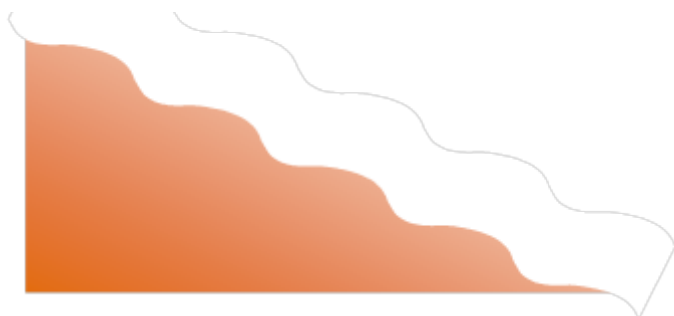
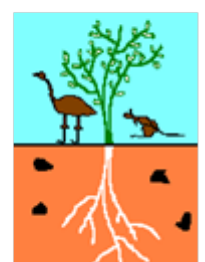


ALICE SPRINGS TURF CLUB ENVIRONMENTAL MONITORING REPORT

AUGUST 2022 – JULY 2023



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Disclaimer:

This document has been prepared by Low Ecological Services (LES) for Alice Springs Turf Club (Turf Club) in accordance with an agreement with the Turf Club. LES has prepared this document using the skill and care expected from professional scientists to provide factual and technical information and reasonable solutions to identified risks. It does not constitute legal advice.

Project:

Prepare a Monitoring Report for the Alice Springs Turf Club as per the requirements of **EPL 208-01**

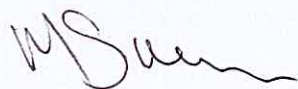
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Approval	Name	Signature	Date
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Certification:

I Mark Summers, Chief Executive Officer, ASTC, have reviewed this report and I confirm that to the best of my knowledge and ability all the information provided in the report is true and accurate.

Signature:



Date:

14/8/23.

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1 Executive Summary

This Annual Monitoring Report covers monitoring activity in the year to 8 August 2023. Environmental monitoring activity within this period included the following;

- Waste oil was applied to the racetrack once only during 19-20 December, being a quantity of 13,000 litres. This application occurred prior to receipt of lab analysis for samples that were taken on 8 December. Lab reports were delayed due to samples for PCB testing having to be sent to a different laboratory. The ALS Lab in Sydney also advised at that time that there was no method by which to test for presence of PFAS in oil. Lab results were returned on 8 January. All three samples returned results within proscribed limits with chemical composition as would be expected for waste oil and with PCBs content below the level of reporting.
- A second waste oil application for the racetrack was planned to take place in July. Waste oil was sampled, however technical issues prevented any oil being applied to the racetrack. Samples were analysed nonetheless, including for PFAS, returning results as expected for used engine oil.
- Groundwater samples were drawn from 5 bores on 12 January and 24 April. Bore RN 03685 located 300m upstream of the racetrack beside the Todd River recorded level above trigger levels for cadmium, zinc, copper and lead. These readings are attributed to factors other than the use of waste oil at the turf club. Broadly consistent levels of copper and zinc were identified in all bores, including some above trigger levels. These are believed to relate to groundwater background levels rather than any contamination.
- Surface water sampling and analysis was undertaken on one occasion following significant rainfall, on 9 January. Of three sampled sites, one tested positive for hydrocarbon concentration of 190 µg/L. This site is located within 10 metres of the oiled outer access track. The reading is not surprising given the proximity of the site sampled to ground where oil has been recently applied.
- Soil samples were drawn from 9 sites around the racetrack at two depths on 13 January to test for waste oil dispersion. One site registered a low hydrocarbon reading that is attributed to proximity to the racetrack where oil had been recently applied and following a large fall of rain.
- Soil samples were drawn from 3 sites on the track itself at 3 depths to test waste oil penetration on 13 January. Analysis found minor presence of hydrocarbon at depth from track surface greater than 400mm at two of these sites, where previous testing had found there to be no penetration to this depth. Oil has been regularly applied to the racetrack surface for 46 years.

Monitoring results continue to imply that the risk of any significant oil quantity migrating from the track into soil, groundwater or nearby watercourses is very low. No ground water samples collected in this reporting period contained hydrocarbons above limits of laboratory reporting. Metal levels for some bore samples exceeded stipulated trigger values. These however, are likely to be naturally occurring in the local groundwater.

2 Introduction

The Alice Springs Turf Club Incorporated (Turf Club) commissions Low Ecological Services (LES) to undertake environmental monitoring required under Environmental Protection Licence (EPL) 208-01, commenced 8 August 2022 for two years, notably conditions 43, 44 and 45. This includes the Turf Club providing the Northern Territory Environmental Protection Agency (NTEPA) with a monitoring report with each annual return. This Monitoring Report has been prepared in accordance with the requirements of the NTEPA Guideline for Reporting on Environmental Monitoring.

3 Monitoring Objectives

Consistent with the EMP developed by Low Ecological Services for the Turf Club, under EPL 208-1 and NTEPA guidelines, the Turf Club's monitoring objectives are:

- Determine baseline environmental conditions;
- Monitor short and long term trends;
- Determine the potential environmental effects arising from management activities;
- Monitor the quality and condition of groundwater, surface water and soil in the area surrounding the racecourse;
- Monitor compliance with Australian standards and other regulatory requirements; and
- Identify any required remediation and/or mitigation measures.

4 Monitoring System

4.1 Program of Sampling and Laboratory Analysis

This report details the sampling and analysis of soils, groundwater and surface water from within, and within the vicinity of the Turf Club to identify environmental issues potentially arising from the application of waste oil to the racetrack surface. Condition 29 of the EPL provides: *The licensee must conduct soil, surface water and groundwater monitoring in accordance with section 10 of the EMP, which under 10.1.2 provides:*

- Groundwater monitoring; 5 bores sampled twice yearly in April and October, irrespective of applications of waste oil on the racetrack or other approved dispersal areas.
- Soil monitoring; 10 sample sites from which soil is collected for laboratory analysis annually, to detect any lateral or vertical movement of hydrocarbon.
- Waste oil penetration depth testing; 3 randomly selected racetrack sites in which soil is sampled at 10-20 cm intervals to a minimum 60cm; to be conducted in 2023.
- Surface water analysis; to be collected following very high rainfall from water in St Mary's Creek and the inside of the racetrack that is likely to contain runoff from the racetrack.
- Waste Oil Characterisation; Samples to be taken from the delivery truck outlet and analysed by NATA accredited laboratory with results provided to NTEPA prior to application of oil to the racetrack or other areas as licensed.

Condition 30 of EPL208-01 provides: *Prior to the application of listed waste (per Table 1) to the Alice Springs Racecourse, the licensee must submit to the NT EPA the laboratory results of a representative sample of the listed waste to be applied, demonstrating its composition is not contaminated by other*

listed waste including, but not limited to, polychlorinated biphenyls (PCBs) and per-and polyfluoroalkyl substances (PFAS).

4.2 Waste Oil Sampling.

Waste oil was sampled twice during the reporting period; in December and in July. On 8 December three representative samples of waste oil were sent for lab analysis from a bulk sampling process involving 16 IBCs of waste oil on a delivery truck. Despite best efforts at that time Low Ecological was unable find a lab with the capacity to test for PFAS in waste oil. Characterisation of the waste oil included Polychlorinated Biphenyls, heavy metals and various contaminants and residual oil additives.



Figure 1. Map showing sites sampled in the 2022-23 reporting period.



In the second oil sampling event the Eurofins lab in Brisbane confirmed capacity to test for PFAS in oil. On 4 July three samples of waste oil drawn from a bulk tanker were collected and sent for lab analysis. Comprehensive analysis of the waste oil included testing for presence and concentrations of:

Perfluoroalkyl carboxylic acids (PFCAs), Perfluoroalkyl sulphonamide substances, Perfluoroalkyl sulfonic acids (PFASs), Fluorotelomer sulfonic acids (n:2 FTSAs), PFASs Summations. Following lab analysis of these samples technical difficulties prevented the Turf Club from having the waste oil applied to the track.

Figure 2. At left; Waste oil samples being taken from a bulk tanker 4 July.

4.3 Groundwater Sampling

Groundwater sampling is designed to detect contamination of groundwater systems if waste oil contaminants migrate from the track through the soil profile into groundwater.

Groundwater sampling was undertaken twice during the 2022-23 reporting period; 23 January and 24 April. Standard procedures applied for each sampling includes bore inspection to note any factors that may impact laboratory results, measuring static water level and recording electronic meter readings. Sampling uses new bailers for every sample to ensure there is no cross contamination between bores and samples. A minimum of 10 litres of water is purged / bailed out. Field data is measured during the purging to determine stability of purged water composition using a calibrated YSI (Professional PLUS) water quality meter. Field data parameters noted include:

- Water Temperature;
- Electrical Conductivity ($\mu\text{S}/\text{cm}$);
- Dissolved Oxygen (% sat);
- Dissolved Oxygen (mg/L);
- pH; and
- Turbidity.

Following purging and recording field data, samples are collected as per laboratory standards in sample containers provided and specified by the laboratory, including appropriate preservative/s for analytes as required. All samples are labelled and placed into a cooled esky and couriered to the ALS laboratory in Sydney within specified holding times. Lab analysis results are provided and discussed in sections 6 and 10.2.

Table 1. Groundwater assessment criteria – Attachment to EPL 208-1

Parameter	Units	Trigger Values in EPL 208-1 Attachment B	Australian Drinking Water Guidelines 2011
Laboratory Parameters			
pH	pH units	6.0-8.0	
Temperature	°C	N/A	
Turbidity	NTU	2-15	
Electrical Conductivity	µS/cm	20-250	
Dissolved Oxygen	% Saturation	80-110	
BTEX			
Benzene	mg/L	0.3	
Toluene	mg/L	0.3	
Ethylbenzene	mg/L	0.005	
Xylenes	mg/L	0.075	
Heavy Metals			
Arsenic	mg/L	0.094	0.01
Cadmium	mg/L	0.0004	0.002
Chromium	mg/L	0.006	0.05
Copper	mg/L	0.0018	2
Lead	mg/L	0.0056	0.01
Mercury	mg/L	0.0019	0.001
Nickel	mg/L	0.013	0.02
Zinc	mg/L	0.015	3
Total Recoverable Hydrocarbons (TRH)			
Total TPH C10-C36	mg/L	0.6	

4.4 Surface Water Sampling

Surface water sampling is designed to detect contamination of surface water by the Turf Club through the migration of oil from the track into the course interior and the St Marys Creek drainage, through rainfall and surface drainage. Surface water samples are collected opportunistically after large falls of rain when water pools at these sites.

Standing water was sampled at three sites following rainfall, on 9 January (Figure 1). There was no water available for sampling in, or near the St Marys Creek channel. Results of surface water sampling assessed against criteria are presented in sections 7 and 10.3. Surface water sampled was tested for presence of hydrocarbons. Where possible field data parameters noted at the time and point of collection include:

- Water Temperature;
- Electrical Conductivity (µS/cm);

- Dissolved Oxygen (% sat);
- Dissolved Oxygen (mg/L);
- pH; and
- Turbidity.

4.5 Near-track Soil Sampling

Soil was sampled for lab-testing for the presence of the following contaminants at 11 sites on 13 January. Nine of these sites have been previously sampled. See S01 – S09, Figure 1. Samples were taken at two soil depths at each site; between 100-200mm below ground level (BGL) and 200-300mm BGL. Two sites previously unsampled were sampled at “control sites” for the presence of PFAS, noting this sampling was not required under the EPL or EMP. See sites SC1 and SC2 in Figure 1.

Soil sampled at the sites shown in Figure 1 were tested for the following contaminants:

Sites	Depths sampled (mm BGL)	Contaminants tested
S01 – S09	100-200, 200-300.	Heavy metals, mercury, Hydrocarbons, PCB, BTEXN.
SC1, SC2	0-150mm	Perfluoroalkyl Sulfonic Acids, Perfluoroalkyl Carboxylic Acids, Fluorotelomer Sulfonic Acids PFAS Sums

4.6 Racetrack Soil sampling to Test Depth of Oil Penetration

On January 13 soil samples were drawn from the racetrack itself from 3 locations (1100m, 1600m and 2000m track markers, see Figure 1) at depths of 100-200mm, 300-400mm and 500-600mm BGL to test the depth at which waste oil has penetrated below the track surface and for the presence at each site and depth for hydrocarbons, heavy metals, BTEXN and BTEXN surrogate, PCB and PCB surrogate. Lab results are summarised at section 9 and are included in full at Appendix 4.

4.7 Quality Control and Assurance

All samples are collected in appropriate laboratory supplied sampling containers, as per laboratory requirements. The sample containers are placed into an ice chilled esky and transported to the laboratory under standard chain of custody (COC) procedures to a National Association of Testing authorities (NATA) accredited laboratory (ALS in Sydney or Tribology in Brisbane for PFAS in oil) for analysis within required holding times.

Disposable and/or dedicated sampling equipment is used where required between each sample and sampling location. Where sampling equipment is of a non-disposable nature, decontamination of sampling equipment is carried out between each sample and sampling location.

4.7.1 Laboratory Analyses

The analytical procedures used by the ALS Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In-house procedures are employed in the absence of documented standards or upon client request.

Upon sampling and analysis, the NATA accredited ALS laboratory conducts the following quality control procedures as part of their internal Quality Control Report:

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

4.7.2 Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intra-laboratory 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%.

4.7.3 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.

4.7.4 Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intra-laboratory 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.

5 Results of Waste Oil Sampling

Laboratory Reports / Certificates of Analysis are given in full in Appendix 1.1 for samples taken 8 December and in Appendix 1.2 for samples taken 4 July.

Characterisation of waste oil by ALS for 3 samples taken 8 December included Polychlorinated Biphenyls, heavy metals, various contaminants and residual oil additives. Analysis found each of these to be within the normal expected range for used engine oil. ALS did not have the capacity to test for the presence of PFAS.

Waste Oil Samples taken 8/12/2022			
Units mg/kg	Sample T1	Sample T2	Sample T3
PCB Total	<2	<2	<2
Metals			
Aluminium	8	9	6
Chromium	1	1	1
Iron	63	71	55
Copper	15	15	10
Lead	9	6	12
Tin	1	2	1
Nickel	<1	1	1
Silver	3	1	1
Contaminants and Additives			
Silicon	24	26	23
Sodium	82	52	65
Potassium	58	48	79
Molybdenum	38	46	41
Boron	126	108	100
Magnesium	172	78	176
Calcium	1462	1590	1185
Zinc	785	795	747
Phosphorus	701	721	679
Antimony	<1	1	<1
Lithium	1	1	1

For the second oil sampling event the Eurofins lab in Brisbane confirmed ability to test for PFAS in oil. On 4 July three samples of waste oil drawn from a bulk tanker were collected and sent for lab analysis that found that amounts for all analytes (PFASs, PFCAs, PFSAs, FTSAs) were less than the limits of reporting.

6 Results of Groundwater Sampling

6.1 Field Observations

Water quality field measurements are presented below in Table 2. Readings that exceed trigger values are highlighted. A synopsis of these results is presented here.

- Groundwater temperatures were within a narrow range from 25.0°C to 27.0°C;
- Electrical conductivity ranged from 0.93 $\mu\text{S}/\text{cm}$ to 4.18 $\mu\text{S}/\text{cm}$; (Trigger value 20-250 $\mu\text{S}/\text{cm}$)
- Dissolved oxygen (DO) concentrations ranged from 15.5 % sat to 46.1 % saturation; (Trigger value 80-110%)
- Field pH levels ranged from 7.24 to 10.64; (Trigger value 6.0 – 8.0).
- Turbidity levels ranged from 1.77 NTU to 92.9 NTU. (trigger value 2 – 15)

Table 2. Groundwater quality results from two samplings during the reporting period.

Bore No.	Date Sampled	Depth to Water (m)	Water Temp (°C)	Elec. Cond. (µS/cm)	DO (% sat)	DO (mg/L)	pH	Turbidity (NTU)	Comments
RN03685	12 Jan 2023	10.91	27.0	2.63	24.0	1.89	10.58	92.9	No odour or sheen. Turbid with sediment.
	24 Apr 2023	12.96	25.0	2.23	23.4	1.90	10.64	59.5	No odour or sheen. Turbid with sediment.
RN018252	12 Jan 2023	16.07	26.3	1.62	36.5	2.94	7.4	3.00	Clear. No sheen or odour.
	24 Apr 2023	15.24	25.3	1.76	46.1	3.75	7.66	4.95	Clear. No sheen or odour.
RN03098	12 Jan 2023	13.7	26.6	0.93	15.3	1.18	7.51	7.26	A few solid particles. Clear. No Sheen or odour.
	24 Apr 2023	13.75	25.2	0.90	24.0	2.01	7.82	15.1	Clear, no sheen or odour.
RN018251	12 Jan 2023	16.70	26.7	4.18	32.8	2.54	7.17	3.54	Clear with sediment, no sheen or odour.
	24 Apr 2023	16.10	26.3	4.08	30.1	2.36	7.24	1.77	Clear. no sheen or odour.
RN04541	12 Jan 2023	15.78	26.9	1.70	21.6	1.56	7.55	28.3	Clear. no sheen or odour.
	24 Apr 2023	14.81	26.3	1.75	21.6	1.58	7.49	15.1	Clear. no sheen or odour.

6.2 Laboratory Results

Laboratory reports (analytical results) for the two sets of groundwater / bore samples are presented in full in Appendix 3. Exceedances of the trigger values for copper and zinc are presented in Table 7 and discussed in Section 7.1. Of note are the very high recordings for zinc for Bore RN3685. This bore was added to the monitoring program this year as a control upstream from the bores. These results however suggest this bore is poorly located as a control due to it being located in the bed of the Todd River itself and being prone to many and various contaminants entering the column during river flows.

Analysis of the sample taken from Bore RN018251 located near the southeast corner of the racetrack on 12 Jan 2023 registered a small hydrocarbon presence of 170 mg/kg. This aberrant reading may be explained by accidental contamination of the sample or be due to the sample having been taken shortly after both an application of waste oil on to the track and a significant rainfall. Notably, no hydrocarbon was detected from this or any other bore sampled in the April sampling event.

Table 3. Groundwater samples that exceeded trigger values.

Sampling Date	Bore	Copper (mg/L)	Cadmium	Zinc (mg/L)	Lead
Trigger value		0.0018	0.0004	0.015	0.0056
12 Jan 2023	RN 3685	0.002	0.0005	103	0.097
	RN 4541				
	RN 18251			0.055	
	RN 3098			0.028	
	RN 18252	00.071		0.054	
24 Apr 2023	RN 3685			14	
	RN 4541				
	RN 18251			0.039	
	RN 3098				
	RN 18252	.008		0.045	

7 Results of Surface Water Sampling

Surface water sampling was carried out following and during a significant rainfall event. Alice Springs recorded 83.6mm on the day of sampling, 9 January and more than 20mm in the preceding 5 days. Laboratory reports (analytical results) for the surface water samples collected are given in full in Appendix 2.

- Lab analysis for the sample from Site #3 located approximately 15m south of the racetrack found copper present at 0.001 mg/L and zinc present at 0.019 m/L.

- Lab analysis for the sample from Site #1 located within 10 metres of the oiled outer access track found hydrocarbon to be present at a concentration of 190 µg/L (0.19mg/L). This may be expected given the proximity of the site sampled to ground where oil has been applied for the purpose of dust suppression, noting that this is below the trigger value of 0.6 mg/L for TRH in groundwater.
- Field measurements of sampled surface water returned no results that required further inquiry.

Table 4. Summary of Surface Water Samples taken 9 January 2023.

Site	Temp °C	Electrical Conductivity (mS/cm)	DO (%sat)	DO (mg/l)	pH	Turbidity (NTU)	TPH C10 - C35 µg/L	Location
#1	22.2	0.025	88.4	7.71	7.24	54.3	190	North edge
#2	Insufficient depth of water for instrument to read					67.9	<LoR	Track interior
#3	23.1	0.034	47.1	4.04	6.9	102	<LoR	South edge



Figure 3. Surface water sample site #1 at the northern side of the racetrack.

8 Results of Soil Sampling near Track

Lab results for nine near-track soil monitoring sites and two PFAS control sites are provided in full in Appendix 4.2. Nothing of significant note was the outcome of comprehensive lab analysis of these samples. 750 mg/kg of Total Recoverable Hydrocarbons was recorded at Site S01 located near the starting gate at the south-eastern corner of the racetrack. This was the only sampling site to record any hydrocarbon presence.

9 Results of Racetrack Soil Sampling – Oil Penetration

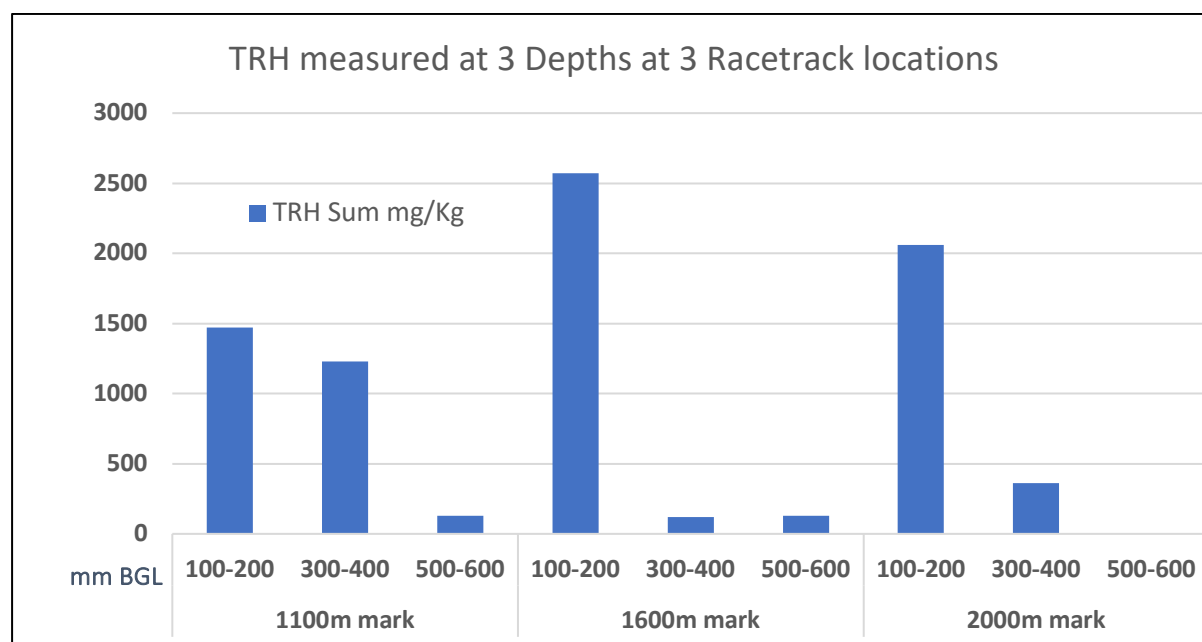


Figure 4. Chart showing depth of waste oil penetration in the racetrack.

The lab report for soil samples drawn from 3 depths at each of 3 sites on the oiled racetrack itself, is provided in full at Appendix 4.1. In summary, hydrocarbons were as expected, present at high levels at shallow (100-200mm) depths at each site. At the 1100m marker TRH levels tapered off moderately from the shallow to the 300-400 sample and sharply at greater depth, up to 600mm BGL. The shallow sample at the 1600m marker was considerably the highest sampled but showed little penetration into, or below the racetrack surface. The samples taken at the 2000m marker were midway / high at shallow depth compared to the other two sites, tapering sharply to the 2nd (300-400mm) depth and presenting no detectable hydrocarbon below 400mm BGL.

10 Discussion and Interpretation of Results

10.1 Waste Oil

The analyses of waste oil samples from the two different sampling events were markedly different. Analysis of the December 2022 samples confirmed that this oil which was applied to the track in that month had a typical waste oil chemical constituency. Waste oil samples taken from a bulk supply that was not applied to the racetrack tested negative for PFAS and related compounds.

10.2 Groundwater

Field Measurements:

The high pH and turbidity readings for RN03685 imply that this bore, which was added this year to the monitoring program is subject to pollution from river flows. It will be removed from future

monitoring. Recordings for other parameters are unremarkable and comparable with previous year's records.

Metals results:

Analytical results for copper and zinc have consistently exceeded specified trigger values in each of the four previous monitoring periods. In this reporting period, ground water samples exceeded trigger values for 3 of 8 samples for copper and 6 of 8 samples for zinc. It is noteworthy that all results for copper were well below the Groundwater Investigation Level of 2mg/L for drinking water given in NEPM 2013 and all results for zinc were well below the Australian Drinking Water Guidelines 2011, of 3mg/L for Zinc.

The broadly consistent levels of copper and zinc in all bores suggests that these are naturally occurring groundwater levels rather than a result of waste oil residue from racetrack treatments. Bore RN003098 is appropriate as a control site as it is located lateral to the groundwater flow direction in the area and RN18252 is located 430m from the site. An additional control site bore that is located upstream and some distance from the racetrack would be beneficial to the monitoring program to derive baseline or control "clean" groundwater chemistry data. RN003685 north of the racetrack on the western bank of the Todd River was added to the monitoring program through the EMP adopted from 2022 for this reason however this year's results suggest its susceptibility to pollution from river flows means that further sampling from this bore will be of little value.

10.3 Surface Water

Analysis of surface water samples found none to contain metals in excess of specified trigger values. It is unsurprising that larger rainfall events resulting in sheet flow across the sloping racetrack will produce small, measurable amounts of hydrocarbon 'rinse' being deposited close to the racetrack as was recorded for site #1. The low frequency of such events suggests that the probability of any significant deposition and accumulation of hydrocarbon over time is low. There is a high probability however that these small amounts of hydrocarbon in surface soil carried by surface water will self-attenuate through microbial action in relatively short timeframes.

10.4 Near-Track Soil

The one soil sampling site to record TRH presence (Site S01, 100-200mm below surface) was located close to the racetrack and was likely subject to rainfall wash directly off a freshly oiled track in December 2023. Lab results otherwise found no reason to be concerned about risk of vertical or lateral migration of waste oil from the racetrack.

10.5 Racetrack Soil – Oil Penetration

Previous to testing in January 2023, the depth of penetration of waste oil into the racetrack surface was tested in 2020. This testing detected no trace of hydrocarbon below 400mm. The detection of hydrocarbons at depth greater than 400mm below ground level in two 2023 samples is not considered significant, noting that waste oil has been regularly applied to the racetrack for about 46 years. In terms of environmental risk the quantity of vertical migration of waste oil below the racetrack surface is considered insignificant.

11 Conclusions and Recommendations

Waste oil was applied to the racetrack on only one occasion during the reporting period, in December 2022. A second application planned to take place in July 2023 did not eventuate. It was not possible to test the waste oil sampled in December for PFAS due to lab capability. Testing for PFAS for the second series of sampling in July found there to be no PFAS compounds present (less than Limit of Reporting).

Other monitoring carried out August 2022 – July 2023 included analysis of ground water samples taken from 5 bores on 12 January and 24 April. Results for bore RN03685 which was added to the program this year were somewhat unusual, suggesting this bore is subject to pollution and is not useful as a control monitoring bore. It is recommended it be removed from the program. One bore recorded a very small quantity of hydrocarbon presence in January following rainfall that may have been a factor in this. This same bore recorded no hydrocarbon in April sampling. Nonetheless this reinforces the need for very careful sampling methods to be upheld. Recordings for other parameters are unremarkable and comparable with previous year's records.

Surface water samples taken following high rainfall in January 2022 included one site that found hydrocarbon to be present, consistent with previous sampling where rain wash off the recently oiled track was clearly visible. Results of groundwater sampling

Oil depth penetration testing was carried out at three sites on the racetrack itself that has been exposed to oil applications for at least 46 years. Depth testing 3 years earlier found no hydrocarbon present at depth greater than 400mm. While this year's testing found two samples to contain hydrocarbon below 400mm, this is not considered significant.

Testing of nine near-track soil monitoring sites and two PFAS control sites included one result of 750 mg/kg of TRH for Site S01 located near the starting gate at the south-eastern corner of the racetrack. This is believed to be from surface wash following heavy rain soon after fresh oil application on the track very close by. This was the only sampling site to record any hydrocarbon presence. Results otherwise disclosed nothing of note other than suggesting that lateral migration of waste oil applied to the track remains unverified.

Other conclusions:

- Groundwater turbidity levels, while exceeding trigger values are notionally 'natural' and do not present issues of concern relating to the application waste oil on the racetrack.
- Levels of metals in groundwater, where they exceed trigger values for copper and zinc are most likely natural background levels that do not present issues of concern relating to the application waste oil on the racetrack.
- While high rainfall events resulting in surface water flow very likely results in carriage of hydrocarbon from racetrack-deposited waste oil to nearby down-slope sites, the risk of significant hydrocarbon contamination for the area's soil (and groundwater) is very low.

Recommendations

- Remove bore RN03685 from the program due its readings this year suggesting it is very likely prone to pollution from river flows. Its value as a 'clean' upstream control site for groundwater testing is considered poor.
- Uphold the highest level of care in sampling methods and sample management to mitigate risk of contamination and aberrative lab results (eg the TRH reading for bore RN018251).
- Adhere to the sampling schedule as set out in section 10 of the 2022 EMP and included in this report at section 4.1.
- Allow adequate lead time between waste oil sampling, testing and derivation of results, and scheduled waste oil applications to the racetrack.

Appendices

Appendix 1 –Certificates of Analysis for Sampled Waste Oil.

Appendix 1.1 Sampled units T1,T2,T3 taken 8 December.

Appendix 1.2 Sampled units 1,2,3 taken 4 July, 2023, Eurofins, 1005859-W.

Appendix 2 - Certificates of Analysis for Sampled Surface Water.

Appendix 2.1 Surface samples taken 9 January, ES2301524.

Appendix 3 – Certificates of Analysis for Sampled Groundwater

Appendix 3.1 Groundwater samples taken 12 January ES2301525.

Appendix 3.2 Groundwater samples taken 24 April ES2313770.

Appendix 4 – Certificates of Analysis for Sampled Soil

Appendix 4.1 Samples from the racetrack; 3 depths at each of 3 locations, ES2301526.

Appendix 4.2 Samples from around the racetrack; 2 depths at each of 9 locations.
ES2301527 and ES2301528.



Certificate of Analysis

LOW ECOLOGICAL SERVICES PTY
LTD
Lot 1858 Isotoma Road
Alice Springs NT 0871

Unit ID: T1

Compartment Name: T1

Make:

Make:

Model:

Model:

Serial No:

Serial No:

Site:

Capacity:

SIF No: 701450415

Lab No: 10700062475

UIN: 05B2385

Date Received: 20-Dec-22

Date Reported: 08-Jan-23

Fluid Manufacturer: Unidentified

Fluid Type: Oil

Fluid Grade: Unknown

Testing Laboratory: Sydney Non-Routine

DATE SAMPLED

DATE SAMPLED

DATE SAMPLED

DATE SAMPLED

TEST/METHOD

UNITS

08-Dec-22

PCB (ASTM D4059 mod)

PCB Total mg/kg <2

Metals (ppm)

*Aluminium (Al) ppm 8

*Chromium (Cr) ppm 1

*Iron (Fe) ppm 63

*Copper (Cu) ppm 15

*Lead (Pb) ppm 9

*Tin (Sn) ppm 1

*Nickel (Ni) ppm <1

Silver (Ag) ppm 3

Contaminants and Additives (ppm)

*Silicon (Si) ppm 24

*Sodium (Na) ppm 82

*Potassium (K) ppm 58

*Molybdenum (Mo) ppm 38

Boron (B) ppm 126

*Magnesium (Mg) ppm 172

*Calcium (Ca) ppm 1462

*Zinc (Zn) ppm 785

*Phosphorus (P) ppm 701

*Antimony (Sb) ppm <1

*Lithium (Li) ppm 1

Physical Tests

Soot (%) (FTIR) % 10.4

Oxidation (Abs) (FTIR) Abs 20.3

Nitration (Abs) (FTIR) Abs 17.5

Sulphation (Abs) (FTIR) Abs 14.6

Viscosity (cSt, 100°C) cSt 11.0

PQ Index Index 21

Total Base Number (FTIR) mgKOH/g 5.3

Fuel (%) % 7

DIAGNOSIS:

Results were obtained on the sample as received. Note: This is an amended report following completion of PCB test. This report supersedes any previous report(s) with this reference. Amendment 01

NATA Accreditation No. 825. Site No. 2024. *NATA accreditation covers the performance of this service.

Diagnosed by: Aco.Traykovski

Right Solutions • Right Partner



Certificate of Analysis

LOW ECOLOGICAL SERVICES PTY
LTD

Lot 1858 Isotoma Road
Alice Springs NT 0871

Unit ID: T2

Compartment Name: T2

Make:

Make:

Model:

Model:

Serial No:

Serial No:

Site:

Capacity:

SIF No: 701450416

Lab No: 10700062476

UIN: 05B4142

Date Received: 20-Dec-22

Date Reported: 08-Jan-23

Fluid Manufacturer: Unidentified

Fluid Type: Oil

Fluid Grade: Unknown

Testing Laboratory: Sydney Non-Routine

DATE SAMPLED

DATE SAMPLED

DATE SAMPLED

DATE SAMPLED

TEST/METHOD

UNITS

08-Dec-22

PCB (ASTM D4059 mod)

PCB Total mg/kg <2

Metals (ppm)

*Aluminium (Al) ppm 9

*Chromium (Cr) ppm 1

*Iron (Fe) ppm 71

*Copper (Cu) ppm 15

*Lead (Pb) ppm 6

*Tin (Sn) ppm 2

*Nickel (Ni) ppm <1

Silver (Ag) ppm 1

Contaminants and Additives (ppm)

*Silicon (Si) ppm 26

*Sodium (Na) ppm 52

*Potassium (K) ppm 48

*Molybdenum (Mo) ppm 46

Boron (B) ppm 108

*Magnesium (Mg) ppm 178

*Calcium (Ca) ppm 1590

*Zinc (Zn) ppm 795

*Phosphorus (P) ppm 721

*Antimony (Sb) ppm 1

*Lithium (Li) ppm 1

Physical Tests

Soot (%) (FTIR) % 13.0

Oxidation (Abs) (FTIR) Abs 19.7

Nitration (Abs) (FTIR) Abs 16.5

Sulphation (Abs) (FTIR) Abs 18.0

Viscosity (cSt,100°C) cSt 18.2

PQ Index Index 15

Total Base Number (FTIR) mgKOH/g 6.3

Fuel (%) % 8

DIAGNOSIS:

Results were obtained on the sample as received. Note: This is an amended report following completion of PCB test. This report supersedes any previous report(s) with this reference. Amendment 01

NATA Accreditation No. 825. Site No. 2024. *NATA accreditation covers the performance of this service.

Diagnosed by: Aco.Traykovski

Right Solutions • Right Partner



Certificate of Analysis

LOW ECOLOGICAL SERVICES PTY
LTD
Lot 1858 Isotoma Road
Alice Springs NT 0871

Unit ID: T3

Compartment Name: T3

Make:

Make:

Model:

Model:

Serial No:

Serial No:

Site:

Capacity:

SIF No: 701450417

Lab No: 10700062477

UIN: 05B2387

Date Received: 20-Dec-22

Date Reported: 08-Jan-23

Fluid Manufacturer: Unidentified

Fluid Type: Oil

Fluid Grade: Unknown

Testing Laboratory: Sydney Non-Routine

DATE SAMPLED

DATE SAMPLED

DATE SAMPLED

DATE SAMPLED

TEST/METHOD

UNITS

08-Dec-22

PCB (ASTM D4059 mod)

PCB Total	mg/kg	<2
-----------	-------	----

Metals (ppm)

*Aluminium (Al)	ppm	6
*Chromium (Cr)	ppm	1
*Iron (Fe)	ppm	55
*Copper (Cu)	ppm	10
*Lead (Pb)	ppm	12
*Tin (Sn)	ppm	1
*Nickel (Ni)	ppm	1
Silver (Ag)	ppm	1

Contaminants and Additives (ppm)

*Silicon (Si)	ppm	23
*Sodium (Na)	ppm	65
*Potassium (K)	ppm	79
*Molybdenum (Mo)	ppm	41
Boron (B)	ppm	100
*Magnesium (Mg)	ppm	176
*Calcium (Ca)	ppm	1185
*Zinc (Zn)	ppm	747
*Phosphorus (P)	ppm	679
*Antimony (Sb)	ppm	<1
*Lithium (Li)	ppm	1

Physical Tests

Soot (%) (FTIR)	%	9.5
Oxidation (Abs) (FTIR)	Abs	18.9
Nitration (Abs) (FTIR)	Abs	15.1
Sulphation (Abs) (FTIR)	Abs	16.0
Viscosity (cSt,100°C)	cSt	9.1
PQ Index	Index	13
Total Base Number (FTIR)	mgKOH/g	4.8
Fuel (%)	%	6

DIAGNOSIS:

Results were obtained on the sample as received. Note: This is an amended report following completion of PCB test. This report supersedes any previous report(s) with this reference. Amendment 01

NATA Accreditation No. 825. Site No. 2024. *NATA accreditation covers the performance of this service.

Diagnosed by: Aco.Traykovski

Right Solutions • Right Partner



Certificate of Analysis

LOW ECOLOGICAL SERVICES PTY
LTDLot 1858 Isotoma Road
Alice Springs NT 0871

Unit ID: T3

Compartment Name: T3

Make:

Make:

Model:

Model:

Serial No:

Serial No:

Site: Alice Springs Turf Club

Capacity:

SIF No: 702323916

Lab No: 10700066119

UIN: 05B2387

Date Received: 12-Jul-23

Fluid Manufacturer: Unidentified

Fluid Type: Oil

Testing Laboratory: Sydney Non-Routine

Date Reported: 27-Jul-23

Fluid Grade: Unknown

DATE SAMPLED

DATE SAMPLED

DATE SAMPLED

DATE SAMPLED

TEST/METHOD

UNITS

04-Jul-23

08-Dec-22

PCB (ASTM D4059 mod)

PCB Total mg/kg

<2

<2

Metals (ppm)

*Aluminium (Al) ppm

19

6

*Chromium (Cr) ppm

<1

1

*Iron (Fe) ppm

54

55

*Copper (Cu) ppm

9

10

*Lead (Pb) ppm

1

12

*Tin (Sn) ppm

1

1

*Nickel (Ni) ppm

1

1

Silver (Ag) ppm

<1

1

Contaminants and Additives (ppm)

*Silicon (Si) ppm

24

23

*Sodium (Na) ppm

30

65

*Potassium (K) ppm

32

79

*Molybdenum (Mo) ppm

17

41

Boron (B) ppm

20

100

*Magnesium (Mg) ppm

52

176

*Calcium (Ca) ppm

1590

1185

*Zinc (Zn) ppm

768

747

*Phosphorus (P) ppm

684

679

*Lithium (Li) ppm

<1

1

Physical Tests

Water (%) (FTIR) %

--

--

Soot (%) (FTIR) %

1.1

9.5

Oxidation (Abs) (FTIR) Abs

14.0

18.9

Sulphation (Abs) (FTIR) Abs

9.3

16.0

Viscosity (cSt, 100°C) cSt

11.2

9.1

PQ Index Index

11

13

Total Base Number (FTIR) mgKOH/g

5.3

4.8

Fuel (%) %

12

6

DIAGNOSIS:

Results were obtained on the sample as received. SIF: Sample ID: 251847.

NATA Accreditation No. 825. Site No. 2024. *NATA accreditation covers the performance of this service.

IOW Low Ecological Services
Lot 1858 Isotoma Road
Alice Springs
NT 0870



NATA Accredited
Accreditation Number 1261
Site Number 20794

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

Attention: **Bill Low**

Report **1005859-W**
Project name **TUFT CLUBS WASTE OIL SAMPLING**
Received Date **Jul 07, 2023**

Client Sample ID			G01 T1-251849	G01 T2-251849	G01 T3-251847
Sample Matrix			Water	Water	Water
Eurofins Sample No.			B23-JI0013303	B23-JI0013304	B23-JI0013305
Date Sampled			Jul 04, 2023	Jul 04, 2023	Jul 04, 2023
Test/Reference	LOR	Unit			
Perfluoroalkyl carboxylic acids (PFCAs)					
Perfluorobutanoic acid (PFBA) ^{N11}	0.05	ug/L	< 50	< 50	< 50
Perfluoropentanoic acid (PFPeA) ^{N11}	0.01	ug/L	< 50	< 50	< 50
Perfluorohexanoic acid (PFHxA) ^{N11}	0.01	ug/L	< 50	< 50	< 50
Perfluoroheptanoic acid (PFHpA) ^{N11}	0.01	ug/L	< 50	< 50	< 50
Perfluorooctanoic acid (PFOA) ^{N11}	0.01	ug/L	< 50	< 50	< 50
Perfluorononanoic acid (PFNA) ^{N11}	0.01	ug/L	< 50	< 50	< 50
Perfluorodecanoic acid (PFDA) ^{N11}	0.01	ug/L	< 50	< 50	< 50
Perfluoroundecanoic acid (PFUnDA) ^{N11}	0.01	ug/L	< 50	< 50	< 50
Perfluorododecanoic acid (PFDoDA) ^{N11}	0.01	ug/L	< 50	< 50	< 50
Perfluorotridecanoic acid (PFTeDA) ^{N15}	0.01	ug/L	< 50	< 50	< 50
Perfluorotetradecanoic acid (PFTeDA) ^{N11}	0.01	ug/L	< 50	< 50	< 50
13C4-PFBA (surr.)	1	%	96	99	99
13C5-PFPeA (surr.)	1	%	83	84	82
13C5-PFHxA (surr.)	1	%	97	97	97
13C4-PFHpA (surr.)	1	%	97	102	102
13C8-PFOA (surr.)	1	%	95	93	95
13C5-PFNA (surr.)	1	%	96	92	95
13C6-PFDA (surr.)	1	%	99	96	102
13C2-PFUnDA (surr.)	1	%	94	91	99
13C2-PFDoDA (surr.)	1	%	89	85	94
13C2-PFTeDA (surr.)	1	%	124	125	135
Perfluoroalkyl sulfonamido substances					
Perfluorooctane sulfonamide (FOSA) ^{N11}	0.05	ug/L	< 50	< 50	< 50
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA) ^{N11}	0.05	ug/L	< 50	< 50	< 50
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA) ^{N11}	0.05	ug/L	< 50	< 50	< 50
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE) ^{N11}	0.05	ug/L	< 50	< 50	< 50
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE) ^{N11}	0.05	ug/L	< 50	< 50	< 50
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) ^{N11}	0.05	ug/L	< 50	< 50	< 50
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA) ^{N11}	0.05	ug/L	< 50	< 50	< 50
13C8-FOSA (surr.)	1	%	94	89	99
D3-N-MeFOSA (surr.)	1	%	100	82	101
D5-N-EtFOSA (surr.)	1	%	103	89	102
D7-N-MeFOSE (surr.)	1	%	89	85	90

Client Sample ID			G01 T1-251849	G01 T2-251849	G01 T3-251847
Sample Matrix			Water	Water	Water
Eurofins Sample No.			B23-JI0013303	B23-JI0013304	B23-JI0013305
Date Sampled			Jul 04, 2023	Jul 04, 2023	Jul 04, 2023
Test/Reference	LOR	Unit			
Perfluoroalkyl sulfonamido substances					
D9-N-EtFOSE (surr.)	1	%	94	87	97
D5-N-EtFOSAA (surr.)	1	%	80	76	80
D3-N-MeFOSAA (surr.)	1	%	96	91	97
Perfluoroalkyl sulfonic acids (PFASs)					
Perfluorobutanesulfonic acid (PFBS) ^{N11}	0.01	ug/L	< 50	< 50	< 50
Perfluorononanesulfonic acid (PFNS) ^{N15}	0.01	ug/L	< 50	< 50	< 50
Perfluoropropanesulfonic acid (PFPrS) ^{N15}	0.01	ug/L	< 50	< 50	< 50
Perfluoropentanesulfonic acid (PFPeS) ^{N15}	0.01	ug/L	< 50	< 50	< 50
Perfluorohexanesulfonic acid (PFHxS) ^{N11}	0.01	ug/L	< 50	< 50	< 50
Perfluoroheptanesulfonic acid (PFHpS) ^{N15}	0.01	ug/L	< 50	< 50	< 50
Perfluorooctanesulfonic acid (PFOS) ^{N11}	0.01	ug/L	< 50	< 50	< 50
Perfluorodecanesulfonic acid (PFDS) ^{N15}	0.01	ug/L	< 50	< 50	< 50
13C3-PFBS (surr.)	1	%	110	117	116
18O2-PFHxS (surr.)	1	%	104	104	108
13C8-PFOS (surr.)	1	%	89	92	97
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA) ^{N11}	0.01	ug/L	< 50	< 50	< 50
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA) ^{N11}	0.05	ug/L	< 50	< 50	< 50
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA) ^{N11}	0.01	ug/L	< 50	< 50	< 50
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA) ^{N11}	0.01	ug/L	< 50	< 50	< 50
13C2-4:2 FTSA (surr.)	1	%	54	60	57
13C2-6:2 FTSA (surr.)	1	%	113	105	101
13C2-8:2 FTSA (surr.)	1	%	77	75	81
13C2-10:2 FTSA (surr.)	1	%	109	106	118
PFASs Summations					
Sum (PFHxS + PFOS)*	0.01	ug/L	< 50	< 50	< 50
Sum of US EPA PFAS (PFOS + PFOA)*	0.01	ug/L	< 50	< 50	< 50
Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	0.01	ug/L	< 50	< 50	< 50
Sum of WA DWER PFAS (n=10)*	0.05	ug/L	< 50	< 50	< 50
Sum of PFASs (n=30)*	0.1	ug/L	< 50	< 50	< 50

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Per- and Polyfluoroalkyl Substances (PFASs)			
Perfluoroalkyl carboxylic acids (PFCAs)	Brisbane	Jul 07, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonamido substances	Brisbane	Jul 07, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
Perfluoroalkyl sulfonic acids (PFSAs)	Brisbane	Jul 07, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			
n:2 Fluorotelomer sulfonic acids (n:2 FTSAs)	Brisbane	Jul 07, 2023	28 Days
- Method: LTM-ORG-2100 Per- and Polyfluoroalkyl Substances (PFAS)			



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email: EnviroSales@eurofins.com

Eurofins Environment Testing Australia Pty Ltd

ABN: 50 005 085 521

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NATA# 1261 Site# 25403

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NATA# 1261 Site# 18217

Canberra
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Mitchell
ACT 2911
Tel: +61 2 6113 8091
NATA# 1261 Site# 25466

Brisbane
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Murarrie
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Tel: +61 7 3902 4600
NATA# 1261 Site# 20794

Newcastle
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Mayfield West NSW 2304
Tel: +61 2 4968 8448
NATA# 1261
Site# 25079 & 25289

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NATA# 2377 Site# 2370

Eurofins Environment Testing NZ Ltd

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43 Detroit Drive
Rolleston,
Christchurch 7675
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IANZ# 1290

Company Name: Low Ecological Services
Address: Lot 1858 Isotoma Road
Alice Springs
NT 0870

Project Name: TUFT CLUBS WASTE OIL SAMPLING

Order No.:
Report #: 1005859
Phone: 08 89555222
Fax:

Received: Jul 7, 2023 8:30 AM
Due: Jul 14, 2023
Priority: 5 Day
Contact Name: Bill Low

Eurofins Analytical Services Manager : Michael Morrison

Sample Detail						Per- and Polyfluoroalkyl Substances (PFASs)
Brisbane Laboratory - NATA # 1261 Site # 20794						X
External Laboratory						
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID	
1	T1-251849	Jul 04, 2023		Water	B23-JI0013303	X
2	T2-251849	Jul 04, 2023		Water	B23-JI0013304	X
3	T3-251847	Jul 04, 2023		Water	B23-JI0013305	X
Test Counts						3

Appendix 1.2 We text here

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

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

Terms

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

QC - Acceptance Criteria

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

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

Results <10 times the LOR: No Limit

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

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

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

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

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

QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	ug/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 (PFTeDA)	ug/L	< 0.01			0.01	Pass	
Method Blank							
Perfluoroalkyl sulfonamido substances							
Perfluorooctane sulfonamide (FOSA)	ug/L	< 0.05			0.05	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	ug/L	< 0.05			0.05	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	ug/L	< 0.05			0.05	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	ug/L	< 0.05			0.05	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	ug/L	< 0.05			0.05	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	ug/L	< 0.05			0.05	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	ug/L	< 0.05			0.05	Pass	
Method Blank							
Perfluoroalkyl sulfonic acids (PFSA's)							
Perfluorobutanesulfonic acid (PFBS)	ug/L	< 0.01			0.01	Pass	
Perfluorononanesulfonic acid (PFNS)	ug/L	< 0.01			0.01	Pass	
Perfluoropropanesulfonic acid (PFPrS)	ug/L	< 0.01			0.01	Pass	
Perfluoropentanesulfonic acid (PFPeS)	ug/L	< 0.01			0.01	Pass	
Perfluorohexanesulfonic acid (PFHxS)	ug/L	< 0.01			0.01	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	ug/L	< 0.01			0.01	Pass	
Perfluorooctanesulfonic acid (PFOS)	ug/L	< 0.01			0.01	Pass	
Perfluorodecanesulfonic acid (PFDS)	ug/L	< 0.01			0.01	Pass	
Method Blank							
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)							
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	ug/L	< 0.05			0.05	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	ug/L	< 0.01			0.01	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	ug/L	< 0.01			0.01	Pass	
LCS - % Recovery							
Perfluoroalkyl carboxylic acids (PFCAs)							
Perfluorobutanoic acid (PFBA)	%	95			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	%	104			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	%	106			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	%	103			50-150	Pass	
Perfluorooctanoic acid (PFOA)	%	101			50-150	Pass	
Perfluorononanoic acid (PFNA)	%	110			50-150	Pass	
Perfluorodecanoic acid (PFDA)	%	96			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	%	104			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	%	113			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	%	98			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	%	108			50-150	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Perfluoroalkyl sulfonamido substances									
Perfluorooctane sulfonamide (FOSA)			%	98			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)			%	116			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)			%	107			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)			%	112			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)			%	110			50-150	Pass	
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)			%	105			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)			%	106			50-150	Pass	
LCS - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)									
Perfluorobutanesulfonic acid (PFBS)			%	81			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)			%	102			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)			%	65			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)			%	76			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)			%	98			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)			%	107			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)			%	104			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)			%	82			50-150	Pass	
LCS - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)									
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)			%	110			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)			%	111			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)			%	104			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									
Perfluoroalkyl carboxylic acids (PFCAs)									
				Result 1					
Perfluorobutanoic acid (PFBA)	S23-JI0028790	NCP	%	116			50-150	Pass	
Perfluoropentanoic acid (PFPeA)	S23-JI0028790	NCP	%	96			50-150	Pass	
Perfluorohexanoic acid (PFHxA)	S23-JI0028790	NCP	%	102			50-150	Pass	
Perfluoroheptanoic acid (PFHpA)	S23-JI0028790	NCP	%	110			50-150	Pass	
Perfluorooctanoic acid (PFOA)	S23-JI0028790	NCP	%	111			50-150	Pass	
Perfluorononanoic acid (PFNA)	S23-JI0028790	NCP	%	109			50-150	Pass	
Perfluorodecanoic acid (PFDA)	S23-JI0028790	NCP	%	96			50-150	Pass	
Perfluoroundecanoic acid (PFUnDA)	S23-JI0028790	NCP	%	107			50-150	Pass	
Perfluorododecanoic acid (PFDoDA)	S23-JI0028790	NCP	%	120			50-150	Pass	
Perfluorotridecanoic acid (PFTTrDA)	S23-JI0028790	NCP	%	124			50-150	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S23-JI0028790	NCP	%	101			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonamido substances									
				Result 1					
Perfluorooctane sulfonamide (FOSA)	S23-JI0028790	NCP	%	93			50-150	Pass	
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S23-JI0028790	NCP	%	126			50-150	Pass	
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S23-JI0028790	NCP	%	117			50-150	Pass	
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	S23-JI0028790	NCP	%	106			50-150	Pass	
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	S23-JI0028790	NCP	%	113			50-150	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S23-JI0028790	NCP	%	98			50-150	Pass	
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S23-JI0028790	NCP	%	104			50-150	Pass	
Spike - % Recovery									
Perfluoroalkyl sulfonic acids (PFSA's)				Result 1					
Perfluorobutanesulfonic acid (PFBS)	S23-JI0028790	NCP	%	70			50-150	Pass	
Perfluorononanesulfonic acid (PFNS)	S23-JI0028790	NCP	%	108			50-150	Pass	
Perfluoropropanesulfonic acid (PFPrS)	S23-JI0028790	NCP	%	74			50-150	Pass	
Perfluoropentanesulfonic acid (PFPeS)	S23-JI0028790	NCP	%	92			50-150	Pass	
Perfluorohexanesulfonic acid (PFHxS)	S23-JI0028790	NCP	%	101			50-150	Pass	
Perfluoroheptanesulfonic acid (PFHpS)	S23-JI0028790	NCP	%	113			50-150	Pass	
Perfluorooctanesulfonic acid (PFOS)	S23-JI0028790	NCP	%	100			50-150	Pass	
Perfluorodecanesulfonic acid (PFDS)	S23-JI0028790	NCP	%	98			50-150	Pass	
Spike - % Recovery									
n:2 Fluorotelomer sulfonic acids (n:2 FTSA's)				Result 1					
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S23-JI0028790	NCP	%	103			50-150	Pass	
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	S23-JI0028790	NCP	%	119			50-150	Pass	
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S23-JI0028790	NCP	%	112			50-150	Pass	
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S23-JI0028790	NCP	%	96			50-150	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Perfluoroalkyl carboxylic acids (PFCAs)				Result 1	Result 2	RPD			
Perfluorobutanoic acid (PFBA)	S23-JI0028789	NCP	ug/L	8.6	8.0	7.2	30%	Pass	
Perfluoropentanoic acid (PFPeA)	S23-JI0028789	NCP	ug/L	18	17	10	30%	Pass	
Perfluorohexanoic acid (PFHxA)	S23-JI0028789	NCP	ug/L	8.8	8.5	3.5	30%	Pass	
Perfluoroheptanoic acid (PFHpA)	S23-JI0028789	NCP	ug/L	5.6	5.1	9.7	30%	Pass	
Perfluorooctanoic acid (PFOA)	S23-JI0028789	NCP	ug/L	0.90	0.88	2.6	30%	Pass	
Perfluorononanoic acid (PFNA)	S23-JI0028789	NCP	ug/L	0.29	0.28	6.1	30%	Pass	
Perfluorodecanoic acid (PFDA)	S23-JI0028789	NCP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Perfluoroundecanoic acid (PFUnDA)	S23-JI0028789	NCP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Perfluorododecanoic acid (PFDoDA)	S23-JI0028789	NCP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Perfluorotridecanoic acid (PFTrDA)	S23-JI0028789	NCP	ug/L	< 0.1	< 0.1	<1	30%	Pass	
Perfluorotetradecanoic acid (PFTeDA)	S23-JI0028789	NCP	ug/L	< 0.1	< 0.1	<1	30%	Pass	

Duplicate								
Perfluoroalkyl sulfonamido substances				Result 1	Result 2	RPD		
Perfluorooctane sulfonamide (FOSA)	S23-JI0028789	NCP	ug/L	< 0.5	< 0.5	<1	30%	Pass
N-methylperfluoro-1-octane sulfonamide (N-MeFOSA)	S23-JI0028789	NCP	ug/L	< 0.5	< 0.5	<1	30%	Pass
N-ethylperfluoro-1-octane sulfonamide (N-EtFOSA)	S23-JI0028789	NCP	ug/L	< 0.5	< 0.5	<1	30%	Pass
2-(N-methylperfluoro-1-octane sulfonamido)-ethanol(N-MeFOSE)	S23-JI0028789	NCP	ug/L	< 0.5	< 0.5	<1	30%	Pass
2-(N-ethylperfluoro-1-octane sulfonamido)-ethanol(N-EtFOSE)	S23-JI0028789	NCP	ug/L	< 0.5	< 0.5	<1	30%	Pass
N-ethyl-perfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	S23-JI0028789	NCP	ug/L	< 0.5	< 0.5	<1	30%	Pass
N-methyl-perfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	S23-JI0028789	NCP	ug/L	< 0.5	< 0.5	<1	30%	Pass
Duplicate								
Perfluoroalkyl sulfonic acids (PFSAs)				Result 1	Result 2	RPD		
Perfluorobutanesulfonic acid (PFBS)	S23-JI0028789	NCP	ug/L	1.1	1.0	4.7	30%	Pass
Perfluorononanesulfonic acid (PFNS)	S23-JI0028789	NCP	ug/L	< 0.1	< 0.1	<1	30%	Pass
Perfluoropropanesulfonic acid (PFPrS)	S23-JI0028789	NCP	ug/L	< 0.1	< 0.1	<1	30%	Pass
Perfluoropentanesulfonic acid (PFPeS)	S23-JI0028789	NCP	ug/L	0.16	0.15	7.2	30%	Pass
Perfluorohexanesulfonic acid (PFHxS)	S23-JI0028789	NCP	ug/L	0.91	0.82	11	30%	Pass
Perfluoroheptanesulfonic acid (PFHpS)	S23-JI0028789	NCP	ug/L	< 0.1	< 0.1	<1	30%	Pass
Perfluorooctanesulfonic acid (PFOS)	S23-JI0028789	NCP	ug/L	0.54	0.51	6.6	30%	Pass
Perfluorodecanesulfonic acid (PFDS)	S23-JI0028789	NCP	ug/L	< 0.1	< 0.1	<1	30%	Pass
Duplicate								
n:2 Fluorotelomer sulfonic acids (n:2 FTSA)				Result 1	Result 2	RPD		
1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	S23-JI0028789	NCP	ug/L	< 0.1	< 0.1	<1	30%	Pass
1H.1H.2H.2H-perfluorooctanesulfonic acid(6:2 FTSA)	S23-JI0028789	NCP	ug/L	21	20	7.9	30%	Pass
1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	S23-JI0028789	NCP	ug/L	< 0.1	< 0.1	<1	30%	Pass
1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	S23-JI0028789	NCP	ug/L	< 0.1	< 0.1	<1	30%	Pass

Comments

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
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:

Savini Suduweli Analytical Services Manager
Jonathon Angell Senior Analyst-PFAS



Glenn Jackson
Managing Director

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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CERTIFICATE OF ANALYSIS

Work Order : **ES2301524**
Client : **LOW ECOLOGICAL SERVICES**
Contact : MR BILL LOW
Address : PO BOX 3130
ALICE SPRINGS NT, AUSTRALIA 0871
Telephone : +61 08 89 555 222
Project : Turf Club
Order number : ----
C-O-C number : ----
Sampler : Elli Fagan / Danesh Anita
Site : ----
Quote number : EN/333
No. of samples received : 3
No. of samples analysed : 3

Page : 1 of 6
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 18-Jan-2023 08:00
Date Analysis Commenced : 19-Jan-2023
Issue Date : 27-Jan-2023 18:09



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.

Signatories	Position	Accreditation Category
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	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 Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- 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

				TC01	TC02	TC03	----	----
Sampling date / time				09-Jan-2023 00:00	09-Jan-2023 00:00	09-Jan-2023 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2301524-001	ES2301524-002	ES2301524-003	-----	-----
				Result	Result	Result	----	----
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.001	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	----	----
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.019	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	----	----
C15 - C28 Fraction	----	100	µg/L	190	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	190	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	----	----
>C16 - C34 Fraction	----	100	µg/L	190	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	190	<100	<100	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	----	----
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	----	----
Toluene	108-88-3	2	µg/L	<2	<2	<2	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	----	----
^ Total Xylenes	----	2	µg/L	<2	<2	<2	----	----
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	----	----
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				TC01	TC02	TC03	----	----
Sampling date / time				09-Jan-2023 00:00	09-Jan-2023 00:00	09-Jan-2023 00:00	----	----
Compound	CAS Number	LOR	Unit	ES2301524-001	ES2301524-002	ES2301524-003	-----	-----
				Result	Result	Result	----	----
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	----	----	<0.02	----	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	----	----	<0.02	----	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	----	----	<0.02	----	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	----	----
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	----	----
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	----	----
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	----	----	<0.02	----	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	----	----	<0.02	----	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	----	----	<0.02	----	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	----	----	<0.02	----	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	----	----	<0.02	----	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	----	----	<0.05	----	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	----	----	<0.02	----	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	----	----	<0.05	----	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	----	----	<0.05	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	TC01	TC02	TC03	----	----
Sampling date / time					09-Jan-2023 00:00	09-Jan-2023 00:00	09-Jan-2023 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2301524-001	ES2301524-002	ES2301524-003	-----	-----
					Result	Result	Result	----	----
EP231C: Perfluoroalkyl Sulfonamides - Continued									
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L		----	----	<0.05	----	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L		----	----	<0.05	----	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L		----	----	<0.02	----	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L		----	----	<0.02	----	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L		<0.05	<0.05	<0.05	----	----
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L		<0.05	<0.05	<0.05	----	----
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L		<0.05	<0.05	<0.05	----	----
EP231P: PFAS Sums									
Sum of PFAS	----	0.01	µg/L		----	----	<0.01	----	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L		<0.01	<0.01	<0.01	----	----
Sum of PFAS (WA DER List)	----	0.01	µg/L		<0.01	<0.01	<0.01	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		119	118	119	----	----
Toluene-D8	2037-26-5	2	%		104	99.2	99.6	----	----
4-Bromofluorobenzene	460-00-4	2	%		105	105	105	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.02	%		104	106	104	----	----
13C8-PFOA	----	0.02	%		89.6	94.6	92.7	----	----



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	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

CERTIFICATE OF ANALYSIS

Work Order : **ES2301525**
Client : **LOW ECOLOGICAL SERVICES**
Contact : MR BILL LOW
Address : PO BOX 3130
ALICE SPRINGS NT, AUSTRALIA 0871
Telephone : +61 08 89 555 222
Project : Turf Club
Order number : ----
C-O-C number : ----
Sampler : Elli Fagan / Danesh Anita
Site : ----
Quote number : EN/333
No. of samples received : 5
No. of samples analysed : 5

Page : 1 of 6
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 18-Jan-2023 08:00
Date Analysis Commenced : 19-Jan-2023
Issue Date : 27-Jan-2023 17:03



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>
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	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 Contract for details.

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

LOR = Limit of reporting

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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP231X - Per- and Polyfluoroalkyl Substances (PFAS): Samples received in 20ml or 125ml bottles have been tested in accordance with the QSM5.3 compliant, NATA accredited method. 60mL or 250mL bottles have been tested to the legacy QSM 5.1 aligned, NATA accredited method.
- 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: Results for samples #1,2 and 4 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

				RN3685	RN18252	RN3098	RN18251	RN4541
Sampling date / time				12-Jan-2023 00:00	12-Jan-2023 00:00	12-Jan-2023 00:00	12-Jan-2023 00:00	12-Jan-2023 00:00
Compound	CAS Number	LOR	Unit	ES2301525-001	ES2301525-002	ES2301525-003	ES2301525-004	ES2301525-005
				Result	Result	Result	Result	Result
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	0.0005	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	0.002	0.071	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	0.002	0.003	<0.001	0.002	<0.001
Lead	7439-92-1	0.001	mg/L	0.097	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	103	0.054	0.028	0.055	<0.005
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	170	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	170	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	170	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	170	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	170	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				RN3685	RN18252	RN3098	RN18251	RN4541
Sampling date / time				12-Jan-2023 00:00	12-Jan-2023 00:00	12-Jan-2023 00:00	12-Jan-2023 00:00	12-Jan-2023 00:00
Compound	CAS Number	LOR	Unit	ES2301525-001	ES2301525-002	ES2301525-003	ES2301525-004	ES2301525-005
				Result	Result	Result	Result	Result
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.02	µg/L	<0.02	<0.02	<0.02	0.03	<0.02
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.02	µg/L	----	----	----	<0.02	----
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.01	µg/L	0.03	0.02	<0.01	0.08	<0.01
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.02	µg/L	----	----	----	<0.02	----
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.01	µg/L	<0.01	0.02	<0.01	0.03	<0.01
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.02	µg/L	----	----	----	<0.02	----
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.1	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorohexanoic acid (PFHxA)	307-24-4	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.02	µg/L	<0.02	<0.02	<0.02	<0.02	<0.02
Perfluorooctanoic acid (PFOA)	335-67-1	0.01	µg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Perfluorononanoic acid (PFNA)	375-95-1	0.02	µg/L	----	----	----	<0.02	----
Perfluorodecanoic acid (PFDA)	335-76-2	0.02	µg/L	----	----	----	<0.02	----
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.02	µg/L	----	----	----	<0.02	----
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.02	µg/L	----	----	----	<0.02	----
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.02	µg/L	----	----	----	<0.02	----
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.05	µg/L	----	----	----	<0.05	----
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.02	µg/L	----	----	----	<0.02	----
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.05	µg/L	----	----	----	<0.05	----
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.05	µg/L	----	----	----	<0.05	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				RN3685	RN18252	RN3098	RN18251	RN4541
Sampling date / time				12-Jan-2023 00:00	12-Jan-2023 00:00	12-Jan-2023 00:00	12-Jan-2023 00:00	12-Jan-2023 00:00
Compound	CAS Number	LOR	Unit	ES2301525-001	ES2301525-002	ES2301525-003	ES2301525-004	ES2301525-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides - Continued								
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.05	µg/L	----	----	----	<0.05	----
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.05	µg/L	----	----	----	<0.05	----
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.02	µg/L	----	----	----	<0.02	----
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.02	µg/L	----	----	----	<0.02	----
EP231D: (n:2) Fluorotelomer Sulfonic Acids								
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.05	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP231P: PFAS Sums								
Sum of PFAS	----	0.01	µg/L	----	----	----	0.14	----
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.01	µg/L	0.03	0.04	<0.01	0.11	<0.01
Sum of PFAS (WA DER List)	----	0.01	µg/L	0.03	0.04	<0.01	0.14	<0.01
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	108	99.2	102	132	137
Toluene-D8	2037-26-5	2	%	95.0	101	102	108	114
4-Bromofluorobenzene	460-00-4	2	%	107	105	110	118	124
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.02	%	102	103	97.6	97.3	102
13C8-PFOA	----	0.02	%	95.7	94.9	96.0	95.1	94.9



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	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

**CERTIFICATE OF ANALYSIS**

Work Order : **ES2313770**
Client : **LOW ECOLOGICAL SERVICES**
Contact : MR BILL LOW
Address : PO BOX 3130
ALICE SPRINGS NT, AUSTRALIA 0871
Telephone : +61 08 89 555 222
Project : Turf Club
Order number : ----
C-O-C number : ----
Sampler : Eilli Fagan / Danesh Anita
Site : ----
Quote number : EN/333
No. of samples received : 5
No. of samples analysed : 5

Page : 1 of 5
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 27-Apr-2023 14:40
Date Analysis Commenced : 01-May-2023
Issue Date : 04-May-2023 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

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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>
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



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

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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.

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				RN3685	RN018252	RN03098	RN018251	RN04541
Sampling date / time				24-Apr-2023 00:00	24-Apr-2023 00:00	24-Apr-2023 00:00	24-Apr-2023 00:00	24-Apr-2023 00:00
Compound	CAS Number	LOR	Unit	ES2313770-001	ES2313770-002	ES2313770-003	ES2313770-004	ES2313770-005
				Result	Result	Result	Result	Result
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	0.0003	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.008	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	0.004	<0.001	0.002	<0.001
Lead	7439-92-1	0.001	mg/L	0.003	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	14.0	0.045	<0.005	0.039	<0.005
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L	<50	<50	<50	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	<20	<20	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	<20	<20	<20	<20
>C10 - C16 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	<100	<100	<100	<100
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	<100	<100	<100	<100
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L	<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L	<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L	<2	<2	<2	<2	<2
^ Total Xylenes	----	2	µg/L	<2	<2	<2	<2	<2
^ Sum of BTEX	----	1	µg/L	<1	<1	<1	<1	<1
Naphthalene	91-20-3	5	µg/L	<5	<5	<5	<5	<5



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	RN3685	RN018252	RN03098	RN018251	RN04541
Sampling date / time					24-Apr-2023 00:00	24-Apr-2023 00:00	24-Apr-2023 00:00	24-Apr-2023 00:00	24-Apr-2023 00:00
Compound	CAS Number	LOR	Unit		ES2313770-001	ES2313770-002	ES2313770-003	ES2313770-004	ES2313770-005
					Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		101	103	98.8	100	92.4
Toluene-D8	2037-26-5	2	%		108	108	109	112	112
4-Bromofluorobenzene	460-00-4	2	%		97.2	96.1	97.4	97.4	99.9



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	72	143
Toluene-D8	2037-26-5	75	131
4-Bromofluorobenzene	460-00-4	73	137

CERTIFICATE OF ANALYSIS

Work Order : **ES2301526**
Client : **LOW ECOLOGICAL SERVICES**
Contact : MR BILL LOW
Address : PO BOX 3130
ALICE SPRINGS NT, AUSTRALIA 0871
Telephone : +61 08 89 555 222
Project : ANNUAL MONITORING
Order number : ----
C-O-C number : ----
Sampler : Bill Low / Elli Fagan / Danesh Anita
Site : ----
Quote number : EN/333
No. of samples received : 9
No. of samples analysed : 9

Page : 1 of 7
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 18-Jan-2023 08:00
Date Analysis Commenced : 23-Jan-2023
Issue Date : 27-Jan-2023 17:11



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.

Signatories	Position	Accreditation Category
Edwandy Fadjjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	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 Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	1100m @ 100-200	1100m @ 300-400	1100m @ 500-600	1600m @ 100-200	1600m @ 300-400
Sampling date / time					13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00
Compound	CAS Number	LOR	Unit		ES2301526-001	ES2301526-002	ES2301526-003	ES2301526-004	ES2301526-005
				Result	Result	Result	Result	Result	Result
EA055: Moisture Content									
Moisture Content	----	1.0	%		7.7	3.5	7.5	7.3	7.9
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		31	10	37	12	28
Copper	7440-50-8	5	mg/kg		19	8	22	8	13
Lead	7439-92-1	5	mg/kg		11	<5	9	12	8
Nickel	7440-02-0	2	mg/kg		17	5	20	6	15
Zinc	7440-66-6	5	mg/kg		53	19	47	69	33
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		540	490	<100	990	<100
C29 - C36 Fraction	----	100	mg/kg		760	560	<100	1220	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		1300	1050	<50	2210	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		1120	900	130	1900	120
>C34 - C40 Fraction	----	100	mg/kg		350	330	<100	670	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		1470	1230	130	2570	120
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	1100m @ 100-200	1100m @ 300-400	1100m @ 500-600	1600m @ 100-200	1600m @ 300-400
Sampling date / time					13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00
Compound	CAS Number	LOR	Unit		ES2301526-001	ES2301526-002	ES2301526-003	ES2301526-004	ES2301526-005
					Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		88.0	75.6	99.9	66.0	62.7
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		102	113	105	112	105
Toluene-D8	2037-26-5	0.2	%		106	121	110	118	110
4-Bromofluorobenzene	460-00-4	0.2	%		114	126	114	113	112



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	1600m @ 500-600	2000m @ 100-200	2000m @ 300-400	2000m @ 500-600	----
Sampling date / time					13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	----
Compound	CAS Number	LOR	Unit		ES2301526-006	ES2301526-007	ES2301526-008	ES2301526-009	-----
				Result	Result	Result	Result	Result	----
EA055: Moisture Content									
Moisture Content	----	1.0	%		6.0	6.4	5.0	6.2	----
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	----
Chromium	7440-47-3	2	mg/kg		32	14	33	39	----
Copper	7440-50-8	5	mg/kg		16	8	17	17	----
Lead	7439-92-1	5	mg/kg		8	7	8	8	----
Nickel	7440-02-0	2	mg/kg		17	8	17	21	----
Zinc	7440-66-6	5	mg/kg		37	54	41	44	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
C15 - C28 Fraction	----	100	mg/kg		<100	870	140	<100	----
C29 - C36 Fraction	----	100	mg/kg		100	960	160	<100	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		100	1830	300	<50	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	----
>C16 - C34 Fraction	----	100	mg/kg		130	1540	250	<100	----
>C34 - C40 Fraction	----	100	mg/kg		<100	520	110	<100	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		130	2060	360	<50	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	1600m @ 500-600	2000m @ 100-200	2000m @ 300-400	2000m @ 500-600	----
Sampling date / time					13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	----
Compound	CAS Number	LOR	Unit		ES2301526-006	ES2301526-007	ES2301526-008	ES2301526-009	-----
				Result	Result	Result	Result	Result	----
EP080: BTEXN - Continued									
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	----
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	----
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		61.5	66.1	80.3	69.4	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		113	110	99.2	100	----
Toluene-D8	2037-26-5	0.2	%		120	118	101	105	----
4-Bromofluorobenzene	460-00-4	0.2	%		121	116	105	108	----



Surrogate Control Limits

Sub-Matrix: **SOIL**

		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

CERTIFICATE OF ANALYSIS

Work Order : **ES2301527**
Client : **LOW ECOLOGICAL SERVICES**
Contact : MR BILL LOW
Address : PO BOX 3130
ALICE SPRINGS NT, AUSTRALIA 0871
Telephone : +61 08 89 555 222
Project : ANNUAL MONITORING
Order number : ----
C-O-C number : ----
Sampler : Bill Low / Elli Fagan / Danesh Anita
Site : ----
Quote number : EN/333
No. of samples received : 10
No. of samples analysed : 10

Page : 1 of 9
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Date Samples Received : 18-Jan-2023 08:00
Date Analysis Commenced : 20-Jan-2023
Issue Date : 27-Jan-2023 17:04



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

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- General Comments
- Analytical Results
- Surrogate Control Limits

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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
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW



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

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

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

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

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP071: Results of sample S01_TC_100-200 have been 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: SOIL
 (Matrix: SOIL)

Sample ID

				S01_TC_100-200 Received as S01_TC_100-150	S01_TC_200-300	S02_TC_100-200	S02_TC_200-300	S03_TC_100-200
Sampling date / time				13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00
Compound	CAS Number	LOR	Unit	ES2301527-001	ES2301527-002	ES2301527-003	ES2301527-004	ES2301527-005
				Result	Result	Result	Result	Result
EA055: Moisture Content								
Moisture Content	----	1.0	%	5.4	10.5	3.9	3.9	7.6
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg	16	39	16	21	11
Copper	7440-50-8	5	mg/kg	10	20	7	8	<5
Lead	7439-92-1	5	mg/kg	13	10	<5	<5	<5
Nickel	7440-02-0	2	mg/kg	8	22	8	10	5
Zinc	7440-66-6	5	mg/kg	65	49	21	25	14
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	280	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	340	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	620	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	520	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	230	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	750	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S01_TC_100-200 Received as S01_TC_100-150	S01_TC_200-300	S02_TC_100-200	S02_TC_200-300	S03_TC_100-200
Sampling date / time				13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00
Compound	CAS Number	LOR	Unit	ES2301527-001	ES2301527-002	ES2301527-003	ES2301527-004	ES2301527-005
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids								
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	<0.0002	----	----	----	<0.0002
Perfluoropentane sulfonic acid (PFPeS)	2706-91-4	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	<0.0002	----	----	----	<0.0002
Perfluoroheptane sulfonic acid (PFHpS)	375-92-8	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	0.0004	----	----	----	<0.0002
Perfluorodecane sulfonic acid (PFDS)	335-77-3	0.0002	mg/kg	----	----	----	----	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids								
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	<0.001	----	----	----	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	<0.0002	----	----	----	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	<0.0002	----	----	----	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	<0.0002	----	----	----	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	<0.0002	----	----	----	<0.0002
Perfluorononanoic acid (PFNA)	375-95-1	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorodecanoic acid (PFDA)	335-76-2	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluoroundecanoic acid (PFUnDA)	2058-94-8	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorododecanoic acid (PFDoDA)	307-55-1	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	0.0002	mg/kg	----	----	----	----	<0.0002
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	0.0005	mg/kg	----	----	----	----	<0.0005



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S01_TC_100-200 Received as S01_TC_100-150	S01_TC_200-300	S02_TC_100-200	S02_TC_200-300	S03_TC_100-200
Sampling date / time				13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00
Compound	CAS Number	LOR	Unit	ES2301527-001	ES2301527-002	ES2301527-003	ES2301527-004	ES2301527-005
				Result	Result	Result	Result	Result
EP231C: Perfluoroalkyl Sulfonamides								
Perfluorooctane sulfonamide (FOSA)	754-91-6	0.0002	mg/kg	----	----	----	----	<0.0002
N-Methyl perfluorooctane sulfonamide (MeFOSA)	31506-32-8	0.0005	mg/kg	----	----	----	----	<0.0005
N-Ethyl perfluorooctane sulfonamide (EtFOSA)	4151-50-2	0.0005	mg/kg	----	----	----	----	<0.0005
N-Methyl perfluorooctane sulfonamidoethanol (MeFOSE)	24448-09-7	0.0005	mg/kg	----	----	----	----	<0.0005
N-Ethyl perfluorooctane sulfonamidoethanol (EtFOSE)	1691-99-2	0.0005	mg/kg	----	----	----	----	<0.0005
N-Methyl perfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	0.0002	mg/kg	----	----	----	----	<0.0002
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	0.0002	mg/kg	----	----	----	----	<0.0002
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
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	<0.0005	----	----	----	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	<0.0005	----	----	----	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	<0.0005	----	----	----	<0.0005
EP231P: PFAS Sums								
Sum of PFAS	----	0.0002	mg/kg	----	----	----	----	<0.0002
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	0.0004	----	----	----	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	0.0004	----	----	----	<0.0002
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	71.3	71.1	76.6	93.1	84.9
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	99.6	97.5	99.0	99.9	101



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S01_TC_100-200 Received as S01_TC_100-150	S01_TC_200-300	S02_TC_100-200	S02_TC_200-300	S03_TC_100-200
Sampling date / time				13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00
Compound	CAS Number	LOR	Unit	ES2301527-001	ES2301527-002	ES2301527-003	ES2301527-004	ES2301527-005
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
Toluene-D8	2037-26-5	0.2	%	109	98.0	96.2	104	101
4-Bromofluorobenzene	460-00-4	0.2	%	110	100	102	104	103
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	108	----	----	----	95.0
13C8-PFOA	----	0.0002	%	104	----	----	----	100



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S03_TC_200-300	S04_TC_100-200	S04_TC_200-300	S05_TC_100-200	S05_TC_200-300
Sampling date / time					13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00
Compound	CAS Number	LOR	Unit		ES2301527-006	ES2301527-007	ES2301527-008	ES2301527-009	ES2301527-010
				Result	Result	Result	Result	Result	Result
EA055: Moisture Content									
Moisture Content	----	1.0	%		2.4	3.3	4.0	4.3	12.3
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		7	7	17	25	15
Copper	7440-50-8	5	mg/kg		<5	<5	10	10	8
Lead	7439-92-1	5	mg/kg		<5	<5	5	7	<5
Nickel	7440-02-0	2	mg/kg		4	4	10	10	8
Zinc	7440-66-6	5	mg/kg		10	15	26	32	19
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S03_TC_200-300	S04_TC_100-200	S04_TC_200-300	S05_TC_100-200	S05_TC_200-300
Sampling date / time					13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00
Compound	CAS Number	LOR	Unit		ES2301527-006	ES2301527-007	ES2301527-008	ES2301527-009	ES2301527-010
				Result	Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		97.5	85.2	71.7	85.8	73.1
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		99.2	101	102	99.5	101
Toluene-D8	2037-26-5	0.2	%		102	105	106	96.7	104
4-Bromofluorobenzene	460-00-4	0.2	%		105	107	105	102	107



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120

CERTIFICATE OF ANALYSIS

Work Order : **ES2301528**
Client : **LOW ECOLOGICAL SERVICES**
Contact : MR BILL LOW
Address : PO BOX 3130
 ALICE SPRINGS NT, AUSTRALIA 0871
Telephone : +61 08 89 555 222
Project : ANNUAL MONITORING
Order number : ----
C-O-C number : ----
Sampler : Bill Low / Elli Fagan / Danesh Anita
Site : ----
Quote number : EN/333
No. of samples received : 13
No. of samples analysed : 10

Page : 1 of 9
Laboratory : Environmental Division Sydney
Contact : Customer Services ES
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164

Telephone : +61-2-8784 8555
Date Samples Received : 18-Jan-2023 08:00
Date Analysis Commenced : 20-Jan-2023
Issue Date : 27-Jan-2023 16:52



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>
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	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 Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- 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: SOIL (Matrix: SOIL)				Sample ID	S06_TC_100_200	S06_TC_200_300	S07_TC_100_200	S07_TC_200_300	S08_TC_100_200
Sampling date / time					13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00
Compound	CAS Number	LOR	Unit		ES2301528-001	ES2301528-002	ES2301528-003	ES2301528-004	ES2301528-005
				Result	Result	Result	Result	Result	Result
EA055: Moisture Content									
Moisture Content	----	1.0	%		<1.0	3.7	10.2	10.0	10.5
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	<5	<5
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	<1	<1
Chromium	7440-47-3	2	mg/kg		12	10	41	43	33
Copper	7440-50-8	5	mg/kg		6	<5	21	21	17
Lead	7439-92-1	5	mg/kg		<5	<5	19	10	9
Nickel	7440-02-0	2	mg/kg		7	6	23	23	17
Zinc	7440-66-6	5	mg/kg		17	16	61	48	38
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1	<0.1	<0.1	<0.1
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S06_TC_100_200	S06_TC_200_300	S07_TC_100_200	S07_TC_200_300	S08_TC_100_200
Sampling date / time					13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00
Compound	CAS Number	LOR	Unit		ES2301528-001	ES2301528-002	ES2301528-003	ES2301528-004	ES2301528-005
				Result	Result	Result	Result	Result	Result
EP080: BTEXN - Continued									
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg		----	----	----	----	<0.0002
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg		----	----	----	----	<0.0002
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg		----	----	----	----	<0.0002
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg		----	----	----	----	<0.001
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg		----	----	----	----	<0.0002
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg		----	----	----	----	<0.0002
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg		----	----	----	----	<0.0002
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg		----	----	----	----	<0.0002
EP231D: (n:2) Fluorotelomer Sulfonic Acids									
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	757124-72-4	0.0005	mg/kg		----	----	----	----	<0.0005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg		----	----	----	----	<0.0005
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg		----	----	----	----	<0.0005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg		----	----	----	----	<0.0005
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg		----	----	----	----	<0.0002
Sum of PFAS (WA DER List)	----	0.0002	mg/kg		----	----	----	----	<0.0002
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%		72.5	83.9	77.5	81.7	68.0
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		96.0	98.8	98.7	100	98.2
Toluene-D8	2037-26-5	0.2	%		97.2	102	102	105	99.9



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sample ID

				S06_TC_100_200	S06_TC_200_300	S07_TC_100_200	S07_TC_200_300	S08_TC_100_200
Sampling date / time				13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00
Compound	CAS Number	LOR	Unit	ES2301528-001	ES2301528-002	ES2301528-003	ES2301528-004	ES2301528-005
				Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued								
4-Bromofluorobenzene	460-00-4	0.2	%	110	109	108	111	109
EP231S: PFAS Surrogate								
13C4-PFOS	----	0.0002	%	----	----	----	----	102
13C8-PFOA	----	0.0002	%	----	----	----	----	102



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S08_TC_200_300	S09_TC_100_200	S09_TC_200_300	SC1	SC2
Sampling date / time					13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00
Compound	CAS Number	LOR	Unit		ES2301528-006	ES2301528-007	ES2301528-008	ES2301528-009	ES2301528-010
				Result	Result	Result	Result	Result	Result
EA055: Moisture Content									
Moisture Content	----	1.0	%		7.4	10.4	10.3	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	0.1	%		----	----	----	10.1	15.4
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	<5	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg		18	31	34	----	----
Copper	7440-50-8	5	mg/kg		9	14	17	----	----
Lead	7439-92-1	5	mg/kg		6	8	8	----	----
Nickel	7440-02-0	2	mg/kg		10	16	18	----	----
Zinc	7440-66-6	5	mg/kg		26	36	38	----	----
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg		<0.1	<0.1	<0.1	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg		<10	<10	<10	----	----
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	----	----
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg		<50	<50	<50	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	----	----

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S08_TC_200_300	S09_TC_100_200	S09_TC_200_300	SC1	SC2
Sampling date / time				13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	
Compound	CAS Number	LOR	Unit	ES2301528-006	ES2301528-007	ES2301528-008	ES2301528-009	ES2301528-010	
				Result	Result	Result	Result	Result	
EP080: BTEXN - Continued									
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	----	----	
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	----	----	
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	----	----	
EP231A: Perfluoroalkyl Sulfonic Acids									
Perfluorobutane sulfonic acid (PFBS)	375-73-5	0.0002	mg/kg	----	----	----	<0.0002	<0.0002	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	0.0002	mg/kg	----	----	----	<0.0002	<0.0002	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.0002	mg/kg	----	----	----	<0.0002	<0.0002	
EP231B: Perfluoroalkyl Carboxylic Acids									
Perfluorobutanoic acid (PFBA)	375-22-4	0.001	mg/kg	----	----	----	<0.001	<0.001	
Perfluoropentanoic acid (PFPeA)	2706-90-3	0.0002	mg/kg	----	----	----	<0.0002	<0.0002	
Perfluorohexanoic acid (PFHxA)	307-24-4	0.0002	mg/kg	----	----	----	<0.0002	<0.0002	
Perfluoroheptanoic acid (PFHpA)	375-85-9	0.0002	mg/kg	----	----	----	<0.0002	<0.0002	
Perfluorooctanoic acid (PFOA)	335-67-1	0.0002	mg/kg	----	----	----	<0.0002	<0.0002	
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	
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	0.0005	mg/kg	----	----	----	<0.0005	<0.0005	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	0.0005	mg/kg	----	----	----	<0.0005	<0.0005	
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	120226-60-0	0.0005	mg/kg	----	----	----	<0.0005	<0.0005	
EP231P: PFAS Sums									
Sum of PFHxS and PFOS	355-46-4/1763-23-1	0.0002	mg/kg	----	----	----	<0.0002	<0.0002	
Sum of PFAS (WA DER List)	----	0.0002	mg/kg	----	----	----	<0.0002	<0.0002	
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%	72.2	81.6	76.3	----	----	
EP080S: TPH(V)/BTEX Surrogates									



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	S08_TC_200_300	S09_TC_100_200	S09_TC_200_300	SC1	SC2
Sampling date / time					13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00	13-Jan-2023 00:00
Compound	CAS Number	LOR	Unit		ES2301528-006	ES2301528-007	ES2301528-008	ES2301528-009	ES2301528-010
				Result	Result	Result	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates - Continued									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		103	97.1	95.1	----	----
Toluene-D8	2037-26-5	0.2	%		104	96.2	92.7	----	----
4-Bromofluorobenzene	460-00-4	0.2	%		112	104	102	----	----
EP231S: PFAS Surrogate									
13C4-PFOS	----	0.0002	%		----	----	----	90.5	84.0
13C8-PFOA	----	0.0002	%		----	----	----	98.0	100



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130
EP231S: PFAS Surrogate			
13C4-PFOS	----	60	120
13C8-PFOA	----	60	120