jul-2021	✓	



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X-SUT) HECO318M1, HST1536RM,	HHS0106P, HHS0042M	01-Feb-2021	05-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HST1782RM, MW01a, QC23, QC27, HHS0027M,	MW06, MW07, QC25, QC28, HHS0029M	01-Feb-2021	08-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIOP0011P-A,	HNPIOP0011P-B	28-Jan-2021	05-Feb-2021	27-Jul-2021	✓	05-Feb-2021	27-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIOP0030P-A, HNPIOP0031P-A, HHS0052M, QC11, QC14	HNPIOP0030P-B, HNPIOP0031P-B, HHS0053M, QC13,	29-Jan-2021	05-Feb-2021	28-Jul-2021	✓	05-Feb-2021	28-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIOP0012P-A, QC15, QC18	HNPIOP0012P-B, QC17,	30-Jan-2021	05-Feb-2021	29-Jul-2021	✓	05-Feb-2021	29-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC19, QC21,	QC20, HNPIOP0018P-B	31-Jan-2021	05-Feb-2021	30-Jul-2021	✓	05-Feb-2021	30-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIOP0018P-A, RPSW01, RPSW03,	OPHSW01, RPSW02, RPSW04	31-Jan-2021	05-Feb-2021	30-Jul-2021	✓	08-Feb-2021	30-Jul-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis				
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation		
EP231C: Perfluoroalkyl Sulfonamides									
HDPE (no PTFE) (EP231X-SUT) HECO318M1, HST1536RM,	HHS0106P, HHS0042M	01-Feb-2021	05-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HST1782RM, MW01a, QC23, QC27, HHS0027M,	MW06, MW07, QC25, QC28, HHS0029M	01-Feb-2021	08-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0011P-A,	HNPIOP0011P-B	28-Jan-2021	05-Feb-2021	27-Jul-2021	✓	05-Feb-2021	27-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0030P-A, HNPIOP0031P-A, HHS0052M, QC11, QC14	HNPIOP0030P-B, HNPIOP0031P-B, HHS0053M, QC13,	29-Jan-2021	05-Feb-2021	28-Jul-2021	✓	05-Feb-2021	28-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0012P-A, QC15, QC18	HNPIOP0012P-B, QC17,	30-Jan-2021	05-Feb-2021	29-Jul-2021	✓	05-Feb-2021	29-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) QC19, QC21,	QC20, HNPIOP0018P-B	31-Jan-2021	05-Feb-2021	30-Jul-2021	✓	05-Feb-2021	30-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0018P-A, RPSW01, RPSW03,	OPHSW01, RPSW02, RPSW04	31-Jan-2021	05-Feb-2021	30-Jul-2021	✓	08-Feb-2021	30-Jul-2021	✓	



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis				
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation		
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
HDPE (no PTFE) (EP231X-SUT) HECO318M1, HST1536RM,	HHS0106P, HHS0042M	01-Feb-2021	05-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HST1782RM, MW01a, QC23, QC27, HHS0027M,	MW06, MW07, QC25, QC28, HHS0029M	01-Feb-2021	08-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0011P-A,	HNPIOP0011P-B	28-Jan-2021	05-Feb-2021	27-Jul-2021	✓	05-Feb-2021	27-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0030P-A, HNPIOP0031P-A, HHS0052M, QC11, QC14	HNPIOP0030P-B, HNPIOP0031P-B, HHS0053M, QC13,	29-Jan-2021	05-Feb-2021	28-Jul-2021	✓	05-Feb-2021	28-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0012P-A, QC15, QC18	HNPIOP0012P-B, QC17,	30-Jan-2021	05-Feb-2021	29-Jul-2021	✓	05-Feb-2021	29-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) QC19, QC21,	QC20, HNPIOP0018P-B	31-Jan-2021	05-Feb-2021	30-Jul-2021	✓	05-Feb-2021	30-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0018P-A, RPSW01, RPSW03,	OPHSW01, RPSW02, RPSW04	31-Jan-2021	05-Feb-2021	30-Jul-2021	✓	08-Feb-2021	30-Jul-2021	✓	



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis				
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation		
EP231P: PFAS Sums									
HDPE (no PTFE) (EP231X-SUT) HECO318M1, HST1536RM,	HHS0106P, HHS0042M	01-Feb-2021	05-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HST1782RM, MW01a, QC23, QC27, HHS0027M,	MW06, MW07, QC25, QC28, HHS0029M	01-Feb-2021	08-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0011P-A,	HNPIOP0011P-B	28-Jan-2021	05-Feb-2021	27-Jul-2021	✓	05-Feb-2021	27-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0030P-A, HNPIOP0031P-A, HHS0052M, QC11, QC14	HNPIOP0030P-B, HNPIOP0031P-B, HHS0053M, QC13,	29-Jan-2021	05-Feb-2021	28-Jul-2021	✓	05-Feb-2021	28-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0012P-A, QC15, QC18	HNPIOP0012P-B, QC17,	30-Jan-2021	05-Feb-2021	29-Jul-2021	✓	05-Feb-2021	29-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) QC19, QC21,	QC20, HNPIOP0018P-B	31-Jan-2021	05-Feb-2021	30-Jul-2021	✓	05-Feb-2021	30-Jul-2021	✓	
HDPE (no PTFE) (EP231X-SUT) HNPIOP0018P-A, RPSW01, RPSW03,	OPHSW01, RPSW02, RPSW04	31-Jan-2021	05-Feb-2021	30-Jul-2021	✓	08-Feb-2021	30-Jul-2021	✓	



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	41	4.88	10.00	✖	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	16	12.50	10.53	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	20.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	17	11.76	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	3	41	7.32	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	19	10.53	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	16	12.50	10.53	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	20	10.00	10.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	3	41	7.32	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	16	6.25	5.26	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	41	4.88	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	19	5.26	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	5	20.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



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
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with 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.

Page : 12 of 12
Work Order : EP2101036
Client : COFFEY ENVIRONMENTS PTY LTD
Project : 754-PEREN282113 BHP Eastern Ridge PFAS Assessment



<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST



Consigning Office: Perth
 Report Results to: Wesley Alport Mobile: _____ Email: wesley.alport@coffey.com
 Invoices to: accounts@coffey.com Phone: _____ Email: _____ @coffey.com

Project No: 754-PEREN-282113 Task No: _____
 Project Name: Eastern Ridge PFAS Assessment Laboratory: ALS
 Sampler's Name: SM RM Project Manager: Wesley Alport
 Quote number (if different to current quoted prices): EP/991/20-V22
 Special Instructions: _____

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)
1	HEOP0368M	01/02/21	14:40	water	various	std.
2	HEOP0366M		14:45			
3	MSO3		15:00			
4	HECO448M-A		15:40			
5	HECO448M-B		15:40			
6	HEOP0815M	02/02/21	7:05			
7	HECO319M1		8:10			
8	ECO754RM		8:25			
9	HEAO141M		10:10			
10	HEOP0574M		10:30			
11	HEOP0504M		12:33			
12	HEOP0430M		12:55			
13	HEOP0387M		13:10			
14	HEAO134M		14:30			
15	HEAO125M		14:45			
16	HECO407M		15:40			

PPAS only
 Full Suite
 Full Suite (no contaminants)

NOTES

Environmental Division
 Perth
 Work Order Reference
EP2101111



Telephone: - 61-8-9406 1301

Matrix
 Lab Prep
 Lab Prep

RELINQUISHED BY

Name: Steven W. Mandelstern Date: 03/02/21
 Coffey Time: 13:30

RECEIVED BY

Name: _____ Date: 4/2/21
 Company: ALS Time: 11:30

Sample Receipt Advice: (Lab Use Only)
 All Samples Received in Good Condition
 All Documentation is in Proper Order
 Samples Received Properly Chilled
 Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2101111

Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: wesley.alport@coffey.com	E-mail	: Lauren.biagioni@alsglobal.com
Telephone	: 61 8 6218 2100	Telephone	: 08 9406 1307
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: 754_PEREN282113 Eastern Ridge PFAS Assessment	Page	: 1 of 3
Order number	: ----	Quote number	: EP2020COFENVWA0039_V2 (EP/991/20_V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: SM/RM		

Dates

Date Samples Received	: 04-Feb-2021 11:30	Issue Date	: 04-Feb-2021
Client Requested Due Date	: 15-Feb-2021	Scheduled Reporting Date	: 15-Feb-2021

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 27.0 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 28 / 28

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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: 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.



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

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EK062G Total Nitrogen as N (TKN + NOx reported) By	WATER - EP005 Total Organic Carbon (TOC)	WATER - EP231X-SUT PFAS - Super Ultra Trace Waters Long Suite (29	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity
EP2101111-001	01-Feb-2021 14:40	HEOP0368M				✓	
EP2101111-002	01-Feb-2021 14:45	HEOP0366M				✓	
EP2101111-003	01-Feb-2021 15:00	MB03				✓	
EP2101111-004	01-Feb-2021 15:40	HEC0448M-A	✓	✓	✓	✓	✓
EP2101111-005	01-Feb-2021 15:40	HEC0448M-B	✓	✓	✓	✓	✓
EP2101111-006	02-Feb-2021 07:05	HEOP0815M				✓	
EP2101111-007	02-Feb-2021 08:10	HEC0319M1				✓	
EP2101111-008	02-Feb-2021 08:25	EC0754RM				✓	
EP2101111-009	02-Feb-2021 10:10	HEA0141M				✓	
EP2101111-010	02-Feb-2021 10:30	HEOP0574M				✓	
EP2101111-011	02-Feb-2021 12:35	HEOP0504M				✓	
EP2101111-012	02-Feb-2021 12:55	HEOP0430M				✓	
EP2101111-013	02-Feb-2021 13:10	HEOP0387M	✓		✓	✓	✓
EP2101111-014	02-Feb-2021 14:30	HEA0134M				✓	
EP2101111-015	02-Feb-2021 14:45	HEA0125M				✓	
EP2101111-016	02-Feb-2021 15:40	HEC0407M	✓		✓	✓	✓
EP2101111-017	02-Feb-2021 17:00	QC31				✓	
EP2101111-018	02-Feb-2021 17:00	QC32				✓	
EP2101111-019	03-Feb-2021 07:55	HEOP0445M				✓	
EP2101111-020	03-Feb-2021 08:55	HEOP0398M				✓	
EP2101111-021	03-Feb-2021 09:30	HEA0351M-A				✓	
EP2101111-022	03-Feb-2021 09:30	HEA0351M-B				✓	
EP2101111-023	03-Feb-2021 09:50	HEA0350M-A				✓	
EP2101111-024	03-Feb-2021 13:00	HEA0350M-B				✓	
EP2101111-025	03-Feb-2021 00:00	HEA0350M-C				✓	
EP2101111-026	03-Feb-2021 00:00	QC33				✓	
EP2101111-027	03-Feb-2021 00:00	QC34				✓	
EP2101111-028	03-Feb-2021 00:00	QC35			✓		

Proactive Holding Time Report

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

CERTIFICATE OF ANALYSIS

Work Order : **EP2101111**
Client : **COFFEY ENVIRONMENTS PTY LTD**
Contact : WESLEY ALPORT
Address : Level 1, Bishop See 235 St Georges Terrace
 Perth WA, AUSTRALIA 6000
Telephone : 61 8 6218 2100
Project : 754_PEREN282113 Eastern Ridge PFAS Assessment
Order number : ----
C-O-C number : ----
Sampler : SM/RM
Site : ----
Quote number : EP/991/20_V2
No. of samples received : 28
No. of samples analysed : 28

Page : 1 of 19
Laboratory : Environmental Division Perth
Contact : Lauren Biagioni
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : 08 9406 1307
Date Samples Received : 04-Feb-2021 11:30
Date Analysis Commenced : 04-Feb-2021
Issue Date : 15-Feb-2021 10:36



Accreditation No. 825
 Accredited for compliance with
 ISO/IEC 17025 - Testing

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

This 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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA



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.

- TOC conducted by ALS Melbourne, NATA accreditation no. 825, site no 13778
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP231X-SUT: Positive result for analyte Perfluorooctanoic acid (PFOA) on sample EP2101111_003 has been confirmed by re-extraction and re-analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- 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.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0368M	HEOP0366M	MB03	HEC0448M-A	HEC0448M-B
Sampling date / time				01-Feb-2021 14:40	01-Feb-2021 14:45	01-Feb-2021 15:00	01-Feb-2021 15:40	01-Feb-2021 15:40	
Compound	CAS Number	LOR	Unit	EP2101111-001	EP2101111-002	EP2101111-003	EP2101111-004	EP2101111-005	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	1250	1520	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	----	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	----	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	----	528	444	
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	528	444	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	156	332	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	----	----	339	397	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	----	----	64	65	
Magnesium	7439-95-4	1	mg/L	----	----	----	102	117	
Sodium	7440-23-5	1	mg/L	----	----	----	226	280	
Potassium	7440-09-7	1	mg/L	----	----	----	4	4	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	----	<0.01	3.35	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	----	1.2	0.6	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	----	----	----	1.2	4.0	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	----	----	23.4	27.0	
∅ Total Cations	----	0.01	meq/L	----	----	----	21.5	25.2	
∅ Ionic Balance	----	0.01	%	----	----	----	4.10	3.50	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	----	----	333	5	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0006	<0.0005	<0.0005	<0.0005	0.0035	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0028	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0098	0.0121	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0368M	HEOP0366M	MB03	HEC0448M-A	HEC0448M-B
Sampling date / time				01-Feb-2021 14:40	01-Feb-2021 14:45	01-Feb-2021 15:00	01-Feb-2021 15:40	01-Feb-2021 15:40	
Compound	CAS Number	LOR	Unit	EP2101111-001	EP2101111-002	EP2101111-003	EP2101111-004	EP2101111-005	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0068	0.0014	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0338	0.0446	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	<0.0020	0.0332	0.0110	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0006	<0.0005	<0.0005	0.0060	0.0087	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0031	0.0046	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0070	0.0097	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	0.0032	0.0311	0.0366	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0018	0.0014	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0009	0.0008	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0368M	HEOP0366M	MB03	HEC0448M-A	HEC0448M-B
Sampling date / time				01-Feb-2021 14:40	01-Feb-2021 14:45	01-Feb-2021 15:00	01-Feb-2021 15:40	01-Feb-2021 15:40	
Compound	CAS Number	LOR	Unit	EP2101111-001	EP2101111-002	EP2101111-003	EP2101111-004	EP2101111-005	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	0.013	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	0.003	<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	<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	0.0436	0.0567	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0012	<0.0002	0.0032	0.140	0.131	
^ Sum of PFAS	----	0.0002	µg/L	0.0012	<0.0002	0.0032	0.150	0.137	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	111	105	96.7	90.7	92.6	
13C8-PFOA	----	0.0005	%	113	116	115	116	119	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0815M	HEC0319M1	EC0754RM	HEA0141M	HEOP0574M
				Sampling date / time	02-Feb-2021 07:05	02-Feb-2021 08:10	02-Feb-2021 08:25	02-Feb-2021 10:10	02-Feb-2021 10:30
Compound	CAS Number	LOR	Unit	EP2101111-006	EP2101111-007	EP2101111-008	EP2101111-009	EP2101111-010	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0007	<0.0005	<0.0005	0.0008	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	0.0008	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0005	<0.0002	0.0034	0.0010	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	0.0028	<0.0020	0.0120	0.0329	<0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0007	<0.0005	0.0236	<0.0005	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	0.0123	<0.0005	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	0.0110	<0.0005	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0019	<0.0005	0.0072	0.0006	<0.0005	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	0.0036	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	0.0018	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<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	<0.0005	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<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	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0815M	HEC0319M1	EC0754RM	HEA0141M	HEOP0574M
Sampling date / time					02-Feb-2021 07:05	02-Feb-2021 08:10	02-Feb-2021 08:25	02-Feb-2021 10:10	02-Feb-2021 10:30
Compound	CAS Number	LOR	Unit	EP2101111-006	EP2101111-007	EP2101111-008	EP2101111-009	EP2101111-010	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0005	<0.0002	0.0034	0.0018	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0066	<0.0002	0.0695	0.0361	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	0.0066	<0.0002	0.0755	0.0361	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	94.6	102	113	110	96.9	
13C8-PFOA	----	0.0005	%	112	114	117	115	116	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0504M	HEOP0430M	HEOP0387M	HEA0134M	HEA0125M
Sampling date / time				02-Feb-2021 12:35	02-Feb-2021 12:55	02-Feb-2021 13:10	02-Feb-2021 14:30	02-Feb-2021 14:45	
Compound	CAS Number	LOR	Unit	EP2101111-011	EP2101111-012	EP2101111-013	EP2101111-014	EP2101111-015	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	----	736	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	<1	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	<1	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	254	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	----	254	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	127	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	----	192	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	----	34	----	----	
Magnesium	7439-95-4	1	mg/L	----	----	38	----	----	
Sodium	7440-23-5	1	mg/L	----	----	164	----	----	
Potassium	7440-09-7	1	mg/L	----	----	6	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	----	13.1	----	----	
∅ Total Cations	----	0.01	meq/L	----	----	12.1	----	----	
∅ Ionic Balance	----	0.01	%	----	----	4.06	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	----	<1	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0014	<0.0005	0.0010	0.0006	0.0040	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	0.0010	0.0005	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.0004	0.0018	0.0008	0.0033	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0504M	HEOP0430M	HEOP0387M	HEA0134M	HEA0125M
Sampling date / time				02-Feb-2021 12:35	02-Feb-2021 12:55	02-Feb-2021 13:10	02-Feb-2021 14:30	02-Feb-2021 14:45	
Compound	CAS Number	LOR	Unit	EP2101111-011	EP2101111-012	EP2101111-013	EP2101111-014	EP2101111-015	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	0.0049	<0.0020	0.0025	0.0068	0.0241	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0041	<0.0005	<0.0005	0.0024	0.0401	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.0005	<0.0005	<0.0005	0.0019	0.0079	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0009	<0.0005	0.0005	0.0008	0.0083	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0005	<0.0005	0.0006	0.0033	0.0070	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0011	0.0032	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0015	0.0029	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<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	<0.0005	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0504M	HEOP0430M	HEOP0387M	HEA0134M	HEA0125M
Sampling date / time				02-Feb-2021 12:35	02-Feb-2021 12:55	02-Feb-2021 13:10	02-Feb-2021 14:30	02-Feb-2021 14:45	
Compound	CAS Number	LOR	Unit	EP2101111-011	EP2101111-012	EP2101111-013	EP2101111-014	EP2101111-015	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	0.008	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	0.003	<0.001	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.001	0.006	0.002	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	0.0004	0.0028	0.0013	0.0033	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0203	0.0004	0.0074	0.0201	0.0947	
^ Sum of PFAS	----	0.0002	µg/L	0.0203	0.0004	0.0074	0.0287	0.103	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	105	105	97.7	117	110	
13C8-PFOA	----	0.0005	%	116	115	118	118	107	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0407M	QC31	QC32	HEOP0445M	HEOP0398M
Sampling date / time				02-Feb-2021 15:40	02-Feb-2021 17:00	02-Feb-2021 17:00	03-Feb-2021 07:55	03-Feb-2021 08:55	
Compound	CAS Number	LOR	Unit	EP2101111-016	EP2101111-017	EP2101111-018	EP2101111-019	EP2101111-020	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	618	----	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	437	----	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	437	----	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	----	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	127	----	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	61	----	----	----	----	
Magnesium	7439-95-4	1	mg/L	63	----	----	----	----	
Sodium	7440-23-5	1	mg/L	69	----	----	----	----	
Potassium	7440-09-7	1	mg/L	8	----	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	12.4	----	----	----	----	
∅ Total Cations	----	0.01	meq/L	11.4	----	----	----	----	
∅ Ionic Balance	----	0.01	%	3.87	----	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	46	----	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0076	<0.0005	<0.0005	<0.0005	0.0035	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	0.0023	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<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	0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0407M	QC31	QC32	HEOP0445M	HEOP0398M
Sampling date / time					02-Feb-2021 15:40	02-Feb-2021 17:00	02-Feb-2021 17:00	03-Feb-2021 07:55	03-Feb-2021 08:55
Compound	CAS Number	LOR	Unit	EP2101111-016	EP2101111-017	EP2101111-018	EP2101111-019	EP2101111-020	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	0.147	<0.0020	<0.0020	<0.0020	0.0030	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0057	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonylamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0407M	QC31	QC32	HEOP0445M	HEOP0398M
Sampling date / time					02-Feb-2021 15:40	02-Feb-2021 17:00	02-Feb-2021 17:00	03-Feb-2021 07:55	03-Feb-2021 08:55
Compound	CAS Number	LOR	Unit	EP2101111-016	EP2101111-017	EP2101111-018	EP2101111-019	EP2101111-020	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<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	<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	<0.0002	0.0025
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.162	<0.0002	<0.0002	<0.0002	<0.0002	0.0090
^ Sum of PFAS	----	0.0002	µg/L	0.162	<0.0002	<0.0002	<0.0002	<0.0002	0.0090
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	82.8	118	117	117	117	119
13C8-PFOA	----	0.0005	%	115	112	108	112	112	112



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0351M-A	HEA0351M-B	HEA0350M-A	HEA0350M-B	HEA0350M-C
				Sampling date / time	03-Feb-2021 09:30	03-Feb-2021 09:30	03-Feb-2021 09:50	03-Feb-2021 13:00	03-Feb-2021 00:00
Compound	CAS Number	LOR	Unit	EP2101111-021	EP2101111-022	EP2101111-023	EP2101111-024	EP2101111-025	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.0014	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0007	0.0006	<0.0005	<0.0005	0.0013	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0004	0.0005	<0.0002	<0.0002	0.0005	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0351M-A	HEA0351M-B	HEA0350M-A	HEA0350M-B	HEA0350M-C
Sampling date / time				03-Feb-2021 09:30	03-Feb-2021 09:30	03-Feb-2021 09:50	03-Feb-2021 13:00	03-Feb-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2101111-021	EP2101111-022	EP2101111-023	EP2101111-024	EP2101111-025	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0011	0.0011	<0.0002	<0.0002	0.0018	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0011	0.0025	<0.0002	<0.0002	0.0018	
^ Sum of PFAS	----	0.0002	µg/L	0.0011	0.0025	<0.0002	<0.0002	0.0018	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	113	115	119	103	120	
13C8-PFOA	----	0.0005	%	111	108	113	111	110	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC33	QC34	QC35	----	----
Sampling date / time				03-Feb-2021 00:00	03-Feb-2021 00:00	03-Feb-2021 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2101111-026	EP2101111-027	EP2101111-028	-----	-----	
				Result	Result	Result	----	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	----	----	<20	----	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	<20	----	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	----	----	<20	----	----	
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	----	----	<1	----	----	
Toluene	108-88-3	2	µg/L	----	----	<2	----	----	
Ethylbenzene	100-41-4	2	µg/L	----	----	<2	----	----	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	<2	----	----	
ortho-Xylene	95-47-6	2	µg/L	----	----	<2	----	----	
^ Total Xylenes	----	2	µg/L	----	----	<2	----	----	
^ Sum of BTEX	----	1	µg/L	----	----	<1	----	----	
Naphthalene	91-20-3	5	µg/L	----	----	<5	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	----	----	----	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	----	----	----	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	----	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC33	QC34	QC35	----	----
Sampling date / time				03-Feb-2021 00:00	03-Feb-2021 00:00	03-Feb-2021 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2101111-026	EP2101111-027	EP2101111-028	-----	-----	
				Result	Result	Result	----	----	
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	----	----	----	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	----	----	----	
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	----	----	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	----	----	----	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	----	----	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	----	----	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	----	----	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	----	----	----	
EP231P: PFAS Sums									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC33	QC34	QC35	----	----
Sampling date / time				03-Feb-2021 00:00	03-Feb-2021 00:00	03-Feb-2021 00:00	----	----	
Compound	CAS Number	LOR	Unit	EP2101111-026	EP2101111-027	EP2101111-028	-----	-----	
				Result	Result	Result	----	----	
EP231P: PFAS Sums - Continued									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	----	----	----	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	----	----	----	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	----	----	----	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	----	----	81.2	----	----	
Toluene-D8	2037-26-5	2	%	----	----	99.8	----	----	
4-Bromofluorobenzene	460-00-4	2	%	----	----	97.2	----	----	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	114	115	----	----	----	
13C8-PFOA	----	0.0005	%	112	108	----	----	----	



Surrogate Control Limits

Sub-Matrix: WATER		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 Melbourne, NATA accreditation no. 825, site no. 13778 (Chemistry).

(WATER) EP005: Total Organic Carbon (TOC)

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

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

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

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids



QUALITY CONTROL REPORT

Work Order	: EP2101111	Page	: 1 of 13
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 61 8 6218 2100	Telephone	: 08 9406 1307
Project	: 754_PEREN282113 Eastern Ridge PFAS Assessment	Date Samples Received	: 04-Feb-2021
Order number	: ----	Date Analysis Commenced	: 04-Feb-2021
C-O-C number	: ----	Issue Date	: 15-Feb-2021
Sampler	: SM/RM		
Site	: ----		
Quote number	: EP/991/20_V2		
No. of samples received	: 28		
No. of samples analysed	: 28		



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA



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 Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3495099)									
EP2101103-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	3690	3610	2.25	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3495273)									
EP2101116-005	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	153	152	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	153	152	0.00	0% - 20%
EP2101105-010	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	11	12	10.6	0% - 50%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	11	12	10.6	0% - 50%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3497309)									
EP2101105-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6600	6600	0.135	0% - 20%
EP2101125-004	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	13	14	9.14	0% - 50%
ED045G: Chloride by Discrete Analyser (QC Lot: 3497310)									
EP2101105-010	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	127	127	0.00	0% - 20%
EP2101125-004	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3	3	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 3496538)									
EP2101111-004	HEC0448M-A	ED093F: Calcium	7440-70-2	1	mg/L	64	64	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	102	98	3.60	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	226	219	3.39	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.00	No Limit
EP2101116-007	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	19	20	5.63	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	17	18	6.60	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	14	15	0.00	0% - 50%



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)	
ED093F: Dissolved Major Cations (QC Lot: 3496538) - continued										
EP2101116-007	Anonymous	ED093F: Potassium	7440-09-7	1	mg/L	5	6	0.00	No Limit	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3497317)										
EP2101039-004	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.20	0.20	0.00	0% - 20%	
EP2100995-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.02	0.02	0.00	No Limit	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3497658)										
EP2101115-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	1.2	1.3	0.00	0% - 50%	
EP005: Total Organic Carbon (TOC) (QC Lot: 3508727)										
EP2101111-004	HEC0448M-A	EP005: Total Organic Carbon	----	1	mg/L	333	330	1.02	0% - 20%	
EP2101173-012	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	<1	<1	0.00	No Limit	
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3506921)										
EP2101111-028	QC35	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3506921)										
EP2101111-028	QC35	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit	
EP080: BTEXN (QC Lot: 3506921)										
EP2101111-028	QC35	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		
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3497536)										
EP2101111-007	HEC0319M1	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	
EP2101111-009	HEA0141M	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0010	0.0010	0.00	No Limit	
		EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0008	0.0008	0.00	No Limit	



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3497536) - continued									
EP2101111-009	HEA0141M	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	0.0008	0.0007	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
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3498826)									
EP2101111-015	HEA0125M	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0033	0.0023	34.8	0% - 50%
		EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0040	0.0045	13.2	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: Perfluoroalkyl Carboxylic Acids (QC Lot: 3497536)									
EP2101111-007	HEC0319M1	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	<0.0005	<0.0005	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
		EP2101111-009	HEA0141M	EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005
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	0.0006	0.0007	0.00	No Limit
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1			0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3497536) - continued									
EP2101111-009	HEA0141M	EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	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	0.0329	0.0318	3.31	0% - 50%
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3498826)									
EP2101111-015	HEA0125M	EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0401	0.0455	12.7	0% - 20%
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0083	0.0078	5.36	0% - 50%
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.0079	0.0080	0.00	0% - 50%
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0070	0.0073	4.24	0% - 50%
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	0.0032	0.0036	14.2	No Limit
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	0.0029	0.0035	18.0	No Limit
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	0.0006	0.0008	26.1	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	0.0241	0.0298	21.1	0% - 50%
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3497536)									
EP2101111-007	HEC0319M1	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
		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
EP2101111-009	HEA0141M	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3497536) - continued									
EP2101111-009	HEA0141M	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
		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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3498826)									
EP2101111-015	HEA0125M	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
		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) Fluorotelomer Sulfonic Acids (QC Lot: 3497536)									
EP2101111-007	HEC0319M1	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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
EP2101111-009	HEA0141M	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	<0.001	<0.001	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3497536) - continued									
EP2101111-009	HEA0141M	EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3498826)									
EP2101111-015	HEA0125M	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	0.002	0.002	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3497536)									
EP2101111-007	HEC0319M1	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	<0.0002	<0.0002	0.00	No Limit
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	0.00	No Limit
EP2101111-009	HEA0141M	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0018	0.0017	5.71	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0361	0.0350	3.09	0% - 20%
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.0361	0.0350	3.09	0% - 20%
EP231P: PFAS Sums (QC Lot: 3498826)									
EP2101111-015	HEA0125M	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0033	0.0023	35.7	0% - 50%
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0947	0.105	10.5	0% - 20%
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.103	0.115	10.7	0% - 20%



Method Blank (MB) and Laboratory Control Spike (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 Spike (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: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3495099)									
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10 <10	2000 mg/L 1000 mg/L	101 102	88.1 88.1	114 114	
ED037P: Alkalinity by PC Titrator (QCLot: 3495273)									
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----	
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----	
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1 <1	20 mg/L 200 mg/L	102 94.8	81.2 90.0	126 110	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3497309)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1 <1	25 mg/L 500 mg/L	96.9 99.0	87.7 87.7	113 113	
ED045G: Chloride by Discrete Analyser (QCLot: 3497310)									
ED045G: Chloride	16887-00-6	1	mg/L	<1 <1	10 mg/L 1000 mg/L	97.0 99.7	87.9 87.9	114 114	
ED093F: Dissolved Major Cations (QCLot: 3496538)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.6	85.9	113	
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	97.2	88.0	110	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.1	87.3	118	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	92.9	89.7	108	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3497317)									
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	100	90.5	110	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3497658)									
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	92.0	75.8	100	
EP005: Total Organic Carbon (TOC) (QCLot: 3508727)									
EP005: Total Organic Carbon	----	1	mg/L	<1	100 mg/L	97.4	81.2	110	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3506921)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	95.0	73.6	113	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3506921)									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	93.5	73.9	115	
EP080: BTEXN (QCLot: 3506921)									
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	88.8	84.1	114	
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	95.1	81.0	115	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
EP080: BTEXN (QCLot: 3506921) - continued									
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	96.9	84.4	113	
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	99.0	84.3	114	
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	93.8	86.5	111	
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	110	77.0	118	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3497536)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	80.8	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	87.6	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	81.2	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	92.4	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	95.2	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	86.0	53.0	142	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3498826)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	77.6	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	84.8	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	86.0	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	88.0	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	87.2	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	71.6	53.0	142	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3497536)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	88.4	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	93.6	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	94.0	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	79.6	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	86.8	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	99.2	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	102	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	114	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	106	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	102	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	76.5	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3498826)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	83.4	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	93.6	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	100	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	90.4	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	95.2	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	94.4	69.0	130	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3498826) - continued									
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	90.8	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	96.4	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	89.6	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	80.4	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	84.2	71.0	132	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3497536)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	100	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	93.4	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	80.8	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	107	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	72.8	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	106	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	88.0	61.0	135	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3498826)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	92.8	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	102	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	90.6	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	84.6	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	82.7	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	91.6	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	88.0	61.0	135	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3497536)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	78.4	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	87.6	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	99.6	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	100	60.9	136	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3498826)									



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3498826) - continued								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	79.2	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	94.4	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	100	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	77.6	60.9	136
EP231P: PFAS Sums (QCLot: 3497536)								
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	----	----	----	----
EP231P: PFAS Sums (QCLot: 3498826)								
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

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%)	Recovery Limits (%)	
					MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3497309)							
EP2101105-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3497310)							
EP2101105-010	Anonymous	ED045G: Chloride	16887-00-6	1000 mg/L	95.8	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3497317)							
EP2100995-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	104	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3497658)							
EP2101115-001	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	10 mg/L	88.5	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3508727)							
EP2101111-005	HEC0448M-B	EP005: Total Organic Carbon	----	100 mg/L	106	76.6	125
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3497536)							
EP2101111-008	EC0754RM	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	80.4	72.0	130
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	114	71.0	127
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	116	68.0	131



Sub-Matrix: WATER

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report					
				Spike Concentration	Spike Recovery(%) MS	Recovery Limits (%)			
						Low	High		
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3497536) - continued									
EP2101111-008	EC0754RM	EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	101	69.0	134		
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	124	65.0	140		
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	90.4	53.0	142		
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3498826)									
EP2101111-020	HEOP0398M	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	81.2	72.0	130		
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	72.0	71.0	127		
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	108	68.0	131		
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	98.0	69.0	134		
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	97.2	65.0	140		
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	90.0	53.0	142		
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3497536)									
EP2101111-008	EC0754RM	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	96.9	73.0	129		
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	# Not Determined	72.0	129		
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	97.2	72.0	129		
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	72.8	72.0	130		
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	116	71.0	133		
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	126	69.0	130		
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	124	71.0	129		
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	133	69.0	133		
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	111	72.0	134		
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.004 µg/L	127	65.0	144		
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	93.9	71.0	132				
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3498826)									
EP2101111-020	HEOP0398M	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	129	73.0	129		
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	93.6	72.0	129		
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	103	72.0	129		
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	80.8	72.0	130		
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	89.2	71.0	133		
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	88.0	69.0	130		
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	99.2	71.0	129		
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	98.0	69.0	133		
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	101	72.0	134		
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.004 µg/L	65.2	65.0	144		
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	83.0	71.0	132		
		EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3497536)							
		EP2101111-008	EC0754RM	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	123	67.0	137



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3497536) - continued							
EP2101111-008	EC0754RM	EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.01 µg/L	124	68.0	141
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.01 µg/L	97.8	56.6	136
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.01 µg/L	94.2	61.9	129
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 µg/L	74.7	52.8	135
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	95.6	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	90.4	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3498826)							
EP2101111-020	HEOP0398M	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	84.4	67.0	137
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.01 µg/L	88.0	68.0	141
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.01 µg/L	84.3	56.6	136
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.01 µg/L	84.0	61.9	129
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 µg/L	78.4	52.8	135
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	80.8	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	82.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3497536)							
EP2101111-008	EC0754RM	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	89.6	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	99.2	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	112	67.0	138
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	92.8	60.9	136
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3498826)							
EP2101111-020	HEOP0398M	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	102	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	92.0	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	103	67.0	138
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	72.0	60.9	136

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2101111	Page	: 1 of 10
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Telephone	: 08 9406 1307
Project	: 754_PEREN282113 Eastern Ridge PFAS Assessment	Date Samples Received	: 04-Feb-2021
Site	: ----	Issue Date	: 15-Feb-2021
Sampler	: SM/RM	No. of samples received	: 28
Order number	: ----	No. of samples analysed	: 28

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- 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.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2101105--010	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231B: Perfluoroalkyl Carboxylic Acids	EP2101111--008	EC0754RM	Perfluoropentanoic acid (PFPeA)	2706-90-3	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Matrix Spikes (MS)					
TRH Volatiles/BTEX	0	1	0.00	5.00	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 **VOC in soils** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA015: Total Dissolved Solids dried at 180 ± 5 °C								
Clear Plastic Bottle - Natural (EA015H)								
HEC0448M-A,	HEC0448M-B	01-Feb-2021	----	----	----	04-Feb-2021	08-Feb-2021	✓
Clear Plastic Bottle - Natural (EA015H)								
HEOP0387M,	HEC0407M	02-Feb-2021	----	----	----	04-Feb-2021	09-Feb-2021	✓
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
HEC0448M-A,	HEC0448M-B	01-Feb-2021	----	----	----	04-Feb-2021	15-Feb-2021	✓
Clear Plastic Bottle - Natural (ED037-P)								
HEOP0387M,	HEC0407M	02-Feb-2021	----	----	----	04-Feb-2021	16-Feb-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
HEC0448M-A,	HEC0448M-B	01-Feb-2021	----	----	----	05-Feb-2021	01-Mar-2021	✓
Clear Plastic Bottle - Natural (ED041G)								
HEOP0387M,	HEC0407M	02-Feb-2021	----	----	----	05-Feb-2021	02-Mar-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) HEC0448M-A,	HEC0448M-B	01-Feb-2021	----	----	----	05-Feb-2021	01-Mar-2021	✓
Clear Plastic Bottle - Natural (ED045G) HEOP0387M,	HEC0407M	02-Feb-2021	----	----	----	05-Feb-2021	02-Mar-2021	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) HEC0448M-A,	HEC0448M-B	01-Feb-2021	----	----	----	05-Feb-2021	08-Feb-2021	✓
Clear Plastic Bottle - Natural (ED093F) HEOP0387M,	HEC0407M	02-Feb-2021	----	----	----	05-Feb-2021	09-Feb-2021	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) HEC0448M-A,	HEC0448M-B	01-Feb-2021	----	----	----	05-Feb-2021	01-Mar-2021	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) HEC0448M-A,	HEC0448M-B	01-Feb-2021	08-Feb-2021	01-Mar-2021	✓	08-Feb-2021	01-Mar-2021	✓
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005) HEC0448M-A,	HEC0448M-B	01-Feb-2021	----	----	----	12-Feb-2021	01-Mar-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005) HEOP0387M,	HEC0407M	02-Feb-2021	----	----	----	12-Feb-2021	02-Mar-2021	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber TOC Vial - Sulfuric Acid (EP080) QC35		03-Feb-2021	11-Feb-2021	17-Feb-2021	✓	11-Feb-2021	17-Feb-2021	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber TOC Vial - Sulfuric Acid (EP080) QC35		03-Feb-2021	11-Feb-2021	17-Feb-2021	✓	11-Feb-2021	17-Feb-2021	✓
EP080: BTEXN								
Amber TOC Vial - Sulfuric Acid (EP080) QC35		03-Feb-2021	11-Feb-2021	17-Feb-2021	✓	11-Feb-2021	17-Feb-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT) HEOP0368M, MB03, HEC0448M-B	HEOP0366M, HEC0448M-A,	01-Feb-2021	08-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEOP0815M, EC0754RM, HEOP0574M, HEOP0430M, HEA0134M	HEC0319M1, HEA0141M, HEOP0504M, HEOP0387M,	02-Feb-2021	08-Feb-2021	01-Aug-2021	✓	08-Feb-2021	01-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEA0125M, QC31,	HEC0407M, QC32	02-Feb-2021	08-Feb-2021	01-Aug-2021	✓	09-Feb-2021	01-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEOP0445M, HEA0351M-A, HEA0350M-A, HEA0350M-C, QC34	HEOP0398M, HEA0351M-B, HEA0350M-B, QC33,	03-Feb-2021	08-Feb-2021	02-Aug-2021	✓	09-Feb-2021	02-Aug-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X-SUT) HEOP0368M, MB03, HEC0448M-B	HEOP0366M, HEC0448M-A,	01-Feb-2021	08-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEOP0815M, EC0754RM, HEOP0574M, HEOP0430M, HEA0134M	HEC0319M1, HEA0141M, HEOP0504M, HEOP0387M,	02-Feb-2021	08-Feb-2021	01-Aug-2021	✓	08-Feb-2021	01-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEA0125M, QC31,	HEC0407M, QC32	02-Feb-2021	08-Feb-2021	01-Aug-2021	✓	09-Feb-2021	01-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEOP0445M, HEA0351M-A, HEA0350M-A, HEA0350M-C, QC34	HEOP0398M, HEA0351M-B, HEA0350M-B, QC33,	03-Feb-2021	08-Feb-2021	02-Aug-2021	✓	09-Feb-2021	02-Aug-2021	✓



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X-SUT) HEOP0368M, MB03, HEC0448M-B	HEOP0366M, HEC0448M-A,	01-Feb-2021	08-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEOP0815M, EC0754RM, HEOP0574M, HEOP0430M, HEA0134M	HEC0319M1, HEA0141M, HEOP0504M, HEOP0387M,	02-Feb-2021	08-Feb-2021	01-Aug-2021	✓	08-Feb-2021	01-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEA0125M, QC31,	HEC0407M, QC32	02-Feb-2021	08-Feb-2021	01-Aug-2021	✓	09-Feb-2021	01-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEOP0445M, HEA0351M-A, HEA0350M-A, HEA0350M-C, QC34	HEOP0398M, HEA0351M-B, HEA0350M-B, QC33,	03-Feb-2021	08-Feb-2021	02-Aug-2021	✓	09-Feb-2021	02-Aug-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT) HEOP0368M, MB03, HEC0448M-B	HEOP0366M, HEC0448M-A,	01-Feb-2021	08-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEOP0815M, EC0754RM, HEOP0574M, HEOP0430M, HEA0134M	HEC0319M1, HEA0141M, HEOP0504M, HEOP0387M,	02-Feb-2021	08-Feb-2021	01-Aug-2021	✓	08-Feb-2021	01-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEA0125M, QC31,	HEC0407M, QC32	02-Feb-2021	08-Feb-2021	01-Aug-2021	✓	09-Feb-2021	01-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEOP0445M, HEA0351M-A, HEA0350M-A, HEA0350M-C, QC34	HEOP0398M, HEA0351M-B, HEA0350M-B, QC33,	03-Feb-2021	08-Feb-2021	02-Aug-2021	✓	09-Feb-2021	02-Aug-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X-SUT) HEOP0368M, MB03, HEC0448M-B	HEOP0366M, HEC0448M-A,	01-Feb-2021	08-Feb-2021	31-Jul-2021	✓	08-Feb-2021	31-Jul-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEOP0815M, EC0754RM, HEOP0574M, HEOP0430M, HEA0134M	HEC0319M1, HEA0141M, HEOP0504M, HEOP0387M,	02-Feb-2021	08-Feb-2021	01-Aug-2021	✓	08-Feb-2021	01-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEA0125M, QC31,	HEC0407M, QC32	02-Feb-2021	08-Feb-2021	01-Aug-2021	✓	09-Feb-2021	01-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEOP0445M, HEA0351M-A, HEA0350M-A, HEA0350M-C, QC34	HEOP0398M, HEA0351M-B, HEA0350M-B, QC33,	03-Feb-2021	08-Feb-2021	02-Aug-2021	✓	09-Feb-2021	02-Aug-2021	✓



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Reaural	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	3	27	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	6	16.67	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	7	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	1	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	6	33.33	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED041G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	6	16.67	5.26	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	1	100.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NO _x) by Discrete Analyser	EK059G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	27	7.41	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Matrix Spikes (MS) - Continued							
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	16	6.25	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	7	14.29	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	5.56	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	0	1	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard



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
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with 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)



<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
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.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

 <small>A TETRA TECH COMPANY</small>		Consigning Office: <u>Level 1, 235 St Georges Tce, Perth, WA</u>																
		Report Results to: <u>Wesley Alport</u>	Mobile: <u>0413414371</u>	Email: <u>wesley.alport@coffey.com</u>														
Project No: <u>754-PEREN282113</u>		Invoices to: <u>accounts.perth@coffey.com</u>		Phone: _____	Email: _____													
Project Name: <u>BHP Eastern Ridge PFAS Assessment</u>		Laboratory: <u>ALS</u>		Analysis Request Section														
Sampler's Name: <u>SM and RM</u>		Project Manager: <u>Wesley Alport</u>		Complete Suite	Complete Suite minus nutrition	PFAS only	Transport Blank	NOTES										
Special Instructions: <u>EP/991/20_V2</u>																		
Lab No.	Sample ID	Sample Date	Time	Matrix <small>(Soil...etc)</small>	Container Type & Preservative*	T-A-T <small>(specify)</small>												
-	HEV0006M	4/02/2021	8:30	Water	Various	Standard												
19	HEQ0008M	4/02/2021	13:30	Water	Various	Standard			X									
20	QC36	4/02/2021	17:00	Water	Various	Standard			X									
21	QC37	4/02/2021	17:00	Water	Various	Standard			X									
22	QC38	5/02/2021	12:30	Water	Various	Standard			X									
23	QC39	5/02/2021	12:40	Water	Various	Standard			X									
24	QC40	5/02/2021	12:40	Water	Various	Standard				X								
25	DCSW1	5/02/2021	11:00	Water	Various	Standard	X											
26	HEC0312-A	5/02/2021	8:10	Water	Various	Standard		X										
27	HEC0312-B	5/02/2021	8:20	Water	Various	Standard		X										
28	HH0085M	5/02/2021	8:45	Water	Various	Standard			X									
29	Sed1	5/02/2021	11:10	Water	Various	Standard	X											
30	Sed2	5/02/2021	11:20	Water	Various	Standard	X											
31	Sed3	5/02/2021	11:30	Water	Various	Standard	X											
32	Sed4	5/02/2021	11:40	Water	Various	Standard	X											
33	HEC0411M	5/02/2021	14:00	Water	Various	Standard			X									
34	Sump 3								X									

RELINQUISHED BY		RECEIVED BY		Sample Receipt Advice: (Lab Use Only)	
Name: <u>Steven Middleton</u>	Date: <u>5/02/2021</u>	Name: <u>[Signature]</u>	Date: <u>8/2/21</u>	All Samples Received in Good Condition	<input type="checkbox"/>
Company: <u>Coffey Environments</u>	Time: <u>16:00</u>	Company: _____	Time: <u>11AM</u>	All Documentation is in Proper Order	<input type="checkbox"/>
Name: _____	Date: _____	Name: _____	Date: _____	Samples Received Properly Chilled	<input type="checkbox"/>
Company: _____	Time: _____	Company: _____	Time: _____	Lab. Ref/Batch No. 	

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2101173

Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: wesley.alport@coffey.com	E-mail	: Lauren.biagioni@alsglobal.com
Telephone	: 61 8 6218 2100	Telephone	: 08 9406 1307
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: 754-PEREN282113 BHP Eastern Ridge PFAS Assessment	Page	: 1 of 4
Order number	: ----	Quote number	: EP2020COFENVWA0039_V2 (EP/991/20_V2)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: Regan MacDonald, Steven Middleton		

Dates

Date Samples Received	: 08-Feb-2021 11:00	Issue Date	: 08-Feb-2021
Client Requested Due Date	: 17-Feb-2021	Scheduled Reporting Date	: 17-Feb-2021

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 22.1 - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 34 / 34

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
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- Please see scanned COC for sample discrepancies: 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.
- **PFAS analysis will be conducted by ALS Environmental, Sydney, NATA accreditation no. 825, Site No. 10911.**
- **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.



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

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EP231X (solids) PFAS - Full Suite (28 analytes)
EP2101173-029	05-Feb-2021 11:10	Sed1	✓
EP2101173-030	05-Feb-2021 11:20	Sed2	✓
EP2101173-031	05-Feb-2021 11:30	Sed3	✓
EP2101173-032	05-Feb-2021 11:40	Sed4	✓

Matrix: **SOIL**

Laboratory sample ID	Sampling date / time	Sample ID	SOIL - EA055-103 Moisture Content
EP2101173-029	05-Feb-2021 11:10	Sed1	✓
EP2101173-030	05-Feb-2021 11:20	Sed2	✓
EP2101173-031	05-Feb-2021 11:30	Sed3	✓
EP2101173-032	05-Feb-2021 11:40	Sed4	✓

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EK062G Total Nitrogen as N (TKN + NOx reported) By	WATER - EP005 Total Organic Carbon (TOC)	WATER - EP231X-SUT PFAS - Super Ultra Trace Waters Long Suite (29	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - W-18 TRH(C6 - C9)/BTEXN
EP2101173-001	03-Feb-2021 15:55	HEOP0317M				✓		
EP2101173-002	03-Feb-2021 14:45	HST1063RM-A	✓	✓	✓	✓	✓	
EP2101173-003	03-Feb-2021 14:50	HST1063RM-B	✓	✓	✓	✓	✓	
EP2101173-004	04-Feb-2021 13:15	HEQ0020M				✓		



			WATER - EA015H Total Dissolved Solids - Standard Level	WATER - EK062G Total Nitrogen as N (TKN + NOx reported) By	WATER - EP005 Total Organic Carbon (TOC)	WATER - EP231X-SUT PFAS - Super Ultra Trace Waters Long Suite (29	WATER - NT-01 & 02 Ca, Mg, Na, K, Cl, SO4, Alkalinity	WATER - W-18 TRH(C6 - C9)/BTEXN
EP2101173-005	04-Feb-2021 13:50	HHS0055M	✓		✓	✓	✓	
EP2101173-006	04-Feb-2021 14:05	HHS0023M	✓		✓	✓	✓	
EP2101173-007	04-Feb-2021 07:45	HEOP0538M				✓		
EP2101173-008	04-Feb-2021 07:35	HEOP0467M				✓		
EP2101173-009	04-Feb-2021 08:05	HEOP0462M				✓		
EP2101173-010	04-Feb-2021 08:55	HEC0406V1	✓		✓	✓	✓	
EP2101173-011	04-Feb-2021 09:30	HEOP0798M				✓		
EP2101173-012	04-Feb-2021 12:00	HEOP0314M	✓		✓	✓	✓	
EP2101173-013	04-Feb-2021 10:25	HEOP0388M				✓		
EP2101173-014	04-Feb-2021 11:00	HEOP0524M				✓		
EP2101173-015	04-Feb-2021 11:15	HEQ0002M				✓		
EP2101173-016	04-Feb-2021 10:20	HEOP0386M				✓		
EP2101173-017	04-Feb-2021 10:00	HEOP0548M				✓		
EP2101173-018	04-Feb-2021 08:30	HEV0006M				✓		
EP2101173-019	04-Feb-2021 13:30	HEQ0008M				✓		
EP2101173-020	04-Feb-2021 17:00	QC36				✓		
EP2101173-021	04-Feb-2021 17:00	QC37				✓		
EP2101173-022	05-Feb-2021 12:30	QC38				✓		
EP2101173-023	05-Feb-2021 12:40	QC39				✓		
EP2101173-024	05-Feb-2021 12:40	QC40						✓
EP2101173-025	05-Feb-2021 11:00	DCSW1	✓	✓	✓	✓	✓	
EP2101173-026	05-Feb-2021 08:10	HEC0312-A	✓		✓	✓	✓	
EP2101173-027	05-Feb-2021 08:20	HEC0312-B	✓		✓	✓	✓	
EP2101173-028	05-Feb-2021 08:45	HH0085M				✓		
EP2101173-033	05-Feb-2021 14:00	HEC0411M				✓		
EP2101173-034	05-Feb-2021 00:00	Sump 3				✓		

Proactive Holding Time Report

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



CERTIFICATE OF ANALYSIS

Work Order : EP2101173
Client : COFFEY ENVIRONMENTS PTY LTD
Contact : WESLEY ALPORT
Address : Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000
Telephone : 61 8 6218 2100
Project : 754-PEREN282113 BHP Eastern Ridge PFAS Assessment
Order number : ----
C-O-C number : ----
Sampler : Regan MacDonald, Steven Middleton
Site : ----
Quote number : EP/991/20_V2
No. of samples received : 34
No. of samples analysed : 34

Page : 1 of 23
Laboratory : Environmental Division Perth
Contact : Lauren Biagioni
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : 08 9406 1307
Date Samples Received : 08-Feb-2021 11:00
Date Analysis Commenced : 08-Feb-2021
Issue Date : 15-Feb-2021 17:06



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This 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.

Table with 3 columns: Signatories, Position, Accreditation Category. Rows include Canhuang Ke, Chris Lemaitre, Dilani Fernando, Franco Lentini, and Vanessa Nguyen with their respective roles and accreditation locations.



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.

- TOC conducted by ALS Melbourne, NATA accreditation no. 825, site no 13778
- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- 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.



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	Sed1	Sed2	Sed3	Sed4	----
				Sampling date / time	05-Feb-2021 11:10	05-Feb-2021 11:20	05-Feb-2021 11:30	05-Feb-2021 11:40	----
Compound	CAS Number	LOR	Unit		EP2101173-029	EP2101173-030	EP2101173-031	EP2101173-032	-----
				Result	Result	Result	Result	Result	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		10.8	7.7	21.2	11.7	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		0.0002	<0.0002	<0.0002	0.0004	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	0.0003	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		0.0339	0.0448	0.0187	0.0680	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg		0.0007	0.0005	0.0005	0.0019	----
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		<0.001	<0.001	<0.001	<0.001	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		<0.0002	<0.0002	<0.0002	<0.0002	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		0.0017	0.0010	0.0003	0.0017	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg		0.0003	0.0005	<0.0002	0.0008	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg		0.0020	0.0026	0.0014	0.0041	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg		0.0007	0.0008	0.0005	0.0013	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg		0.0015	0.0015	0.0009	0.0022	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg		0.0003	0.0003	<0.0002	0.0004	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	0.0006	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg		0.0023	0.0010	0.0007	0.0042	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	Sed1	Sed2	Sed3	Sed4	----
Sampling date / time					05-Feb-2021 11:10	05-Feb-2021 11:20	05-Feb-2021 11:30	05-Feb-2021 11:40	----
Compound	CAS Number	LOR	Unit		EP2101173-029	EP2101173-030	EP2101173-031	EP2101173-032	-----
					Result	Result	Result	Result	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg		0.0086	0.0059	0.0024	0.0124	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg		0.0029	0.0033	0.0008	0.0030	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		<0.0005	<0.0005	<0.0005	<0.0005	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.0002	mg/kg		0.0551	0.0622	0.0262	0.101	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		0.0341	0.0448	0.0187	0.0684	----
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		0.0358	0.0458	0.0190	0.0701	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		104	114	98.5	106	----
13C8-PFOA	----	0.0002	%		113	108	118	114	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0317M	HST1063RM-A	HST1063RM-B	HEQ0020M	HHS0055M
Sampling date / time				03-Feb-2021 15:55	03-Feb-2021 14:45	03-Feb-2021 14:50	04-Feb-2021 13:15	04-Feb-2021 13:50	
Compound	CAS Number	LOR	Unit	EP2101173-001	EP2101173-002	EP2101173-003	EP2101173-004	EP2101173-005	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	1890	1820	----	794	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	<1	----	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	<1	----	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	374	387	----	381	
Total Alkalinity as CaCO3	----	1	mg/L	----	374	387	----	381	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	438	434	----	82	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	479	480	----	171	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	144	151	----	86	
Magnesium	7439-95-4	1	mg/L	----	156	162	----	80	
Sodium	7440-23-5	1	mg/L	----	198	203	----	75	
Potassium	7440-09-7	1	mg/L	----	12	13	----	7	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	----	2.17	2.48	----	----	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	2.5	2.6	----	----	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	----	4.7	5.1	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	30.1	30.3	----	14.1	
∅ Total Cations	----	0.01	meq/L	----	28.9	30.0	----	14.3	
∅ Ionic Balance	----	0.01	%	----	1.96	0.46	----	0.61	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	<1	4	----	<1	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.0018	0.0011	0.0070	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	0.0036	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0317M	HST1063RM-A	HST1063RM-B	HEQ0020M	HHS0055M
Sampling date / time				03-Feb-2021 15:55	03-Feb-2021 14:45	03-Feb-2021 14:50	04-Feb-2021 13:15	04-Feb-2021 13:50	
Compound	CAS Number	LOR	Unit	EP2101173-001	EP2101173-002	EP2101173-003	EP2101173-004	EP2101173-005	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids - Continued									
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0014	0.0237	0.0209	0.0010	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	0.0022	<0.0020	<0.0020	<0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.0020	0.0016	0.0014	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	0.0010	0.0007	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.0020	0.0016	0.0006	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.0093	0.0076	0.0043	<0.0005	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.0008	<0.0005	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.0008	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0317M	HST1063RM-A	HST1063RM-B	HEQ0020M	HHS0055M
Sampling date / time				03-Feb-2021 15:55	03-Feb-2021 14:45	03-Feb-2021 14:50	04-Feb-2021 13:15	04-Feb-2021 13:50	
Compound	CAS Number	LOR	Unit	EP2101173-001	EP2101173-002	EP2101173-003	EP2101173-004	EP2101173-005	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0014	0.0237	0.0245	0.0010	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0014	0.0410	0.0374	0.0150	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	0.0014	0.0426	0.0374	0.0150	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	102	111	118	106	113	
13C8-PFOA	----	0.0005	%	106	103	96.1	95.0	86.6	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HHS0023M	HEOP0538M	HEOP0467M	HEOP0462M	HEC0406V1
Sampling date / time				04-Feb-2021 14:05	04-Feb-2021 07:45	04-Feb-2021 07:35	04-Feb-2021 08:05	04-Feb-2021 08:55	
Compound	CAS Number	LOR	Unit	EP2101173-006	EP2101173-007	EP2101173-008	EP2101173-009	EP2101173-010	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	916	----	----	----	847	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	426	----	----	----	283	
Total Alkalinity as CaCO3	----	1	mg/L	426	----	----	----	283	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	166	----	----	----	122	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	186	----	----	----	212	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	86	----	----	----	78	
Magnesium	7439-95-4	1	mg/L	93	----	----	----	67	
Sodium	7440-23-5	1	mg/L	103	----	----	----	105	
Potassium	7440-09-7	1	mg/L	10	----	----	----	7	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	17.2	----	----	----	14.2	
∅ Total Cations	----	0.01	meq/L	16.7	----	----	----	14.2	
∅ Ionic Balance	----	0.01	%	1.57	----	----	----	0.08	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	6	----	----	----	<1	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<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	0.0024	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HHS0023M	HEOP0538M	HEOP0467M	HEOP0462M	HEC0406V1
Sampling date / time				04-Feb-2021 14:05	04-Feb-2021 07:45	04-Feb-2021 07:35	04-Feb-2021 08:05	04-Feb-2021 08:55	
Compound	CAS Number	LOR	Unit	EP2101173-006	EP2101173-007	EP2101173-008	EP2101173-009	EP2101173-010	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	0.0006	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0009	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HHS0023M	HEOP0538M	HEOP0467M	HEOP0462M	HEC0406V1
Sampling date / time				04-Feb-2021 14:05	04-Feb-2021 07:45	04-Feb-2021 07:35	04-Feb-2021 08:05	04-Feb-2021 08:55	
Compound	CAS Number	LOR	Unit	EP2101173-006	EP2101173-007	EP2101173-008	EP2101173-009	EP2101173-010	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0024	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0045	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	0.0045	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	97.9	98.8	118	114	110	
13C8-PFOA	----	0.0005	%	92.0	94.6	84.3	90.7	97.9	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0798M	HEOP0314M	HEOP0388M	HEOP0524M	HEQ0002M
Sampling date / time				04-Feb-2021 09:30	04-Feb-2021 12:00	04-Feb-2021 10:25	04-Feb-2021 11:00	04-Feb-2021 11:15	
Compound	CAS Number	LOR	Unit	EP2101173-011	EP2101173-012	EP2101173-013	EP2101173-014	EP2101173-015	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	778	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	<1	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	<1	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	71	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	----	71	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	<1	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	289	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	27	----	----	----	
Magnesium	7439-95-4	1	mg/L	----	59	----	----	----	
Sodium	7440-23-5	1	mg/L	----	66	----	----	----	
Potassium	7440-09-7	1	mg/L	----	4	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	9.57	----	----	----	
∅ Total Cations	----	0.01	meq/L	----	9.18	----	----	----	
∅ Ionic Balance	----	0.01	%	----	2.10	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	<1	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.0010	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0013	<0.0002	0.0022	0.0009	0.0021	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0798M	HEOP0314M	HEOP0388M	HEOP0524M	HEQ0002M
Sampling date / time				04-Feb-2021 09:30	04-Feb-2021 12:00	04-Feb-2021 10:25	04-Feb-2021 11:00	04-Feb-2021 11:15	
Compound	CAS Number	LOR	Unit	EP2101173-011	EP2101173-012	EP2101173-013	EP2101173-014	EP2101173-015	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	0.0022	<0.0020	0.0036	<0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0052	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0006	0.0007	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0005	0.0017	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0008	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0798M	HEOP0314M	HEOP0388M	HEOP0524M	HEQ0002M
Sampling date / time				04-Feb-2021 09:30	04-Feb-2021 12:00	04-Feb-2021 10:25	04-Feb-2021 11:00	04-Feb-2021 11:15	
Compound	CAS Number	LOR	Unit	EP2101173-011	EP2101173-012	EP2101173-013	EP2101173-014	EP2101173-015	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0013	<0.0002	0.0022	0.0009	0.0021	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0013	0.0032	0.0022	0.0108	0.0045	
^ Sum of PFAS	----	0.0002	µg/L	0.0013	0.0032	0.0022	0.0108	0.0053	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	114	115	102	114	105	
13C8-PFOA	----	0.0005	%	91.3	87.7	80.7	87.7	88.7	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0386M	HEOP0548M	HEV0006M	HEQ0008M	QC36
Sampling date / time				04-Feb-2021 10:20	04-Feb-2021 10:00	04-Feb-2021 08:30	04-Feb-2021 13:30	04-Feb-2021 17:00	
Compound	CAS Number	LOR	Unit	EP2101173-016	EP2101173-017	EP2101173-018	EP2101173-019	EP2101173-020	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0007	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0018	0.0006	0.0010	0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	0.0016	<0.0005	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	0.0009	<0.0005	<0.0005	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEOP0386M	HEOP0548M	HEV0006M	HEQ0008M	QC36
Sampling date / time				04-Feb-2021 10:20	04-Feb-2021 10:00	04-Feb-2021 08:30	04-Feb-2021 13:30	04-Feb-2021 17:00	
Compound	CAS Number	LOR	Unit	EP2101173-016	EP2101173-017	EP2101173-018	EP2101173-019	EP2101173-020	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0018	0.0006	0.0010	0.0002	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0025	0.0006	0.0041	0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	0.0025	0.0006	0.0041	0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	95.0	114	107	101	114	
13C8-PFOA	----	0.0005	%	84.9	89.2	91.6	86.1	104	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC37	QC38	QC39	QC40	DCSW1
Sampling date / time				04-Feb-2021 17:00	05-Feb-2021 12:30	05-Feb-2021 12:40	05-Feb-2021 12:40	05-Feb-2021 11:00	
Compound	CAS Number	LOR	Unit	EP2101173-021	EP2101173-022	EP2101173-023	EP2101173-024	EP2101173-025	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	----	----	----	----	1740	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	----	----	----	----	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	----	----	----	----	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	----	----	----	----	178	
Total Alkalinity as CaCO3	----	1	mg/L	----	----	----	----	178	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	----	----	----	----	599	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	----	----	----	----	405	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	----	----	----	----	121	
Magnesium	7439-95-4	1	mg/L	----	----	----	----	112	
Sodium	7440-23-5	1	mg/L	----	----	----	----	256	
Potassium	7440-09-7	1	mg/L	----	----	----	----	18	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	0.01	mg/L	----	----	----	----	4.04	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	----	----	----	----	1.7	
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	0.1	mg/L	----	----	----	----	5.7	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	----	----	----	----	27.4	
∅ Total Cations	----	0.01	meq/L	----	----	----	----	26.8	
∅ Ionic Balance	----	0.01	%	----	----	----	----	1.11	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	----	----	----	----	3	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L	----	----	----	<20	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	----	----	----	<20	----	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	----	----	----	<20	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC37	QC38	QC39	QC40	DCSW1
Sampling date / time				04-Feb-2021 17:00	05-Feb-2021 12:30	05-Feb-2021 12:40	05-Feb-2021 12:40	05-Feb-2021 11:00	
Compound	CAS Number	LOR	Unit	EP2101173-021	EP2101173-022	EP2101173-023	EP2101173-024	EP2101173-025	
				Result	Result	Result	Result	Result	
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	----	----	----	<1	----	
Toluene	108-88-3	2	µg/L	----	----	----	<2	----	
Ethylbenzene	100-41-4	2	µg/L	----	----	----	<2	----	
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	----	----	----	<2	----	
ortho-Xylene	95-47-6	2	µg/L	----	----	----	<2	----	
^ Total Xylenes	----	2	µg/L	----	----	----	<2	----	
^ Sum of BTEX	----	1	µg/L	----	----	----	<1	----	
Naphthalene	91-20-3	5	µg/L	----	----	----	<5	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
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	----	0.0025	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0008	0.0006	<0.0005	----	0.0192	
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	0.0026	0.0024	<0.0002	----	0.0141	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	<0.0020	----	0.0105	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	0.0225	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	0.0095	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	0.0250	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	0.0121	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	0.0128	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	----	<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	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC37	QC38	QC39	QC40	DCSW1
Sampling date / time				04-Feb-2021 17:00	05-Feb-2021 12:30	05-Feb-2021 12:40	05-Feb-2021 12:40	05-Feb-2021 11:00	
Compound	CAS Number	LOR	Unit	EP2101173-021	EP2101173-022	EP2101173-023	EP2101173-024	EP2101173-025	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids - Continued									
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									
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	0.012	0.008	<0.001	----	0.009	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	----	<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	0.0034	0.0030	<0.0002	----	0.0333	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0154	0.0110	<0.0002	----	0.122	
^ Sum of PFAS	----	0.0002	µg/L	0.0154	0.0110	<0.0002	----	0.137	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	----	----	----	109	----	
Toluene-D8	2037-26-5	2	%	----	----	----	101	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC37	QC38	QC39	QC40	DCSW1
Sampling date / time					04-Feb-2021 17:00	05-Feb-2021 12:30	05-Feb-2021 12:40	05-Feb-2021 12:40	05-Feb-2021 11:00
Compound	CAS Number	LOR	Unit	EP2101173-021	EP2101173-022	EP2101173-023	EP2101173-024	EP2101173-025	EP2101173-025
				Result	Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	2	%	----	----	----	87.7	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	105	107	110	----	108	108
13C8-PFOA	----	0.0005	%	98.8	99.2	104	----	89.1	89.1



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0312-A	HEC0312-B	HH0085M	HEC0411M	Sump 3
Sampling date / time				05-Feb-2021 08:10	05-Feb-2021 08:20	05-Feb-2021 08:45	05-Feb-2021 14:00	05-Feb-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2101173-026	EP2101173-027	EP2101173-028	EP2101173-033	EP2101173-034	
				Result	Result	Result	Result	Result	
EA015: Total Dissolved Solids dried at 180 ± 5 °C									
Total Dissolved Solids @180°C	----	10	mg/L	630	642	----	----	----	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	----	----	----	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	260	260	----	----	----	
Total Alkalinity as CaCO3	----	1	mg/L	260	260	----	----	----	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	94	94	----	----	----	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	152	152	----	----	----	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	56	58	----	----	----	
Magnesium	7439-95-4	1	mg/L	58	59	----	----	----	
Sodium	7440-23-5	1	mg/L	86	86	----	----	----	
Potassium	7440-09-7	1	mg/L	6	6	----	----	----	
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	11.4	11.4	----	----	----	
∅ Total Cations	----	0.01	meq/L	11.5	11.6	----	----	----	
∅ Ionic Balance	----	0.01	%	0.10	0.89	----	----	----	
EP005: Total Organic Carbon (TOC)									
Total Organic Carbon	----	1	mg/L	<1	<1	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0010	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0011	0.0006	<0.0005	<0.0005	0.0010	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0050	0.0026	0.0006	<0.0002	0.0011	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0312-A	HEC0312-B	HH0085M	HEC0411M	Sump 3
Sampling date / time				05-Feb-2021 08:10	05-Feb-2021 08:20	05-Feb-2021 08:45	05-Feb-2021 14:00	05-Feb-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2101173-026	EP2101173-027	EP2101173-028	EP2101173-033	EP2101173-034	
				Result	Result	Result	Result	Result	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	0.0076	<0.0020	0.0030	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0035	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0013	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<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	<0.001	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<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	<0.0005	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEC0312-A	HEC0312-B	HH0085M	HEC0411M	Sump 3
Sampling date / time				05-Feb-2021 08:10	05-Feb-2021 08:20	05-Feb-2021 08:45	05-Feb-2021 14:00	05-Feb-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2101173-026	EP2101173-027	EP2101173-028	EP2101173-033	EP2101173-034	
				Result	Result	Result	Result	Result	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued									
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	0.010	0.005	0.002	0.003	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0061	0.0032	0.0006	<0.0002	0.0021	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0161	0.0082	0.0102	0.0030	0.0116	
^ Sum of PFAS	----	0.0002	µg/L	0.0161	0.0082	0.0102	0.0030	0.0116	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	113	106	115	102	105	
13C8-PFOA	----	0.0005	%	95.7	96.8	96.1	68.5	88.2	



Surrogate Control Limits

Sub-Matrix: SEDIMENT		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: WATER		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 Melbourne, NATA accreditation no. 825, site no. 13778 (Chemistry).

(WATER) EP005: Total Organic Carbon (TOC)

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

(WATER) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

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

(WATER) EP231C: Perfluoroalkyl Sulfonamides

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231B: Perfluoroalkyl Carboxylic Acids

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

(SOIL) EP231C: Perfluoroalkyl Sulfonamides

(SOIL) EP231A: Perfluoroalkyl Sulfonic Acids

(SOIL) EP231P: PFAS Sums

(SOIL) EP231S: PFAS Surrogate

(SOIL) EA055: Moisture Content (Dried @ 105-110°C)



QUALITY CONTROL REPORT

Work Order	: EP2101173	Page	: 1 of 19
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 61 8 6218 2100	Telephone	: 08 9406 1307
Project	: 754-PEREN282113 BHP Eastern Ridge PFAS Assessment	Date Samples Received	: 08-Feb-2021
Order number	: ----	Date Analysis Commenced	: 08-Feb-2021
C-O-C number	: ----	Issue Date	: 15-Feb-2021
Sampler	: Regan MacDonald, Steven Middleton		
Site	: ----		
Quote number	: EP/991/20_V2		
No. of samples received	: 34		
No. of samples analysed	: 34		



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Vanessa Nguyen	Organic Chemist	Perth Organics, Wangara, WA



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: SOIL

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3502329)									
EP2101091-002	Anonymous	EA055: Moisture Content	----	0.1	%	2.5	2.5	0.00	0% - 20%
ES2104247-006	Anonymous	EA055: Moisture Content	----	0.1	%	22.9	22.9	0.00	0% - 20%
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3503107)									
EP2101173-029	Sed1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	0.0002	0.0002	0.00	No Limit
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0339	0.0355	4.68	0% - 20%
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	0.0007	0.0009	31.5	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3503107)									
EP2101173-029	Sed1	EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	<0.0002	0.00	No Limit
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	0.0017	0.0017	0.00	No Limit
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	0.0003	0.0003	0.00	No Limit
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	0.0020	0.0018	10.4	No Limit
		EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	0.0007	0.0006	0.00	No Limit
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	0.0015	0.0016	9.14	No Limit
		EP231X: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0002	mg/kg	0.0003	0.0002	0.00	No Limit
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	<0.001	0.00	No Limit
		EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3503107)							
EP2101173-029	Sed1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	0.0023	0.0026	9.54	0% - 50%



Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3503107) - continued									
EP2101173-029	Sed1	EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	0.0086	0.0092	6.41	0% - 20%
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	0.0029	0.0029	0.00	0% - 50%
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3503107)									
EP2101173-029	Sed1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	<0.0005	0.00	No Limit
Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QC Lot: 3500265)									
EP2101164-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	4820	4820	0.0622	0% - 20%
EP2101173-010	HEC0406V1	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	847	841	0.711	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3500421)									
EP2101173-002	HST1063RM-A	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	374	370	1.15	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	374	370	1.15	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3500289)									
EP2101173-003	HST1063RM-B	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	434	435	0.00	0% - 20%
EP2101173-010	HEC0406V1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	122	123	0.816	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3500290)									
EP2101173-003	HST1063RM-B	ED045G: Chloride	16887-00-6	1	mg/L	480	487	1.39	0% - 20%
EP2101173-010	HEC0406V1	ED045G: Chloride	16887-00-6	1	mg/L	212	212	0.00	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3501350)									
EP2101173-002	HST1063RM-A	ED093F: Calcium	7440-70-2	1	mg/L	144	148	2.97	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	156	160	2.69	0% - 20%



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 3501350) - continued									
EP2101173-002	HST1063RM-A	ED093F: Sodium	7440-23-5	1	mg/L	198	201	1.64	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	12	12	0.00	0% - 50%
EP2101175-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	7	7	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	6	6	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	33	33	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QC Lot: 3501530)									
EP2101125-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	0.14	0.14	0.00	0% - 50%
EP2101125-011	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	7.03	7.04	0.00	0% - 20%
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QC Lot: 3500236)									
EP2101124-017	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	0.4	0.4	0.00	No Limit
EP2101149-005	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	6.7	7.2	6.75	0% - 50%
EP005: Total Organic Carbon (TOC) (QC Lot: 3508727)									
EP2101111-004	Anonymous	EP005: Total Organic Carbon	----	1	mg/L	333	330	1.02	0% - 20%
EP2101173-012	HEOP0314M	EP005: Total Organic Carbon	----	1	mg/L	<1	<1	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3503809)									
EP2101057-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP2101181-005	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3503809)									
EP2101057-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<0.02 mg/L	<20	0.00	No Limit
EP2101181-005	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 3503809)									
EP2101057-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<0.001 mg/L	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<0.002 mg/L	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<0.005 mg/L	<5	0.00	No Limit
EP2101181-005	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
		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
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3502313)									
EP2101173-004	HEQ0020M	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0010	0.0009	0.00	No Limit



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3502313) - continued									
EP2101173-004	HEQ0020M	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0070	0.0066	4.46	0% - 50%
		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
EP2101173-014	HEOP0524M	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0009	0.0012	27.3	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
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3503552)									
EP2101173-017	HEOP0548M	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0006	0.0005	22.2	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
EP2101173-028	HH0085M	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0006	0.0014	77.9	No Limit
		EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.0008	48.0	No Limit
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3503552) - continued									
EP2101173-028	HH0085M	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: Perfluoroalkyl Carboxylic Acids (QC Lot: 3502313)									
EP2101173-004	HEQ0020M	EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0014	0.0014	0.00	No Limit
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0006	0.0006	0.00	No Limit
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.0007	<0.0005	29.4	No Limit
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0043	0.0044	2.93	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	<0.0005	<0.0005	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
EP2101173-014	HEOP0524M	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	<0.0020	0.00	No Limit
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0052	0.0052	0.00	0% - 50%
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0006	0.0006	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	0.0006	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	<0.0005	<0.0005	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
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3503552)	HEOP0548M	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



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3503552) - continued									
EP2101173-017	HEOP0548M	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	<0.0005	<0.0005	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 (PFTTrDA)	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
EP2101173-028	HH0085M	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	<0.0005	<0.0005	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 (PFTTrDA)	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	0.0076	0.0071	6.11	No Limit		
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3502313)									
EP2101173-004	HEQ0020M	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
		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
EP2101173-014	HEOP0524M	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit



Sub-Matrix: WATER

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3502313) - continued									
EP2101173-014	HEOP0524M	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
		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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3503552)									
EP2101173-017	HEOP0548M	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
		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
EP2101173-028	HH0085M	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
		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



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3502313)									
EP2101173-004	HEQ0020M	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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
EP2101173-014	HEOP0524M	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3503552)									
EP2101173-017	HEOP0548M	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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
EP2101173-028	HH0085M	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	0.003	47.5	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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 Sums (QC Lot: 3502313)									
EP2101173-004	HEQ0020M	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0010	0.0009	10.5	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0150	0.0139	7.61	0% - 20%
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.0150	0.0139	7.61	0% - 20%
EP2101173-014	HEOP0524M	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0009	0.0012	28.6	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0108	0.0110	1.83	0% - 20%

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 Work Order : EP2101173
 Client : COFFEY ENVIRONMENTS PTY LTD
 Project : 754-PEREN282113 BHP Eastern Ridge PFAS Assessment



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231P: PFAS Sums (QC Lot: 3502313) - continued									
EP2101173-014	HEOP0524M	EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.0108	0.0110	1.83	0% - 20%
EP231P: PFAS Sums (QC Lot: 3503552)									
EP2101173-017	HEOP0548M	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0006	0.0005	18.2	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0006	0.0005	18.2	No Limit
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.0006	0.0005	18.2	No Limit
EP2101173-028	HH0085M	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0006	0.0014	80.0	No Limit
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0102	0.0123	18.7	0% - 20%
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.0102	0.0123	18.7	0% - 20%



Method Blank (MB) and Laboratory Control Spike (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 Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3503107)									
EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	0.00125 mg/kg	84.0	72.0	128	
EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	98.4	73.0	123	
EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.8	67.0	130	
EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	94.0	70.0	132	
EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	92.0	68.0	136	
EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	118	59.0	134	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3503107)									
EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	0.00625 mg/kg	77.8	71.0	135	
EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.2	69.0	132	
EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	0.00125 mg/kg	101	70.0	132	
EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.2	71.0	131	
EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	103	69.0	133	
EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	97.6	72.0	129	
EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	69.0	133	
EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	116	64.0	136	
EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	<0.0002	0.00125 mg/kg	108	69.0	135	
EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	<0.0002	0.00125 mg/kg	109	66.0	139	
EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	101	69.0	133	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3503107)									
EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	99.2	67.0	137	
EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.9	71.6	129	
EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	86.7	69.8	131	
EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	<0.0005	0.00312 mg/kg	97.9	68.7	130	
EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	<0.0005	0.00312 mg/kg	95.4	65.1	134	
EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	<0.0002	0.00125 mg/kg	102	63.0	144	
EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	<0.0002	0.00125 mg/kg	89.2	61.0	139	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3503107)									
EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	107	62.0	145	
EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	0.00125 mg/kg	90.0	64.0	140	
EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	0.00125 mg/kg	114	65.0	137	



Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
Method: Compound	CAS Number	LOR	Unit		Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3503107) - continued									
EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	0.00125 mg/kg	101	69.2	143	

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
Method: Compound	CAS Number	LOR	Unit		Result	Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
EA015: Total Dissolved Solids dried at 180 ± 5 °C (QCLot: 3500265)									
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	2000 mg/L	101	88.1	114	
				<10	1000 mg/L	101	88.1	114	
ED037P: Alkalinity by PC Titrator (QCLot: 3500421)									
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-00 1	1	mg/L	<1	----	----	----	----	
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----	
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----	
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	90.4	81.2	126	
				<1	200 mg/L	96.7	90.0	110	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3500289)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	93.8	87.7	113	
				<1	500 mg/L	105	87.7	113	
ED045G: Chloride by Discrete Analyser (QCLot: 3500290)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	96.4	87.9	114	
				<1	1000 mg/L	97.6	87.9	114	
ED093F: Dissolved Major Cations (QCLot: 3501350)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	100	85.9	113	
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	100	88.0	110	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.8	87.3	118	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	94.6	89.7	108	
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3501530)									
EK059G: Nitrite + Nitrate as N	----	0.01	mg/L	<0.01	0.5 mg/L	100	90.5	110	
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3500236)									
EK061G: Total Kjeldahl Nitrogen as N	----	0.1	mg/L	<0.1	10 mg/L	93.6	75.8	100	
EP005: Total Organic Carbon (TOC) (QCLot: 3508727)									
EP005: Total Organic Carbon	----	1	mg/L	<1	100 mg/L	97.4	81.2	110	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3503809)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	111	73.6	113	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3503809)									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	114	73.9	115	
EP080: BTEXN (QCLot: 3503809)									
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	111	84.1	114	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Recovery Limits (%)	
					Concentration	LCS	Low	High	
EP080: BTEXN (QCLot: 3503809) - continued									
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	115	81.0	115	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	111	84.4	113	
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	109	84.3	114	
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	102	86.5	111	
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	104	77.0	118	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3502313)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	80.8	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	92.0	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	94.0	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	116	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	89.2	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	86.0	53.0	142	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3503552)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	78.8	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	87.2	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	87.6	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	108	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	91.6	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	94.0	53.0	142	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3502313)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	92.6	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	104	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	101	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	96.4	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	95.2	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	106	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	90.8	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	101	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	98.4	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	97.6	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	90.4	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3503552)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	87.3	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	91.2	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	90.4	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	93.6	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	95.2	71.0	133	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3503552) - continued									
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	106	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	110	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	116	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	96.4	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	110	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	92.0	71.0	132	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3502313)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	92.0	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	120	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	81.4	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	96.0	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	87.8	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	87.6	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	92.4	61.0	135	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3503552)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	80.4	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	108	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	78.2	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	99.4	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	84.0	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	91.6	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	98.8	61.0	135	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3502313)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	90.4	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	92.0	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	101	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	108	60.9	136	



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3503552)								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	95.2	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	93.6	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	116	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	108	60.9	136
EP231P: PFAS Sums (QCLot: 3502313)								
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	----	----	----	----
EP231P: PFAS Sums (QCLot: 3503552)								
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: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%) MS	Recovery Limits (%) Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3503107)							
EP2101173-029	Sed1	EP231X: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.00125 mg/kg	88.8	72.0	128
		EP231X: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.00125 mg/kg	113	73.0	123
		EP231X: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.00125 mg/kg	109	67.0	130
		EP231X: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.00125 mg/kg	110	70.0	132
		EP231X: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.00125 mg/kg	# Not Determined	68.0	136
		EP231X: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.00125 mg/kg	110	59.0	134
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3503107)							
EP2101173-029	Sed1	EP231X: Perfluorobutanoic acid (PFBA)	375-22-4	0.00625 mg/kg	89.0	71.0	135
		EP231X: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.00125 mg/kg	123	69.0	132
		EP231X: Perfluorohexanoic acid (PFHxA)	307-24-4	0.00125 mg/kg	115	70.0	132
		EP231X: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.00125 mg/kg	113	71.0	131
		EP231X: Perfluorooctanoic acid (PFOA)	335-67-1	0.00125 mg/kg	94.0	69.0	133
		EP231X: Perfluorononanoic acid (PFNA)	375-95-1	0.00125 mg/kg	106	72.0	129
		EP231X: Perfluorodecanoic acid (PFDA)	335-76-2	0.00125 mg/kg	90.4	69.0	133



Sub-Matrix: **SOIL**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3503107) - continued							
EP2101173-029	Sed1	EP231X: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.00125 mg/kg	121	64.0	136
		EP231X: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.00125 mg/kg	134	69.0	135
		EP231X: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.00125 mg/kg	114	66.0	139
		EP231X: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.00312 mg/kg	119	69.0	133
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3503107)							
EP2101173-029	Sed1	EP231X: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.00125 mg/kg	78.4	67.0	137
		EP231X: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.00312 mg/kg	92.5	71.6	129
		EP231X: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.00312 mg/kg	95.5	69.8	131
		EP231X: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.00312 mg/kg	108	68.7	130
		EP231X: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.00312 mg/kg	110	65.1	134
		EP231X: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.00125 mg/kg	# Not Determined	63.0	144
		EP231X: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.00125 mg/kg	74.4	61.0	139
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3503107)							
EP2101173-029	Sed1	EP231X: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.00125 mg/kg	122	62.0	145
		EP231X: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.00125 mg/kg	88.0	64.0	140
		EP231X: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.00125 mg/kg	119	65.0	137
		EP231X: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.00125 mg/kg	88.8	69.2	143

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3500289)							
EP2101173-002	HST1063RM-A	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3500290)							
EP2101173-002	HST1063RM-A	ED045G: Chloride	16887-00-6	1000 mg/L	87.2	70.0	130
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser (QCLot: 3501530)							
EP2101125-001	Anonymous	EK059G: Nitrite + Nitrate as N	----	0.5 mg/L	107	70.0	130
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser (QCLot: 3500236)							
EP2101124-017	Anonymous	EK061G: Total Kjeldahl Nitrogen as N	----	5 mg/L	99.1	70.0	130
EP005: Total Organic Carbon (TOC) (QCLot: 3508727)							
EP2101111-005	Anonymous	EP005: Total Organic Carbon	----	100 mg/L	106	76.6	125



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3503809)							
EP2101057-002	Anonymous	EP080: C6 - C9 Fraction	----	240 µg/L	100	77.0	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3503809)							
EP2101057-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	290 µg/L	83.8	77.0	137
EP080: BTEXN (QCLot: 3503809)							
EP2101057-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	113	77.0	122
		EP080: Toluene	108-88-3	20 µg/L	126	73.5	126
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3502313)							
EP2101173-013	HEOP0388M	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	98.0	72.0	130
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	116	71.0	127
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	102	68.0	131
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	104	69.0	134
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	80.4	65.0	140
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	83.2	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3503552)							
EP2101173-018	HEV0006M	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	89.6	72.0	130
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	82.0	71.0	127
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	103	68.0	131
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	115	69.0	134
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	84.8	65.0	140
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	102	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3502313)							
EP2101173-013	HEOP0388M	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	78.0	73.0	129
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	102	72.0	129
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	98.8	72.0	129
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	102	72.0	130
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	99.2	71.0	133
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	88.8	69.0	130
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	73.2	71.0	129
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	76.0	69.0	133
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	76.4	72.0	134
		EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.004 µg/L	65.2	65.0	144
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	97.3	71.0	132
		EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3503552)					
EP2101173-018	HEV0006M	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	87.8	73.0	129
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	96.0	72.0	129
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	87.6	72.0	129
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	94.0	72.0	130



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3503552) - continued							
EP2101173-018	HEV0006M	EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	91.6	71.0	133
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	101	69.0	130
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	99.6	71.0	129
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	125	69.0	133
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	90.0	72.0	134
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.004 µg/L	108	65.0	144
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	79.0	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3502313)							
EP2101173-013	HEOP0388M	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	108	68.0	141
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.01 µg/L	85.1	56.6	136
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.01 µg/L	87.2	61.9	129
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 µg/L	105	52.8	135
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	79.6	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	99.2	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3503552)							
EP2101173-018	HEV0006M	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	69.6	67.0	137
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.01 µg/L	100	68.0	141
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.01 µg/L	72.0	56.6	136
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.01 µg/L	73.4	61.9	129
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 µg/L	72.0	52.8	135
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	73.6	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	78.8	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3502313)							
EP2101173-013	HEOP0388M	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	86.8	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	91.6	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	102	67.0	138



Sub-Matrix: **WATER**

				<i>Matrix Spike (MS) Report</i>			
				<i>Spike</i>	<i>SpikeRecovery(%)</i>	<i>Recovery Limits (%)</i>	
<i>Laboratory sample ID</i>	<i>Sample ID</i>	<i>Method: Compound</i>	<i>CAS Number</i>	<i>Concentration</i>	<i>MS</i>	<i>Low</i>	<i>High</i>
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3502313) - continued							
EP2101173-013	HEOP0388M	EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	81.6	60.9	136
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3503552)							
EP2101173-018	HEV0006M	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	84.4	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	79.6	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	102	67.0	138
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	67.2	60.9	136

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2101173	Page	: 1 of 11
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Telephone	: 08 9406 1307
Project	: 754-PEREN282113 BHP Eastern Ridge PFAS Assessment	Date Samples Received	: 08-Feb-2021
Site	: ----	Issue Date	: 15-Feb-2021
Sampler	: Regan MacDonald, Steven Middleton	No. of samples received	: 34
Order number	: ----	No. of samples analysed	: 34

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- 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

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2101173--029	Sed1	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP231C: Perfluoroalkyl Sulfonamides	EP2101173--029	Sed1	N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EP2101173--002	HST1063RM-A	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
HDPE Soil Jar (EA055)								
Sed1, Sed3,	Sed2, Sed4	05-Feb-2021	----	----	----	09-Feb-2021	19-Feb-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE Soil Jar (EP231X)								
Sed1, Sed3,	Sed2, Sed4	05-Feb-2021	10-Feb-2021	04-Aug-2021	✓	10-Feb-2021	22-Mar-2021	✓
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE Soil Jar (EP231X)								
Sed1, Sed3,	Sed2, Sed4	05-Feb-2021	10-Feb-2021	04-Aug-2021	✓	10-Feb-2021	22-Mar-2021	✓



Matrix: **SOIL** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE Soil Jar (EP231X) Sed1, Sed3, Sed2, Sed4	05-Feb-2021	10-Feb-2021	04-Aug-2021	✓	10-Feb-2021	22-Mar-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE Soil Jar (EP231X) Sed1, Sed3, Sed2, Sed4	05-Feb-2021	10-Feb-2021	04-Aug-2021	✓	10-Feb-2021	22-Mar-2021	✓
EP231P: PFAS Sums							
HDPE Soil Jar (EP231X) Sed1, Sed3, Sed2, Sed4	05-Feb-2021	10-Feb-2021	04-Aug-2021	✓	10-Feb-2021	22-Mar-2021	✓

Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids dried at 180 ± 5 °C							
Clear Plastic Bottle - Natural (EA015H) HST1063RM-A, HST1063RM-B	03-Feb-2021	----	----	----	08-Feb-2021	10-Feb-2021	✓
Clear Plastic Bottle - Natural (EA015H) HHS0055M, HEC0406V1, HHS0023M, HEOP0314M	04-Feb-2021	----	----	----	08-Feb-2021	11-Feb-2021	✓
Clear Plastic Bottle - Natural (EA015H) DCSW1, HEC0312-B, HEC0312-A,	05-Feb-2021	----	----	----	08-Feb-2021	12-Feb-2021	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P) HST1063RM-A, HST1063RM-B	03-Feb-2021	----	----	----	08-Feb-2021	17-Feb-2021	✓
Clear Plastic Bottle - Natural (ED037-P) HHS0055M, HEC0406V1, HHS0023M, HEOP0314M	04-Feb-2021	----	----	----	08-Feb-2021	18-Feb-2021	✓
Clear Plastic Bottle - Natural (ED037-P) DCSW1, HEC0312-B, HEC0312-A,	05-Feb-2021	----	----	----	08-Feb-2021	19-Feb-2021	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G) HST1063RM-A, HST1063RM-B	03-Feb-2021	----	----	----	08-Feb-2021	03-Mar-2021	✓
Clear Plastic Bottle - Natural (ED041G) HHS0055M, HEC0406V1, HHS0023M, HEOP0314M	04-Feb-2021	----	----	----	08-Feb-2021	04-Mar-2021	✓
Clear Plastic Bottle - Natural (ED041G) DCSW1, HEC0312-B, HEC0312-A,	05-Feb-2021	----	----	----	08-Feb-2021	05-Mar-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G) HST1063RM-A,	HST1063RM-B	03-Feb-2021	----	----	----	08-Feb-2021	03-Mar-2021	✓
Clear Plastic Bottle - Natural (ED045G) HHS0055M, HEC0406V1,	HHS0023M, HEOP0314M	04-Feb-2021	----	----	----	08-Feb-2021	04-Mar-2021	✓
Clear Plastic Bottle - Natural (ED045G) DCSW1, HEC0312-B	HEC0312-A,	05-Feb-2021	----	----	----	08-Feb-2021	05-Mar-2021	✓
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Natural (ED093F) HST1063RM-A,	HST1063RM-B	03-Feb-2021	----	----	----	09-Feb-2021	10-Feb-2021	✓
Clear Plastic Bottle - Natural (ED093F) HHS0055M, HEC0406V1,	HHS0023M, HEOP0314M	04-Feb-2021	----	----	----	09-Feb-2021	11-Feb-2021	✓
Clear Plastic Bottle - Natural (ED093F) DCSW1, HEC0312-B	HEC0312-A,	05-Feb-2021	----	----	----	09-Feb-2021	12-Feb-2021	✓
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK059G) HST1063RM-A,	HST1063RM-B	03-Feb-2021	----	----	----	09-Feb-2021	03-Mar-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK059G) DCSW1		05-Feb-2021	----	----	----	09-Feb-2021	05-Mar-2021	✓
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK061G) HST1063RM-A,	HST1063RM-B	03-Feb-2021	09-Feb-2021	03-Mar-2021	✓	09-Feb-2021	03-Mar-2021	✓
Clear Plastic Bottle - Sulfuric Acid (EK061G) DCSW1		05-Feb-2021	09-Feb-2021	05-Mar-2021	✓	09-Feb-2021	05-Mar-2021	✓
EP005: Total Organic Carbon (TOC)								
Amber TOC Vial - Sulfuric Acid (EP005) HST1063RM-A,	HST1063RM-B	03-Feb-2021	----	----	----	12-Feb-2021	03-Mar-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005) HHS0055M, HEC0406V1,	HHS0023M, HEOP0314M	04-Feb-2021	----	----	----	12-Feb-2021	04-Mar-2021	✓
Amber TOC Vial - Sulfuric Acid (EP005) DCSW1, HEC0312-B	HEC0312-A,	05-Feb-2021	----	----	----	12-Feb-2021	05-Mar-2021	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080) QC40		05-Feb-2021	10-Feb-2021	19-Feb-2021	✓	10-Feb-2021	19-Feb-2021	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080) QC40		05-Feb-2021	10-Feb-2021	19-Feb-2021	✓	10-Feb-2021	19-Feb-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080) QC40	05-Feb-2021	10-Feb-2021	19-Feb-2021	✓	10-Feb-2021	19-Feb-2021	✓
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) HEOP0317M, HST1063RM-A, HST1063RM-B	03-Feb-2021	09-Feb-2021	02-Aug-2021	✓	10-Feb-2021	02-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEQ0020M, HHS0055M, HHS0023M, HEOP0538M, HEOP0467M, HEOP0462M, HEC0406V1, HEOP0798M, HEOP0314M, HEOP0388M, HEOP0524M	04-Feb-2021	09-Feb-2021	03-Aug-2021	✓	10-Feb-2021	03-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEQ0002M, HEOP0386M, HEOP0548M, HEV0006M, HEQ0008M, QC36, QC37	04-Feb-2021	10-Feb-2021	03-Aug-2021	✓	10-Feb-2021	03-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC38, QC39, DCSW1, HEC0312-A, HEC0312-B, HH0085M, HEC0411M, Sump 3	05-Feb-2021	10-Feb-2021	04-Aug-2021	✓	10-Feb-2021	04-Aug-2021	✓



Matrix: WATER

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X-SUT) HEOP0317M, HST1063RM-B	HST1063RM-A,	03-Feb-2021	09-Feb-2021	02-Aug-2021	✓	10-Feb-2021	02-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEQ0020M, HHS0023M, HEOP0467M, HEC0406V1, HEOP0314M, HEOP0524M	HHS0055M, HEOP0538M, HEOP0462M, HEOP0798M, HEOP0388M,	04-Feb-2021	09-Feb-2021	03-Aug-2021	✓	10-Feb-2021	03-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEQ0002M, HEOP0548M, HEQ0008M, QC37	HEOP0386M, HEV0006M, QC36,	04-Feb-2021	10-Feb-2021	03-Aug-2021	✓	10-Feb-2021	03-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC38, DCSW1, HEC0312-B, HEC0411M,	QC39, HEC0312-A, HH0085M, Sump 3	05-Feb-2021	10-Feb-2021	04-Aug-2021	✓	10-Feb-2021	04-Aug-2021	✓
EP231C: Perfluoroalkyl Sulfonamides								
HDPE (no PTFE) (EP231X-SUT) HEOP0317M, HST1063RM-B	HST1063RM-A,	03-Feb-2021	09-Feb-2021	02-Aug-2021	✓	10-Feb-2021	02-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEQ0020M, HHS0023M, HEOP0467M, HEC0406V1, HEOP0314M, HEOP0524M	HHS0055M, HEOP0538M, HEOP0462M, HEOP0798M, HEOP0388M,	04-Feb-2021	09-Feb-2021	03-Aug-2021	✓	10-Feb-2021	03-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEQ0002M, HEOP0548M, HEQ0008M, QC37	HEOP0386M, HEV0006M, QC36,	04-Feb-2021	10-Feb-2021	03-Aug-2021	✓	10-Feb-2021	03-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC38, DCSW1, HEC0312-B, HEC0411M,	QC39, HEC0312-A, HH0085M, Sump 3	05-Feb-2021	10-Feb-2021	04-Aug-2021	✓	10-Feb-2021	04-Aug-2021	✓



Matrix: WATER

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT) HEOP0317M, HST1063RM-B	HST1063RM-A,	03-Feb-2021	09-Feb-2021	02-Aug-2021	✓	10-Feb-2021	02-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEQ0020M, HHS0023M, HEOP0467M, HEC0406V1, HEOP0314M, HEOP0524M	HHS0055M, HEOP0538M, HEOP0462M, HEOP0798M, HEOP0388M,	04-Feb-2021	09-Feb-2021	03-Aug-2021	✓	10-Feb-2021	03-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEQ0002M, HEOP0548M, HEQ0008M, QC37	HEOP0386M, HEV0006M, QC36,	04-Feb-2021	10-Feb-2021	03-Aug-2021	✓	10-Feb-2021	03-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC38, DCSW1, HEC0312-B, HEC0411M,	QC39, HEC0312-A, HH0085M, Sump 3	05-Feb-2021	10-Feb-2021	04-Aug-2021	✓	10-Feb-2021	04-Aug-2021	✓
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X-SUT) HEOP0317M, HST1063RM-B	HST1063RM-A,	03-Feb-2021	09-Feb-2021	02-Aug-2021	✓	10-Feb-2021	02-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEQ0020M, HHS0023M, HEOP0467M, HEC0406V1, HEOP0314M, HEOP0524M	HHS0055M, HEOP0538M, HEOP0462M, HEOP0798M, HEOP0388M,	04-Feb-2021	09-Feb-2021	03-Aug-2021	✓	10-Feb-2021	03-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) HEQ0002M, HEOP0548M, HEQ0008M, QC37	HEOP0386M, HEV0006M, QC36,	04-Feb-2021	10-Feb-2021	03-Aug-2021	✓	10-Feb-2021	03-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC38, DCSW1, HEC0312-B, HEC0411M,	QC39, HEC0312-A, HH0085M, Sump 3	05-Feb-2021	10-Feb-2021	04-Aug-2021	✓	10-Feb-2021	04-Aug-2021	✓



Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Moisture Content	EA055	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	25.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	1	4	25.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	9	22.22	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	4	29	13.79	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	13	15.38	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	9	22.22	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	2	13	15.38	10.53	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Method Blanks (MB) - Continued							
Chloride by Discrete Analyser	ED045G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Dissolved Solids (High Level)	EA015H	1	13	7.69	5.26	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Organic Carbon	EP005	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X	SOIL	In-house: Analysis of soils by solvent extraction followed by LC-Electrospray-MS-MS, Negative Mode using MRM using internal standard quantitation. Isotopically labelled analogues of target analytes used as internal standards and surrogates are added to a portion of soil which is then extracted with MTBE and an ion pairing reagent. A portion of extract is exchanged into the analytical solvent mixture, combined with an equal volume reagent water and filtered for analysis. Method procedures and data quality objectives conform to US DoD QSM 5.3, table B-15 requirements.
Total Dissolved Solids (High Level)	EA015H	WATER	In house: Referenced to APHA 2540C. A gravimetric procedure that determines the amount of 'filterable' residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Nitrite and Nitrate as N (NOx) by Discrete Analyser	EK059G	WATER	In house: Referenced to APHA 4500-NO3- F. Combined oxidised Nitrogen (NO2+NO3) is determined by Chemical Reduction and direct colourimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Kjeldahl Nitrogen as N By Discrete Analyser	EK061G	WATER	In house: Referenced to APHA 4500-Norg D (In house). An aliquot of sample is digested using a high temperature Kjeldahl digestion to convert nitrogenous compounds to ammonia. Ammonia is determined colorimetrically by discrete analyser. This method is compliant with NEPM Schedule B(3)
Total Nitrogen as N (TKN + Nox) By Discrete Analyser	EK062G	WATER	In house: Referenced to APHA 4500-Norg / 4500-NO3-. This method is compliant with NEPM Schedule B(3)



Analytical Methods	Method	Matrix	Method Descriptions
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Total Organic Carbon	EP005	WATER	In house: Referenced to APHA 5310 B, The automated TOC analyzer determines Total and Inorganic Carbon by IR cell. TOC is calculated as the difference. This method is compliant with 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
QuEChERS Extraction of Solids	ORG71	SOIL	In house: Sequential extractions with Acetonitrile/Methanol by shaking. Extraction efficiency aided by the addition of salts under acidic conditions. Where relevant, interferences from co-extracted organics are removed with dispersive clean-up media (dSPE). The extract is either diluted or concentrated and exchanged into the analytical solvent.
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
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.

Rhiannon Steere

RECEIVED ASSTEE

18/02/21 2:01 PM

From: Boyes, David <DAVID.BOYES@coffey.com>
Sent: Thursday, 18 February 2021 1:59 PM
To: ALS Enviro Perth
Cc: Lauren Biagioni
Subject: [EXTERNAL] - EP2101173 - Additional Analysis

Follow Up Flag: Follow up
Flag Status: Flagged

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi

Please can I get ASLP pH 5 and pH7 for the following 4 samples

EP2101173029	EP2101173030	EP2101173031	EP2101173032
05/02/2021	05/02/2021	05/02/2021	05/02/2021
Sed1	Sed2	Sed3	Sed4
1/S	2,6	3,7	4,8

Super ultra-trace PFAS (full suite as previous on this job) please.

Thanks

David Boyes
Senior Associate Environmental Engineer

Level 1, Bishops See
235 St Georges Terrace
Perth WA 6000

T: +61 8 6218 2100
M: +61 403 225 195

coffey
A PERVA TECH COMPANY



Environmental Division
Perth

Work Order Reference
EP2101690



Telephone : 61-8-9406 1301

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST


 Consigning Office: Level 1, 235 St Georges Ter, Perth, WA
 Report Results to: Wesley Alport
 Invoices to: accounts-perth@coffey.com Phone: Wesley Alport
 Email: wesley.alport@coffey.com

Project No: 754-PEB02413
 Project Name: BHP Eastern Ridge PFAS Assessment
 Sampler's Name: SM and RM
 Project Manager: Wesley Alport
 Laboratory: ALS
 Special Instructions: EP/991/20_V2

Lab No.	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (Specify)	Complete Site minus nutrient	PFAS only	Transport Blank
1	HEOP0317M	3/02/2021	15:55	Water	Various	Standard		X	
2	PST10038M-A	3/02/2021	14:45	Water	Various	Standard	X		
3	PST10038M-B	3/02/2021	14:50	Water	Various	Standard	X		
4	HEO0020M	4/02/2021	13:45	Water	Various	Standard		X	
5	HH0055M	4/02/2021	13:50	Water	Various	Standard		X	
6	HH00223M	4/02/2021	14:05	Water	Various	Standard		X	
7	HEOP058M	4/02/2021	7:45	Water	Various	Standard		X	
8	HEOP047M	4/02/2021	7:35	Water	Various	Standard		X	
9	HEOP042M	4/02/2021	8:05	Water	Various	Standard		X	
10	HEO049V1	4/02/2021	8:55	Water	Various	Standard		X	
11	HEOP079M	4/02/2021	9:30	Water	Various	Standard		X	
12	HEOP0314M	4/02/2021	12:00	Water	Various	Standard		X	
13	HEOP038M	4/02/2021	10:25	Water	Various	Standard		X	
14	HEOP0021M	4/02/2021	11:00	Water	Various	Standard		X	
15	HEOP0321M	4/02/2021	11:15	Water	Various	Standard		X	
16	HEOP038M	4/02/2021	10:20	Water	Various	Standard		X	
17	HEOP038M	4/02/2021	10:00	Water	Various	Standard		X	
18	HEOP061M	4/02/2021	8:30	Water	Various	Standard		X	

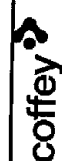
Name: Steven Middleton
 Coffey Environmental
 Date: 5/02/2021
 Time: 8:11 AM
 Date: 8/11/21
 Time: 10:00 AM

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Environmental Division
 Perth
 Work Order Reference
EP2101173

NOTES

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST


 Consigning Office: Level 1, 235 St Georges Ter, Perth, WA
 Report Results to: Wesley Alport
 Invoices to: accounts-perth@coffey.com Phone: Wesley Alport
 Email: wesley.alport@coffey.com

Project No: 754-PEB02413
 Project Name: BHP Eastern Ridge PFAS Assessment
 Sampler's Name: SM and RM
 Project Manager: Wesley Alport
 Laboratory: ALS
 Special Instructions: EP/991/20_V2

Lab No.	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (Specify)	Complete Site minus nutrient	PFAS only	Transport Blank
19	HEV0005M	4/02/2021	8:30	Water	Various	Standard		X	
20	HEC0008M	4/02/2021	13:50	Water	Various	Standard		X	
21	QC-36	4/02/2021	17:00	Water	Various	Standard		X	
22	QC-37	4/02/2021	17:00	Water	Various	Standard		X	
23	QC-38	5/02/2021	12:30	Water	Various	Standard		X	
24	QC-39	5/02/2021	12:40	Water	Various	Standard		X	
25	QC-40	5/02/2021	12:40	Water	Various	Standard		X	
26	DCSW1	5/02/2021	11:00	Water	Various	Standard		X	
27	HEC0312-A	5/02/2021	8:10	Water	Various	Standard		X	
28	HEC0312-B	5/02/2021	8:20	Water	Various	Standard		X	
29	HH0085M	5/02/2021	8:45	Water	Various	Standard		X	
30	Seed	5/02/2021	11:10	Water	Various	Standard		X	
31	Seed	5/02/2021	11:20	Water	Various	Standard		X	
32	Seed	5/02/2021	11:30	Water	Various	Standard		X	
33	Seed	5/02/2021	11:40	Water	Various	Standard		X	
34	HEO0411M	5/02/2021	14:00	Water	Various	Standard		X	

Name: Steven Middleton
 Coffey Environmental
 Date: 5/02/2021
 Time: 16:00
 Date: 8/11/21
 Time: 10:00 AM

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

NOTES

CERTIFICATE OF ANALYSIS

Work Order : **EP2101690**
Client : **COFFEY ENVIRONMENTS PTY LTD**
Contact : WESLEY ALPORT
Address : Level 1, Bishop See 235 St Georges Terrace
 Perth WA, AUSTRALIA 6000
Telephone : 61 8 6218 2100
Project : 754-PEREN282113 BHP Eastern Ridge PFAS Assessment
Order number : ----
C-O-C number : ----
Sampler : SM & RM
Site : ----
Quote number : EP/991/20_V2
No. of samples received : 8
No. of samples analysed : 8

Page : 1 of 9
Laboratory : Environmental Division Perth
Contact : Lauren Biagioni
Address : 26 Rigali Way Wangara WA Australia 6065
Telephone : 08 9406 1307
Date Samples Received : 18-Feb-2021 14:00
Date Analysis Commenced : 20-Feb-2021
Issue Date : 02-Mar-2021 08:56



Accreditation No. 825
 Accredited for compliance with
 ISO/IEC 17025 - Testing

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

This 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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW



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.

- PFAS conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EP231X-SUT: Particular samples required dilution due to sample matrix . LOR values have been adjusted accordingly.
- 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.
- EN60: Where leachable PFAS analysis is requested, centrifugation rather than pressure filtration is used as the default approach for removal of particulates, in line with AS 4439.3.
- EN60-DI: Where leachable PFAS analysis is requested, centrifugation rather than pressure filtration is used as the default approach for removal of particulates, in line with AS 4439.3.



Analytical Results

Sub-Matrix: ACETIC ACID LEACHATE (Matrix: WATER)				Sample ID	Sed1	Sed2	Sed3	Sed4	----
				Sampling date / time	05-Feb-2021 00:00	05-Feb-2021 00:00	05-Feb-2021 00:00	05-Feb-2021 00:00	----
Compound	CAS Number	LOR	Unit		EP2101690-001	EP2101690-002	EP2101690-003	EP2101690-004	-----
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L		0.0009	<0.0005	<0.0016	<0.0016	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L		0.0007	<0.0005	<0.0016	<0.0016	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L		0.0053	0.0027	0.0048	0.0027	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L		0.0019	0.0024	<0.0016	<0.0016	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L		0.288	0.393	0.278	0.130	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L		0.0007	0.0010	<0.0016	<0.0016	----
EP231B: Perfluoroalkyl Carboxylic Acids									
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		0.0258	0.0182	0.0448	0.0216	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L		0.0030	0.0016	0.0030	<0.0016	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L		0.0018	<0.0005	<0.0016	<0.0016	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L		0.0326	0.0216	0.0294	0.0106	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L		0.0047	0.0105	0.0078	0.0035	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L		0.0150	0.0222	0.0152	0.0054	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L		0.0011	0.0018	<0.0016	<0.0016	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L		<0.0005	0.0005	<0.0016	<0.0016	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L		<0.0005	<0.0005	<0.0016	<0.0016	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L		<0.0005	<0.0005	<0.0040	<0.0040	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L		0.0032	0.0030	0.0027	<0.0016	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L		<0.001	<0.001	<0.004	<0.004	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L		<0.001	<0.001	<0.004	<0.004	----



Analytical Results

Sub-Matrix: ACETIC ACID LEACHATE (Matrix: WATER)				Sample ID	Sed1	Sed2	Sed3	Sed4	----
Sampling date / time				05-Feb-2021 00:00	05-Feb-2021 00:00	05-Feb-2021 00:00	05-Feb-2021 00:00	----	
Compound	CAS Number	LOR	Unit	EP2101690-001	EP2101690-002	EP2101690-003	EP2101690-004	-----	
				Result	Result	Result	Result	----	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	<0.004	<0.004	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	<0.004	<0.004	----	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	0.0300	0.0310	0.0269	<0.0016	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	0.0032	0.0052	<0.0016	<0.0016	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	<0.002	<0.002	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	<0.002	<0.002	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	0.006	<0.002	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	<0.002	<0.002	----	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.293	0.396	0.283	0.133	----	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.357	0.437	0.366	0.165	----	
^ Sum of PFAS	----	0.0002	µg/L	0.418	0.515	0.419	0.174	----	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	104	108	116	114	----	
13C8-PFOA	----	0.0005	%	103	104	111	109	----	



Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Sample ID	Sed1	Sed2	Sed3	Sed4	----
				Sampling date / time	05-Feb-2021 00:00	05-Feb-2021 00:00	05-Feb-2021 00:00	05-Feb-2021 00:00	----
Compound	CAS Number	LOR	Unit		EP2101690-005	EP2101690-006	EP2101690-007	EP2101690-008	-----
					Result	Result	Result	Result	----
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L		<0.0016	<0.0016	<0.0016	<0.0016	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L		<0.0016	<0.0016	<0.0016	<0.0016	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L		0.0050	0.0032	0.0070	0.0018	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L		<0.0016	0.0037	0.0032	<0.0016	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L		0.589	0.871	0.806	0.240	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L		<0.0016	<0.0016	<0.0016	<0.0016	----
EP231B: Perfluoroalkyl Carboxylic Acids									
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		0.0293	0.0301	0.0974	0.0310	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L		<0.0016	<0.0016	<0.0016	<0.0016	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L		<0.0016	<0.0016	<0.0016	<0.0016	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L		0.0394	0.0301	0.0323	0.0078	----
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L		0.0058	0.0142	0.0130	0.0043	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L		0.0190	0.0326	0.0443	0.0107	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L		<0.0016	<0.0016	<0.0016	<0.0016	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L		<0.0016	<0.0016	<0.0016	<0.0016	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L		<0.0016	<0.0016	<0.0016	<0.0016	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L		<0.0040	<0.0040	<0.0040	<0.0040	----
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L		0.0400	0.0370	0.0126	0.0021	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L		<0.004	<0.004	<0.004	<0.004	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L		<0.004	<0.004	<0.004	<0.004	----



Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Sample ID	Sed1	Sed2	Sed3	Sed4	----
Sampling date / time				05-Feb-2021 00:00	05-Feb-2021 00:00	05-Feb-2021 00:00	05-Feb-2021 00:00	----	
Compound	CAS Number	LOR	Unit	EP2101690-005	EP2101690-006	EP2101690-007	EP2101690-008	-----	
				Result	Result	Result	Result	----	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.004	<0.004	<0.004	<0.004	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.004	<0.004	<0.004	<0.004	----	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	0.0450	0.0326	0.0549	0.0054	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	0.0088	0.0158	0.0098	<0.0016	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.002	<0.002	<0.002	<0.002	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.002	<0.002	<0.002	<0.002	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.002	<0.002	<0.002	<0.002	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.002	<0.002	<0.002	<0.002	----	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.594	0.874	0.813	0.242	----	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.663	0.934	0.943	0.281	----	
^ Sum of PFAS	----	0.0002	µg/L	0.781	1.07	1.08	0.303	----	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	107	112	107	108	----	
13C8-PFOA	----	0.0005	%	98.7	102	97.7	97.8	----	



Analytical Results

Sub-Matrix: SEDIMENT (Matrix: SOIL)				Sample ID	Sed1	Sed2	Sed3	Sed4	Sed1
Sampling date / time				05-Feb-2021 00:00	05-Feb-2021 00:00	05-Feb-2021 00:00	05-Feb-2021 00:00	05-Feb-2021 00:00	05-Feb-2021 00:00
Compound	CAS Number	LOR	Unit	EP2101690-001	EP2101690-002	EP2101690-003	EP2101690-004	EP2101690-005	EP2101690-005
				Result	Result	Result	Result	Result	Result
EN60: ASLP Leaching Procedure - Inorganics/PFAS (Plastic Vessel)									
Extraction Fluid pH	----	0.1	pH Unit	5.0	5.0	5.0	5.0	5.0	----
Final pH	----	0.1	pH Unit	5.4	5.8	5.1	5.1	5.1	----
EN60-DI: Bottle Leaching Procedure - Inorganics/PFAS (Plastic Vessel)									
Final pH	----	0.1	pH Unit	----	----	----	----	----	7.8



Analytical Results

Sub-Matrix: **SEDIMENT**
 (Matrix: **SOIL**)

Sample ID

				Sed2	Sed3	Sed4	----	----
Sampling date / time				05-Feb-2021 00:00	05-Feb-2021 00:00	05-Feb-2021 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2101690-006	EP2101690-007	EP2101690-008	-----	-----
				Result	Result	Result	----	----
EN60-DI: Bottle Leaching Procedure - Inorganics/PFAS (Plastic Vessel)								
Final pH	----	0.1	pH Unit	8.0	6.4	6.6	----	----



Surrogate Control Limits

Sub-Matrix: ACETIC ACID LEACHATE		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

Sub-Matrix: DI WATER LEACHATE		Recovery Limits (%)	
Compound	CAS Number	Low	High
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).

- (SOIL) EN60: ASLP Leaching Procedure - Inorganics/PFAS (Plastic Vessel)
- (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
- (SOIL) EN60-DI: Bottle Leaching Procedure - Inorganics/PFAS (Plastic Vessel)



QUALITY CONTROL REPORT

Work Order	: EP2101690	Page	: 1 of 7
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 61 8 6218 2100	Telephone	: 08 9406 1307
Project	: 754-PEREN282113 BHP Eastern Ridge PFAS Assessment	Date Samples Received	: 18-Feb-2021
Order number	: ----	Date Analysis Commenced	: 20-Feb-2021
C-O-C number	: ----	Issue Date	: 02-Mar-2021
Sampler	: SM & RM		
Site	: ----		
Quote number	: EP/991/20_V2		
No. of samples received	: 8		
No. of samples analysed	: 8		



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This Quality Control Report contains the following information:

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Alex Rossi	Organic Chemist	Sydney Organics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW



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 Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3523271)									
EP2101690-005	Sed1	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.589	0.553	6.24	0% - 20%
		EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0016	<0.0016	0.00	No Limit
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0016	<0.0016	0.00	No Limit
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0050	0.0050	0.00	No Limit
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0016	<0.0016	0.00	No Limit
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0016	<0.0016	0.00	No Limit
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3523271)									
EP2101690-005	Sed1	EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0293	0.0314	6.86	0% - 50%
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0016	<0.0016	0.00	No Limit
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0016	<0.0016	0.00	No Limit
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0394	0.0413	4.76	0% - 20%
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	0.0058	0.0067	15.4	No Limit
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	0.0190	0.0189	0.844	0% - 50%
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0016	<0.0016	0.00	No Limit
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0016	<0.0016	0.00	No Limit
		EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0016	<0.0016	0.00	No Limit



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3523271) - continued									
EP2101690-005	Sed1	EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0040	<0.0040	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: Perfluoroalkyl Sulfonamides (QC Lot: 3523271)									
EP2101690-005	Sed1	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	0.0400	0.0427	6.58	0% - 20%
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	0.0450	0.0456	1.41	0% - 20%
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	0.0088	0.0082	7.55	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.004	<0.004	0.00	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.004	<0.004	0.00	No Limit
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.004	<0.004	0.00	No Limit
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.004	<0.004	0.00	No Limit
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3523271)									
EP2101690-005	Sed1	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.002	<0.002	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	<0.002	<0.002	0.00	No Limit
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.002	<0.002	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3523271)									
EP2101690-005	Sed1	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.594	0.558	6.25	0% - 20%
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.663	0.631	4.95	0% - 20%
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.781	0.753	3.72	0% - 20%



Method Blank (MB) and Laboratory Control Spike (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 Spike (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: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3523271)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	82.0	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	93.6	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	89.6	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	99.2	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	87.2	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	86.4	53.0	142	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3533904)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	102	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	114	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	89.6	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	113	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	98.0	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	107	53.0	142	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3523271)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	86.4	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	92.8	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	94.8	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	94.0	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	94.4	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	101	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	100	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	111	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	104	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	98.4	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	94.6	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3533904)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	95.1	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	110	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	107	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	113	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	114	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	120	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	113	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	112	69.0	133	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report				
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
						LCS	Low	High	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3533904) - continued									
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	97.2	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	111	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	87.2	71.0	132	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3523271)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	88.0	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	92.5	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	73.0	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	95.4	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	83.8	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	102	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	102	61.0	135	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3533904)									
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	90.4	67.0	137	
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	102	68.0	141	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	81.4	56.6	136	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	108	61.9	129	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	89.9	52.8	135	
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	114	65.0	136	
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	90.8	61.0	135	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3523271)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	94.0	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	101	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	90.4	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	91.2	60.9	136	
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3533904)									
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	98.0	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	124	64.0	140	



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3533904) - continued								
EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.004 µg/L	106	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	100	60.9	136
EP231P: PFAS Sums (QCLot: 3523271)								
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	----	----	----	----
EP231P: PFAS Sums (QCLot: 3533904)								
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**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%)	Recovery Limits (%)	
					MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3523271)							
EP2101690-006	Sed2	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	90.0	72.0	130
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	98.0	71.0	127
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	94.4	68.0	131
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	102	69.0	134
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	# Not Determined	65.0	140
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	101	53.0	142
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3523271)							
EP2101690-006	Sed2	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	74.0	73.0	129
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	100	72.0	129
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	122	72.0	129
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	102	72.0	130
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	91.2	71.0	133
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	99.2	69.0	130
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	104	71.0	129
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	132	69.0	133
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	88.0	72.0	134



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3523271) - continued							
EP2101690-006	Sed2	EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.004 µg/L	116	65.0	144
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	79.8	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3523271)							
EP2101690-006	Sed2	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	93.2	67.0	137
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.01 µg/L	84.6	68.0	141
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.01 µg/L	83.2	56.6	136
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.01 µg/L	91.4	61.9	129
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 µg/L	92.2	52.8	135
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	88.8	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	70.4	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3523271)							
EP2101690-006	Sed2	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	89.2	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	102	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	113	67.0	138
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	90.8	60.9	136

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2101690	Page	: 1 of 5
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: WESLEY ALPORT	Telephone	: 08 9406 1307
Project	: 754-PEREN282113 BHP Eastern Ridge PFAS Assessment	Date Samples Received	: 18-Feb-2021
Site	: ----	Issue Date	: 02-Mar-2021
Sampler	: SM & RM	No. of samples received	: 8
Order number	: ----	No. of samples analysed	: 8

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- 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

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP231A: Perfluoroalkyl Sulfonic Acids	EP2101690--006	Sed2	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Analysis Holding Time Compliance

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

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

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

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

Matrix: SOIL

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EN60: ASLP Leaching Procedure - Inorganics/PFAS (Plastic Vessel)							
Non-Volatile Leach: 180 day HT (e.g. PFAS, metals ex.Hg) (EN60a-P) Sed1, Sed2, Sed3, Sed4	05-Feb-2021	25-Feb-2021	04-Aug-2021	✓	----	----	----
EN60-DI: Bottle Leaching Procedure - Inorganics/PFAS (Plastic Vessel)							
Non-Volatile Leach: 180 day HT (e.g. PFAS, metals ex.Hg) (EN60-DIa-P) Sed1, Sed2, Sed3, Sed4	05-Feb-2021	20-Feb-2021	04-Aug-2021	✓	----	----	----

Matrix: WATER

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231A: Perfluoroalkyl Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) Sed1, Sed2, Sed3, Sed4	20-Feb-2021	22-Feb-2021	19-Aug-2021	✓	22-Feb-2021	19-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) Sed1, Sed2, Sed3, Sed4	25-Feb-2021	26-Feb-2021	24-Aug-2021	✓	26-Feb-2021	24-Aug-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231B: Perfluoroalkyl Carboxylic Acids							
HDPE (no PTFE) (EP231X-SUT) Sed1, Sed3, Sed2, Sed4	20-Feb-2021	22-Feb-2021	19-Aug-2021	✓	22-Feb-2021	19-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) Sed1, Sed3, Sed2, Sed4	25-Feb-2021	26-Feb-2021	24-Aug-2021	✓	26-Feb-2021	24-Aug-2021	✓
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-SUT) Sed1, Sed3, Sed2, Sed4	20-Feb-2021	22-Feb-2021	19-Aug-2021	✓	22-Feb-2021	19-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) Sed1, Sed3, Sed2, Sed4	25-Feb-2021	26-Feb-2021	24-Aug-2021	✓	26-Feb-2021	24-Aug-2021	✓
EP231D: (n:2) Fluorotelomer Sulfonic Acids							
HDPE (no PTFE) (EP231X-SUT) Sed1, Sed3, Sed2, Sed4	20-Feb-2021	22-Feb-2021	19-Aug-2021	✓	22-Feb-2021	19-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) Sed1, Sed3, Sed2, Sed4	25-Feb-2021	26-Feb-2021	24-Aug-2021	✓	26-Feb-2021	24-Aug-2021	✓
EP231P: PFAS Sums							
HDPE (no PTFE) (EP231X-SUT) Sed1, Sed3, Sed2, Sed4	20-Feb-2021	22-Feb-2021	19-Aug-2021	✓	22-Feb-2021	19-Aug-2021	✓
HDPE (no PTFE) (EP231X-SUT) Sed1, Sed3, Sed2, Sed4	25-Feb-2021	26-Feb-2021	24-Aug-2021	✓	26-Feb-2021	24-Aug-2021	✓



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	8	12.50	10.00	✔	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	8	25.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	8	25.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard



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
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	SOIL	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
ASLP for Non & Semivolatile Analytes - Plastic Leaching Vessel	EN60a-P	SOIL	In house QWI-EN/60 referenced to AS4439.3 Preparation of Leachates.
Deionised Water Leach - Plastic Leaching Vessel	EN60-DIa-P	SOIL	In house QWI-EN/60 referenced to AS4439.3 Preparation of Leachates
Solid Phase Extraction (SPE) for PFAS in water	ORG72	SOIL	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.

Robert Johnston

From: Middleton, Steven <Steven.Middleton@coffey.com>
Sent: Tuesday, 2 February 2021 12:16
To: #AU06_EnviroSampleWA; Robert Johnston
Subject: Re: BHP Eastern Ridge.

EXTERNAL EMAIL*

*Caitlyn Gilbert
Eurofins # 771064*

Hi Rob,

Could you please add EC, TDS, pH, major anions, major cations to QC12 and QC16.

Thanks Rob

Get [Outlook for Android](#)

From: EnviroSampleWA@eurofins.com <EnviroSampleWA@eurofins.com>
Sent: Tuesday, February 2, 2021 11:53:33 AM
To: Robert Johnston <RobertJohnston@eurofins.com>; Middleton, Steven <Steven.Middleton@coffey.com>
Subject: RE: BHP Eastern Ridge.

⚠ CAUTION: This email originated from an external sender. Verify the source before opening links or attachments. ⚠

Hi Steve,

Please see attached COC.

Kind Regards,
Rob

Eurofins | Environment Testing
Unit 2, 91 Leach Highway
KEWDALE WA 6105
Australia

Phone : +61 8 9251 9692
Email : EnviroSampleWA@eurofins.com

From: Robert Johnston <RobertJohnston@eurofins.com>
Sent: Tuesday, 2 February 2021 9:54 AM
To: Middleton, Steven <Steven.Middleton@coffey.com>; #AU06_EnviroSampleWA <EnviroSampleWA@eurofins.com>
Subject: RE: BHP Eastern Ridge.

*scanned to you shortly after arrival

Kind Regards,
Robert Johnston

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST



Consigning Office: Perth
 Report Results to: Nesley Alport
 Invoices to: accounts@coffey.com

Mobile: _____ Email: Nesley.Alport @coffey.com
 Phone: _____ Email: _____ @coffey.com

Project No: 754-PEREN282113 Task No: _____
 Project Name: BHP Eastern Ridge PFAS Laboratory: Eurofins
 Sampler's Name: SM RM Project Manager: Nesley Alport
 Quote number (if different to current quoted prices): _____
 Special Instructions: _____

Analysis Request Section

Eurofins Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)
	<u>QC12</u>	<u>29/01/21</u>	<u>10:35</u>	<u>water</u>	<u>various</u>	<u>std.</u>
	<u>QC16</u>	<u>30/01/21</u>	<u>11:50</u>			
	<u>QC22</u>	<u>31/01/21</u>	<u>13:30</u>			
	<u>QC24</u>	<u>01/02/21</u>	<u>9:35</u>			
	<u>QC26</u>	<u>"</u>	<u>11:50</u>			

TDS	TOC	PFAS, Super Ultra	trace	Ca, Mg, Na, K, Cl	SO ₄ , Alkalinity	NOTES
X	X	X		X	X	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">Complete suite</div> <div style="text-align: right;">Send to ALS</div>
X	X	X		X	X	
X	X	X		X	X	
X	X	X		X	X	
X	X	X		X	X	

Date/Time: 2/2/21 11:50
 Chilled: Yes / No
 Temp: 26.4
25.7
 Correction: -0.2
 Final Temp: 25.7°C

RELINQUISHED BY

Name: _____ Date: _____ →
 Coffey Time: 01/02/21 13:45

RECEIVED BY

Name: Rob Johnston Date: 2/2/21
 Company: Eurofins Time: 11:50

Sample Receipt Advice: (Lab Use Only)

All Samples Received in Good Condition
 All Documentation is in Proper Order
 Samples Received Properly Chilled
 Lab. Ref/Batch No. 771064

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
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

New Zealand

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

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

Sample Receipt Advice

Company name: Coffey Services Australia Pty Ltd
Contact name: Wesley Alport
Project name: BHP EASTERN RIDGE PFAS
Project ID: 754-PEREN282113
Turnaround time: 5 Day
Date/Time received: Feb 2, 2021 11:50 AM
Eurofins reference: 771064

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 Wesley Alport - Wesley.Alport@coffey.com.

Australia
Melbourne
 6 Monterey Road
 Dandenong South VIC 3175
 Phone : +61 3 8564 5000
 NATA # 1261
 Site # 1254 & 14271

Sydney
 Unit F3, Building F
 16 Mars Road
 Lane Cove West NSW 2066
 Phone : +61 2 9900 8400
 NATA # 1261 Site # 18217

Brisbane
 1/21 Smallwood Place
 Murarrie QLD 4172
 Phone : +61 7 3902 4600
 NATA # 1261 Site # 20794

Perth
 2/91 Leach Highway
 Kewdale WA 6105
 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

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

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

Company Name:	Coffey Services Australia Pty Ltd	Order No.:		Received:	Feb 2, 2021 11:50 AM
Address:	Bishops See Level 1, 235 St Georges Terrace Perth WA 6000	Report #:	771064	Due:	Feb 9, 2021
Project Name:	BHP EASTERN RIDGE PFAS	Phone:	08 9355 7100	Priority:	5 Day
Project ID:	754-PEREN282113	Fax:	08 9470 8601	Contact Name:	Wesley Alport

Eurofins Analytical Services Manager : Rhys Thomas

Sample Detail						Conductivity (at 25°C)	pH (at 25 °C)	Total Organic Carbon	Eurofins Suite B11E: Cl/SO4/Alkalinity	Per- and Polyfluoroalkyl Substances (PFASs) - Ultra Trace	Eurofins Suite B11C: Na/K/Ca/Mg	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X		X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794										X		
Perth Laboratory - NATA Site # 23736												
Mayfield Laboratory												
External Laboratory												
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID							
1	QC12	Jan 29, 2021	10:35AM	Water	P21-Fe03477	X	X	X	X	X	X	X
2	QC16	Jan 30, 2021	11:50AM	Water	P21-Fe03478	X	X	X	X	X	X	X
3	QC22	Jan 31, 2021	1:30PM	Water	P21-Fe03479					X		
4	QC24	Feb 01, 2021	9:35AM	Water	P21-Fe03480					X		
5	QC26	Feb 01, 2021	11:50AM	Water	P21-Fe03481					X		
Test Counts						2	2	2	2	5	2	2

Coffey Services Australia Pty Ltd
Bishops See Level 1, 235 St Georges Terrace
Perth
WA 6000



NATA Accredited
Accreditation Number 1261
Site Number 23736

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

Attention: **Wesley Alport**

Report **771064-W**
 Project name **BHP EASTERN RIDGE PFAS**
 Project ID **754-PEREN282113**
 Received Date **Feb 02, 2021**

Client Sample ID			QC12	QC16	QC22	QC24
Sample Matrix			Water	Water	Water	Water
Eurofins Sample No.			P21-Fe03477	P21-Fe03478	P21-Fe03479	P21-Fe03480
Date Sampled			Jan 29, 2021	Jan 30, 2021	Jan 31, 2021	Feb 01, 2021
Test/Reference	LOR	Unit				
Chloride	1	mg/L	310	240	-	-
Conductivity (at 25°C)	10	uS/cm	1700	1400	-	-
pH (at 25 °C)	0.1	pH Units	8.3	8.2	-	-
Sulphate (as SO4)	5	mg/L	220	150	-	-
Total Dissolved Solids Dried at 180°C ± 2°C	10	mg/L	1400	1200	-	-
Total Organic Carbon	5	mg/L	6.2	11	-	-
Alkalinity (speciated)						
Bicarbonate Alkalinity (as CaCO3)	20	mg/L	420	380	-	-
Carbonate Alkalinity (as CaCO3)	10	mg/L	< 10	< 10	-	-
Hydroxide Alkalinity (as CaCO3)	20	mg/L	< 20	< 20	-	-
Total Alkalinity (as CaCO3)	20	mg/L	430	380	-	-
Eurofins Suite B11C: Na/K/Ca/Mg						
Calcium	0.5	mg/L	56	64	-	-
Magnesium	0.5	mg/L	81	71	-	-
Potassium	0.5	mg/L	8.0	6.6	-	-
Sodium	0.5	mg/L	200	140	-	-
Perfluoroalkyl carboxylic acids (PFCA) - Ultra Trace						
Perfluorobutanoic acid (PFBA) ^{N11}	0.005	ug/L	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoropentanoic acid (PFPeA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanoic acid (PFHxA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanoic acid (PFOA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanoic acid (PFNA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorodecanoic acid (PFDA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
13C4-PFBA (surr.)	1	%	34	27	28	24
13C5-PFPeA (surr.)	1	%	49	35	37	42
13C5-PFHxA (surr.)	1	%	34	62	47	52
13C4-PFHpA (surr.)	1	%	46	60	46	45
13C8-PFOA (surr.)	1	%	52	66	79	45
13C5-PFNA (surr.)	1	%	53	68	61	46
13C6-PFDA (surr.)	1	%	44	54	76	52

Client Sample ID			QC12 Water P21-Fe03477 Jan 29, 2021	QC16 Water P21-Fe03478 Jan 30, 2021	QC22 Water P21-Fe03479 Jan 31, 2021	QC24 Water P21-Fe03480 Feb 01, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace						
13C2-PFUnDA (surr.)	1	%	36	43	56	53
13C2-PFDoDA (surr.)	1	%	36	50	54	34
13C2-PFTeDA (surr.)	1	%	14	29	23	14
Perfluoroalkyl sulfonic acids (PFSA)- Ultra Trace						
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.0001	ug/L	0.0002	0.0005	0.0017	0.0002
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
13C3-PFBS (surr.)	1	%	21	37	35	28
18O2-PFHxS (surr.)	1	%	77	90	80	52
13C8-PFOS (surr.)	1	%	59	79	84	67
Perfluoroalkyl sulfonamido substances- Ultra Trace						
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.005	ug/L	< 0.005	< 0.005	< 0.005	< 0.005
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.005	ug/L	< 0.005	< 0.005	< 0.005	< 0.005
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.005	ug/L	< 0.005	< 0.005	< 0.005	< 0.005
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE) ^{N11}	0.005	ug/L	< 0.005	< 0.005	< 0.005	< 0.005
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE) ^{N11}	0.005	ug/L	< 0.005	< 0.005	< 0.005	< 0.005
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.005	ug/L	< 0.005	< 0.005	< 0.005	< 0.005
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.005	ug/L	< 0.005	< 0.005	< 0.005	< 0.005
13C8-FOSA (surr.)	1	%	57	54	66	57
D3-N-MeFOSA (surr.)	1	%	23	37	53	24
D5-N-EtFOSA (surr.)	1	%	18	31	44	19
D7-N-MeFOSE (surr.)	1	%	17	28	28	22
D9-N-EtFOSE (surr.)	1	%	17	25	24	19
D5-N-EtFOSAA (surr.)	1	%	51	35	53	49
D3-N-MeFOSAA (surr.)	1	%	58	36	48	28
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)- Ultra Trace						
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.005	ug/L	< 0.005	< 0.005	< 0.005	< 0.005
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
13C2-4:2 FTS (surr.)	1	%	23	37	66	31
13C2-6:2 FTSA (surr.)	1	%	23	38	86	38
13C2-8:2 FTSA (surr.)	1	%	32	42	111	65
13C2-10:2 FTSA (surr.)	1	%	122	80	199	86

Client Sample ID			QC12 Water P21-Fe03477 Jan 29, 2021	QC16 Water P21-Fe03478 Jan 30, 2021	QC22 Water P21-Fe03479 Jan 31, 2021	QC24 Water P21-Fe03480 Feb 01, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
PFASs Summations						
Sum (PFHxS + PFOS)*	0.001	ug/L	< 0.001	< 0.001	0.0017	< 0.001
Sum of US EPA PFAS (PFOS + PFOA)*	0.001	ug/L	< 0.001	< 0.001	0.0017	< 0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.001	ug/L	< 0.001	< 0.001	0.0017	< 0.001
Sum of WA DWER PFAS (n=10)*	0.005	ug/L	< 0.005	< 0.005	< 0.005	< 0.005
Sum of PFASs (n=30)*	0.005	ug/L	< 0.005	< 0.005	< 0.005	< 0.005

Client Sample ID			QC26 Water P21-Fe03481 Feb 01, 2021
Sample Matrix			
Eurofins Sample No.			
Date Sampled			
Test/Reference	LOR	Unit	
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace			
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
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.001	ug/L	< 0.001
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.001	ug/L	< 0.001
Perfluorotridecanoic acid (PFTrDA) ^{N15}	0.001	ug/L	< 0.001
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.001	ug/L	< 0.001
13C4-PFBA (surr.)	1	%	INT
13C5-PFPeA (surr.)	1	%	18
13C5-PFHxA (surr.)	1	%	29
13C4-PFHpA (surr.)	1	%	34
13C8-PFOA (surr.)	1	%	45
13C5-PFNA (surr.)	1	%	42
13C6-PFDA (surr.)	1	%	65
13C2-PFUnDA (surr.)	1	%	47
13C2-PFDoDA (surr.)	1	%	32
13C2-PFTeDA (surr.)	1	%	INT
Perfluoroalkyl sulfonic acids (PFSAs)- Ultra 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}	0.0001	ug/L	< 0.0001
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.001	ug/L	< 0.001
13C3-PFBS (surr.)	1	%	33
18O2-PFHxS (surr.)	1	%	57
13C8-PFOS (surr.)	1	%	60

Client Sample ID			QC26
Sample Matrix			Water
Eurofins Sample No.			P21-Fe03481
Date Sampled			Feb 01, 2021
Test/Reference	LOR	Unit	
Perfluoroalkyl sulfonamido substances- Ultra 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	%	25
D3-N-MeFOSA (surr.)	1	%	18
D5-N-EtFOSA (surr.)	1	%	11
D7-N-MeFOSE (surr.)	1	%	19
D9-N-EtFOSE (surr.)	1	%	20
D5-N-EtFOSAA (surr.)	1	%	76
D3-N-MeFOSAA (surr.)	1	%	86
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)- Ultra 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	%	52
13C2-6:2 FTSA (surr.)	1	%	77
13C2-8:2 FTSA (surr.)	1	%	96
13C2-10:2 FTSA (surr.)	1	%	143
PFASs Summations			
Sum (PFHxS + PFOS)*	0.001	ug/L	< 0.001
Sum of US EPA PFAS (PFOS + PFOA)*	0.001	ug/L	0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.001	ug/L	0.001
Sum of WA DWER PFAS (n=10)*	0.005	ug/L	< 0.005
Sum of PFASs (n=30)*	0.005	ug/L	< 0.005

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Eurofins Suite B11E: Cl/SO4/Alkalinity			
Chloride - Method: LTM-INO-4090 Chloride by Discrete Analyser	Melbourne	Feb 03, 2021	28 Days
Sulphate (as SO4) - Method: LTM-INO-4110 Sulfate by Discrete Analyser	Melbourne	Feb 03, 2021	28 Days
Alkalinity (speciated) - Method: LTM-INO-4250 Alkalinity by Electrometric Titration	Melbourne	Feb 03, 2021	14 Days
Conductivity (at 25°C) - Method: LTM-INO-4030 Conductivity	Melbourne	Feb 03, 2021	28 Days
pH (at 25 °C) - Method: LTM-GEN-7090 pH in water by ISE	Melbourne	Feb 03, 2021	0 Hours
Total Organic Carbon - Method: LTM-INO-4060 Total Organic Carbon in water and soil	Melbourne	Feb 03, 2021	28 Days
Eurofins Suite B11C: Na/K/Ca/Mg - Method: LTM-MET-3010 Alkali Metals by ICP-AES	Melbourne	Feb 03, 2021	180 Days
Total Dissolved Solids Dried at 180°C ± 2°C - Method: LTM-INO-4170 Total Dissolved Solids in Water	Melbourne	Feb 03, 2021	7 Days
Per- and Polyfluoroalkyl Substances (PFASs) - Ultra Trace			
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Feb 03, 2021	14 Days
Perfluoroalkyl sulfonic acids (PFASs)- Ultra Trace - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Feb 03, 2021	14 Days
Perfluoroalkyl sulfonamido substances- Ultra Trace - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) Ultra trace	Brisbane	Feb 03, 2021	14 Days
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)- Ultra Trace - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)	Brisbane	Feb 03, 2021	14 Days
PFASs Summations - Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS) - low level	Brisbane	Feb 03, 2021	

Australia

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Company Name: Coffey Services Australia Pty Ltd
Address: Bishops See Level 1, 235 St Georges Terrace
Perth
WA 6000

Order No.:
Report #: 771064
Phone: 08 9355 7100
Fax: 08 9470 8601

Received: Feb 2, 2021 11:50 AM
Due: Feb 9, 2021
Priority: 5 Day
Contact Name: Wesley Alport

Project Name: BHP EASTERN RIDGE PFAS
Project ID: 754-PEREN282113

Eurofins Analytical Services Manager : Rhys Thomas

Sample Detail						Conductivity (at 25°C)	pH (at 25 °C)	Total Organic Carbon	Eurofins Suite B11E: Cl/SO4/Alkalinity	Per- and Polyfluoroalkyl Substances (PFASs) - Ultra Trace	Eurofins Suite B11C: Na/K/Ca/Mg	Total Dissolved Solids Dried at 180°C ± 2°C
Melbourne Laboratory - NATA Site # 1254 & 14271						X	X	X	X		X	X
Sydney Laboratory - NATA Site # 18217												
Brisbane Laboratory - NATA Site # 20794										X		
Perth Laboratory - NATA Site # 23736												
Mayfield Laboratory												
External Laboratory												
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID							
1	QC12	Jan 29, 2021	10:35AM	Water	P21-Fe03477	X	X	X	X	X	X	X
2	QC16	Jan 30, 2021	11:50AM	Water	P21-Fe03478	X	X	X	X	X	X	X
3	QC22	Jan 31, 2021	1:30PM	Water	P21-Fe03479					X		
4	QC24	Feb 01, 2021	9:35AM	Water	P21-Fe03480					X		
5	QC26	Feb 01, 2021	11:50AM	Water	P21-Fe03481					X		
Test Counts						2	2	2	2	5	2	2

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.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

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

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

QC Data General Comments

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- 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.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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							
Chloride	mg/L	< 1			1	Pass	
Conductivity (at 25°C)	uS/cm	< 10			10	Pass	
Sulphate (as SO ₄)	mg/L	< 5			5	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	mg/L	< 10			10	Pass	
Total Organic Carbon	mg/L	< 5			5	Pass	
Method Blank							
Alkalinity (speciated)							
Bicarbonate Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Carbonate Alkalinity (as CaCO ₃)	mg/L	< 10			10	Pass	
Hydroxide Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Total Alkalinity (as CaCO ₃)	mg/L	< 20			20	Pass	
Method Blank							
Eurofins Suite B11C: Na/K/Ca/Mg							
Calcium	mg/L	< 0.5			0.5	Pass	
Magnesium	mg/L	< 0.5			0.5	Pass	
Potassium	mg/L	< 0.5			0.5	Pass	
Sodium	mg/L	< 0.5			0.5	Pass	
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace							
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	
Perfluoroundecanoic acid (PFUnDA)	ug/L	< 0.001			0.001	Pass	
Perfluorododecanoic acid (PFDoDA)	ug/L	< 0.001			0.001	Pass	
Perfluorotridecanoic acid (PFTTrDA)	ug/L	< 0.001			0.001	Pass	
Perfluorotetradecanoic acid (PFTTeDA)	ug/L	< 0.001			0.001	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSA)- Ultra Trace							
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	< 0.0001			0.0001	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.001			0.001	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances- Ultra Trace							
Perfluorooctane 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)	ug/L	< 0.005			0.005	Pass	
Method Blank							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)- Ultra 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	
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							
Chloride	%	109			70-130	Pass	
Conductivity (at 25°C)	%	88			70-130	Pass	
Sulphate (as SO4)	%	128			70-130	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	%	91			70-130	Pass	
Total Organic Carbon	%	105			70-130	Pass	
LCS - % Recovery							
Alkalinity (speciated)							
Carbonate Alkalinity (as CaCO3)	%	110			70-130	Pass	
Total Alkalinity (as CaCO3)	%	122			70-130	Pass	
LCS - % Recovery							
Eurofins Suite B11C: Na/K/Ca/Mg							
Calcium	%	87			80-120	Pass	
Magnesium	%	101			80-120	Pass	
Potassium	%	101			80-120	Pass	
Sodium	%	111			80-120	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs) - Ultra Trace							
Perfluorobutanoic acid (PFBA)	%	108			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	93			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	97			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	80			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	106			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	84			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	101			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	95			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	80			50-150	Pass	
Perfluorotridecanoic acid (PFTrDA)	%	135			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	101			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonic acids (PFSA)- Ultra Trace							
Perfluorobutanesulfonic acid (PFBS)	%	87			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	%	140			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	%	112			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	%	95			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	%	76			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	%	81			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	%	94			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	%	123			50-150	Pass	
LCS - % Recovery							
Perfluoroalkyl sulfonamido substances- Ultra Trace							
Perfluorooctane sulfonamide (FOSA)	%	96			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	%	85			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	%	83			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol (N-MeFOSE)	%	97			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol (N-EtFOSE)	%	83			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	%	82			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	%	91			50-150	Pass	
LCS - % Recovery							

Test				Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)- Ultra Trace										
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)				%	93			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)				%	104			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)				%	105			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)				%	93			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1				Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery										
Alkalinity (speciated)					Result 1					
Bicarbonate Alkalinity (as CaCO ₃)	M21-Fe05740	NCP	%	112				70-130	Pass	
Carbonate Alkalinity (as CaCO ₃)	B21-Fe00396	NCP	%	110				70-130	Pass	
Total Alkalinity (as CaCO ₃)	S21-Fe04252	NCP	%	60				70-130	Fail	Q08
Spike - % Recovery										
Eurofins Suite B11C: Na/K/Ca/Mg					Result 1					
Calcium	M21-Fe02567	NCP	%	112				75-125	Pass	
Magnesium	M21-Fe02567	NCP	%	111				75-125	Pass	
Potassium	M21-Fe02567	NCP	%	107				75-125	Pass	
Sodium	M21-Fe02567	NCP	%	97				75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1				Acceptance Limits	Pass Limits	Qualifying Code
Duplicate										
				Result 1	Result 2	RPD				
Chloride	S21-Fe04790	NCP	mg/L	100	77	26		30%	Pass	
Conductivity (at 25°C)	B21-Fe05288	NCP	uS/cm	6500	6400	2.0		30%	Pass	
pH (at 25 °C)	B21-Fe05288	NCP	pH Units	7.9	7.9	pass		30%	Pass	
Sulphate (as SO ₄)	M21-Fe10835	NCP	mg/L	210	380	1.0		30%	Pass	
Total Dissolved Solids Dried at 180°C ± 2°C	B21-Fe05288	NCP	mg/L	3200	3500	6.7		30%	Pass	
Total Organic Carbon	M21-Fe06715	NCP	mg/L	32	35	8.0		30%	Pass	
Duplicate										
Alkalinity (speciated)					Result 1	Result 2	RPD			
Bicarbonate Alkalinity (as CaCO ₃)	B21-Fe05288	NCP	mg/L	1200	1200	1.0		30%	Pass	
Carbonate Alkalinity (as CaCO ₃)	B21-Fe05288	NCP	mg/L	< 10	< 10	<1		30%	Pass	
Hydroxide Alkalinity (as CaCO ₃)	B21-Fe05288	NCP	mg/L	< 20	< 20	<1		30%	Pass	
Total Alkalinity (as CaCO ₃)	B21-Fe05288	NCP	mg/L	1200	1200	1.0		30%	Pass	
Duplicate										
Eurofins Suite B11C: Na/K/Ca/Mg					Result 1	Result 2	RPD			
Calcium	M21-Fe06467	NCP	mg/L	300	240	24		30%	Pass	
Magnesium	M21-Fe02567	NCP	mg/L	110	100	6.0		30%	Pass	
Potassium	M21-Fe06467	NCP	mg/L	440	350	21		30%	Pass	
Sodium	M21-Fe02567	NCP	mg/L	510	520	2.0		30%	Pass	

Comments
Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
N15	Where the native PFAS compound does not have labelled analogue then the quantification is made using the Extracted Internal Standard Analyte with the closest retention time to the analyte and no recovery correction has been made (Internal Standard Quantitation).
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.

Authorised By

Rhys Thomas	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Sarah McCallion	Senior Analyst-PFAS (QLD)
Scott Beddoes	Senior Analyst-Inorganic (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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CHAIN-OF-CUSTODY AND ANALYSIS REQUEST



Consigning Office: **PERTH**
 Report Results to: **david.boyes@coffey.com** Mobile: **0403 225 195** Email: **damien.arnaud@coffey.com**
 Invoices to: **accounts.perth@coffey.com** Phone: **0431645387** Email: **rejan.macdonald@coffey.com**

Project No: **754-PERENZ82113** Task No: **018**
 Project Name: **BHP EASTERN RIDGE (EA)** laboratory: **ALS**
 Sampler's Name: **DA, RM** Project Manager: **DAB DAVID BOYES**
 Quote number (if different to current quoted prices): -
 Special Instructions: -

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS (SUT)	NOTES
SNR	HEA0149M	09/04/21		W		Std	X	
2	EA0978RM	"		W		"	X	
2	HEOP0489M	"		W		"	X	
3	HEOP0415M	"		W		"	X	
4	ECO0681R	"		W		"	X	
SNR	ECO0763RM	"		W		"	X	
5	HEC0324M	"		W		"	X	
6	EC1775RDGM	"		W		"	X	
7	HHS0074M	09/04/21		W		"	X	
8	HNPIWR003	10/04/21		W		"	X	
9	EOP0334R	"		W		"	X	
10	EOP0378R	"		W		"	X	
11	EOP0222R	"		W		"	X	
12	EOP0220R	"		W		"	X	
13	T0399	"		W		"	X	
14	HEOP0467	"		W		"	X	

Environmental Division
 Perth
 Work Order Reference
EP2104088



Telephone: -- 61-8-9406 1301

RELINQUISHED BY Name: DAMIEN ARNAUD Date: 12/04/21 Coffey Time: -		RECEIVED BY Name: Koufa/ Date: 15/4/21 Company: ALS Time: 1020		Sample Receipt Advice: (Lab Use Only) All Samples Received in Good Condition <input type="checkbox"/> All Documentation is in Proper Order <input type="checkbox"/> Samples Received Properly Chilled <input type="checkbox"/> Lab. Ref/Batch No. <input type="text"/>
Name: _____ Date: _____ Company: _____ Time: _____		Name: _____ Date: _____ Company: _____ Time: _____		Lab. Ref/Batch No. <input type="text"/>

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST



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 Report Results to: **david.boyes@coffey.com** Mobile: **0403 225 195** Email: **damien-arnaud@coffey.com**
 Invoices to: **accounts.perth@coffey.com** Phone: **0431645387** Email: **regan.macdonald@coffey.com**

Project No: **754-PEREN282113** Task No: **018**
 Project Name: **BHP EASTERN RIDGE (ER)** Laboratory: **ALS**
 Sampler's Name: **DA, RM** Project Manager: **DAVID BOYES**
 Quote number (if different to current quoted prices): **-**
 Special Instructions: **-**

Analysis Request Section

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PPAS (SUT)	NOTES
15	HEQ0006	10/04/21		W		Std	X	
16	EQ0112R	"		W		"	X	
17	HEOP0398	"		W		"	X	
18	W029	"		W		"	X	
19	W028	"		W		"	X	
20	HEOPOS24	"		W		"	X	
21	HEA0351	"		W		"	X	
22	HEC0448	"		W		"	X	
23	T0411A	"		W		"	X	
24	HHS0036M_19	11/04/21		W		"	X	
25	HHS0036M_50	"		W		"	X	
26	HNPIHS0045P_A	"		W		"	X	
27	HNPIHS0045P_B	"		W		"	X	
28	HHS0016M_45	"		W		"	X	
29	HHS0016M_110	"		W		"	X	
30	HHS0019M_40	"		W		"	X	

RELINQUISHED BY Name: DAMIEN ARNAUD Date: 12/04/21 Coffey Time: -		RECEIVED BY Name: Date: _____ Company: _____ Time: _____		Sample Receipt Advice: (Lab Use Only) All Samples Received in Good Condition <input type="checkbox"/> All Documentation is in Proper Order <input type="checkbox"/> Samples Received Properly Chilled <input type="checkbox"/> Lab. Ref/Batch No. <input type="text"/>
Name: _____ Date: _____ Company: _____ Time: _____		Name: _____ Date: _____ Company: _____ Time: _____		

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST



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 Invoices to: **accounts.perth@coffey.com** Phone: **0431 645387** Email: **regan-macdonald@coffey.com**

Project No: **754-PEREN282113** Task No: **018**
 Project Name: **BHP EASTERN RIDGE (ER)** Laboratory: **ALS**
 Sampler's Name: **DA, RM** Project Manager: **DAND BOYES**
 Quote number (if different to current quoted prices): **-**
 Special Instructions: **-**

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS (SUT)	NOTES
31	HHS0019M_75	11/04/21		W		Std	X	
32	HHS0019M_110	"		W		"	X	
33	HNPIHS0039P_A	"		W		"	X	
34	HNPIHS0039P_B	"		W		"	X	
35	HHS0027M_35	"		W		"	X	
36	HHS0027M_70	"		W		"	X	
37	HHS0027M_100	"		W		"	X	
38	HHS0029M_35	"		W		"	X	
39	HHS0029M_95	"		W		"	X	
40	HHS0029M_120	"		W		"	X	
41	HHS0085M_64	"		W		"	X	
42	HHS0085M_90	"		W		"	X	

RELINQUISHED BY Name: DAMIEN ARNAUD Date: 12/04/21 Coffey Time: -		RECEIVED BY Name: RD Date: _____ Company: _____ Time: _____		Sample Receipt Advice: (Lab Use Only) All Samples Received in Good Condition <input type="checkbox"/> All Documentation is in Proper Order <input type="checkbox"/> Samples Received Properly Chilled <input type="checkbox"/> Lab. Ref/Batch No. <input type="text"/>
Name: _____ Date: _____ Company: _____ Time: _____		Name: _____ Date: _____ Company: _____ Time: _____		

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST



TETRA TECH COMPANY

Consigning Office: **PERTH**

Report Results to: **david.boyes@coffey.com** Mobile: **0403 225 195**

Email: **damien-arnaud@coffey.com**

Invoices to: **accounts.perth@coffey.com**

Phone: **0431 645 387**

Email: **regan-macdonald@coffey.com**

Project No: **754-PEREN282113** Task No: **018**
 Project Name: **BHP EASTERN RIDGE (ER)** Laboratory: **ALS**
 Sampler's Name: **DA, RM** Project Manager: **DAVID BOYES**
 Quote number (if different to current quoted prices): -
 Special Instructions: -

Analysis Request Section

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS (SUT)	NOTES
43	QC01	07/04/21		W		Std	X	
44	QC02	08/04/21		W		//	X	
45	QC03	09/04/21		W		//	X	
46	QC05	09/04/21		W		//	X	
47	QC06	09/04/21		W		//	X	
48	QC07	10/04/21		W		//	X	
49	QC08	10/04/21		W		//	X	
50	QC10	10/04/21		W		//	X	
51	QC12	10/04/21		W		//	X	
52	QC13	11/04/21		W		//	X	
53	QC14	11/04/21		W		//	X	
54	QC16	11/04/21		W		//	X	
55	QC18	11/04/21		W		//	X	

RELINQUISHED BY

Name: **DAMIEN ARNAUD** Date: **12/04/21** →
 Coffey: **[Signature]** Time: -
 Name: _____ Date: _____ →
 Company: _____ Time: _____

RECEIVED BY

Name: **[Signature]** Date: _____
 Company: _____ Time: _____
 Name: _____ Date: _____
 Company: _____ Time: _____

Sample Receipt Advice: (Lab Use Only)

All Samples Received in Good Condition
 All Documentation is in Proper Order
 Samples Received Properly Chilled
 Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G- Glass Bottle, J - Glass Jar, V- Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST



Consigning Office: PERTH
 Report Results to: david.boyes@coffey.com Mobile: 0403 225 195 Email: damienu.arnaud @coffey.com
 Invoices to: accounts.perth@coffey.com Phone: 0431 645 387 Email: regan.macdonald @coffey.com

Project No: 754-PEREN282113 Task No: 018
 Project Name: BHP EASTERN RIDGE (ER) Laboratory: ALS
 Sampler's Name: DA, RM Project Manager: DAVID BOYES
 Quote number (if different to current quoted prices): -
 Special Instructions: -

Analysis Request Section

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS (SUT)	NOTES
	LAB DUP01	09/04/21		W		Std	X	
	LAB DUP02	10/04/21		W		"	X	
	LAB DUP03	10/04/21		W		"	X	
	LAB DUP04	11/04/21		W		"	X	
	LAB DUP05	11/04/21		W		"	X	
	LAB MS01	09/04/21		W		Std	X	
	LAB MS02	10/04/21		W		"	X	
	LAB MS03	10/04/21		W		"	X	
	LAB MS04	11/04/21		W		"	X	
	LAB MS05	11/04/21		W		"	X	

RELINQUISHED BY

Name: DAMIEN ARNAUD Date: 12/04/21 →
 Coffey: [Signature] Time: -
 Name: _____ Date: _____ →
 Company: _____ Time: _____

RECEIVED BY

Name: LO Date: _____
 Company: _____ Time: _____
 Name: _____ Date: _____
 Company: _____ Time: _____

Sample Receipt Advice: (Lab Use Only)

All Samples Received in Good Condition
 All Documentation is in Proper Order
 Samples Received Properly Chilled
 Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST



Consigning Office: PERTH
 Report Results to: david.boyes@coffey.com Mobile: 0403 225 195 Email: damien.arnaud@coffey.com
 Invoices to: accounts.perth@coffey.com Phone: 0431 645 387 Email: regan.macdonald@coffey.com

Project No: 754-PEREN282113 Task No: 018
 Project Name: BHP EASTERN RIDGE (ER) Laboratory: ALS
 Sampler's Name: DA, RM Project Manager: DAVID BOYES
 Quote number (if different to current quoted prices): -
 Special Instructions: -

Analysis Request Section

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	PFAS (SUT)	NOTES
56	RPSW02_A	12/04/21		W		Std	X	
57	RPSW02_B	"		W		"	X	
58	RPSW03	"		W		"	X	
59	RPSW04	"		W		"	X	
60	RPSW05	"		W		"	X	
61	QC01	12/04/21		W		Std	X	
62	QC02	"		W		"	X	
<div style="border: 1px solid black; width: 100px; height: 30px; margin: auto; display: flex; align-items: center; justify-content: center;"> NOTES </div>								

RELINQUISHED BY Name: <u>DAMIEN ARNAUD</u> Date: <u>12/04/21</u> → Coffey <u>[Signature]</u> Time: <u>-</u>	RECEIVED BY Name: _____ Date: _____ Company: _____ Time: _____	Sample Receipt Advice: (Lab Use Only) All Samples Received in Good Condition <input type="checkbox"/> All Documentation is in Proper Order <input type="checkbox"/> Samples Received Properly Chilled <input type="checkbox"/> Lab. Ref/Batch No.
Name: _____ Date: _____ → Company: _____ Time: _____	Name: _____ Date: _____ Company: _____ Time: _____	

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative



SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : EP2104088

Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: Damien Arnaud	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
E-mail	: damien.arnaud@coffey.com	E-mail	: Lauren.biagioni@alsglobal.com
Telephone	: ----	Telephone	: 08 9406 1307
Facsimile	: ----	Facsimile	: +61-8-9406 1399
Project	: 754-PEREN282113 BHP Eastern Ridge (ER)	Page	: 1 of 4
Order number	: ----	Quote number	: EP2020COFENVWA0041 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: DA, RM		

Dates

Date Samples Received	: 15-Apr-2021 10:20	Issue Date	: 15-Apr-2021
Client Requested Due Date	: 27-Apr-2021	Scheduled Reporting Date	: 27-Apr-2021

Delivery Details

Mode of Delivery	: Carrier	Security Seal	: Intact.
No. of coolers/boxes	: 2	Temperature	: 21.5 - Ice present
Receipt Detail	:	No. of samples received / analysed	: 62 / 62

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 discrepancies: 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 Sydney, NATA accreditation no. 825, site no 10911.
- 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.



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

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EP231X-SUT PFAS - Super Ultra Trace Waters Long Suite (29)
EP2104088-001	09-Apr-2021 00:00	EA0978RM	✓
EP2104088-002	09-Apr-2021 00:00	HE0P0489M	✓
EP2104088-003	09-Apr-2021 00:00	HE0P0415M	✓
EP2104088-004	09-Apr-2021 00:00	EC00681R	✓
EP2104088-005	09-Apr-2021 00:00	HEC0324M	✓
EP2104088-006	09-Apr-2021 00:00	EC1775RDGM	✓
EP2104088-007	09-Apr-2021 00:00	HHS0074M	✓
EP2104088-008	10-Apr-2021 00:00	HNPIWR003	✓
EP2104088-009	10-Apr-2021 00:00	E0P0334R	✓
EP2104088-010	10-Apr-2021 00:00	E0P0378R	✓
EP2104088-011	10-Apr-2021 00:00	E0P0222R	✓
EP2104088-012	10-Apr-2021 00:00	E0P0220R	✓
EP2104088-013	10-Apr-2021 00:00	T0399	✓
EP2104088-014	10-Apr-2021 00:00	HE0P0467	✓
EP2104088-015	10-Apr-2021 00:00	HEQ0006	✓
EP2104088-016	10-Apr-2021 00:00	EQ0112R	✓
EP2104088-017	10-Apr-2021 00:00	HE0P0398	✓
EP2104088-018	10-Apr-2021 00:00	W029	✓
EP2104088-019	10-Apr-2021 00:00	W028	✓
EP2104088-020	10-Apr-2021 00:00	HE0P0524	✓
EP2104088-021	10-Apr-2021 00:00	HEA0351	✓
EP2104088-022	10-Apr-2021 00:00	HEC0448	✓
EP2104088-023	10-Apr-2021 00:00	T0411A	✓
EP2104088-024	11-Apr-2021 00:00	HHS0036M_19	✓
EP2104088-025	11-Apr-2021 00:00	HHS0036M_50	✓
EP2104088-026	11-Apr-2021 00:00	HNPIHS0045P_A	✓
EP2104088-027	11-Apr-2021 00:00	HNPIHS0045P_B	✓
EP2104088-028	11-Apr-2021 00:00	HHS0016M_45	✓
EP2104088-029	11-Apr-2021 00:00	HHS0016M_110	✓
EP2104088-030	11-Apr-2021 00:00	HHS0019M_40	✓
EP2104088-031	11-Apr-2021 00:00	HHS0019M_75	✓
EP2104088-032	11-Apr-2021 00:00	HHS0019M_110	✓
EP2104088-033	11-Apr-2021 00:00	HNPIHS0039P_A	✓
EP2104088-034	11-Apr-2021 00:00	HNPIHS0039P_B	✓
EP2104088-035	11-Apr-2021 00:00	HHS0027M_35	✓



WATER - EP231X-SUT
PFAS - Super Ultra Trace Waters Long Suite (29)

EP2104088-036	11-Apr-2021 00:00	HHS0027M_70	✓
EP2104088-037	11-Apr-2021 00:00	HHS0027M_100	✓
EP2104088-038	11-Apr-2021 00:00	HHS0029M_35	✓
EP2104088-039	11-Apr-2021 00:00	HHS0029M_95	✓
EP2104088-040	11-Apr-2021 00:00	HHS0029M_120	✓
EP2104088-041	11-Apr-2021 00:00	HHS0085M_64	✓
EP2104088-042	11-Apr-2021 00:00	HHS0085M_90	✓
EP2104088-043	07-Apr-2021 00:00	QC01	✓
EP2104088-044	08-Apr-2021 00:00	QC02	✓
EP2104088-045	09-Apr-2021 00:00	QC03	✓
EP2104088-046	09-Apr-2021 00:00	QC05	✓
EP2104088-047	09-Apr-2021 00:00	QC06	✓
EP2104088-048	10-Apr-2021 00:00	QC07	✓
EP2104088-049	10-Apr-2021 00:00	QC08	✓
EP2104088-050	10-Apr-2021 00:00	QC10	✓
EP2104088-051	10-Apr-2021 00:00	QC12	✓
EP2104088-052	11-Apr-2021 00:00	QC13	✓
EP2104088-053	11-Apr-2021 00:00	QC14	✓
EP2104088-054	11-Apr-2021 00:00	QC16	✓
EP2104088-055	11-Apr-2021 00:00	QC18	✓
EP2104088-056	12-Apr-2021 00:00	RPSW02_A	✓
EP2104088-057	12-Apr-2021 00:00	RPSW02_B	✓
EP2104088-058	12-Apr-2021 00:00	RPSW03	✓
EP2104088-059	12-Apr-2021 00:00	RPSW04	✓
EP2104088-060	12-Apr-2021 00:00	RPSW05	✓
EP2104088-061	12-Apr-2021 00:00	QC01	✓
EP2104088-062	12-Apr-2021 00:00	QC02	✓

Proactive Holding Time Report

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

CERTIFICATE OF ANALYSIS

Work Order : **EP2104088**
Client : **COFFEY ENVIRONMENTS PTY LTD**
Contact : Damien Arnaud
Address : Level 1, Bishop See 235 St Georges Terrace
 Perth WA, AUSTRALIA 6000

Telephone : ----
Project : 754-PEREN282113 BHP Eastern Ridge (ER)
Order number : ----
C-O-C number : ----
Sampler : DA, RM
Site : ER
Quote number : EN/222
No. of samples received : 62
No. of samples analysed : 62

Page : 1 of 29
Laboratory : Environmental Division Perth
Contact : Lauren Biagioni
Address : 26 Rigali Way Wangara WA Australia 6065

Telephone : 08 9406 1307
Date Samples Received : 15-Apr-2021 10:20
Date Analysis Commenced : 22-Apr-2021
Issue Date : 28-Apr-2021 17:09



Accreditation No. 825
 Accredited for compliance with
 ISO/IEC 17025 - Testing

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

This 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.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



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.

- EP231X-SUT: PFAS results for sample #6, #8, #12, #13, #18, #19 confirmed by re-extraction and re-analysis.
- EP231X-SUT: PFAS results for sample #20, #24 confirmed by re-extraction and re-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.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	EA0978RM	HE0P0489M	HE0P0415M	EC00681R	HEC0324M
Sampling date / time				09-Apr-2021 00:00	09-Apr-2021 00:00	09-Apr-2021 00:00	09-Apr-2021 00:00	09-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-001	EP2104088-002	EP2104088-003	EP2104088-004	EP2104088-005	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0038	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	0.0069	<0.0020	<0.0020	<0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0014	0.0008	<0.0005	<0.0005	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.0037	<0.0005	<0.0005	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0007	<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	<0.0005	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	EA0978RM	HE0P0489M	HE0P0415M	EC00681R	HEC0324M
Sampling date / time				09-Apr-2021 00:00	09-Apr-2021 00:00	09-Apr-2021 00:00	09-Apr-2021 00:00	09-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-001	EP2104088-002	EP2104088-003	EP2104088-004	EP2104088-005	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	0.005	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0038	<0.0002	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0021	0.0164	0.0038	<0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	0.0021	0.0164	0.0038	<0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	103	93.0	92.4	92.0	92.7	
13C8-PFOA	----	0.0005	%	100	96.3	112	94.5	96.9	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	EC1775RDGM	HHS0074M	HNPIWR003	E0P0334R	E0P0378R
Sampling date / time				09-Apr-2021 00:00	09-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-006	EP2104088-007	EP2104088-008	EP2104088-009	EP2104088-010	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	0.0021	<0.0005	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.0004	<0.0002	0.0004	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	0.0092	<0.0020	0.0029	<0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.0023	0.0005	0.0008	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	0.0008	<0.0005	<0.0005	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	EC1775RDGM	HHS0074M	HNPIWR003	E0P0334R	E0P0378R
Sampling date / time				09-Apr-2021 00:00	09-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-006	EP2104088-007	EP2104088-008	EP2104088-009	EP2104088-010	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	0.005	<0.001	0.013	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.002	<0.001	0.004	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	0.0004	<0.0002	0.0004	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0010	0.0189	0.0034	0.0211	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	0.0010	0.0189	0.0034	0.0217	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	97.3	96.3	94.2	93.6	93.2	
13C8-PFOA	----	0.0005	%	96.6	94.5	96.2	96.0	93.0	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	E0P0222R	E0P0220R	T0399	HE0P0467	HEQ0006
Sampling date / time				10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-011	EP2104088-012	EP2104088-013	EP2104088-014	EP2104088-015	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<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	0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	0.0009	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0014	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0009	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0141	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	E0P0222R	E0P0220R	T0399	HE0P0467	HEQ0006
Sampling date / time				10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-011	EP2104088-012	EP2104088-013	EP2104088-014	EP2104088-015	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	0.005	<0.001	<0.001	0.003	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	0.0050	0.0006	<0.0002	0.0205	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	0.0050	0.0006	<0.0002	0.0205	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	90.4	95.4	96.3	93.9	91.7	
13C8-PFOA	----	0.0005	%	97.8	97.6	97.2	92.5	97.1	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	EQ0112R	HE0P0398	W029	W028	HE0P0524
Sampling date / time				10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-016	EP2104088-017	EP2104088-018	EP2104088-019	EP2104088-020	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.0010	0.0011	0.0014	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.0010	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.0097	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.0006	<0.0002	<0.0002	0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	<0.0020	<0.0020	0.0349	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0152	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0012	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0026	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	EQ0112R	HE0P0398	W029	W028	HE0P0524
Sampling date / time				10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-016	EP2104088-017	EP2104088-018	EP2104088-019	EP2104088-020	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	0.0103	<0.0002	<0.0002	0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	0.0123	0.0011	0.0014	0.0541	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	0.0133	0.0011	0.0014	0.0541	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	91.6	92.0	90.0	95.0	103	
13C8-PFOA	----	0.0005	%	95.9	97.6	93.3	93.9	96.1	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0351	HEC0448	T0411A	HHS0036M_19	HHS0036M_50
Sampling date / time				10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-021	EP2104088-022	EP2104088-023	EP2104088-024	EP2104088-025	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0109	0.0018	<0.0005	0.0157	0.0098	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	0.0077	0.0007	<0.0005	<0.0005	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	0.0583	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0006	0.0250	<0.0002	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	0.0032	0.0278	<0.0020	0.0077	0.0073	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.0084	<0.0005	0.0057	0.0039	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.0042	<0.0005	0.0053	0.0035	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.0124	<0.0005	0.0049	0.0033	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.0245	<0.0005	0.0086	0.0064	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.0011	<0.0005	0.0007	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.0016	<0.0005	0.0014	0.0009	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HEA0351	HEC0448	T0411A	HHS0036M_19	HHS0036M_50
Sampling date / time				10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-021	EP2104088-022	EP2104088-023	EP2104088-024	EP2104088-025	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	0.012	<0.001	0.002	0.002	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	0.007	<0.001	<0.001	<0.001	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.002	<0.001	<0.001	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0589	0.0250	<0.0002	<0.0002	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0730	0.123	<0.0002	0.0499	0.0362	
^ Sum of PFAS	----	0.0002	µg/L	0.0807	0.128	<0.0002	0.0520	0.0371	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	104	104	104	105	101	
13C8-PFOA	----	0.0005	%	95.5	98.1	97.6	97.8	94.9	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIHS0045P_A	HNPIHS0045P_B	HHS0016M_45	HHS0016M_110	HHS0019M_40
Sampling date / time				11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-026	EP2104088-027	EP2104088-028	EP2104088-029	EP2104088-030	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HNPIHS0045P_A	HNPIHS0045P_B	HHS0016M_45	HHS0016M_110	HHS0019M_40
Sampling date / time				11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-026	EP2104088-027	EP2104088-028	EP2104088-029	EP2104088-030	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	105	102	101	101	109	
13C8-PFOA	----	0.0005	%	95.3	95.3	95.6	97.4	99.3	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HHS0019M_75	HHS0019M_110	HNPIHS0039P_A	HNPIHS0039P_B	HHS0027M_35
Sampling date / time				11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-031	EP2104088-032	EP2104088-033	EP2104088-034	EP2104088-035	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HHS0019M_75	HHS0019M_110	HNPIHS0039P_A	HNPIHS0039P_B	HHS0027M_35
Sampling date / time				11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-031	EP2104088-032	EP2104088-033	EP2104088-034	EP2104088-035	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	104	98.4	104	100	104	
13C8-PFOA	----	0.0005	%	99.2	102	99.9	98.0	97.5	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HHS0027M_70	HHS0027M_100	HHS0029M_35	HHS0029M_95	HHS0029M_120
Sampling date / time				11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-036	EP2104088-037	EP2104088-038	EP2104088-039	EP2104088-040	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	0.0310	0.0032	0.0008	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0005	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	0.0022	<0.0020	<0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	0.0044	0.0006	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	0.0012	<0.0005	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	0.0024	<0.0005	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	0.0010	<0.0005	<0.0005	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HHS0027M_70	HHS0027M_100	HHS0029M_35	HHS0029M_95	HHS0029M_120
Sampling date / time				11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-036	EP2104088-037	EP2104088-038	EP2104088-039	EP2104088-040	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	0.004	<0.001	0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	<0.0002	0.0005	<0.0002	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	0.0467	0.0038	0.0018	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	0.0467	0.0038	0.0018	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	99.9	98.9	105	101	115	
13C8-PFOA	----	0.0005	%	98.4	100	100	98.2	104	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HHS0085M_64	HHS0085M_90	QC01	QC02	QC03
Sampling date / time				11-Apr-2021 00:00	11-Apr-2021 00:00	07-Apr-2021 00:00	08-Apr-2021 00:00	09-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-041	EP2104088-042	EP2104088-043	EP2104088-044	EP2104088-045	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0009	0.0009	<0.0005	<0.0005	0.0011	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<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	0.0004	0.0009	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	0.0075	0.0083	<0.0020	0.0249	<0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	HHS0085M_64	HHS0085M_90	QC01	QC02	QC03
Sampling date / time					11-Apr-2021 00:00	11-Apr-2021 00:00	07-Apr-2021 00:00	08-Apr-2021 00:00	09-Apr-2021 00:00
Compound	CAS Number	LOR	Unit	EP2104088-041	EP2104088-042	EP2104088-043	EP2104088-044	EP2104088-045	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<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	0.0004	0.0009	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0084	0.0092	<0.0002	0.0253	0.0020	
^ Sum of PFAS	----	0.0002	µg/L	0.0084	0.0092	<0.0002	0.0253	0.0020	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	120	119	116	108	103	
13C8-PFOA	----	0.0005	%	97.2	97.1	98.1	96.0	82.0	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC05	QC06	QC07	QC08	QC10
Sampling date / time				09-Apr-2021 00:00	09-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-046	EP2104088-047	EP2104088-048	EP2104088-049	EP2104088-050	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0002	0.0004	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<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	0.0008	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<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	0.0006	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	0.0169	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC05	QC06	QC07	QC08	QC10
Sampling date / time				09-Apr-2021 00:00	09-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	10-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-046	EP2104088-047	EP2104088-048	EP2104088-049	EP2104088-050	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	0.012	0.002	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	0.003	<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	<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	0.0004	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0152	0.0207	
^ Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	<0.0002	0.0152	0.0207	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	105	106	92.3	97.5	104	
13C8-PFOA	----	0.0005	%	94.8	96.1	98.2	118	108	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC12	QC13	QC14	QC16	QC18
Sampling date / time				10-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-051	EP2104088-052	EP2104088-053	EP2104088-054	EP2104088-055	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	<0.0005	0.0205	<0.0005	<0.0005	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0009	<0.0002	<0.0002	<0.0002	<0.0002	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	0.0080	<0.0020	<0.0020	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	0.0039	<0.0005	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	0.0053	<0.0005	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	0.0020	<0.0005	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	0.0108	<0.0005	<0.0005	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	0.0012	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC12	QC13	QC14	QC16	QC18
Sampling date / time				10-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	11-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-051	EP2104088-052	EP2104088-053	EP2104088-054	EP2104088-055	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0009	<0.0002	<0.0002	<0.0002	<0.0002	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0009	<0.0002	0.0525	<0.0002	<0.0002	
^ Sum of PFAS	----	0.0002	µg/L	0.0009	<0.0002	0.0543	<0.0002	<0.0002	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	99.2	92.6	93.8	90.8	89.7	
13C8-PFOA	----	0.0005	%	99.8	108	80.0	103	93.6	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RPSW02_A	RPSW02_B	RPSW03	RPSW04	RPSW05
Sampling date / time				12-Apr-2021 00:00	12-Apr-2021 00:00	12-Apr-2021 00:00	12-Apr-2021 00:00	12-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-056	EP2104088-057	EP2104088-058	EP2104088-059	EP2104088-060	
				Result	Result	Result	Result	Result	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0006	<0.0005	<0.0005	0.0008	0.0007	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<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	0.0039	<0.0005	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0006	0.0004	0.0006	0.0141	0.0005	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	<0.0020	<0.0020	0.0032	<0.0020	0.0040	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0009	<0.0005	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	0.0017	<0.0005	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<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	<0.001	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	<0.001	<0.001	<0.001	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RPSW02_A	RPSW02_B	RPSW03	RPSW04	RPSW05
Sampling date / time				12-Apr-2021 00:00	12-Apr-2021 00:00	12-Apr-2021 00:00	12-Apr-2021 00:00	12-Apr-2021 00:00	
Compound	CAS Number	LOR	Unit	EP2104088-056	EP2104088-057	EP2104088-058	EP2104088-059	EP2104088-060	
				Result	Result	Result	Result	Result	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<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	<0.001	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<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	<0.0005	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<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	<0.001	<0.001	<0.001	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	<0.001	0.003	<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	<0.001	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0006	0.0004	0.0006	0.0180	0.0005	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0012	0.0004	0.0038	0.0250	0.0052	
^ Sum of PFAS	----	0.0002	µg/L	0.0012	0.0004	0.0038	0.0250	0.0052	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	98.3	91.7	91.2	84.1	102	
13C8-PFOA	----	0.0005	%	109	116	105	103	94.0	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC01	QC02	----	----	----
Sampling date / time				12-Apr-2021 00:00	12-Apr-2021 00:00	----	----	----	
Compound	CAS Number	LOR	Unit	EP2104088-061	EP2104088-062	-----	-----	-----	
				Result	Result	----	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.0008	----	----	----	
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.0007	----	----	----	
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.0020	µg/L	0.0051	0.0038	----	----	----	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
EP231C: Perfluoroalkyl Sulfonamides									
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	<0.001	----	----	----	
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	----	----	----	



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	QC01	QC02	----	----	----
Sampling date / time				12-Apr-2021 00:00	12-Apr-2021 00:00	----	----	----	
Compound	CAS Number	LOR	Unit	EP2104088-061	EP2104088-062	-----	-----	-----	
				Result	Result	----	----	----	
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	<0.001	----	----	----	
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	----	----	----	
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	<0.0005	----	----	----	
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	<0.001	----	----	----	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.001	µg/L	<0.001	<0.001	----	----	----	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	----	----	----	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	<0.001	----	----	----	
EP231P: PFAS Sums									
^ Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	<0.0002	0.0007	----	----	----	
^ Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0051	0.0053	----	----	----	
^ Sum of PFAS	----	0.0002	µg/L	0.0051	0.0053	----	----	----	
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0005	%	96.8	104	----	----	----	
13C8-PFOA	----	0.0005	%	95.7	90.7	----	----	----	



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
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) EP231B: Perfluoroalkyl Carboxylic Acids

(WATER) EP231A: Perfluoroalkyl Sulfonic Acids

(WATER) EP231P: PFAS Sums

(WATER) EP231S: PFAS Surrogate

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

(WATER) EP231C: Perfluoroalkyl Sulfonamides



QUALITY CONTROL REPORT

Work Order	: EP2104088	Page	: 1 of 16
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: Damien Arnaud	Contact	: Lauren Biagioni
Address	: Level 1, Bishop See 235 St Georges Terrace Perth WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: 08 9406 1307
Project	: 754-PEREN282113 BHP Eastern Ridge (ER)	Date Samples Received	: 15-Apr-2021
Order number	: ----	Date Analysis Commenced	: 22-Apr-2021
C-O-C number	: ----	Issue Date	: 28-Apr-2021
Sampler	: DA, RM		
Site	: ER		
Quote number	: EN/222		
No. of samples received	: 62		
No. of samples analysed	: 62		



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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

This Quality Control Report contains the following information:

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW



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 Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3633291)									
EP2104088-004	EC00681R	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
EP2104088-011	E0P0222R	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
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3636863)									



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 (%)
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3636863) - continued									
EP2104088-025	HHS0036M_50	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	0.0098	0.0102	3.35	0% - 20%
		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
EP2104088-034	HNPIHS0039P_B	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
EP231A: Perfluoroalkyl Sulfonic Acids (QC Lot: 3638421)									
EP2104200-008	Anonymous	EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	0.0030	0.0028	7.78	0% - 50%
		EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	0.0017	0.0015	15.1	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	0.0022	0.0020	12.3	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: Perfluoroalkyl Carboxylic Acids (QC Lot: 3633291)									
EP2104088-004	EC00681R	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



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 (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3633291) - continued									
EP2104088-004	EC00681R	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	<0.0005	<0.0005	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
EP2104088-011	E0P0222R	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	<0.0005	<0.0005	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		
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3636863)									
EP2104088-025	HHS0036M_50	EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	0.0039	0.0045	14.2	No Limit
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	0.0033	0.0037	9.57	No Limit
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	0.0035	0.0039	9.07	No Limit
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	0.0064	0.0067	5.63	0% - 50%
		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	0.0009	0.0009	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	0.0073	0.0117	46.2	No Limit
EP2104088-034	HNPIHS0039P_B	EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	<0.0005	0.00	No Limit



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 (%)
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3636863) - continued									
EP2104088-034	HNPIHS0039P_B	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	<0.0005	<0.0005	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		
EP231B: Perfluoroalkyl Carboxylic Acids (QC Lot: 3638421)									
EP2104200-008	Anonymous	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	0.0012	0.0010	16.0	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	<0.0005	<0.0005	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	0.0123	0.0181	37.9	No Limit		
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3633291)									
EP2104088-004	EC00681R	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
		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



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: Perfluoroalkyl Sulfonamides (QC Lot: 3633291) - continued									
EP2104088-004	EC00681R	EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit
EP2104088-011	EOP0222R	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
		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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3636863)									
EP2104088-025	HHS0036M_50	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
		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
EP2104088-034	HNPIHS0039P_B	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
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	<0.001	0.00	No Limit



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: Perfluoroalkyl Sulfonamides (QC Lot: 3636863) - continued									
EP2104088-034	HNPIHS0039P_B	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
EP231C: Perfluoroalkyl Sulfonamides (QC Lot: 3638421)									
EP2104200-008	Anonymous	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	0.0007	0.0006	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
		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) Fluorotelomer Sulfonic Acids (QC Lot: 3633291)									
EP2104088-004	EC00681R	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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
EP2104088-011	E0P0222R	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3636863)									
EP2104088-025	HHS0036M_50	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



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 (%)
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3636863) - continued									
EP2104088-025	HHS0036M_50	EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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
EP2104088-034	HNPIHS0039P_B	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	<0.001	<0.001	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
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QC Lot: 3638421)									
EP2104200-008	Anonymous	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	<0.001	<0.001	0.00	No Limit
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.001	µg/L	0.002	<0.001	68.1	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 Sums (QC Lot: 3633291)									
EP2104088-004	EC00681R	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	<0.0002	<0.0002	0.00	No Limit
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	0.00	No Limit
EP2104088-011	E0P0222R	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	<0.0002	<0.0002	0.00	No Limit
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3636863)									
EP2104088-025	HHS0036M_50	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	0.0362	0.0427	16.5	0% - 20%
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.0371	0.0441	17.2	0% - 20%
EP2104088-034	HNPIHS0039P_B	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	<0.0002	<0.0002	0.00	No Limit
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	<0.0002	<0.0002	0.00	No Limit
EP231P: PFAS Sums (QC Lot: 3638421)									

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 Work Order : EP2104088
 Client : COFFEY ENVIRONMENTS PTY LTD
 Project : 754-PEREN282113 BHP Eastern Ridge (ER)



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 (%)
EP231P: PFAS Sums (QC Lot: 3638421) - continued									
EP2104200-008	Anonymous	EP231X-SUT: Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	µg/L	0.0052	0.0048	8.00	0% - 20%
		EP231X-SUT: Sum of PFAS (WA DER List)	----	0.0002	µg/L	0.0224	0.0254	12.6	0% - 50%
		EP231X-SUT: Sum of PFAS	----	0.0002	µg/L	0.0231	0.0260	11.8	0% - 50%



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: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
						LCS	Low	High	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3633291)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	98.4	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	109	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	114	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	117	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	115	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	104	53.0	142	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3636863)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	78.8	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	87.2	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	94.0	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	94.4	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	82.0	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	83.6	53.0	142	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3638266)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	90.8	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	99.6	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	95.2	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	107	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	102	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	76.0	53.0	142	
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3638421)									
EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0005	µg/L	<0.0005	0.004 µg/L	106	72.0	130	
EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0005	µg/L	<0.0005	0.004 µg/L	112	71.0	127	
EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0005	µg/L	<0.0005	0.004 µg/L	92.4	68.0	131	
EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0005	µg/L	<0.0005	0.004 µg/L	115	69.0	134	
EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	µg/L	<0.0002	0.004 µg/L	106	65.0	140	
EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0005	µg/L	<0.0005	0.004 µg/L	75.6	53.0	142	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3633291)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	121	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	122	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	113	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	122	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	118	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	119	69.0	130	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report				
				Result	Spike	Spike Recovery (%)		Acceptable Limits (%)	
					Concentration	LCS	Low	High	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3633291) - continued									
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	118	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	121	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	119	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	101	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	105	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3636863)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	93.2	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	78.4	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	83.2	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	84.0	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	84.0	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	84.4	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	86.4	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	84.0	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	96.4	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	86.8	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	77.4	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3638266)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	104	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	105	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	95.2	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	119	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	108	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	118	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	112	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	120	69.0	133	
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	94.0	72.0	134	
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	79.6	65.0	144	
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	118	71.0	132	
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3638421)									
EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.002	µg/L	<0.0020	0.02 µg/L	90.1	73.0	129	
EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0005	µg/L	<0.0005	0.004 µg/L	102	72.0	129	
EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.0005	µg/L	<0.0005	0.004 µg/L	108	72.0	129	
EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0005	µg/L	<0.0005	0.004 µg/L	119	72.0	130	
EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.0005	µg/L	<0.0005	0.004 µg/L	108	71.0	133	
EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.0005	µg/L	<0.0005	0.004 µg/L	119	69.0	130	
EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.0005	µg/L	<0.0005	0.004 µg/L	117	71.0	129	
EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	119	69.0	133	



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike	Spike Recovery (%)	Acceptable Limits (%)	
					Concentration	LCS	Low	High
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3638421) - continued								
EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0005	µg/L	<0.0005	0.004 µg/L	75.6	72.0	134
EP231X-SUT: Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0005	µg/L	<0.0005	0.004 µg/L	78.0	65.0	144
EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	µg/L	<0.0005	0.01 µg/L	127	71.0	132
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3633291)								
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	112	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	126	68.0	141
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	110	56.6	136
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	119	61.9	129
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	98.4	52.8	135
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	125	65.0	136
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	111	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3636863)								
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	83.2	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	74.7	68.0	141
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	78.4	56.6	136
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	82.7	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	79.2	65.0	136
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	80.0	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3638266)								
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	104	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	112	68.0	141
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	98.2	56.6	136
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	93.1	61.9	129



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
					LCS	Low	High	
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3638266) - continued								
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	111	52.8	135
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	114	65.0	136
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	106	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3638421)								
EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0005	µg/L	<0.0005	0.004 µg/L	90.4	67.0	137
EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.001	µg/L	<0.001	0.01 µg/L	137	68.0	141
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.001	µg/L	<0.001	0.01 µg/L	123	56.6	136
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.001	µg/L	<0.001	0.01 µg/L	83.4	61.9	129
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.001	µg/L	<0.001	0.01 µg/L	116	52.8	135
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0005	µg/L	<0.0005	0.004 µg/L	112	65.0	136
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0005	µg/L	<0.0005	0.004 µg/L	108	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3633291)								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	94.0	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	107	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	110	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	92.4	60.9	136
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3636863)								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	82.8	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	81.6	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	111	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	90.8	60.9	136
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3638266)								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	93.2	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	116	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	113	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	90.0	60.9	136
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3638421)								
EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.001	µg/L	<0.001	0.004 µg/L	90.8	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	90.4	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	86.8	67.0	138



Sub-Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report Result	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3638421) - continued								
EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.001	µg/L	<0.001	0.004 µg/L	78.4	60.9	136
EP231P: PFAS Sums (QCLot: 3633291)								
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	----	----	----	----
EP231P: PFAS Sums (QCLot: 3636863)								
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	----	----	----	----
EP231P: PFAS Sums (QCLot: 3638266)								
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	----	----	----	----
EP231P: PFAS Sums (QCLot: 3638421)								
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

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report			
				Spike Concentration	Spike Recovery(%)	Acceptable Limits (%)	
					MS	Low	High
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3633291)							
EP2104088-004	EC00681R	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	97.2	72.0	130
		EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	88.4	71.0	127
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	96.4	68.0	131
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	99.2	69.0	134
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	85.6	65.0	140
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	84.0	53.0	142
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3636863)							
EP2104088-025	HHS0036M_50	EP231X-SUT: Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.004 µg/L	104	72.0	130



Sub-Matrix: WATER

				Matrix Spike (MS) Report					
				Spike	SpikeRecovery(%)	Acceptable Limits (%)			
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High		
EP231A: Perfluoroalkyl Sulfonic Acids (QCLot: 3636863) - continued									
EP2104088-025	HHS0036M_50	EP231X-SUT: Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.004 µg/L	76.4	71.0	127		
		EP231X-SUT: Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.004 µg/L	100	68.0	131		
		EP231X-SUT: Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.004 µg/L	104	69.0	134		
		EP231X-SUT: Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.004 µg/L	82.4	65.0	140		
		EP231X-SUT: Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.004 µg/L	94.4	53.0	142		
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3633291)									
EP2104088-004	EC00681R	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	90.7	73.0	129		
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	84.0	72.0	129		
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	95.2	72.0	129		
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	83.6	72.0	130		
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	82.8	71.0	133		
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	85.2	69.0	130		
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	83.6	71.0	129		
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	88.0	69.0	133		
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	114	72.0	134		
		EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.004 µg/L	81.2	65.0	144		
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	91.8	71.0	132		
EP231B: Perfluoroalkyl Carboxylic Acids (QCLot: 3636863)									
EP2104088-025	HHS0036M_50	EP231X-SUT: Perfluorobutanoic acid (PFBA)	375-22-4	0.02 µg/L	127	73.0	129		
		EP231X-SUT: Perfluoropentanoic acid (PFPeA)	2706-90-3	0.004 µg/L	83.2	72.0	129		
		EP231X-SUT: Perfluorohexanoic acid (PFHxA)	307-24-4	0.004 µg/L	99.6	72.0	129		
		EP231X-SUT: Perfluoroheptanoic acid (PFHpA)	375-85-9	0.004 µg/L	84.8	72.0	130		
		EP231X-SUT: Perfluorooctanoic acid (PFOA)	335-67-1	0.004 µg/L	89.2	71.0	133		
		EP231X-SUT: Perfluorononanoic acid (PFNA)	375-95-1	0.004 µg/L	86.4	69.0	130		
		EP231X-SUT: Perfluorodecanoic acid (PFDA)	335-76-2	0.004 µg/L	91.2	71.0	129		
		EP231X-SUT: Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.004 µg/L	86.8	69.0	133		
		EP231X-SUT: Perfluorododecanoic acid (PFDoDA)	307-55-1	0.004 µg/L	104	72.0	134		
		EP231X-SUT: Perfluorotridecanoic acid (PFTTrDA)	72629-94-8	0.004 µg/L	71.6	65.0	144		
		EP231X-SUT: Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.01 µg/L	83.7	71.0	132		
		EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3633291)							
		EP2104088-004	EC00681R	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	91.6	67.0	137
				EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.01 µg/L	94.2	68.0	141
EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2			0.01 µg/L	93.0	56.6	136		
EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7			0.01 µg/L	91.0	61.9	129		
EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2			0.01 µg/L	92.0	52.8	135		



Sub-Matrix: WATER

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3633291) - continued							
EP2104088-004	EC00681R	EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	94.4	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	81.2	61.0	135
EP231C: Perfluoroalkyl Sulfonamides (QCLot: 3636863)							
EP2104088-025	HHS0036M_50	EP231X-SUT: Perfluorooctane sulfonamide (FOSA)	754-91-6	0.004 µg/L	85.6	67.0	137
		EP231X-SUT: N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.01 µg/L	94.1	68.0	141
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.01 µg/L	97.9	56.6	136
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.01 µg/L	87.4	61.9	129
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.01 µg/L	91.4	52.8	135
		EP231X-SUT: N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.004 µg/L	86.0	65.0	136
		EP231X-SUT: N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.004 µg/L	82.0	61.0	135
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3633291)							
EP2104088-004	EC00681R	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	85.2	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	83.2	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	115	67.0	138
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	83.2	60.9	136
EP231D: (n:2) Fluorotelomer Sulfonic Acids (QCLot: 3636863)							
EP2104088-025	HHS0036M_50	EP231X-SUT: 4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.004 µg/L	78.8	63.0	143
		EP231X-SUT: 6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.004 µg/L	69.6	64.0	140
		EP231X-SUT: 8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.004 µg/L	115	67.0	138
		EP231X-SUT: 10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.004 µg/L	76.4	60.9	136

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EP2104088	Page	: 1 of 13
Client	: COFFEY ENVIRONMENTS PTY LTD	Laboratory	: Environmental Division Perth
Contact	: Damien Arnaud	Telephone	: 08 9406 1307
Project	: 754-PEREN282113 BHP Eastern Ridge (ER)	Date Samples Received	: 15-Apr-2021
Site	: ER	Issue Date	: 28-Apr-2021
Sampler	: DA, RM	No. of samples received	: 62
Order number	: ----	No. of samples analysed	: 62

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **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.



Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	5	71	7.04	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	2	71	2.82	5.00	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 VOC in soils vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231A: Perfluoroalkyl Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT) QC01	07-Apr-2021	26-Apr-2021	04-Oct-2021	✔	26-Apr-2021	04-Oct-2021	✔	
HDPE (no PTFE) (EP231X-SUT) QC02	08-Apr-2021	26-Apr-2021	05-Oct-2021	✔	26-Apr-2021	05-Oct-2021	✔	
HDPE (no PTFE) (EP231X-SUT) EA0978RM, HE0P0415M, HEC0324M, HHS0074M	HE0P0489M, EC00681R, EC1775RDGM,	09-Apr-2021	22-Apr-2021	06-Oct-2021	✔	22-Apr-2021	06-Oct-2021	✔
HDPE (no PTFE) (EP231X-SUT) QC03, QC06	QC05,	09-Apr-2021	26-Apr-2021	06-Oct-2021	✔	26-Apr-2021	06-Oct-2021	✔
HDPE (no PTFE) (EP231X-SUT) HNPIWR003, E0P0378R, E0P0220R, HE0P0467, EQ0112R, W029,	E0P0334R, E0P0222R, T0399, HEQ0006, HE0P0398, W028	10-Apr-2021	22-Apr-2021	07-Oct-2021	✔	22-Apr-2021	07-Oct-2021	✔
HDPE (no PTFE) (EP231X-SUT) HE0P0524, HEC0448,	HEA0351, T0411A	10-Apr-2021	23-Apr-2021	07-Oct-2021	✔	23-Apr-2021	07-Oct-2021	✔
HDPE (no PTFE) (EP231X-SUT)								



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231A: Perfluoroalkyl Sulfonic Acids - Continued								
QC07, QC10,	QC08, QC12	10-Apr-2021	26-Apr-2021	07-Oct-2021	✓	26-Apr-2021	07-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0036M_19, HNPIHS0045P_A, HHS0016M_45, HHS0019M_40, HHS0019M_110, HNPIHS0039P_B, HHS0027M_70, HHS0029M_35,	HHS0036M_50, HNPIHS0045P_B, HHS0016M_110, HHS0019M_75, HNPIHS0039P_A, HHS0027M_35, HHS0027M_100, HHS0029M_95	11-Apr-2021	23-Apr-2021	08-Oct-2021	✓	23-Apr-2021	08-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0029M_120, HHS0085M_90, QC14, QC18	HHS0085M_64, QC13, QC16,	11-Apr-2021	26-Apr-2021	08-Oct-2021	✓	26-Apr-2021	08-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) RPSW02_A, RPSW03, RPSW05, QC02	RPSW02_B, RPSW04, QC01,	12-Apr-2021	26-Apr-2021	09-Oct-2021	✓	26-Apr-2021	09-Oct-2021	✓



Matrix: WATER

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231B: Perfluoroalkyl Carboxylic Acids								
HDPE (no PTFE) (EP231X-SUT) QC01	07-Apr-2021	26-Apr-2021	04-Oct-2021	✓	26-Apr-2021	04-Oct-2021	✓	
HDPE (no PTFE) (EP231X-SUT) QC02	08-Apr-2021	26-Apr-2021	05-Oct-2021	✓	26-Apr-2021	05-Oct-2021	✓	
HDPE (no PTFE) (EP231X-SUT) EA0978RM, HE0P0415M, HEC0324M, HHS0074M	HE0P0489M, EC00681R, EC1775RDGM,	09-Apr-2021	22-Apr-2021	06-Oct-2021	✓	22-Apr-2021	06-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC03, QC06	QC05,	09-Apr-2021	26-Apr-2021	06-Oct-2021	✓	26-Apr-2021	06-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIWR003, E0P0378R, E0P0220R, HE0P0467, EQ0112R, W029,	E0P0334R, E0P0222R, T0399, HEQ0006, HE0P0398, W028	10-Apr-2021	22-Apr-2021	07-Oct-2021	✓	22-Apr-2021	07-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HE0P0524, HEC0448,	HEA0351, T0411A	10-Apr-2021	23-Apr-2021	07-Oct-2021	✓	23-Apr-2021	07-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC07, QC10,	QC08, QC12	10-Apr-2021	26-Apr-2021	07-Oct-2021	✓	26-Apr-2021	07-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0036M_19, HNPIHS0045P_A, HHS0016M_45, HHS0019M_40, HHS0019M_110, HNPIHS0039P_B, HHS0027M_70, HHS0029M_35,	HHS0036M_50, HNPIHS0045P_B, HHS0016M_110, HHS0019M_75, HNPIHS0039P_A, HHS0027M_35, HHS0027M_100, HHS0029M_95	11-Apr-2021	23-Apr-2021	08-Oct-2021	✓	23-Apr-2021	08-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0029M_120, HHS0085M_90, QC14, QC18	HHS0085M_64, QC13, QC16,	11-Apr-2021	26-Apr-2021	08-Oct-2021	✓	26-Apr-2021	08-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT)								

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 Work Order : EP2104088
 Client : COFFEY ENVIRONMENTS PTY LTD
 Project : 754-PEREN282113 BHP Eastern Ridge (ER)



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231B: Perfluoroalkyl Carboxylic Acids - Continued								
RPSW02_A, RPSW03, RPSW05, QC02	RPSW02_B, RPSW04, QC01,	12-Apr-2021	26-Apr-2021	09-Oct-2021	✓	26-Apr-2021	09-Oct-2021	✓



Matrix: **WATER** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP231C: Perfluoroalkyl Sulfonamides							
HDPE (no PTFE) (EP231X-SUT) QC01	07-Apr-2021	26-Apr-2021	04-Oct-2021	✓	26-Apr-2021	04-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC02	08-Apr-2021	26-Apr-2021	05-Oct-2021	✓	26-Apr-2021	05-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) EA0978RM, HE0P0415M, HEC0324M, HHS0074M HE0P0489M, EC00681R, EC1775RDGM,	09-Apr-2021	22-Apr-2021	06-Oct-2021	✓	22-Apr-2021	06-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC03, QC06 QC05,	09-Apr-2021	26-Apr-2021	06-Oct-2021	✓	26-Apr-2021	06-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIWR003, E0P0378R, E0P0220R, HE0P0467, EQ0112R, W029, E0P0334R, E0P0222R, T0399, HEQ0006, HE0P0398, W028	10-Apr-2021	22-Apr-2021	07-Oct-2021	✓	22-Apr-2021	07-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HE0P0524, HEC0448, HEA0351, T0411A	10-Apr-2021	23-Apr-2021	07-Oct-2021	✓	23-Apr-2021	07-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC07, QC10, QC08, QC12	10-Apr-2021	26-Apr-2021	07-Oct-2021	✓	26-Apr-2021	07-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0036M_19, HNPIHS0045P_A, HHS0016M_45, HHS0019M_40, HHS0019M_110, HNPIHS0039P_B, HHS0027M_70, HHS0029M_35, HHS0036M_50, HNPIHS0045P_B, HHS0016M_110, HHS0019M_75, HNPIHS0039P_A, HHS0027M_35, HHS0027M_100, HHS0029M_95	11-Apr-2021	23-Apr-2021	08-Oct-2021	✓	23-Apr-2021	08-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0029M_120, HHS0085M_90, QC14, QC18 HHS0085M_64, QC13, QC16,	11-Apr-2021	26-Apr-2021	08-Oct-2021	✓	26-Apr-2021	08-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT)							

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 Project : 754-PEREN282113 BHP Eastern Ridge (ER)



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231C: Perfluoroalkyl Sulfonamides - Continued								
RPSW02_A, RPSW03, RPSW05, QC02	RPSW02_B, RPSW04, QC01,	12-Apr-2021	26-Apr-2021	09-Oct-2021	✔	26-Apr-2021	09-Oct-2021	✔



Matrix: WATER

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
HDPE (no PTFE) (EP231X-SUT) QC01	07-Apr-2021	26-Apr-2021	04-Oct-2021	✓	26-Apr-2021	04-Oct-2021	✓	
HDPE (no PTFE) (EP231X-SUT) QC02	08-Apr-2021	26-Apr-2021	05-Oct-2021	✓	26-Apr-2021	05-Oct-2021	✓	
HDPE (no PTFE) (EP231X-SUT) EA0978RM, HE0P0415M, HEC0324M, HHS0074M	HE0P0489M, EC00681R, EC1775RDGM,	09-Apr-2021	22-Apr-2021	06-Oct-2021	✓	22-Apr-2021	06-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC03, QC06	QC05,	09-Apr-2021	26-Apr-2021	06-Oct-2021	✓	26-Apr-2021	06-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIWR003, E0P0378R, E0P0220R, HE0P0467, EQ0112R, W029,	E0P0334R, E0P0222R, T0399, HEQ0006, HE0P0398, W028	10-Apr-2021	22-Apr-2021	07-Oct-2021	✓	22-Apr-2021	07-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HE0P0524, HEC0448,	HEA0351, T0411A	10-Apr-2021	23-Apr-2021	07-Oct-2021	✓	23-Apr-2021	07-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC07, QC10,	QC08, QC12	10-Apr-2021	26-Apr-2021	07-Oct-2021	✓	26-Apr-2021	07-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0036M_19, HNPIHS0045P_A, HHS0016M_45, HHS0019M_40, HHS0019M_110, HNPIHS0039P_B, HHS0027M_70, HHS0029M_35,	HHS0036M_50, HNPIHS0045P_B, HHS0016M_110, HHS0019M_75, HNPIHS0039P_A, HHS0027M_35, HHS0027M_100, HHS0029M_95	11-Apr-2021	23-Apr-2021	08-Oct-2021	✓	23-Apr-2021	08-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0029M_120, HHS0085M_90, QC14, QC18	HHS0085M_64, QC13, QC16,	11-Apr-2021	26-Apr-2021	08-Oct-2021	✓	26-Apr-2021	08-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT)								

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 Project : 754-PEREN282113 BHP Eastern Ridge (ER)



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231D: (n:2) Fluorotelomer Sulfonic Acids - Continued								
RPSW02_A, RPSW03, RPSW05, QC02	RPSW02_B, RPSW04, QC01,	12-Apr-2021	26-Apr-2021	09-Oct-2021	✓	26-Apr-2021	09-Oct-2021	✓



Matrix: WATER

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231P: PFAS Sums								
HDPE (no PTFE) (EP231X-SUT) QC01	07-Apr-2021	26-Apr-2021	04-Oct-2021	✓	26-Apr-2021	04-Oct-2021	✓	
HDPE (no PTFE) (EP231X-SUT) QC02	08-Apr-2021	26-Apr-2021	05-Oct-2021	✓	26-Apr-2021	05-Oct-2021	✓	
HDPE (no PTFE) (EP231X-SUT) EA0978RM, HE0P0415M, HEC0324M, HHS0074M	HE0P0489M, EC00681R, EC1775RDGM,	09-Apr-2021	22-Apr-2021	06-Oct-2021	✓	22-Apr-2021	06-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC03, QC06	QC05,	09-Apr-2021	26-Apr-2021	06-Oct-2021	✓	26-Apr-2021	06-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HNPIWR003, E0P0378R, E0P0220R, HE0P0467, EQ0112R, W029,	E0P0334R, E0P0222R, T0399, HEQ0006, HE0P0398, W028	10-Apr-2021	22-Apr-2021	07-Oct-2021	✓	22-Apr-2021	07-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HE0P0524, HEC0448,	HEA0351, T0411A	10-Apr-2021	23-Apr-2021	07-Oct-2021	✓	23-Apr-2021	07-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) QC07, QC10,	QC08, QC12	10-Apr-2021	26-Apr-2021	07-Oct-2021	✓	26-Apr-2021	07-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0036M_19, HNPIHS0045P_A, HHS0016M_45, HHS0019M_40, HHS0019M_110, HNPIHS0039P_B, HHS0027M_70, HHS0029M_35,	HHS0036M_50, HNPIHS0045P_B, HHS0016M_110, HHS0019M_75, HNPIHS0039P_A, HHS0027M_35, HHS0027M_100, HHS0029M_95	11-Apr-2021	23-Apr-2021	08-Oct-2021	✓	23-Apr-2021	08-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT) HHS0029M_120, HHS0085M_90, QC14, QC18	HHS0085M_64, QC13, QC16,	11-Apr-2021	26-Apr-2021	08-Oct-2021	✓	26-Apr-2021	08-Oct-2021	✓
HDPE (no PTFE) (EP231X-SUT)								

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 Client : COFFEY ENVIRONMENTS PTY LTD
 Project : 754-PEREN282113 BHP Eastern Ridge (ER)



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP231P: PFAS Sums - Continued								
RPSW02_A, RPSW03, RPSW05, QC02	RPSW02_B, RPSW04, QC01,	12-Apr-2021	26-Apr-2021	09-Oct-2021	✓	26-Apr-2021	09-Oct-2021	✓



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
		QC	Regular	Actual	Expected	Evaluation	
Analytical Methods							
Laboratory Duplicates (DUP)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	5	71	7.04	10.00	✖	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	4	71	5.63	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	4	71	5.63	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Per- and Polyfluoroalkyl Substances (PFAS) by LCMSMS	EP231X-SUT	2	71	2.82	5.00	✖	NEPM 2013 B3 & ALS QC Standard



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.

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
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.



Consigning Office: **PERTH**

Report Results to: **david.boyes@coffey.com**
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Email: **damiem-arnaud@coffey.com**
 Email: **regan-macdonald@coffey.com**

Project No: **754-PEREN282113**
 Project Name: **BHP EASTERN RIDGE (ER)**
 Sampler's Name: **DA, RM**
 Quote number (if different to current quoted prices): **-**
 Special Instructions: **-**

Task No: **018**
 Laboratory: **EUROFINS**
 Project Manager: **DAVID BOYES**

Analysis Request Section

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)	NOTES
	QC03	12/04/21		W		Std	<p>PTAS (SUT) X</p> <p>14/4/21 12:20</p> <p>11.8</p> <p>12.6</p> <p>12.2</p> <p>Boyal Lager Eurofins 787790</p>

RELINQUISHED BY

Name: **DAMIEN ARNOLD** Date: **14/04/21** Time: **-**

Company: **CoFFey**

Name: _____ Date: _____ Time: _____

Company: _____

RECEIVED BY

Name: **Carlynn Gibson** Date: **14/4/21** Time: **12:20**

Company: **Eurofins**

Name: _____ Date: _____ Time: _____

Company: _____

Sample Receipt Advice: (Lab Use Only)

All Samples Received in Good Condition

All Documentation is in Proper Order

Samples Received Properly Chilled

Lab. Ref/Batch No.

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Australia

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Site # 1254 & 14271

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NATA # 1261 Site # 20794

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NATA # 1261
Site # 23736

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IANZ # 1290

Sample Receipt Advice

Company name: Coffey Services Australia Pty Ltd
Contact name: David Boyes
Project name: BHP EASTERN RIDGE (ER)
Project ID: 754-PREN282113
Turnaround time: 5 Day
Date/Time received: Apr 16, 2021 12:20 PM
Eurofins reference: 787790

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 David Boyes - david.boyes@coffey.com.

Australia

Melbourne
 6 Monterey Road
 Dandenong South VIC 3175
 Phone : +61 3 8564 5000
 NATA # 1261
 Site # 1254 & 14271

Sydney
 Unit F3, Building F
 16 Mars Road
 Lane Cove West NSW 2066
 Phone : +61 2 9900 8400
 NATA # 1261 Site # 18217

Brisbane
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 Phone : +61 7 3902 4600
 NATA # 1261 Site # 20794

Perth
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New Zealand

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 Penrose, Auckland 1061
 Phone : +64 9 526 45 51
 IANZ # 1327

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

Company Name:	Coffey Services Australia Pty Ltd	Order No.:		Received:	Apr 16, 2021 12:20 PM
Address:	Bishops See Level 1, 235 St Georges Terrace Perth WA 6000	Report #:	787790	Due:	Apr 23, 2021
Project Name:	BHP EASTERN RIDGE (ER)	Phone:	08 9355 7100	Priority:	5 Day
Project ID:	754-PREN282113	Fax:	08 9470 8601	Contact Name:	David Boyes
Eurofins Analytical Services Manager : Rhys Thomas					

Sample Detail						Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace	
Melbourne Laboratory - NATA Site # 1254 & 14271							X
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	QC03	Apr 12, 2021		Water	M21-Ap25189		X
Test Counts							1

Coffey Services Australia Pty Ltd
Bishops See Level 1, 235 St Georges Terrace
Perth
WA 6000



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: **David Boyes**

Report **787790-W**
 Project name **BHP EASTERN RIDGE (ER)**
 Project ID **754-PREN282113**
 Received Date **Apr 16, 2021**

Client Sample ID			QC03
Sample Matrix			Water
Eurofins Sample No.			M21-Ap25189
Date Sampled			Apr 12, 2021
Test/Reference	LOR	Unit	
Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace			
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.005	ug/L	< 0.005
13C2-6:2 FTSA (surr.)	1	%	106
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.001	ug/L	< 0.001
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.001	ug/L	< 0.001
18O2-PFHxS (surr.)	1	%	100
13C8-PFOS (surr.)	1	%	64
Perfluorooctanoic acid (PFOA) ^{N11}	0.001	ug/L	< 0.001
13C8-PFOA (surr.)	1	%	117
Sum (PFHxS + PFOS)*	0.001	ug/L	< 0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.001	ug/L	< 0.001
Sum of US EPA PFAS (PFOS + PFOA)*	0.001	ug/L	< 0.001

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

Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace

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

Testing Site

Melbourne

Extracted

Apr 16, 2021

Holding Time

14 Days

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
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Phone : +61 2 9900 8400
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Company Name:	Coffey Services Australia Pty Ltd	Order No.:		Received:	Apr 16, 2021 12:20 PM
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Project Name:	BHP EASTERN RIDGE (ER)	Phone:	08 9355 7100	Priority:	5 Day
Project ID:	754-PREN282113	Fax:	08 9470 8601	Contact Name:	David Boyes
Eurofins Analytical Services Manager : Rhys Thomas					

Sample Detail						Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace	
Melbourne Laboratory - NATA Site # 1254 & 14271							X
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	QC03	Apr 12, 2021		Water	M21-Ap25189		X
Test Counts							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.
- All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
- All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
- Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
- Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
- SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- Samples were analysed on an 'as received' basis.
- Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
- This report replaces any interim results previously issued.

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

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

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

QC Data General Comments

- 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.
- 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.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- 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.
- 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.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- 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									
Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace									
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			ug/L	< 0.005			0.005	Pass	
Perfluorohexanesulfonic acid (PFHxS)			ug/L	< 0.001			0.001	Pass	
Perfluorooctanesulfonic acid (PFOS)			ug/L	< 0.001			0.001	Pass	
Perfluorooctanoic acid (PFOA)			ug/L	< 0.001			0.001	Pass	
LCS - % Recovery									
Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace									
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	93			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	120			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	102			50-150	Pass	
Perfluorooctanoic acid (PFOA)			%	83			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace									
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)				Result 1					
	M21-Ap23520	NCP	%	124			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)				118			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)				51			50-150	Pass	
Perfluorooctanoic acid (PFOA)				149			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace									
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)				Result 1	Result 2	RPD			
	M21-Ap23519	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)				0.001	< 0.001	41	30%	Fail	Q15
Perfluorooctanesulfonic acid (PFOS)				0.005	0.005	17	30%	Pass	
Perfluorooctanoic acid (PFOA)				0.002	0.002	9.0	30%	Pass	

Comments
Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Rhys Thomas	Analytical Services Manager
Joseph Edouard	Senior Analyst-PFAS (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](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.



Consigning Office: **PERTH**
 Report Results to: **David.boyes@coffey.com**
 Invoices to: **accounts.perth@coffey.com**

Mobile: **0403 225 195**
 Phone: **0431 645 387**
 Email: **damiem-arnaud**
 Email: **reagan-macdonald**
 @coffey.com
 @coffey.com

Task No: **018**
 Laboratory: **EUROFINS**
 Project Manager: **DAVID BOYES**

Project No: **754-PEREN 282113**
 Project Name: **BHP EASTERN RIDGE (ER)**
 Sampler's Name: **DA, RM**
 Quote number (if different to current quoted prices): **-**
 Special Instructions: **-**

Analysis Request Section

Lab Batch Ref	Sample ID	Sample Date	Time	Matrix (Soil...etc)	Container Type & Preservative*	T-A-T (specify)
	QC04	09/04/21		W		Std
	QC09	10/04/21		W		"
	QC11	10/04/21		W		"
	QC15	11/04/21		W		"
	QC17	11/04/21		W		"

Analysis Request Section	Notes
	<p>Date/Time: 14/4/21 12:20</p> <p>Temp: 12.8</p> <p>Corr: 11.6</p> <p>Final Result: 12.2</p>

RELINQUISHED BY

Name: **DAMIEN ARNAUD** Date: **14/04/21** Time: **-**

RECEIVED BY

Name: **Carly Gibson** Date: **14/4/21** Time: **12:20**

Company: **Eurolin**

Name: _____ Date: _____

Company: _____ Time: _____

Sample Receipt Advice: (Lab Use Only)

All Samples Received in Good Condition

All Documentation is in Proper Order

Samples Received Properly Chilled

Lab. Ref/Batch No. **78789**

*Container Type & Preservation Codes: P - Plastic, G - Glass Bottle, J - Glass Jar, V - Vial, Z - Ziplock bag, N - Nitric Acid Preserved, C - Hydrochloric Acid Preserved, S - Sulphuric Acid Preserved, I - Ice, ST - Sodium Thiosulfate, NP - No Preservative

Australia

Melbourne

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Phone : 0800 856 450
IANZ # 1290

Sample Receipt Advice

Company name: Coffey Services Australia Pty Ltd
Contact name: David Boyes
Project name: BHP EASTERN RIDGE (ER)
Project ID: 754-PEREN282113
Turnaround time: 5 Day
Date/Time received: Apr 14, 2021 12:20 PM
Eurofins reference: 787805

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 David Boyes - david.boyes@coffey.com.

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NATA # 1261
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Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name:	Coffey Services Australia Pty Ltd	Order No.:		Received:	Apr 14, 2021 12:20 PM
Address:	Bishops See Level 1, 235 St Georges Terrace Perth WA 6000	Report #:	787805	Due:	Apr 21, 2021
Project Name:	BHP EASTERN RIDGE (ER)	Phone:	08 9355 7100	Priority:	5 Day
Project ID:	754-PEREN282113	Fax:	08 9470 8601	Contact Name:	David Boyes
Eurofins Analytical Services Manager : Rhys Thomas					

Sample Detail						Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace
Melbourne Laboratory - NATA Site # 1254 & 14271						X
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						
Mayfield Laboratory						
External Laboratory						
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	
1	QC04	Apr 09, 2021		Water	M21-Ap25298	X
2	QC09	Apr 10, 2021		Water	M21-Ap25299	X
3	QC11	Apr 10, 2021		Water	M21-Ap25300	X
4	QC15	Apr 11, 2021		Water	M21-Ap25301	X
5	QC17	Apr 11, 2021		Water	M21-Ap25302	X
Test Counts						5

Coffey Services Australia Pty Ltd
 Bishops See Level 1, 235 St Georges Terrace
 Perth
 WA 6000



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 Accreditation Number 1261
 Site Number 1254

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 NATA is a signatory to the ILAC Mutual Recognition
 Arrangement for the mutual recognition of the
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 inspection and proficiency testing scheme providers
 reports.

Attention: David Boyes

Report 787805-W
 Project name BHP EASTERN RIDGE (ER)
 Project ID 754-PEREN282113
 Received Date Apr 14, 2021

Client Sample ID			QC04 Water M21-Ap25298 Apr 09, 2021	QC09 Water M21-Ap25299 Apr 10, 2021	QC11 Water M21-Ap25300 Apr 10, 2021	QC15 Water M21-Ap25301 Apr 11, 2021
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace						
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.005	ug/L	< 0.005	0.020	0.008	< 0.005
13C2-6:2 FTSA (surr.)	1	%	118	132	139	83
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.001	ug/L	< 0.001	< 0.001	< 0.001	< 0.001
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.001	ug/L	0.002	< 0.001	< 0.001	< 0.001
18O2-PFHxS (surr.)	1	%	86	90	109	79
13C8-PFOS (surr.)	1	%	65	82	83	80
Perfluorooctanoic acid (PFOA) ^{N11}	0.001	ug/L	< 0.001	< 0.001	0.023	0.012
13C8-PFOA (surr.)	1	%	103	129	101	138
Sum (PFHxS + PFOS)*	0.001	ug/L	0.002	< 0.001	< 0.001	< 0.001
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.001	ug/L	0.002	< 0.001	0.023	0.012
Sum of US EPA PFAS (PFOS + PFOA)*	0.001	ug/L	0.002	< 0.001	0.023	0.012

Client Sample ID			QC17 Water M21-Ap25302 Apr 11, 2021
Sample Matrix			
Eurofins Sample No.			
Date Sampled			
Test/Reference	LOR	Unit	
Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace			
1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2 FTSA) ^{N11}	0.005	ug/L	< 0.005
13C2-6:2 FTSA (surr.)	1	%	101
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.001	ug/L	< 0.001
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.001	ug/L	0.003
18O2-PFHxS (surr.)	1	%	87
13C8-PFOS (surr.)	1	%	72
Perfluorooctanoic acid (PFOA) ^{N11}	0.001	ug/L	< 0.001
13C8-PFOA (surr.)	1	%	124
Sum (PFHxS + PFOS)*	0.001	ug/L	0.003
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.001	ug/L	0.003
Sum of US EPA PFAS (PFOS + PFOA)*	0.001	ug/L	0.003

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

Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace

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

Testing Site

Melbourne

Extracted

Apr 16, 2021

Holding Time

14 Days

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

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

New Zealand

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

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

Company Name:	Coffey Services Australia Pty Ltd	Order No.:		Received:	Apr 14, 2021 12:20 PM
Address:	Bishops See Level 1, 235 St Georges Terrace Perth WA 6000	Report #:	787805	Due:	Apr 21, 2021
Project Name:	BHP EASTERN RIDGE (ER)	Phone:	08 9355 7100	Priority:	5 Day
Project ID:	754-PEREN282113	Fax:	08 9470 8601	Contact Name:	David Boyes
Eurofins Analytical Services Manager : Rhys Thomas					

Sample Detail						Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace	
Melbourne Laboratory - NATA Site # 1254 & 14271							X
Sydney Laboratory - NATA Site # 18217							
Brisbane Laboratory - NATA Site # 20794							
Perth Laboratory - NATA Site # 23736							
Mayfield Laboratory							
External Laboratory							
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID		
1	QC04	Apr 09, 2021		Water	M21-Ap25298		X
2	QC09	Apr 10, 2021		Water	M21-Ap25299		X
3	QC11	Apr 10, 2021		Water	M21-Ap25300	X	
4	QC15	Apr 11, 2021		Water	M21-Ap25301	X	
5	QC17	Apr 11, 2021		Water	M21-Ap25302	X	
Test Counts						5	

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

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

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

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

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

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

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

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

QC Data General Comments

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

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank									
Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace									
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			ug/L	< 0.005			0.005	Pass	
Perfluorohexanesulfonic acid (PFHxS)			ug/L	< 0.001			0.001	Pass	
Perfluorooctanesulfonic acid (PFOS)			ug/L	< 0.001			0.001	Pass	
Perfluorooctanoic acid (PFOA)			ug/L	< 0.001			0.001	Pass	
LCS - % Recovery									
Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace									
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)			%	141			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	107			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	90			50-150	Pass	
Perfluorooctanoic acid (PFOA)			%	118			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace									
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)				Result 1					
	M21-Ap23520	NCP	%	124			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)				118			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)				51			50-150	Pass	
Perfluorooctanoic acid (PFOA)				149			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Per- and Polyfluoroalkyl Substances (PFASs) - Short Trace									
1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)				Result 1	Result 2	RPD			
	M21-Ap23519	NCP	ug/L	< 0.005	< 0.005	<1	30%	Pass	
Perfluorohexanesulfonic acid (PFHxS)				0.001	< 0.001	41	30%	Fail	Q15
Perfluorooctanesulfonic acid (PFOS)				0.005	0.005	17	30%	Pass	
Perfluorooctanoic acid (PFOA)				0.002	0.002	9.0	30%	Pass	

Comments
Sample Integrity

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

Qualifier Codes/Comments

Code	Description
N11	Isotope dilution is used for calibration of each native compound for which an exact labelled analogue is available (Isotope Dilution Quantitation). The isotopically labelled analogues allow identification and recovery correction of the concentration of the associated native PFAS compounds.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Rhys Thomas	Analytical Services Manager
Joseph Edouard	Senior Analyst-PFAS (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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