



Archer Waste Transfer Station Water Quality Monitoring Report 2020-2021 Wet Season City of Palmerston



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1	Gisela Lamche	Gisela Lamche	Katie O'Neill	7 June 2021

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EcOz Pty Ltd.
ABN: 81 143 989 039
Level 1, 70 Cavenagh Street
DARWIN NT 0800
GPO Box 381, Darwin NT 0800

Telephone: +61 8 8981 1100
Email: ecoz@ecoz.com.au
Internet: www.ecoz.com.au



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1 INTRODUCTION

EcOz Environmental Consultants (EcOz) were engaged by City of Palmerston (CoP) to undertake stormwater sampling at the Archer Waste Transfer Station over the 2020-2021 wet season. The Archer Waste Transfer Station (the facility) is located on Lot 11497 Town of Palmerston, Elrundie Avenue, Archer. CoP have been granted an Environmental Protection Licence (EPL 233-02) for the transfer station, which licences the handling and storage of listed waste at the facility. Waste is stored at the facility, and then transported and disposed of at the Shoal Bay Waste Management Facility, as required. The following waste streams are stored at the facility:

- Paper and cardboard
- Plastics
- Glass and aluminium
- General household waste
- Oil and grease
- Steel and metal
- Batteries
- Paint
- White goods and gas bottles.

Green waste is accepted and mulched onsite, for sale to the general public.

1.1 Purpose

EPL 233-02 lists a series of conditions (i.e. Conditions 8, 32 - 38) that detail the requirements for a Water Quality Monitoring and Management Plan (WQMMP). The WQMMP was developed in 2018, and outlines the measures in place to ensure any water discharges from the facility do not impact on the surrounding receiving environment. A Sampling Analysis and Quality Plan (SAQP) was also developed to supplement the WQMMP, and documents the sampling requirements to fulfil all conditions of EPL 233. EPL 233-01 expired in December 2020 and is followed by EPL 233-02 commencing in December 2020.

This wet season sampling report provides the outcomes of the 2020-2021 water quality monitoring program. The wet season sampling design was developed prior to commencement of the wet season based on the SAQP and EPL 233-01. Adaptations were made to fulfil requirements of EPL 233-02 halfway through the wet season.

2 WATER SAMPLING

2.1 Sampling locations

The original SAQP identified six water sampling sites to be sampled during three sampling rounds each wet season, that are at representative locations throughout the waste transfer facility. A further sample site was added downstream from the confluence of the facilities drain and the ephemeral stream to identify the water quality after exposure to runoff (see Figure 2-1):

- Four sites from unlined stormwater drains within the site boundary: SW02, SW03, SW04, SW06

- Three sites from an ephemeral stream on the western boundary: SW01, SW05, SW07.

A duplicate sample was collected during each sampling round for quality control/quality assurance (QA/QC) purposes.

On the commencement of EPL233-02 a new monitoring program was advised with SW04 moved toward the south west (Figure 2-2). Data relating to the old SW04 site are labelled as such.

Figure 2-1. Sample sites as per the original Sampling Analysis and Quality Plan SAQP



Figure 2-2. Sample sites as per EPL 233-02



2.2 Sampling methods

Sampling was undertaken in accordance with the WQMMP, SAQP and EcOz's Surface Water Sampling Standard Operating Procedure (SOP), which complies with relevant standards and guidelines, including:

- Australian Standard on Water Quality Sampling - Part 1: Guidance on the design of sampling programs, sampling techniques and the preservation and handling of samples (AS/NZS 5667.1:1998);
- Australian Standard on Water Quality Sampling – Part 6: Guidance on sampling of rivers and streams (AS/NZS 5667.6:1998);
- Australian Standard on Water Quality Sampling – Part 10: Guidance on sampling of waste waters (AN/NZS 5667.10:1998).

Field parameters were measured *in-situ* with water quality meters that had been calibrated immediately prior to the first sample being taken. Laboratory samples were collected upstream of the location where *in-situ* field parameters were measured, to prevent contamination of samples. Samples were collected with laboratory supplied containers and decanted from unpreserved bottles into preserved bottles as required. Samples were immediately placed in eskies with ice bricks and submitted after sampling had been completed. The samples were analysed by a NATA accredited lab (ALS or Eurofins).

Field data sheets were filled out for each site including information such as who collected the sample, date and time, flow rate, field parameters measurements, and any items of interest such as presence of algae, animals or potential contaminants that may affect the water quality.

2.3 Field and laboratory parameters

In-situ field parameters included: temperature, pH, dissolved oxygen (DO), electrical conductivity (EC), turbidity, salinity and total dissolved solids (TDS).

Laboratory parameters included: Dissolved heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg), ammonia (NH₃), total phosphorous (TP), biochemical oxygen demand (BOD), total phenols, total recoverable hydrocarbons/total petroleum hydrocarbons (TRH/TPH), organochlorine pesticides (OC), organophosphorus pesticides (OP) (first sampling round only), total suspended solids (TSS), and benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXN).

2.4 Assessment criteria

The *in-situ* field parameters and nutrient concentrations (i.e. pH, DO, EC, turbidity, suspended solids and total phosphorus) were assessed against the Darwin Harbour Water Quality Objectives (WQO) for 'freshwater rivers and streams' and 'upper estuary', developed by the Northern Territory Government (2010).

Dissolved metals, phenols, pesticides and BTEXN were assessed against the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, marine, 95% species protection (ANZG 2018).

2.5 Rainfall and site conditions

The average annual rainfall for Darwin is 1676.4 mm (BoM, site no. 014015), however the total rainfall for the 2020-2021 season was 1857.8 mm. The 2020-2021 wet season (i.e. October to April) experienced above average rainfall during several months, including in January which was more than 200 mm above the monthly average (BOM 2021a, b, c, e). The large amount of rainfall produced numerous storms of longer duration and often greater intensity.

EcOz employees used the BoM radar and other forecasts to assess whether to attempt a sample round. Due to experience from the previous years, it was known that in order to collect samples at all sampling sites, a twenty-minute heavy rainfall event was required. The month of March experienced rainfall more than 100 mm below average (BOM 2021d). The lack of rainfall runoff led to an inability to sample the majority of sites during the end of wet sampling event, while the first two sampling rounds had been completed (see section 2.6 and results in section 3 below).

The 2020-2021 wet season was above average, with the 2018-2019 and 2019-2020 wet seasons having been two of the poorest rainfall seasons on record (BoM, Seasonal Climate Summary for Northern Territory).

NT EPA had requested sample site SW04 be moved to the south west (shown in Figure 2-2), however this location was dry on each of EcOz’s site visits (see section 2.6 below).

2.6 Sampling undertaken during 2020-2021

The first sampling event was undertaken on 8 October 2020 and samples were collected from 5 sites. SW04 (old) and SW06 were not flowing at the time of visit and so no sample was taken.

The second sampling round was undertaken on 19 January 2021 during a period of monsoonal conditions (BoM 2021e) and all sites were sampled with the exception of SW06. EcOz attempted to collect a sample from the new SW04 location but was not able to do so due to lack of flow (Figure 2-3).

Figure 2-3. New site SW04 as per EPL 233-02 on 19 January 2021



Top left: New SW04 site, view towards waste batteries area.

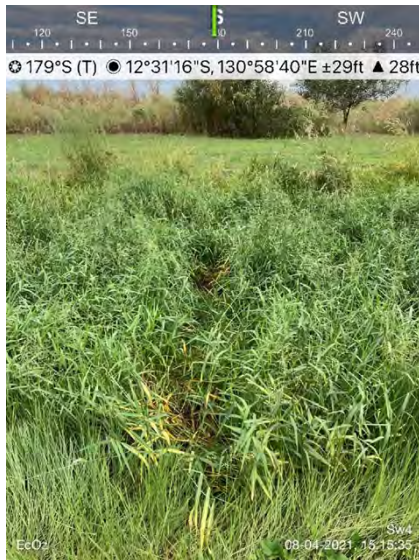
Top right: At new site SW04: dry ground on 19 January 2021, during monsoon period.

Bottom left: View downstream (to the east) from new site SW04.

The third sampling round was undertaken on 8 April 2021 and only three sites (SW01, SW05 and SW07) were sampled. No other sites had flow, although pooling water was apparent at some of the sites (Figure 2-4). Additional sampling would have been undertaken in the following weeks, but the extended rainfall required did not occur at Archer WTS before the start of the dry season 2021. Please note that the new site SW04 was drier than the old site on 8 April 2021 with regards to soil moisture and the state of the vegetation at the sites.

Figure 2-4. Sample sites on 8 April 2021





old SW04



new SW04



old SW04



new SW04

Three sampling events were proposed in EPL 233-01 and the SAQP representing first-flush following the first significant rainfall event of the wet season, a mid-wet season sampling event, and a late wet season sampling event. The new EPL-02 requires monthly sampling between December and March. As outlined above, the 2020/2021 wet season sampling of Archer waste transfer station (WTS) was designed based on EPL-01 and the SAQP. Sampling in March was not possible due to lack of substantial twenty-minute heavy rainfall at the facility as described in section 2.5.

In addition, sampling is limited by short holding times for certain analytes and the need to freight samples to laboratories outside of the Northern Territory. Therefore, sampling is limited to four days of the week (i.e. Monday to Thursday), where it is possible to collect and freight a sample, whilst ensuring the quality of laboratory analysis.

The limitation of water flow at the sample sites being linked to large rainfall events, combined with sample holding times and laboratory opening times reduces the window for sampling and resulted in sampling being undertaken when not all sites were flowing in April 2021.

3 RESULTS AND DISCUSSION

Key field and laboratory results for the 2020-2021 wet season are presented in Table 3-1 and Table 3-2. A complete summary of water quality data including from previous years is provided in Appendix A. Trend analysis graphs for key parameters, displaying trends in data from 2018 to 2021 are provided in Appendix B. These trend analysis graphs are not discussed further in this report, however are provided for reference of guideline value exceedance over time. It is recommended that with further data collection, seasonal and long-term trend analysis be undertaken.

All laboratory documentation is provided in Appendix C. This includes the Chain of Custody (COC), Sample Receipt Notification (SRN), Certificate of Analysis (COA) and QA/QC documents.

Table 3-1 provides the 2020-2021 water quality results for the physical parameters and dissolved metals. Table 3-2 presents the results for those nutrients, phenols, pesticides and BTEXN, which have a guideline value for comparison. Exceedances of these guidelines are highlighted.

Water quality during the 2020-2021 period exceeded guideline values for a number of parameters and analytes against the Darwin Harbour WQOs (2010) and the ANZG (2018) guideline values.

Key results are summarised below:

- **pH** results were within the relevant Darwin harbour WQO guideline values 6-7.5 (freshwater rivers and streams) and 6-8.5 (upper estuary) at all sites and all three dates.
- **EC** results were consistently lowest at SW01 (values between 81.9-134.9 $\mu\text{S}/\text{cm}$) during the 2020-2021 sampling events. SW02 and SW07 recorded the highest values (1225 $\mu\text{S}/\text{cm}$ at both sites during the October sampling round) for the entire 2020-2021 wet season, with most sites recording exceedances with values of 200.5-1087 $\mu\text{S}/\text{m}$.
- **Dissolved Oxygen** was below the minimum WQO at all sites for all sampling events with the exception of SW01 which recorded a value of 89.8 % on the April sampling date.
- **Turbidity** readings were highest at the SW02, SW03 and old SW04 sites (i.e. 63-341 NTU) and generally lower at sites SW01, SW05 and SW07 (i.e. 11.85-51.1 NTU). Two thirds of the turbidity results exceeded the WQO.
- **Total Suspended Solids** recorded exceedances of the WQO at all sites for different or all sampling events with no pattern discernable.
- **Copper** concentrations exceeded the ANZG (2018) guidelines at SW02, SW03, SW05 and SW07 during the October 2020 event and SW03, old SW04, SW05 and SW07 during the January sampling event. Copper concentrations were below the guideline at all sites in the April sampling event.
- **Zinc** concentrations exceeded the ANZG (2018) guidelines at SW02 and SW03 for the October sampling event. All other sites recorded values lower than the guidelines.
- **Ammonia** concentrations exceeded the Darwin Harbour WQO (2010) guidelines at all sites for the 2020-2021 sampling period with values between 0.03-0.89 mg/L. However, these concentrations were below the higher guideline values of the ANZG (2018).
- **Phosphorus** exceeded the WQO (upper estuary) value of 0.03 mg/L at all sites in October and January bar SW05 in January. In April all sites recorded values below the upper estuary guideline but exceeding the freshwater rivers and streams guideline of 0.01mg/L
- Concentrations for total phenols, endrin, benzene and naphthalene were all below their respective limit of reporting (LOR) and are thus all below the ANZG (2018) guideline values.

Table 3-1. Water sampling results 2020-2021 - physical parameters and dissolved metals

Parameter		pH	EC	DO	Turbidity	TSS	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
Unit		pH units	µS/cm	% sat	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
ANZG 2018		-	-	-	-	-	0.0055	0.0274	0.0013	0.0044	0.0004	0.07	0.015
WQO Darwin Harbour (upper estuary)		6-8.5	-	80-100	-	10	-	-	-	-	-	-	-
WQO Darwin Harbour (freshwater rivers and streams)		6-7.5	200	50-100	20	5	-	-	-	-	-	-	-
Sampling site	Date												
SW01	08 Oct 2021	7.01	134.9	73.5	12.5	8	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005
SW02		7.18	1225	73.5	91.6	21	<0.0001	0.002	0.02	<0.001	<0.0001	0.003	0.023
SW03		7.20	1087	78	109.9	76	<0.0001	0.002	0.017	<0.001	<0.0001	0.002	0.02
SW05		6.79	229.8	54	11.85	6	<0.0001	<0.001	0.005	<0.001	<0.0001	<0.001	0.005
SW07		6.76	233.6	57.9	15.8	40	<0.0001	<0.001	0.002	<0.001	<0.0001	<0.001	<0.005
Duplicate (SW05)		6.79	229.8	54	11.85	6	<0.0001	<0.001	0.005	<0.001	<0.0001	<0.001	0.005
SW01	19 Jan 2021	6.62	81.9	42	55.7	18	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005
SW02		6.39	190.5	23.3	174	225	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005
SW03		6.94	473	31.3	63	22	<0.0001	0.002	0.003	0.001	<0.0001	0.002	0.007
SW04 (old site, Figure 2-1)		6.97	494	23.5	341	385	<0.0001	0.002	0.003	0.001	<0.0001	0.002	<0.005
SW05		6.69	135.8	49.6	23.9	9	<0.0001	<0.001	0.002	<0.001	<0.0001	<0.001	<0.005
SW07		6.94	426.6	45.7	51.1	23	<0.0001	0.001	0.003	<0.001	<0.0001	0.001	<0.005
Duplicate (SW05)		6.69	135.8	49.6	23.9	7	<0.0001	<0.001	0.002	<0.001	<0.0001	<0.001	<0.005
SW01	08 Apr 2021	6.55	86.2	89.8	48.22	14	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005
SW05		6.55	241.4	76	23.19	11	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005
SW07		6.67	200.5	78.4	17.55	11	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005

Table 3-2. Water sampling results 2020-2021 - nutrients, phenols, pesticides and BTEXN with guideline values

Parameter		Ammonia as N	Total Phosphorus as P	Phenols (Total)	Endrin	Chlorpyrifos	Benzene	Naphthalene
Unit		mg/L	mg/L	mg/L	µS/cm	µS/cm	µS/cm	µS/cm
ANZECC 2000		0.91	-	0.4	0.008	0.009	700	70
WQO Darwin Harbour (upper estuary)		0.02	0.03	-	-	-	-	-
WQO Darwin Harbour (freshwater rivers and streams)		-	0.01	-	-	-	-	-
Sampling site	Date							
SW01	08 Oct 2021	0.03	0.04	<0.05	<0.05	<0.5	<1	<5
SW02		0.87	2.44	<0.05	<0.05	<0.5	<1	<5
SW03		0.7	1.9	<0.05	<0.05	<0.5	<1	<5
SW05		0.16	0.05	<0.05	<0.05	<0.5	<1	<5
SW07		0.1	0.19	<0.05	<0.05	<0.5	<1	<5
Duplicate (SW05)		0.1	0.04	<0.05	<0.05	<0.5	<1	<5
SW01	19 Jan 2021	0.04	0.05	<0.05	<0.05	<0.5	<1	<5
SW02		0.07	0.19	<0.05	<0.05	<0.5	<1	<5
SW03		0.1	0.25	<0.05	<0.05	<0.5	<1	<5
Old SW04		0.18	0.84	<0.05	<0.05	<0.5	<1	<5
SW05		0.05	0.02	<0.05	<0.05	<0.5	<1	<5
SW07		0.29	0.31	<0.05	<0.05	<0.5	<1	<5
Duplicate (SW05)		0.04	0.18	<0.05	<0.05	<0.5	<1	<5
SW01	08 Apr 2021	0.06	0.02	<0.05	-	-	<1	<5
SW05		0.05	0.02	<0.05	-	-	<1	<5
SW07		0.09	0.02	<0.05	-	-	<1	<5

Results show that the most common exceedance values were for dissolved oxygen, electrical conductivity, turbidity, total suspended solids, dissolved copper, ammonia and total phosphorous.

Sample sites within the facility generally returned results with greater concentrations than SW01 or SW05, both of which are located upstream of the facility on an ephemeral stream to the east. This is not unexpected given the proximity of both the white goods and green waste areas to the SW02, SW03 and old SW04 sample points.

pH was within the guideline values at all sites during all sampling events.

Electrical conductivity exceeded the guideline value of 200 $\mu\text{S}/\text{cm}$ at all sites with the exceptions of SW01 for the October sampling event, at SW03, old SW04 and SW07 for the January sampling event and at SW05 and SW07 for the April sampling event. The greatest concentrations were recorded in the October sampling event, lesser concentrations in the January and the smallest in the April event with peak values of 1225 $\mu\text{S}/\text{cm}$ (SW02 and SW07), 494 $\mu\text{S}/\text{cm}$ (old SW04) and 241.4 $\mu\text{S}/\text{cm}$ (SW05) respectively.

Dissolved oxygen failed to meet the Darwin Harbour WQO 2010 - upper estuary guideline value of 80-100% at all sites for all sampling events with the exception of SW01 in April.

SW02 and SW03 exceeded the turbidity guideline value of 20 NTU in the October sampling event. All sites recorded exceedances in the January sampling round, with SW01 and SW05 recording exceedances in the April sampling event.

Total suspended solids exceeded the Darwin Harbour WQO 2010 - freshwater rivers and streams guideline value of 5 mg/L at all sites for at least one or more sampling events. The Darwin Harbour WQO 2010 - upper estuary guideline value of 10 mg/L was exceeded at SW02, SW03 and SW07 for the October sampling event, all sites except SW05 in the January sampling event and all sites for the April sampling event. TSS recorded greater values in the January sampling event compared to the October and April sampling rounds.

Dissolved copper concentrations exceeded the guideline value during both the October and January sampling events, albeit with a significant drop in concentrations. The highest concentrations (0.02 mg/L and 0.017 mg/L) were recorded at SW02 and SW03 respectively in October, while the January results greatest concentration was 0.003mg/L (SW03, old SW04, SW07) and April results were below the laboratory's LOR.

Zinc recorded exceedance values at SW02 and SW03 for the October sampling event. All other results were below the guideline value or the LOR.

Ammonia results exceeded the Darwin Harbour WQO 2010 - upper estuary guideline value of 0.02 mg/L at all sites for all sampling events. Like other analytes, the greatest concentrations recorded each event were lower than the previous sampling event with the highest recorded values in October, followed by January and April at 0.87 mg/L, 0.29 mg/L and 0.09 mg/L respectively

Total phosphorus exceeded the freshwater rivers and streams WQO guideline value of 0.01 mg/L at all sites for all sampling events. The upper estuary WQO guideline value of 0.03 mg/L was exceeded at all sites for both the October and January sampling events with the exception of SW05. The greatest concentrations were again recorded at sites within the facility, with a noticeable reduction during each sampling event. The highest concentrations were 2.44 mg/L (SW02), 0.84 mg/L (old SW04) and 0.02 mg/L (SW01, SW05 and SW07) for the October, January and April sampling events respectively.

All other analytes, such as hydrocarbons, BTEXN and pesticides returned values that were either below guideline recommendations or below the laboratories LOR, and as such have not been further discussed.

3.1 Comments on new site SW04 (EPL 233-02)

In the 2020/21 wet season, two attempts were made to sample the new site SW04 as per the new EPL 233-02. From EcOz staff familiar with Archer WTS, the drain that the old and new SW04 locations were located on, flows east into the ephemeral creek that passes the Archer WTS on its eastern boundary.

Photos were taken of the new site SW04 on 19 January 2021 during a monsoon and the site was found dry (section 2.6 , Figure 2-3). The old and new site SW04 were dry on 8 April 2021 (Figure 2-4).

It is concluded that the new location of site SW04 will flow on rare occasions only and it is thus suggested to revert to the old site SW04 as per the SWQP as water at this site was flowing and was thus sampled on 19 January 2021.

4 CONCLUSION AND RECOMMENDATIONS

Samples were collected from the majority of sites in the October and January sampling events and from three sites in the April sampling event, an improvement from the 2019-2020 wet season sampling. SW06 was not flowing on any of EcOz's site visits despite heavy rain in January. No sample was collected at SW06 in 2020/21. The new site SW04 was either dry or not flowing on all site visits.

Exceedance values in EC, dissolved copper, total phosphorous and ammonia generally decreased over the wet season sampling events.

SW01 and SW05 recorded fewer exceedances and lesser concentrations compared to the sample sites located within the facility. SW07 was added to this wet seasons sample plan to investigate the water quality flowing off site. SW07 frequently recorded high concentrations of phosphorous, likely due to flow from the green waste area.

SW01, SW05 and SW07 are located within an ephemeral stream and are the most reliable sites for wet season sampling. The intended new location for SW04 was not flowing during any of EcOz's site visits, and it is recommended to continue using the old SW04 site.

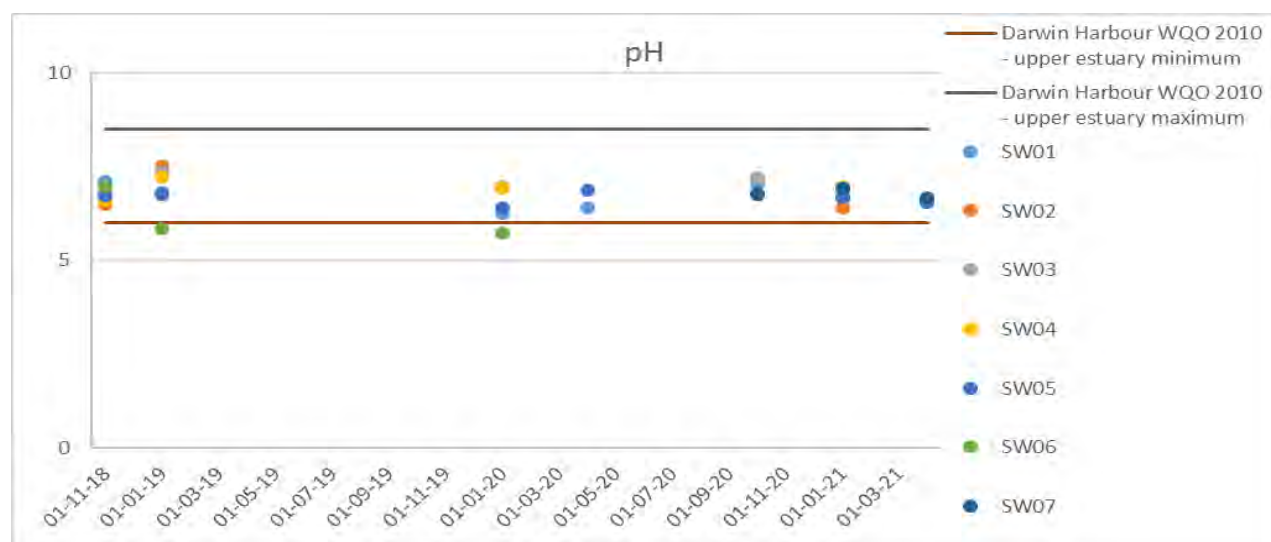
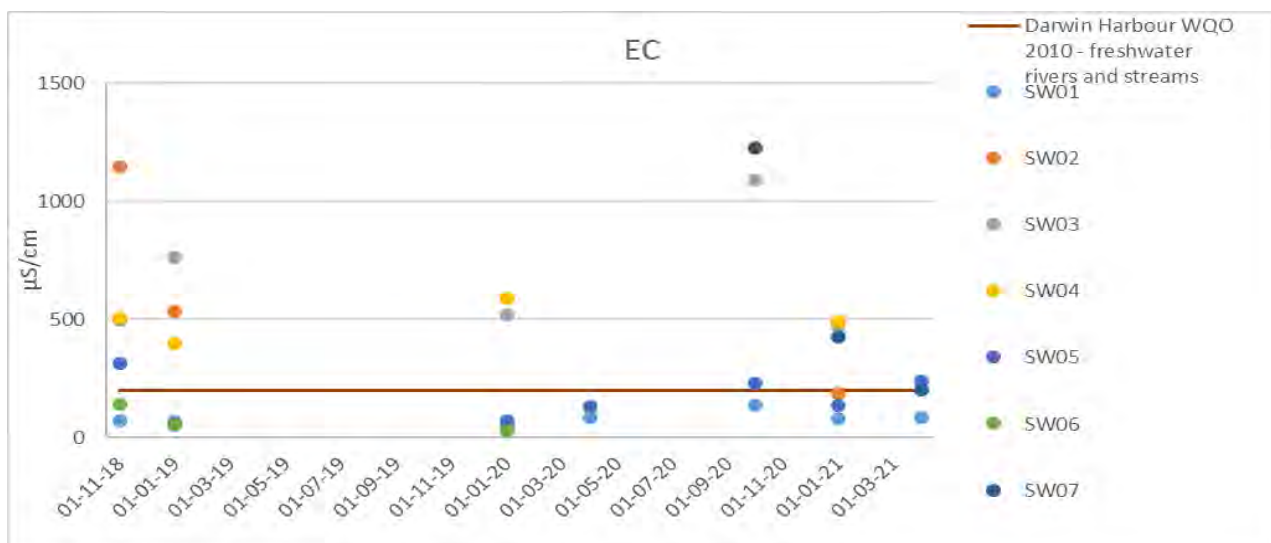
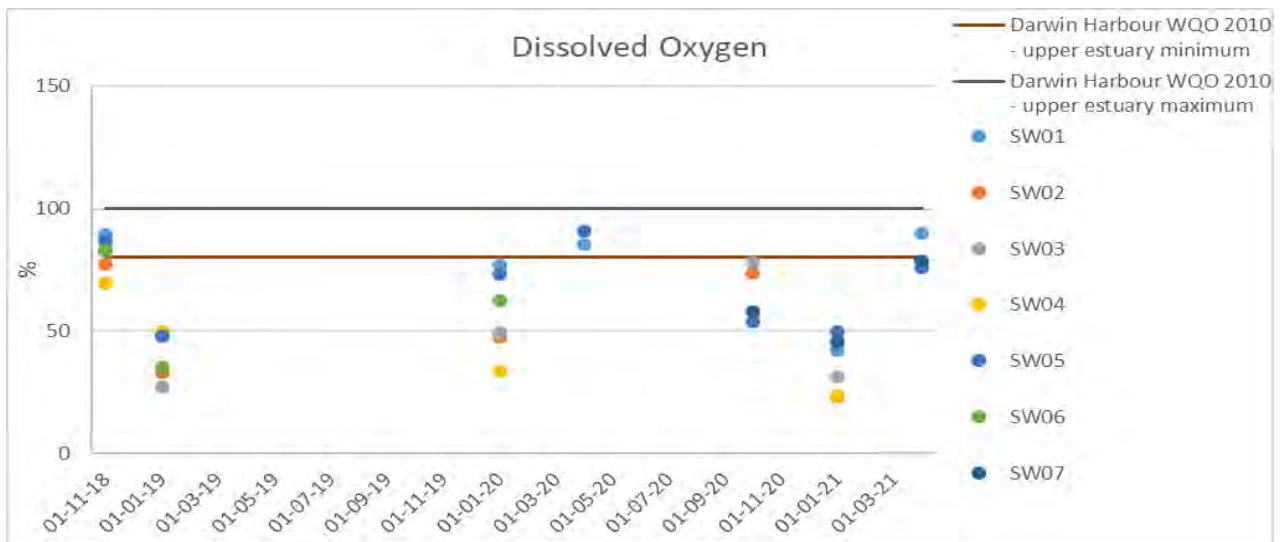
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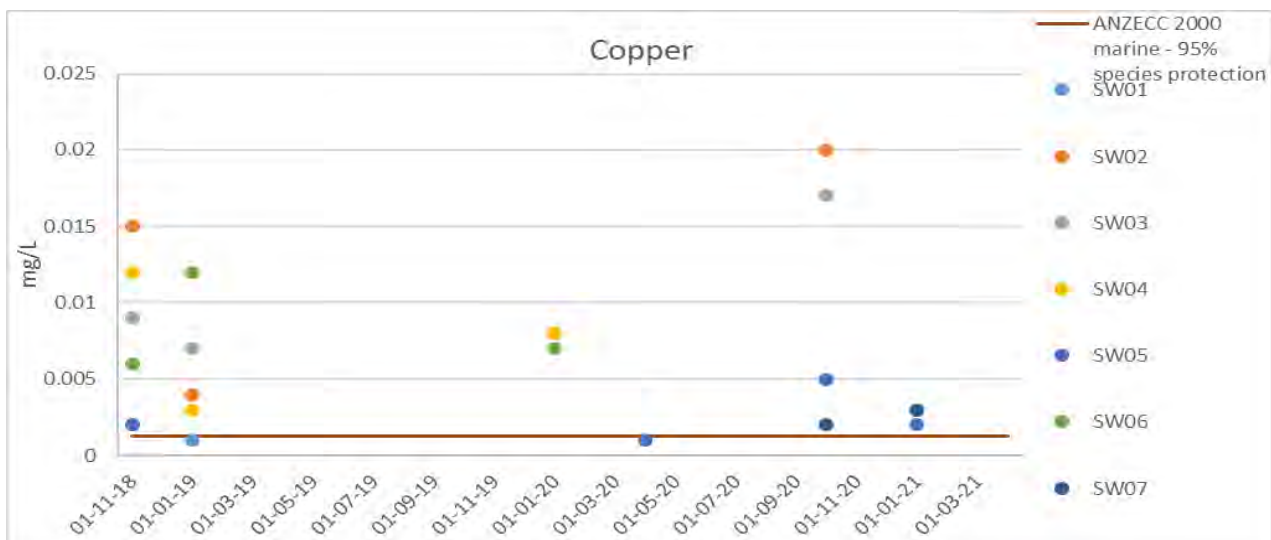
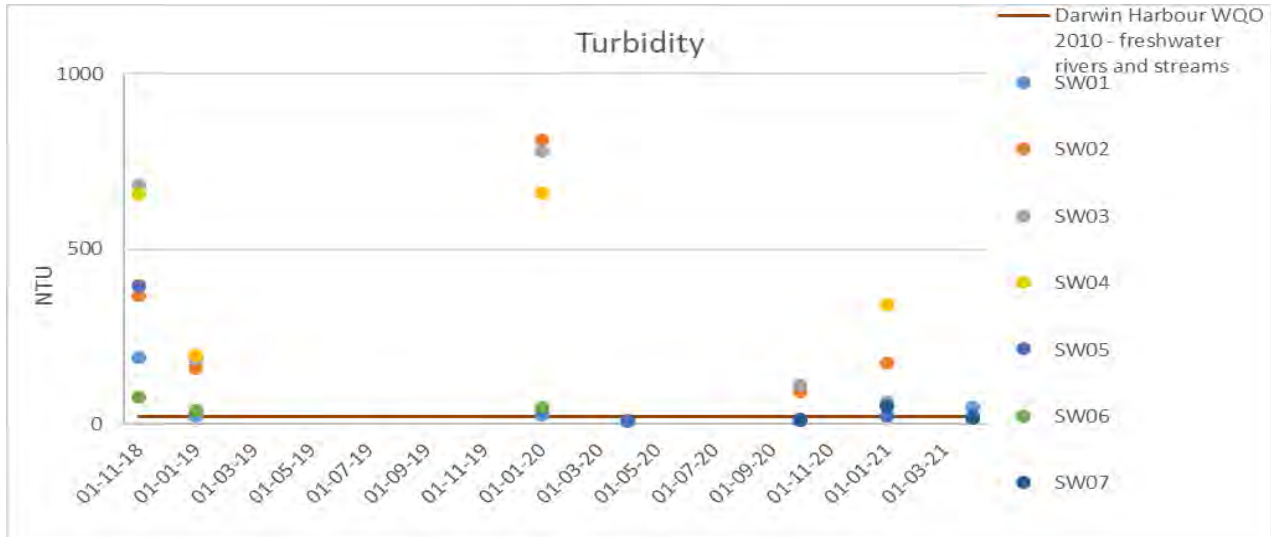
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- Northern Territory Government (2010) *Water Quality Objectives for the Darwin Harbour Region for marine and estuarine systems*.

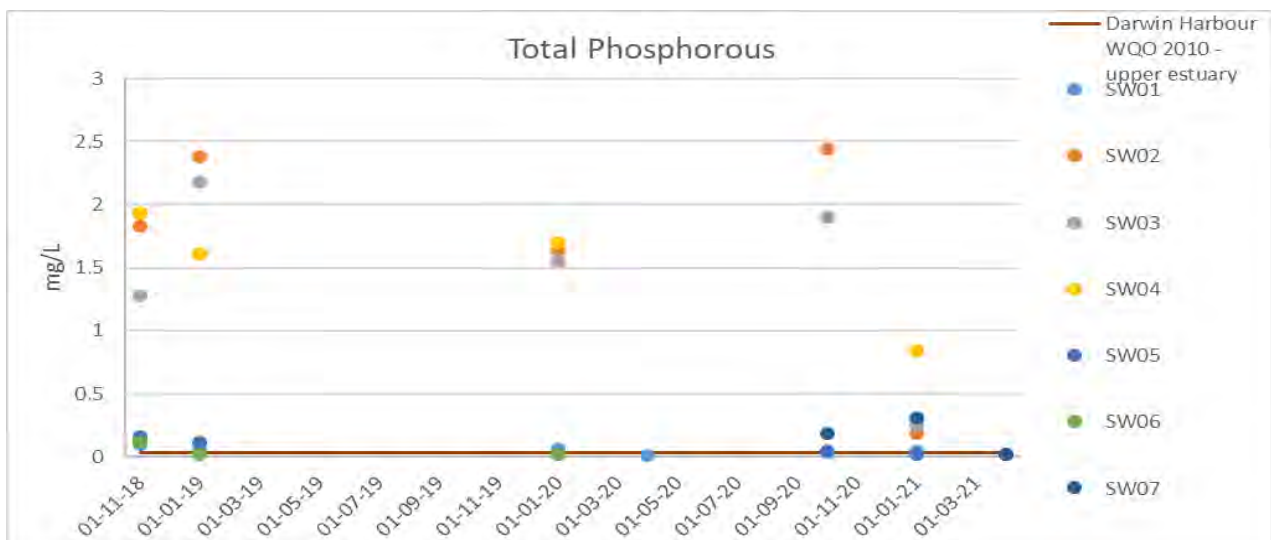
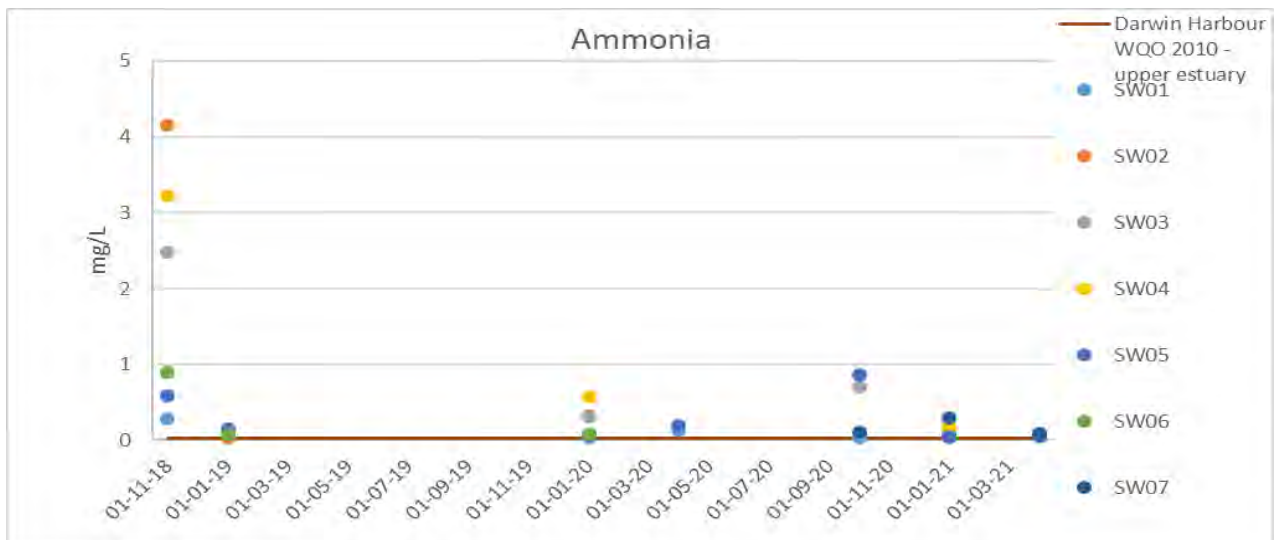
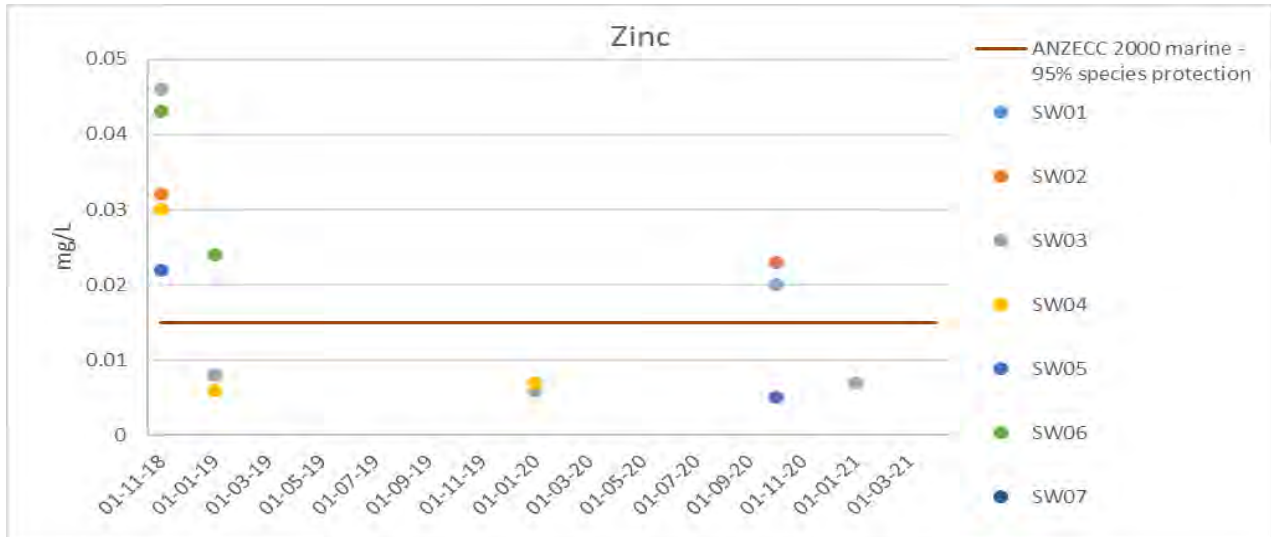
APPENDIX A WATER QUALITY DATA 2018 TO 2021

The water quality data collected by EcOz from 2018 to 2021 are provided in an Excel database forwarded as separate file.

APPENDIX B STORMWATER TREND GRAPHS







APPENDIX C LABORATORY DOCUMENTATION

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : ES2035037**

Client	: ECOZ ENVIRONMENTAL SERVICES	Laboratory	: Environmental Division Sydney
Contact	: MS CORINNE HUTCHINSON	Contact	: Customer Services ES
Address	: PO BOX 381 DARWIN NT, AUSTRALIA 0801	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: corinne.hutchinson@ecoz.com.au	E-mail	: ALSEnviro.Sydney@ALSGlobal.com
Telephone	: +61 08 89811100	Telephone	: +61-2-8784 8555
Facsimile	: +61 08 89811102	Facsimile	: +61-2-8784 8500
Project	: EZ20207 Archer Waste Surface Water -September 2020	Page	: 1 of 2
Order number	: EZ20207	Quote number	: EB2017ECOZENV0001 (EN/222)
C-O-C number	: ----	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ----		
Sampler	: BILL DWYER		

Dates

Date Samples Received	: 09-Oct-2020 08:00	Issue Date	: 09-Oct-2020
Client Requested Due Date	: 16-Oct-2020	Scheduled Reporting Date	: 16-Oct-2020

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 1	Temperature	: 16.4' C - Ice Bricks present
Receipt Detail	:	No. of samples received / analysed	: 6 / 6

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Client sampling date / time	Client sample ID	WATER - EA025H Suspended Solids - Standard Level	WATER - EK055G Ammonia as N By Discrete Analyser	WATER - EK067G Total Phosphorus as P By Discrete Analyser	WATER - EP030 BOD	WATER - EP035SF Total Phenol by Segmented Flow Analyser	WATER - W-05 TRH/TEXN/8 Metals	WATER - W-12 OC/OP Pesticides
ES2035037-001	08-Oct-2020 00:00	SW01	✓	✓	✓	✓	✓	✓	✓
ES2035037-002	08-Oct-2020 00:00	SW02	✓	✓	✓	✓	✓	✓	✓
ES2035037-003	08-Oct-2020 00:00	SW03	✓	✓	✓	✓	✓	✓	✓
ES2035037-004	08-Oct-2020 00:00	SW05	✓	✓	✓	✓	✓	✓	✓
ES2035037-005	08-Oct-2020 00:00	SW07	✓	✓	✓	✓	✓	✓	✓
ES2035037-006	08-Oct-2020 00:00	Duplicate	✓	✓	✓	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

CORINNE HUTCHINSON

- *AU Certificate of Analysis - NATA (COA)	Email	corinne.hutchinson@ecoz.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	corinne.hutchinson@ecoz.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	corinne.hutchinson@ecoz.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	corinne.hutchinson@ecoz.com.au
- A4 - AU Tax Invoice (INV)	Email	corinne.hutchinson@ecoz.com.au
- AU Certificate of Analysis - NATA (With Guidelines) (COA_GL)	Email	corinne.hutchinson@ecoz.com.au
- Chain of Custody (CoC) (COC)	Email	corinne.hutchinson@ecoz.com.au
- EDI Format - ENMRG (ENMRG)	Email	corinne.hutchinson@ecoz.com.au
- EDI Format - ESDAT (ESDAT)	Email	corinne.hutchinson@ecoz.com.au

INVOICE ADDRESS

- A4 - AU Tax Invoice (INV)	Email	ecoz@ecoz.com.au
-----------------------------	-------	------------------

JACK DYMALLA

- *AU Certificate of Analysis - NATA (COA)	Email	jack.dymalla@ecoz.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jack.dymalla@ecoz.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jack.dymalla@ecoz.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jack.dymalla@ecoz.com.au
- AU Certificate of Analysis - NATA (With Guidelines) (COA_GL)	Email	jack.dymalla@ecoz.com.au
- Chain of Custody (CoC) (COC)	Email	jack.dymalla@ecoz.com.au
- EDI Format - ENMRG (ENMRG)	Email	jack.dymalla@ecoz.com.au
- EDI Format - ESDAT (ESDAT)	Email	jack.dymalla@ecoz.com.au



CHAIN OF CUSTODY

ALS Laboratory
please tick →

ADLAIDE 21 Blume Road Poraka SA 5095
Ph: 08 8399 0890 E: adelaide@alsglobal.com
BRISBANE 32 Strand Street Stafford QLD 4053
Ph: 07 3243 7222 E: samples.brisbane@alsglobal.com
GLADSTONE 46 Callamondah Drive Clinton QLD 4680
Ph: 07 7471 6500 E: gladstone@alsglobal.com

MACQUARY 76 Harbour Road Mackay QLD 4740
Ph: 07 4944 0177 E: mackay@alsglobal.com
MELBOURNE 2-4 Westgate Road Springvale VIC 3171
Ph: 03 8549 9600 E: samples.melbourne@alsglobal.com
MURDOCK 27 Sydney Road Mudgee NSW 2850
Ph: 02 6372 8733 E: mudgee@alsglobal.com

NEWCASTLE 5 Ross Gurn Road Warminster NSW 2304
Ph: 02 4956 8433 E: samples.newcastle@alsglobal.com
NOWRA 413 Geary Place North Nowra NSW 2541
Ph: 02 4423 2053 E: nowra@alsglobal.com
PERTH 10 Hud Way Malaga WA 6060
Ph: 08 9209 7855 E: samples.perth@alsglobal.com

SYDNEY 277-288 Woodpark Road Smithfield NSW 2154
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com
TOWNSVILLE 14-15 Drama Court Baffle QLD 4818
Ph: 07 4796 0600 E: townsville@alsglobal.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500
Ph: 02 4225 3125 E: portmanga@alsglobal.com

CLIENT: EcoZ Environmental Consultants

OFFICE: Darwin

PROJECT: Archer Waste Surface Water - September 2020

PROJECT NUMBER: EZ20207

PROJECT MANAGER: Corinne Hutchinson

CONTACT PH: 8951 1110

SAMPLER: *B. Dwyer*

SAMPLER MOBILE: 0435616072

COC emailed to ALS? (YES/NO)

EDD FORMAT:

Email Reports to: corinne.hutchinson@ecoz.com.au; jack.dymalla@ecoz.com.au

Email Invoice to: ecoz@ecoz.com.au; corinne.hutchinson@ecoz.com.au

TURNAROUND REQUIREMENTS:

☐ Standard TAT (List due date):

(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)

☐ Non Standard or urgent TAT (List due date):

ALS QUOTE NO.:

EN222/20

SAMPLING ROUND: of 3

RELINQUISHED BY:

DATE/TIME:

8.10.20 1100

STANDARD TAT

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 4 5 6 7
OP: 1 2 3 4 5 6 7

RECEIVED BY:

DATE/TIME:

08/10/20 11:00am

RELINQUISHED BY:

DATE/TIME:

FOR LABORATORY USE ONLY (Circle)

Category Seal Intact?

Class 1001: Potential Risks Present (List if any)

Random Sample Temperature not checked

Other Comments:

RECEIVED BY: Kim

DATE/TIME:

09.10.20 8:00 am

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please report COA_GL for results comparison against ANZECC 2000 95% protection marine waters. Thank you.

ALS USE		SAMPLE DETAILS		CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required)														Additional Information	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	W-S TRH/BTEX/8 Metals	Total suspended solids	Biological oxygen demand	Ammonia	Phosphorus	OC/OP (first round only)	Total phenolics									Comments on likely contaminant levels, dilutions, or samples requiring specific GC analysis etc.
1	SW01	8.10.20	W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓	✓	✓									
2	SW02	8.10.20	W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓	✓	✓									
3	SW03	8.10.20	W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓	✓	✓									
	~~SW04~~		W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓	✓	✓									
4	SW05	8.10.20	W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓	✓	✓									
	~~SW06~~		W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓	✓	✓									
5	SW07	8.10.20	W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓	✓	✓									
6	Duplicate	8.10.20	W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓	✓	✓									
TOTAL																					

Environmental Division
Sydney

Work Order Reference
ES2035037



Telephone : 61-2-8784 8588

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulfate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved; Amber Glass: H = HCl preserved Plastic; HS = HCl preserved Sealed bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Solids; B = Unpreserved Bag

Environmental Division
Sydney
Work Order Reference
ES2035037



Telephone : + 61-2-8784 8551

LAB OF ORIGIN
DARWIN

CERTIFICATE OF ANALYSIS

Work Order : **ES2035037**
Client : **ECOZ ENVIRONMENTAL SERVICES**
Contact : **MS CORINNE HUTCHINSON**
Address : **PO BOX 381**
DARWIN NT, AUSTRALIA 0801
Telephone : **+61 08 89811100**
Project : **EZ20207 Archer Waste Surface Water -September 2020**
Order number : **EZ20207**
C-O-C number : **----**
Sampler : **BILL DWYER**
Site : **----**
Quote number : **EN/222**
No. of samples received : **6**
No. of samples analysed : **6**

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 : 09-Oct-2020 08:00
Date Analysis Commenced : 09-Oct-2020
Issue Date : 16-Oct-2020 09:49



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. 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
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW



General Comments

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

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

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

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

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

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

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

- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- 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**)

Client sample ID

				SW01	SW02	SW03	SW05	SW07
Client sampling date / time				08-Oct-2020 00:00	08-Oct-2020 00:00	08-Oct-2020 00:00	08-Oct-2020 00:00	08-Oct-2020 00:00
Compound	CAS Number	LOR	Unit	ES2035037-001	ES2035037-002	ES2035037-003	ES2035037-004	ES2035037-005
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	8	21	76	6	40
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	0.010	0.008	0.001	0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	0.002	0.002	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	0.020	0.017	0.005	0.002
Nickel	7440-02-0	0.001	mg/L	<0.001	0.003	0.002	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	0.023	0.020	0.005	<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
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.87	0.70	0.16	0.10
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	0.04	2.44	1.90	0.05	0.19
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	mg/L	3	23	16	3	2
EP035SF: Total Phenol by Segmented Flow Analyser								
Phenols (Total)	----	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05
EP068A: Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Client sample ID

				SW01	SW02	SW03	SW05	SW07
Client sampling date / time				08-Oct-2020 00:00	08-Oct-2020 00:00	08-Oct-2020 00:00	08-Oct-2020 00:00	08-Oct-2020 00:00
Compound	CAS Number	LOR	Unit	ES2035037-001	ES2035037-002	ES2035037-003	ES2035037-004	ES2035037-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
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	370	380	<100	<100



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	SW01	SW02	SW03	SW05	SW07
Client sampling date / time					08-Oct-2020 00:00	08-Oct-2020 00:00	08-Oct-2020 00:00	08-Oct-2020 00:00	08-Oct-2020 00:00
Compound	CAS Number	LOR	Unit		ES2035037-001	ES2035037-002	ES2035037-003	ES2035037-004	ES2035037-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
C29 - C36 Fraction	----	50	µg/L		<50	110	120	<50	<50
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	480	500	<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	420	440	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	420	440	<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
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		98.4	94.9	95.6	84.5	79.7
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		91.2	83.5	76.1	67.3	74.3
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		119	121	121	82.8	118
Toluene-D8	2037-26-5	2	%		105	111	114	85.3	104
4-Bromofluorobenzene	460-00-4	2	%		98.8	101	103	72.6	96.8



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Duplicate	----	----	----	----
Client sampling date / time				08-Oct-2020 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2035037-006	-----	-----	-----	-----	-----
Result				----	----	----	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L	7	----	----	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	0.001	----	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	----	----	----	----	----
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----	----
Copper	7440-50-8	0.001	mg/L	0.005	----	----	----	----	----
Nickel	7440-02-0	0.001	mg/L	<0.001	----	----	----	----	----
Lead	7439-92-1	0.001	mg/L	<0.001	----	----	----	----	----
Zinc	7440-66-6	0.005	mg/L	0.005	----	----	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	----	----	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L	0.10	----	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L	0.04	----	----	----	----	----
EP030: Biochemical Oxygen Demand (BOD)									
Biochemical Oxygen Demand	----	2	mg/L	2	----	----	----	----	----
EP035SF: Total Phenol by Segmented Flow Analyser									
Phenols (Total)	----	0.05	mg/L	<0.05	----	----	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L	<0.5	----	----	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	----	----	----	----	----
beta-BHC	319-85-7	0.5	µg/L	<0.5	----	----	----	----	----
gamma-BHC	58-89-9	0.5	µg/L	<0.5	----	----	----	----	----
delta-BHC	319-86-8	0.5	µg/L	<0.5	----	----	----	----	----
Heptachlor	76-44-8	0.5	µg/L	<0.5	----	----	----	----	----
Aldrin	309-00-2	0.5	µg/L	<0.5	----	----	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	----	----	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	----	----	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	----	----	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	----	----	----	----	----
Dieldrin	60-57-1	0.5	µg/L	<0.5	----	----	----	----	----
4,4'-DDE	72-55-9	0.5	µg/L	<0.5	----	----	----	----	----
Endrin	72-20-8	0.5	µg/L	<0.5	----	----	----	----	----



Analytical Results

Sub-Matrix: **WATER**
 (Matrix: **WATER**)

Client sample ID

				Duplicate	----	----	----	----
Client sampling date / time				08-Oct-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2035037-006	-----	-----	-----	-----
				Result	----	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	----	----	----	----
4,4'-DDD	72-54-8	0.5	µg/L	<0.5	----	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	----	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	----	----	----	----
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	----	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	----	----	----	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	----	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	<0.5	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	----	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	----	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	----	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	----	----	----	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	----	----	----	----
Diazinon	333-41-5	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	----	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	----	----	----	----
Malathion	121-75-5	0.5	µg/L	<0.5	----	----	----	----
Fenthion	55-38-9	0.5	µg/L	<0.5	----	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	----	----	----	----
Parathion	56-38-2	2.0	µg/L	<2.0	----	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	----	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	----	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	----	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	----	----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	----	----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	----	----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	----	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	----	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	----	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	Duplicate	----	----	----	----
Client sampling date / time				08-Oct-2020 00:00	----	----	----	----	----
Compound	CAS Number	LOR	Unit	ES2035037-006	-----	-----	-----	-----	-----
Result				----	----	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
C29 - C36 Fraction	----	50	µg/L	<50	----	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L	<50	----	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L	<20	----	----	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	<20	----	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L	<100	----	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L	<100	----	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L	<100	----	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L	<100	----	----	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L	<100	----	----	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L	<1	----	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----	----
^ Total Xylenes	----	2	µg/L	<2	----	----	----	----	----
^ Sum of BTEX	----	1	µg/L	<1	----	----	----	----	----
Naphthalene	91-20-3	5	µg/L	<5	----	----	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%	81.2	----	----	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%	64.1	----	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%	122	----	----	----	----	----
Toluene-D8	2037-26-5	2	%	110	----	----	----	----	----
4-Bromofluorobenzene	460-00-4	2	%	99.5	----	----	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	67	111
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	67	111
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

QUALITY CONTROL REPORT

Work Order	: ES2035037	Page	: 1 of 7
Client	: ECOZ ENVIRONMENTAL SERVICES	Laboratory	: Environmental Division Sydney
Contact	: MS CORINNE HUTCHINSON	Contact	: Customer Services ES
Address	: PO BOX 381 DARWIN NT, AUSTRALIA 0801	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 08 89811100	Telephone	: +61-2-8784 8555
Project	: EZ20207 Archer Waste Surface Water -September 2020	Date Samples Received	: 09-Oct-2020
Order number	: EZ20207	Date Analysis Commenced	: 09-Oct-2020
C-O-C number	: ----	Issue Date	: 16-Oct-2020
Sampler	: BILL DWYER		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 6		
No. of samples analysed	: 6		



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

This Quality Control Report contains the following information:

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC

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

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP035SF: Total Phenol by Segmented Flow Analyser (QC Lot: 3304124)									
CA2006678-001	Anonymous	EP035SF: Phenols (Total)	----	0.05	mg/L	0.05	0.06	0.00	No Limit
ES2035155-012	Anonymous	EP035SF: Phenols (Total)	----	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3306058)									
ES2035036-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	44	37	16.8	No Limit
ES2035037-006	Duplicate	EA025H: Suspended Solids (SS)	----	5	mg/L	7	6	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3304185)									
ES2035037-001	SW01	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
ES2035117-005	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.013	0.013	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 3304186)									
ES2035037-003	SW03	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES2035117-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3306093)									

Page : 3 of 7
 Work Order : ES2035037
 Client : ECOZ ENVIRONMENTAL SERVICES
 Project : EZ20207 Archer Waste Surface Water -September 2020



Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3306093) - continued									
ES2035034-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.07	0.07	0.00	No Limit
ES2035117-008	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.03	0.04	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3306096)									
ES2035034-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	7.20	7.08	1.62	0% - 20%
ES2035117-009	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.17	0.17	0.00	No Limit
EP030: Biochemical Oxygen Demand (BOD) (QC Lot: 3300724)									
ES2035034-001	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	7	111	No Limit
ES2035123-004	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	<2	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3300416)									
ES2035037-001	SW01	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES2035182-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3300416)									
ES2035037-001	SW01	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES2035182-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 3300416)									
ES2035037-001	SW01	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
ES2035182-003	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit



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

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

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP035SF: Total Phenol by Segmented Flow Analyser (QCLot: 3304124)								
EP035SF: Phenols (Total)	----	0.05	mg/L	<0.05	0.2 mg/L	94.8	70.9	123
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3306058)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	106	83.0	129
				<5	1000 mg/L	103	82.0	110
EG020F: Dissolved Metals by ICP-MS (QCLot: 3304185)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	90.4	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	88.5	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	90.2	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	87.4	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	89.6	83.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	88.9	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	89.2	81.0	117
EG035F: Dissolved Mercury by FIMS (QCLot: 3304186)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	93.1	83.0	105
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3306093)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	96.1	90.0	114
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3306096)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	92.8	71.0	101
				<0.01	0.442 mg/L	99.4	72.0	108
				<0.01	1 mg/L	118	70.0	130
EP030: Biochemical Oxygen Demand (BOD) (QCLot: 3300724)								
EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	200 mg/L	85.0	74.0	112
EP068A: Organochlorine Pesticides (OC) (QCLot: 3300289)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	99.1	64.9	107
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	99.0	58.3	111
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	95.8	69.0	117
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	100	70.0	112
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	92.3	68.9	110
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	93.4	65.2	108
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	102	65.8	109
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	79.6	67.1	107
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	79.4	64.1	110
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	83.6	66.7	112
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	78.6	63.2	111



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit	Result					
EP068A: Organochlorine Pesticides (OC) (QCLot: 3300289) - continued								
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	80.2	65.2	113
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	82.1	66.0	112
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	81.9	65.2	113
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	81.1	67.3	114
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	78.3	72.0	122
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	87.8	66.9	109
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	86.1	65.2	112
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	81.1	65.2	112
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	80.1	63.8	110
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	81.4	61.1	114
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3300289)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	103	65.6	114
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	98.8	63.7	113
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	24.1	19.7	48.0
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	95.7	69.5	110
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	84.0	71.1	110
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	84.1	77.0	119
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	78.0	70.0	124
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	81.8	68.4	116
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	76.5	68.6	112
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	79.5	75.0	119
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	75.3	67.0	121
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	78.8	69.0	121
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	81.8	71.8	110
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	78.4	67.5	112
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	76.6	64.1	116
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	77.1	67.8	114
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	75.6	74.0	120
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	92.5	66.2	114
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	95.4	51.6	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3300288)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	78.3	55.8	112
EP071: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	81.1	71.6	113
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	86.6	56.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3300416)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	80.0	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3300288)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	73.6	57.9	119

Matrix Spike (MS) Report

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP035SF: Total Phenol by Segmented Flow Analyser (QCLot: 3304124)							
CA2006678-001	Anonymous	EP035SF: Phenols (Total)	----	0.2 mg/L	72.6	65.1	128
EG020F: Dissolved Metals by ICP-MS (QCLot: 3304185)							
ES2035037-004	SW05	EG020A-F: Arsenic	7440-38-2	1 mg/L	92.0	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	95.9	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	87.5	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	87.5	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	86.6	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	92.7	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	95.7	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 3304186)							
ES2035037-002	SW02	EG035F: Mercury	7439-97-6	0.01 mg/L	82.5	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3306093)							
ES2035034-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	86.2	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3306096)							
ES2035064-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	116	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3300416)							

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Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3300416) - continued							
ES2035037-001	SW01	EP080: C6 - C9 Fraction	----	325 µg/L	81.1	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3300416)							
ES2035037-001	SW01	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	81.4	70.0	130
EP080: BTEXN (QCLot: 3300416)							
ES2035037-001	SW01	EP080: Benzene	71-43-2	25 µg/L	88.1	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	85.3	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	88.1	70.0	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	86.8	70.0	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	91.5	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	86.9	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2035037	Page	: 1 of 8
Client	: ECOZ ENVIRONMENTAL SERVICES	Laboratory	: Environmental Division Sydney
Contact	: MS CORINNE HUTCHINSON	Telephone	: +61-2-8784 8555
Project	: EZ20207 Archer Waste Surface Water -September 2020	Date Samples Received	: 09-Oct-2020
Site	: ----	Issue Date	: 16-Oct-2020
Sampler	: BILL DWYER	No. of samples received	: 6
Order number	: EZ20207	No. of samples analysed	: 6

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

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



Regular Sample Surrogates

Sub-Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP068T: Organophosphorus Pesticide Surrogate	ES2035037-006	Duplicate	DEF	78-48-8	64.1 %	66.5-111 %	Recovery less than lower data quality objective

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Pesticides by GCMS	0	9	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatle Fraction	0	15	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Pesticides by GCMS	0	9	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatle Fraction	0	15	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H) SW01, SW03, SW07, SW02, SW05, Duplicate	08-Oct-2020	----	----	----	13-Oct-2020	15-Oct-2020	✔
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F) SW01, SW03, SW07, SW02, SW05, Duplicate	08-Oct-2020	----	----	----	13-Oct-2020	06-Apr-2021	✔
EG035F: Dissolved Mercury by FIMS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F) SW01, SW03, SW07, SW02, SW05, Duplicate	08-Oct-2020	----	----	----	13-Oct-2020	05-Nov-2020	✔



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G) SW01, SW03, SW07,	SW02, SW05, Duplicate	08-Oct-2020	----	----	----	14-Oct-2020	05-Nov-2020	✓
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G) SW01, SW03, SW07,	SW02, SW05, Duplicate	08-Oct-2020	14-Oct-2020	05-Nov-2020	✓	14-Oct-2020	05-Nov-2020	✓
EP030: Biochemical Oxygen Demand (BOD)								
Clear Plastic Bottle - Natural (EP030) SW01, SW03, SW07,	SW02, SW05, Duplicate	08-Oct-2020	----	----	----	09-Oct-2020	10-Oct-2020	✓
EP035SF: Total Phenol by Segmented Flow Analyser								
Clear Plastic Bottle - Sulfuric Acid (EP035SF) SW01, SW03, SW07,	SW02, SW05, Duplicate	08-Oct-2020	----	----	----	13-Oct-2020	05-Nov-2020	✓
EP068A: Organochlorine Pesticides (OC)								
Amber Glass Bottle - Unpreserved (EP068) SW01, SW03, SW07,	SW02, SW05, Duplicate	08-Oct-2020	12-Oct-2020	15-Oct-2020	✓	14-Oct-2020	21-Nov-2020	✓
EP068B: Organophosphorus Pesticides (OP)								
Amber Glass Bottle - Unpreserved (EP068) SW01, SW03, SW07,	SW02, SW05, Duplicate	08-Oct-2020	12-Oct-2020	15-Oct-2020	✓	14-Oct-2020	21-Nov-2020	✓
EP080/071: Total Petroleum Hydrocarbons								
Amber Glass Bottle - Unpreserved (EP071) SW01, SW03, SW07,	SW02, SW05, Duplicate	08-Oct-2020	12-Oct-2020	15-Oct-2020	✓	14-Oct-2020	21-Nov-2020	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW01, SW03, SW07,	SW02, SW05, Duplicate	08-Oct-2020	13-Oct-2020	22-Oct-2020	✓	13-Oct-2020	22-Oct-2020	✓

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Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber Glass Bottle - Unpreserved (EP071)		08-Oct-2020	12-Oct-2020	15-Oct-2020	✔	14-Oct-2020	21-Nov-2020	✔
SW01,	SW02,							
SW03,	SW05,							
SW07,	Duplicate							
Amber VOC Vial - Sulfuric Acid (EP080)		08-Oct-2020	13-Oct-2020	22-Oct-2020	✔	13-Oct-2020	22-Oct-2020	✔
SW01,	SW02,							
SW03,	SW05,							
SW07,	Duplicate							
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)		08-Oct-2020	13-Oct-2020	22-Oct-2020	✔	13-Oct-2020	22-Oct-2020	✔
SW01,	SW02,							
SW03,	SW05,							
SW07,	Duplicate							



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	9	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Segmented Flow Analyser	EP035SF	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	15	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Segmented Flow Analyser	EP035SF	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	15.00	15.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Segmented Flow Analyser	EP035SF	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard

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Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Matrix Spikes (MS) - Continued							
Pesticides by GCMS	EP068	0	9	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Segmented Flow Analyser	EP035SF	1	17	5.88	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	15	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Biochemical Oxygen Demand (BOD)	EP030	WATER	In house: Referenced to APHA 5210 B. The 5-Day BOD test provides an empirical measure of the oxygen consumption capacity of a given water. A portion of the sample is diluted into oxygenated, nutrient rich water, and a seed added to begin biological decay. The initial dissolved oxygen content is measured, then the bottle is sealed and incubated for five days. The remaining dissolved oxygen is measured, and from the difference, the demand for oxygen, by biological decay, is determined. This method is compliant with NEPM Schedule B(3).
Total Phenol by Segmented Flow Analyser	EP035SF	WATER	In house: Referenced to ISO 14402. The sample is in-line-distilled at pH 1- 4. The distillate, containing steam-volatile phenolic compounds is then oxidised by hexacyanoferrate(III). The resulting quinones react with 4-aminoantipyrine forming red condensation products, which are measured spectrometrically in a flow spectrometer at 505 nm.. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)

Page : 8 of 8
 Work Order : ES2035037
 Client : ECOZ ENVIRONMENTAL SERVICES
 Project : EZ20207 Archer Waste Surface Water -September 2020



<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES2101472

Client : ECOZ ENVIRONMENTAL SERVICES Contact : MS CORINNE HUTCHINSON Address : PO BOX 381 DARWIN NT, AUSTRALIA 0801 E-mail : corinne.hutchinson@ecoz.com.au Telephone : +61 08 89811100 Facsimile : +61 08 89811102 Project : EZ20207 Archer Waste Surface Water -January 2021 Order number : EZ20207 C-O-C number : ---- Site : ---- Sampler : BILL DWYER	Laboratory : Environmental Division Sydney Contact : Customer Services ES Address : 277-289 Woodpark Road Smithfield NSW Australia 2164 E-mail : ALSEnviro.Sydney@ALSGlobal.com Telephone : +61-2-8784 8555 Facsimile : +61-2-8784 8500 Page : 1 of 2 Quote number : EB2017ECOZENV0001 (EN/222) QC Level : NEPM 2013 B3 & ALS QC Standard
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Dates

Date Samples Received : 20-Jan-2021 07:30	Issue Date : 20-Jan-2021
Client Requested Due : 27-Jan-2021	Scheduled Reporting Date : 27-Jan-2021
Date	

Delivery Details

Mode of Delivery : Undefined	Security Seal : Not Available
No. of coolers/boxes : 1	Temperature : 20.2
Receipt Detail :	No. of samples received / analysed : 7 / 7

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA025H Suspended Solids - Standard Level	WATER - EK055G Ammonia as N By Discrete Analyser	WATER - EK067G Total Phosphorus as P By Discrete Analyser	WATER - EP030 BOD	WATER - EP035SF Total Phenol by Segmented Flow Analyser	WATER - W-05 TRH/TEXN/8 Metals	WATER - W-12 OC/OP Pesticides
ES2101472-001	19-Jan-2021 00:00	SW01	✓	✓	✓	✓	✓	✓	✓
ES2101472-002	19-Jan-2021 00:00	SW02	✓	✓	✓	✓	✓	✓	✓
ES2101472-003	19-Jan-2021 00:00	SW03	✓	✓	✓	✓	✓	✓	✓
ES2101472-004	19-Jan-2021 00:00	SW04	✓	✓	✓	✓	✓	✓	✓
ES2101472-005	19-Jan-2021 00:00	SW05	✓	✓	✓	✓	✓	✓	✓
ES2101472-006	19-Jan-2021 00:00	SW07	✓	✓	✓	✓	✓	✓	✓
ES2101472-007	19-Jan-2021 00:00	Duplicate	✓	✓	✓	✓	✓	✓	✓

Proactive Holding Time Report

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

Requested Deliverables

CORINNE HUTCHINSON

- *AU Certificate of Analysis - NATA (COA)	Email	corinne.hutchinson@ecoz.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	corinne.hutchinson@ecoz.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	corinne.hutchinson@ecoz.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	corinne.hutchinson@ecoz.com.au
- A4 - AU Tax Invoice (INV)	Email	corinne.hutchinson@ecoz.com.au
- AU Certificate of Analysis - NATA (With Guidelines) (COA_GL)	Email	corinne.hutchinson@ecoz.com.au
- Chain of Custody (CoC) (COC)	Email	corinne.hutchinson@ecoz.com.au
- EDI Format - ENMRG (ENMRG)	Email	corinne.hutchinson@ecoz.com.au
- EDI Format - ESDAT (ESDAT)	Email	corinne.hutchinson@ecoz.com.au

INVOICE ADDRESS

- A4 - AU Tax Invoice (INV)	Email	ecoz@ecoz.com.au
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JACK DYMALLA

- *AU Certificate of Analysis - NATA (COA)	Email	jack.dymalla@ecoz.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jack.dymalla@ecoz.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jack.dymalla@ecoz.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jack.dymalla@ecoz.com.au
- Chain of Custody (CoC) (COC)	Email	jack.dymalla@ecoz.com.au
- EDI Format - ENMRG (ENMRG)	Email	jack.dymalla@ecoz.com.au
- EDI Format - ESDAT (ESDAT)	Email	jack.dymalla@ecoz.com.au



ALS Laboratory:
please tick →

ADLAIDE 21 Burns Road Pooraka SA 5005
 Ph: 08 8354 0890 F: adelaide@nsglobal.com
BURISBANE 32 Shand Street Stafford QLD 4053
 Ph: 07 3243 7222 F: samples.brisbane@nsglobal.com
GLADSTONE 46 Calamondah Drive Clinton QLD 4690
 Ph: 07 7471 5600 F: gladstone@nsglobal.com

LMACKAY 78 Harcour Road Mackay QLD 4740
 Ph: 07 4944 0177 E: mackay@elsglobal.com
LMELBOURNE 24 Westall Road Springvale VIC 3174
 Ph: 03 8549 9600 E: samples.melbourne@elsglobal.com
LMUDGE 27 Sydney Road Mudgee NSW 2850
 Ph: 02 6372 6735 E: mudgee.mail@elsglobal.com

LUNEWCASTLE 5 Ross Cam Road Warrbrook NSW 2304
 Ph: 02 480 9433 E: samples.newcastle@sbsglobal.com
 LINDWRA 4/13 Geary Place North Lismore NSW 2541
 Ph: 024423 2053 E: newra@sbsglobal.com
 LIPERTH 10 Had Way Mangles WA 6660
 Ph: 08 9208 7555 E: samples.perth@sbsglobal.com

USYDNEY 277-289 Woodpark Road Smithfield NSW 2164
 Ph: 02 8784 8555 E: samples.sydny@alsglobal.com
QTOWNSVILLE 14-15 Deane Court Bonita QLD 4318
 Ph: 07 4786 9500 E: townsville.environmental@regional.als.com
WOLLONGONG 99 Kenny Street Wollongong NSW 2500
 Ph: 02 4225 3125 E: adkembia@alsglobal.com

Email Invoice to: ecoz@ecoz.com.au; corinne.hutchinson@ecoz.com.au

☐ Non Standard or urgent TAT (List due date):

EN/222/20

SAMPLING ROUND: of 3

DATE/TIME:

19.1.21

COC SEQUENCE NUMBER (Circle)

COC:	1	2	3	4	5	6	7
------	---	---	---	---	---	---	---

OF:	1	2	3	4	5	6	7
-----	---	---	---	---	---	---	---

DATE/TIME:

[illegible]

DATE/TIME: 01/11/2001 10:00

FOR LABORATORY USE ONLY (Circle)

Custody Seal (Ink)

Free ice / frozen ice bricks present upon receipt.

7 Random Sample Temperature on Recalib

7	Other comment
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COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please report COA_GL for results comparison against ANZECC 2000 95% protection marine waters. Thank you.

[illegible]

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airflight Unpreserved Plastic
Y = VOA Vial HCl Preserved; VS = VOA Vial Sodium Bisulfate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airflight Unpreserved Vial SG = Sulfuric Preserved; Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulfate Soils; B = Unpreserved Bag

Work Order Reference

ES2101472



Telephone : + 61-2-8784 8554

LAB OF ORIGIN
DARWIN

CERTIFICATE OF ANALYSIS

Work Order : **ES2101472**
Client : **ECOZ ENVIRONMENTAL SERVICES**
Contact : MS CORINNE HUTCHINSON
Address : PO BOX 381
 DARWIN NT, AUSTRALIA 0801
Telephone : +61 08 89811100
Project : EZ20207 Archer Waste Surface Water -January 2021
Order number : EZ20207
C-O-C number : ----
Sampler : BILL DWYER
Site : ----
Quote number : EN/222
No. of samples received : 7
No. of samples analysed : 7

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 : 20-Jan-2021 07:30
Date Analysis Commenced : 20-Jan-2021
Issue Date : 27-Jan-2021 14:30



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>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic 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 Contact for details.

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

- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- 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	SW01	SW02	SW03	SW04	SW05
Sampling date / time					19-Jan-2021 00:00	19-Jan-2021 00:00	19-Jan-2021 00:00	19-Jan-2021 00:00	19-Jan-2021 00:00
Compound	CAS Number	LOR	Unit		ES2101472-001	ES2101472-002	ES2101472-003	ES2101472-004	ES2101472-005
					Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		18	225	22	385	9
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	0.003	0.003	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	0.002	0.002	<0.001
Copper	7440-50-8	0.001	mg/L		<0.001	<0.001	0.003	0.003	0.002
Nickel	7440-02-0	0.001	mg/L		<0.001	<0.001	0.002	0.002	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	0.001	0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	0.007	<0.005	<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
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.04	0.07	0.10	0.18	0.05
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.05	0.19	0.25	0.84	0.02
EP030: Biochemical Oxygen Demand (BOD)									
Biochemical Oxygen Demand	----	2	mg/L		2	<2	2	3	<2
EP035SF: Total Phenol by Segmented Flow Analyser									
Phenols (Total)	----	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	<0.5	<0.5	<0.5



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				SW01	SW02	SW03	SW04	SW05
Sampling date / time				19-Jan-2021 00:00	19-Jan-2021 00:00	19-Jan-2021 00:00	19-Jan-2021 00:00	19-Jan-2021 00:00
Compound	CAS Number	LOR	Unit	ES2101472-001	ES2101472-002	ES2101472-003	ES2101472-004	ES2101472-005
				Result	Result	Result	Result	Result
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDD	72-54-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	<2.0	<2.0	<2.0
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
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



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SW01	SW02	SW03	SW04	SW05
Sampling date / time					19-Jan-2021 00:00	19-Jan-2021 00:00	19-Jan-2021 00:00	19-Jan-2021 00:00	19-Jan-2021 00:00
Compound	CAS Number	LOR	Unit		ES2101472-001	ES2101472-002	ES2101472-003	ES2101472-004	ES2101472-005
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
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	5	<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	5	<1	2	<1
Naphthalene	91-20-3	5	µg/L		<5	<5	<5	<5	<5
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		70.4	74.0	98.6	78.2	76.9
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		73.8	88.9	104	65.0	96.1
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		107	124	131	128	112
Toluene-D8	2037-26-5	2	%		97.9	113	118	117	105
4-Bromofluorobenzene	460-00-4	2	%		93.4	109	111	101	101



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SW07	Duplicate	----	----	----
Sampling date / time					19-Jan-2021 00:00	19-Jan-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2101472-006	ES2101472-007	-----	-----	-----
					Result	Result	----	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		23	7	----	----	----
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		0.002	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	<0.0001	----	----	----
Chromium	7440-47-3	0.001	mg/L		0.001	<0.001	----	----	----
Copper	7440-50-8	0.001	mg/L		0.003	0.002	----	----	----
Nickel	7440-02-0	0.001	mg/L		0.001	<0.001	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	<0.005	----	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.29	0.04	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.31	0.18	----	----	----
EP030: Biochemical Oxygen Demand (BOD)									
Biochemical Oxygen Demand	----	2	mg/L		2	<2	----	----	----
EP035SF: Total Phenol by Segmented Flow Analyser									
Phenols (Total)	----	0.05	mg/L		<0.05	<0.05	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.5	µg/L		<0.5	<0.5	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L		<0.5	<0.5	----	----	----
beta-BHC	319-85-7	0.5	µg/L		<0.5	<0.5	----	----	----
gamma-BHC	58-89-9	0.5	µg/L		<0.5	<0.5	----	----	----
delta-BHC	319-86-8	0.5	µg/L		<0.5	<0.5	----	----	----
Heptachlor	76-44-8	0.5	µg/L		<0.5	<0.5	----	----	----
Aldrin	309-00-2	0.5	µg/L		<0.5	<0.5	----	----	----
Heptachlor epoxide	1024-57-3	0.5	µg/L		<0.5	<0.5	----	----	----
trans-Chlordane	5103-74-2	0.5	µg/L		<0.5	<0.5	----	----	----
alpha-Endosulfan	959-98-8	0.5	µg/L		<0.5	<0.5	----	----	----
cis-Chlordane	5103-71-9	0.5	µg/L		<0.5	<0.5	----	----	----
Dieldrin	60-57-1	0.5	µg/L		<0.5	<0.5	----	----	----
4,4'-DDE	72-55-9	0.5	µg/L		<0.5	<0.5	----	----	----
Endrin	72-20-8	0.5	µg/L		<0.5	<0.5	----	----	----



Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Sample ID

				SW07	Duplicate	----	----	----
Sampling date / time				19-Jan-2021 00:00	19-Jan-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit	ES2101472-006	ES2101472-007	-----	-----	-----
				Result	Result	----	----	----
EP068A: Organochlorine Pesticides (OC) - Continued								
beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	<0.5	----	----	----
4,4'-DDD	72-54-8	0.5	µg/L	<0.5	<0.5	----	----	----
Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	<0.5	----	----	----
Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	<0.5	----	----	----
4,4'-DDT	50-29-3	2.0	µg/L	<2.0	<2.0	----	----	----
Endrin ketone	53494-70-5	0.5	µg/L	<0.5	<0.5	----	----	----
Methoxychlor	72-43-5	2.0	µg/L	<2.0	<2.0	----	----	----
^ Total Chlordane (sum)	----	0.5	µg/L	<0.5	<0.5	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.5	µg/L	<0.5	<0.5	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.5	µg/L	<0.5	<0.5	----	----	----
EP068B: Organophosphorus Pesticides (OP)								
Dichlorvos	62-73-7	0.5	µg/L	<0.5	<0.5	----	----	----
Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	<0.5	----	----	----
Monocrotophos	6923-22-4	2.0	µg/L	<2.0	<2.0	----	----	----
Dimethoate	60-51-5	0.5	µg/L	<0.5	<0.5	----	----	----
Diazinon	333-41-5	0.5	µg/L	<0.5	<0.5	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	<0.5	----	----	----
Parathion-methyl	298-00-0	2.0	µg/L	<2.0	<2.0	----	----	----
Malathion	121-75-5	0.5	µg/L	<0.5	<0.5	----	----	----
Fenthion	55-38-9	0.5	µg/L	<0.5	<0.5	----	----	----
Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	<0.5	----	----	----
Parathion	56-38-2	2.0	µg/L	<2.0	<2.0	----	----	----
Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	<0.5	----	----	----
Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	<0.5	----	----	----
Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	<0.5	----	----	----
Fenamiphos	22224-92-6	0.5	µg/L	<0.5	<0.5	----	----	----
Prothiofos	34643-46-4	0.5	µg/L	<0.5	<0.5	----	----	----
Ethion	563-12-2	0.5	µg/L	<0.5	<0.5	----	----	----
Carbophenothion	786-19-6	0.5	µg/L	<0.5	<0.5	----	----	----
Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	<0.5	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	20	µg/L	<20	<20	----	----	----
C10 - C14 Fraction	----	50	µg/L	<50	<50	----	----	----
C15 - C28 Fraction	----	100	µg/L	<100	<100	----	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SW07	Duplicate	----	----	----
Sampling date / time					19-Jan-2021 00:00	19-Jan-2021 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2101472-006	ES2101472-007	-----	-----	-----
					Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
C29 - C36 Fraction	----	50	µg/L		<50	<50	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	20	µg/L		<20	<20	----	----	----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L		<20	<20	----	----	----
>C10 - C16 Fraction	----	100	µg/L		<100	<100	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	----	----	----
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	100	µg/L		<100	<100	----	----	----
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	----	----	----
Toluene	108-88-3	2	µg/L		<2	<2	----	----	----
Ethylbenzene	100-41-4	2	µg/L		<2	<2	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	----	----	----
ortho-Xylene	95-47-6	2	µg/L		<2	<2	----	----	----
^ Total Xylenes	----	2	µg/L		<2	<2	----	----	----
^ Sum of BTEX	----	1	µg/L		<1	<1	----	----	----
Naphthalene	91-20-3	5	µg/L		<5	<5	----	----	----
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.5	%		68.1	80.1	----	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.5	%		94.2	95.9	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		134	104	----	----	----
Toluene-D8	2037-26-5	2	%		120	96.2	----	----	----
4-Bromofluorobenzene	460-00-4	2	%		109	91.1	----	----	----



Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	67	111
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	67	111
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

QUALITY CONTROL REPORT

Work Order	: ES2101472	Page	: 1 of 7
Client	: ECOZ ENVIRONMENTAL SERVICES	Laboratory	: Environmental Division Sydney
Contact	: MS CORINNE HUTCHINSON	Contact	: Customer Services ES
Address	: PO BOX 381 DARWIN NT, AUSTRALIA 0801	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 08 89811100	Telephone	: +61-2-8784 8555
Project	: EZ20207 Archer Waste Surface Water -January 2021	Date Samples Received	: 20-Jan-2021
Order number	: EZ20207	Date Analysis Commenced	: 20-Jan-2021
C-O-C number	: ----	Issue Date	: 27-Jan-2021
Sampler	: BILL DWYER		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 7		
No. of samples analysed	: 7		



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

This Quality Control Report contains the following information:

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC

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

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP035SF: Total Phenol by Segmented Flow Analyser (QC Lot: 3471625)									
ES2101472-001	SW01	EP035SF: Phenols (Total)	----	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES2101864-013	Anonymous	EP035SF: Phenols (Total)	----	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3474027)									
ES2101472-001	SW01	EA025H: Suspended Solids (SS)	----	5	mg/L	18	16	7.41	No Limit
ES2101566-002	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	32	34	6.15	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3477276)									
ES2101472-001	SW01	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EW2100313-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 3477277)									
ES2101472-003	SW03	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES2101641-003	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3474386)									



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3474386) - continued									
ES2101472-006	SW07	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.29	0.30	0.00	0% - 20%
ES2100964-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.07	0.07	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3474390)									
ES2100964-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	0.01	0.00	No Limit
ES2101662-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	0.44	0.44	0.00	0% - 20%
EP030: Biochemical Oxygen Demand (BOD) (QC Lot: 3471416)									
ES2101472-001	SW01	EP030: Biochemical Oxygen Demand	----	2	mg/L	2	4	66.7	No Limit
ES2101566-002	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	4	66.7	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3470874)									
ES2101472-001	SW01	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES2101721-001	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3470874)									
ES2101472-001	SW01	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES2101721-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 3470874)									
ES2101472-001	SW01	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
ES2101721-001	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit



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

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

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP035SF: Total Phenol by Segmented Flow Analyser (QCLot: 3471625)								
EP035SF: Phenols (Total)	----	0.05	mg/L	<0.05	0.2 mg/L	82.3	70.9	123
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3474027)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	104	83.0	129
				<5	1000 mg/L	98.5	82.0	110
EG020F: Dissolved Metals by ICP-MS (QCLot: 3477276)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	90.6	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.5	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	89.2	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	89.5	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	88.9	83.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	88.0	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	90.7	81.0	117
EG035F: Dissolved Mercury by FIMS (QCLot: 3477277)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	100	83.0	105
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3474386)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	105	90.0	114
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3474390)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	87.2	71.0	101
				<0.01	0.442 mg/L	75.2	72.0	108
				<0.01	1 mg/L	87.9	70.0	130
EP030: Biochemical Oxygen Demand (BOD) (QCLot: 3471416)								
EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	200 mg/L	86.5	74.0	112
EP068A: Organochlorine Pesticides (OC) (QCLot: 3470503)								
EP068: alpha-BHC	319-84-6	0.5	µg/L	<0.5	5 µg/L	79.9	64.9	107
EP068: Hexachlorobenzene (HCB)	118-74-1	0.5	µg/L	<0.5	5 µg/L	88.4	58.3	111
EP068: beta-BHC	319-85-7	0.5	µg/L	<0.5	5 µg/L	91.1	69.0	117
EP068: gamma-BHC	58-89-9	0.5	µg/L	<0.5	5 µg/L	77.8	70.0	112
EP068: delta-BHC	319-86-8	0.5	µg/L	<0.5	5 µg/L	102	68.9	110
EP068: Heptachlor	76-44-8	0.5	µg/L	<0.5	5 µg/L	105	65.2	108
EP068: Aldrin	309-00-2	0.5	µg/L	<0.5	5 µg/L	88.5	65.8	109
EP068: Heptachlor epoxide	1024-57-3	0.5	µg/L	<0.5	5 µg/L	105	67.1	107
EP068: trans-Chlordane	5103-74-2	0.5	µg/L	<0.5	5 µg/L	98.8	64.1	110
EP068: alpha-Endosulfan	959-98-8	0.5	µg/L	<0.5	5 µg/L	96.6	66.7	112
EP068: cis-Chlordane	5103-71-9	0.5	µg/L	<0.5	5 µg/L	87.6	63.2	111



Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result			Low	High
EP068A: Organochlorine Pesticides (OC) (QCLot: 3470503) - continued								
EP068: Dieldrin	60-57-1	0.5	µg/L	<0.5	5 µg/L	96.7	65.2	113
EP068: 4,4'-DDE	72-55-9	0.5	µg/L	<0.5	5 µg/L	87.6	66.0	112
EP068: Endrin	72-20-8	0.5	µg/L	<0.5	5 µg/L	77.7	65.2	113
EP068: beta-Endosulfan	33213-65-9	0.5	µg/L	<0.5	5 µg/L	98.5	67.3	114
EP068: 4,4'-DDD	72-54-8	0.5	µg/L	<0.5	5 µg/L	98.3	72.0	122
EP068: Endrin aldehyde	7421-93-4	0.5	µg/L	<0.5	5 µg/L	84.4	66.9	109
EP068: Endosulfan sulfate	1031-07-8	0.5	µg/L	<0.5	5 µg/L	97.6	65.2	112
EP068: 4,4'-DDT	50-29-3	2	µg/L	<2.0	5 µg/L	87.5	65.2	112
EP068: Endrin ketone	53494-70-5	0.5	µg/L	<0.5	5 µg/L	76.0	63.8	110
EP068: Methoxychlor	72-43-5	2	µg/L	<2.0	5 µg/L	105	61.1	114
EP068B: Organophosphorus Pesticides (OP) (QCLot: 3470503)								
EP068: Dichlorvos	62-73-7	0.5	µg/L	<0.5	5 µg/L	85.2	65.6	114
EP068: Demeton-S-methyl	919-86-8	0.5	µg/L	<0.5	5 µg/L	81.6	63.7	113
EP068: Monocrotophos	6923-22-4	2	µg/L	<2.0	5 µg/L	23.8	19.7	48.0
EP068: Dimethoate	60-51-5	0.5	µg/L	<0.5	5 µg/L	84.0	69.5	110
EP068: Diazinon	333-41-5	0.5	µg/L	<0.5	5 µg/L	96.0	71.1	110
EP068: Chlorpyrifos-methyl	5598-13-0	0.5	µg/L	<0.5	5 µg/L	105	77.0	119
EP068: Parathion-methyl	298-00-0	2	µg/L	<2.0	5 µg/L	76.4	70.0	124
EP068: Malathion	121-75-5	0.5	µg/L	<0.5	5 µg/L	83.0	68.4	116
EP068: Fenthion	55-38-9	0.5	µg/L	<0.5	5 µg/L	94.5	68.6	112
EP068: Chlorpyrifos	2921-88-2	0.5	µg/L	<0.5	5 µg/L	97.8	75.0	119
EP068: Parathion	56-38-2	2	µg/L	<2.0	5 µg/L	83.4	67.0	121
EP068: Pirimphos-ethyl	23505-41-1	0.5	µg/L	<0.5	5 µg/L	85.9	69.0	121
EP068: Chlorfenvinphos	470-90-6	0.5	µg/L	<0.5	5 µg/L	86.8	71.8	110
EP068: Bromophos-ethyl	4824-78-6	0.5	µg/L	<0.5	5 µg/L	106	67.5	112
EP068: Fenamiphos	22224-92-6	0.5	µg/L	<0.5	5 µg/L	98.8	64.1	116
EP068: Prothiofos	34643-46-4	0.5	µg/L	<0.5	5 µg/L	93.4	67.8	114
EP068: Ethion	563-12-2	0.5	µg/L	<0.5	5 µg/L	83.7	74.0	120
EP068: Carbophenothion	786-19-6	0.5	µg/L	<0.5	5 µg/L	86.6	66.2	114
EP068: Azinphos Methyl	86-50-0	0.5	µg/L	<0.5	5 µg/L	105	51.6	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3470504)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	76.1	55.8	112
EP071: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	97.4	71.6	113
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	84.8	56.0	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3470874)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	75.5	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3470504)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	81.8	57.9	119

Matrix Spike (MS) Report

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP035SF: Total Phenol by Segmented Flow Analyser (QCLot: 3471625)							
ES2101472-001	SW01	EP035SF: Phenols (Total)	----	0.2 mg/L	86.7	65.1	128
EG020F: Dissolved Metals by ICP-MS (QCLot: 3477276)							
ES2101472-004	SW04	EG020A-F: Arsenic	7440-38-2	1 mg/L	113	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	127	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	118	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	118	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	111	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	120	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	123	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 3477277)							
ES2101472-002	SW02	EG035F: Mercury	7439-97-6	0.01 mg/L	74.0	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3474386)							
ES2100964-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	103	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3474390)							
ES2100964-002	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	87.0	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3470874)							

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 Work Order : ES2101472
 Client : ECOZ ENVIRONMENTAL SERVICES
 Project : EZ20207 Archer Waste Surface Water -January 2021



Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Recovery Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3470874) - continued							
ES2101472-001	SW01	EP080: C6 - C9 Fraction	----	325 µg/L	92.2	70.0	130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3470874)							
ES2101472-001	SW01	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	91.8	70.0	130
EP080: BTEXN (QCLot: 3470874)							
ES2101472-001	SW01	EP080: Benzene	71-43-2	25 µg/L	102	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	94.3	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	91.9	70.0	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	91.1	70.0	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	93.8	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	91.4	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2101472	Page	: 1 of 8
Client	: ECOZ ENVIRONMENTAL SERVICES	Laboratory	: Environmental Division Sydney
Contact	: MS CORINNE HUTCHINSON	Telephone	: +61-2-8784 8555
Project	: EZ20207 Archer Waste Surface Water -January 2021	Date Samples Received	: 20-Jan-2021
Site	: ----	Issue Date	: 27-Jan-2021
Sampler	: BILL DWYER	No. of samples received	: 7
Order number	: EZ20207	No. of samples analysed	: 7

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- Surrogate recovery outliers exist for all regular sample matrices - please see following pages for full details.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

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



Regular Sample Surrogates

Sub-Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Samples Submitted							
EP068T: Organophosphorus Pesticide Surrogate	ES2101472-004	SW04	DEF	78-48-8	65.0 %	66.5-111 %	Recovery less than lower data quality objective

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
Pesticides by GCMS	0	7	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	7	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Pesticides by GCMS	0	7	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	0	7	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method	Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural (EA025H)	19-Jan-2021	----	----	----	21-Jan-2021	26-Jan-2021	✔
SW01, SW02,							
SW03, SW04,							
SW05, SW07,							
Duplicate							
EG020F: Dissolved Metals by ICP-MS							
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)	19-Jan-2021	----	----	----	25-Jan-2021	18-Jul-2021	✔
SW01, SW02,							
SW03, SW04,							
SW05, SW07,							
Duplicate							



Matrix: **WATER**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method		Sample Date	Extraction / Preparation				Analysis	
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F)		19-Jan-2021	----	----	----	25-Jan-2021	16-Feb-2021	✓
SW01, SW03, SW05, Duplicate	SW02, SW04, SW07,							
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G)		19-Jan-2021	----	----	----	22-Jan-2021	16-Feb-2021	✓
SW01, SW03, SW05, Duplicate	SW02, SW04, SW07,							
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)		19-Jan-2021	22-Jan-2021	16-Feb-2021	✓	22-Jan-2021	16-Feb-2021	✓
SW01, SW03, SW05, Duplicate	SW02, SW04, SW07,							
EP030: Biochemical Oxygen Demand (BOD)								
Clear Plastic Bottle - Natural (EP030)		19-Jan-2021	----	----	----	20-Jan-2021	21-Jan-2021	✓
SW01, SW03, SW05, Duplicate	SW02, SW04, SW07,							
EP035SF: Total Phenol by Segmented Flow Analyser								
Clear Plastic Bottle - Sulfuric Acid (EP035SF)		19-Jan-2021	----	----	----	21-Jan-2021	16-Feb-2021	✓
SW01, SW03, SW05, Duplicate	SW02, SW04, SW07,							
EP068A: Organochlorine Pesticides (OC)								
Amber Glass Bottle - Unpreserved (EP068)		19-Jan-2021	21-Jan-2021	26-Jan-2021	✓	25-Jan-2021	02-Mar-2021	✓
SW01, SW03, SW05, Duplicate	SW02, SW04, SW07,							
EP068B: Organophosphorus Pesticides (OP)								
Amber Glass Bottle - Unpreserved (EP068)		19-Jan-2021	21-Jan-2021	26-Jan-2021	✓	25-Jan-2021	02-Mar-2021	✓
SW01, SW03, SW05, Duplicate	SW02, SW04, SW07,							

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Evaluation	Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction			Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons									
Amber Glass Bottle - Unpreserved (EP071) SW01, SW03, SW05, Duplicate		SW02, SW04, SW07,	19-Jan-2021	21-Jan-2021	26-Jan-2021	✓	25-Jan-2021	02-Mar-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW01, SW03, SW05, Duplicate		SW02, SW04, SW07,	19-Jan-2021	20-Jan-2021	02-Feb-2021	✓	20-Jan-2021	02-Feb-2021	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
Amber Glass Bottle - Unpreserved (EP071) SW01, SW03, SW05, Duplicate		SW02, SW04, SW07,	19-Jan-2021	21-Jan-2021	26-Jan-2021	✓	25-Jan-2021	02-Mar-2021	✓
Amber VOC Vial - Sulfuric Acid (EP080) SW01, SW03, SW05, Duplicate		SW02, SW04, SW07,	19-Jan-2021	20-Jan-2021	02-Feb-2021	✓	20-Jan-2021	02-Feb-2021	✓
EP080: BTEXN									
Amber VOC Vial - Sulfuric Acid (EP080) SW01, SW03, SW05, Duplicate		SW02, SW04, SW07,	19-Jan-2021	20-Jan-2021	02-Feb-2021	✓	20-Jan-2021	02-Feb-2021	✓



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	12	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	0	7	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Segmented Flow Analyser	EP035SF	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	7	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Segmented Flow Analyser	EP035SF	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	15.00	15.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS	EP068	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Segmented Flow Analyser	EP035SF	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	7	14.29	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	12	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard

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 Work Order : ES2101472
 Client : ECOZ ENVIRONMENTAL SERVICES
 Project : EZ20207 Archer Waste Surface Water -January 2021



Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Matrix Spikes (MS) - Continued							
Pesticides by GCMS	EP068	0	7	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Segmented Flow Analyser	EP035SF	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	7	0.00	5.00	✖	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Biochemical Oxygen Demand (BOD)	EP030	WATER	In house: Referenced to APHA 5210 B. The 5-Day BOD test provides an empirical measure of the oxygen consumption capacity of a given water. A portion of the sample is diluted into oxygenated, nutrient rich water, and a seed added to begin biological decay. The initial dissolved oxygen content is measured, then the bottle is sealed and incubated for five days. The remaining dissolved oxygen is measured, and from the difference, the demand for oxygen, by biological decay, is determined. This method is compliant with NEPM Schedule B(3).
Total Phenol by Segmented Flow Analyser	EP035SF	WATER	In house: Referenced to ISO 14402. The sample is in-line-distilled at pH 1- 4. The distillate, containing steam-volatile phenolic compounds is then oxidised by hexacyanoferrate(III). The resulting quinones react with 4-aminoantipyrine forming red condensation products, which are measured spectrometrically in a flow spectrometer at 505 nm.. This method is compliant with NEPM Schedule B(3)
Pesticides by GCMS	EP068	WATER	In house: Referenced to USEPA SW 846 - 8270 Sample extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)

Page : 8 of 8
 Work Order : ES2101472
 Client : ECOZ ENVIRONMENTAL SERVICES
 Project : EZ20207 Archer Waste Surface Water -January 2021



<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES2112928

Client : ECOZ ENVIRONMENTAL SERVICES Contact : MS CORINNE HUTCHINSON Address : PO BOX 381 DARWIN NT, AUSTRALIA 0801 E-mail : corinne.hutchinson@ecoz.com.au Telephone : +61 08 89811100 Facsimile : +61 08 89811102 Project : EZ20207 Archer Waste Surface Water - March 2021 Order number : ---- C-O-C number : ---- Site : ---- Sampler : JACK DYMALLA	Laboratory : Environmental Division Sydney Contact : Customer Services ES Address : 277-289 Woodpark Road Smithfield NSW Australia 2164 E-mail : ALSEnviro.Sydney@ALSGlobal.com Telephone : +61-2-8784 8555 Facsimile : +61-2-8784 8500 Page : 1 of 3 Quote number : EB2017ECOZENV0001 (EN/222) QC Level : NEPM 2013 B3 & ALS QC Standard
--	--

Dates

Date Samples Received : 09-Apr-2021 07:30	Issue Date : 09-Apr-2021
Client Requested Due : 16-Apr-2021	Scheduled Reporting Date : 16-Apr-2021
Date	

Delivery Details

Mode of Delivery : Carrier	Security Seal : Intact.
No. of coolers/boxes : 1	Temperature : 4.9' C SYD - Ice present
Receipt Detail :	No. of samples received / analysed : 3 / 3

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



Sample Container(s)/Preservation Non-Compliances

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

- No sample container / preservation non-compliance exists.

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **WATER**

Laboratory sample ID	Sampling date / time	Sample ID	WATER - EA025H Suspended Solids - Standard Level	WATER - EK055G Ammonia as N By Discrete Analyser	WATER - EK067G Total Phosphorus as P By Discrete Analyser	WATER - EP030 BOD	WATER - EP035SF Total Phenol by Segmented Flow Analyser	WATER - W-05 TRH/BTEXN/8 Metals
ES2112928-001	08-Apr-2021 00:00	SW01	✓	✓	✓	✓	✓	✓
ES2112928-002	08-Apr-2021 00:00	SW05	✓	✓	✓	✓	✓	✓
ES2112928-003	08-Apr-2021 00:00	SW07	✓	✓	✓	✓	✓	✓

Proactive Holding Time Report

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



Requested Deliverables

BILL DWYER

- *AU Certificate of Analysis - NATA (COA)	Email	Bill.Dwyer@ecoz.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	Bill.Dwyer@ecoz.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	Bill.Dwyer@ecoz.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	Bill.Dwyer@ecoz.com.au
- AU Certificate of Analysis - NATA (With Guidelines) (COA_GL)	Email	Bill.Dwyer@ecoz.com.au
- Chain of Custody (CoC) (COC)	Email	Bill.Dwyer@ecoz.com.au
- EDI Format - ENMRG (ENMRG)	Email	Bill.Dwyer@ecoz.com.au
- EDI Format - ESDAT (ESDAT)	Email	Bill.Dwyer@ecoz.com.au

CORINNE HUTCHINSON

- *AU Certificate of Analysis - NATA (COA)	Email	corinne.hutchinson@ecoz.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	corinne.hutchinson@ecoz.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	corinne.hutchinson@ecoz.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	corinne.hutchinson@ecoz.com.au
- AU Certificate of Analysis - NATA (With Guidelines) (COA_GL)	Email	corinne.hutchinson@ecoz.com.au
- Chain of Custody (CoC) (COC)	Email	corinne.hutchinson@ecoz.com.au
- EDI Format - ENMRG (ENMRG)	Email	corinne.hutchinson@ecoz.com.au
- EDI Format - ESDAT (ESDAT)	Email	corinne.hutchinson@ecoz.com.au

Gisela Lamche

- *AU Certificate of Analysis - NATA (COA)	Email	Gisela.Lamche@ecoz.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	Gisela.Lamche@ecoz.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	Gisela.Lamche@ecoz.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	Gisela.Lamche@ecoz.com.au
- A4 - AU Tax Invoice (INV)	Email	Gisela.Lamche@ecoz.com.au
- AU Certificate of Analysis - NATA (With Guidelines) (COA_GL)	Email	Gisela.Lamche@ecoz.com.au
- Chain of Custody (CoC) (COC)	Email	Gisela.Lamche@ecoz.com.au
- EDI Format - ENMRG (ENMRG)	Email	Gisela.Lamche@ecoz.com.au
- EDI Format - ESDAT (ESDAT)	Email	Gisela.Lamche@ecoz.com.au

INVOICE ADDRESS

- A4 - AU Tax Invoice (INV)	Email	ecoz@ecoz.com.au
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JACK DYMALLA

- *AU Certificate of Analysis - NATA (COA)	Email	jack.dymalla@ecoz.com.au
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)	Email	jack.dymalla@ecoz.com.au
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)	Email	jack.dymalla@ecoz.com.au
- A4 - AU Sample Receipt Notification - Environmental HT (SRN)	Email	jack.dymalla@ecoz.com.au
- AU Certificate of Analysis - NATA (With Guidelines) (COA_GL)	Email	jack.dymalla@ecoz.com.au
- Chain of Custody (CoC) (COC)	Email	jack.dymalla@ecoz.com.au
- EDI Format - ENMRG (ENMRG)	Email	jack.dymalla@ecoz.com.au
- EDI Format - ESDAT (ESDAT)	Email	jack.dymalla@ecoz.com.au

16.04.21



CHAIN OF CUSTODY

ALS Laboratory
please tick →

CLIENT: EcOz Environmental Consultants

OFFICE: Darwin

PROJECT: Archer Waste Surface Water - March 2021

PROJECT NUMBER: EZ20207

PROJECT MANAGER: Corinne Hutchinson

SAMPLER: J Dymalla

COC emailed to ALS? (YES/NO)

Email Reports to: gisela.lamche@ecoz.com.au; jack.dymalla@ecoz.com.au; bill.dwyer@ecoz.com.au

Email Invoice to: ecoz@ecoz.com.au; gisela.lamche@ecoz.com.au

TURNAROUND REQUIREMENTS:

(Standard TAT may be longer for some tests e.g. Ultra Trace Organics)

ALB QUOTE NO.: EN/222/20

SAMPLING ROUND: of 3

CONTACT PH: 8981 1110

SAMPLER MOBILE: 0411778612

EDD FORMAT:

RELINQUISHED BY: Jack Dymalla

DATE/TIME: 8.4.21

STANDARD TAT

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

RECEIVED BY: Kim

DATE/TIME: 08.04.21

RECEIVED BY: Kim

DATE/TIME: 09.04.21

FOR LABORATORY USE ONLY (Circle)

Outlet Seal intact? Yes No N/A

Freezer / frozen ice packs present upon receipt? Yes No N/A

Random Sample Temperature on Receipt

Other comment:

RECEIVED BY: Kim

DATE/TIME: 09.04.21

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL: Please report COA_GL for results comparison against ANZECC 2000 95% protection marine waters. Thank you.

7.30am

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required)										Additional Information	
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL CONTAINERS	W-5 TRH/BTEX/8 Metals	Total suspended solids	Biological oxygen demand	Ammonia	Phosphorus	OC/OP (first round only)	Total phenolics					Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
①	SW01 ✓	08.04.21	W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓		✓					
	SW02		W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓		✓					
	SW03		W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓		✓					
	SW04		W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓		✓					
②	SW05 ✓	08.04.21	W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓		✓					
	SW06		W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓		✓					
③	SW07 ✓	08.04.21	W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓		✓					
	Duplicate		W	Amber X1 100mL, X2 vials, metals, green plastic 500mL, purple plastic X2	7	✓	✓	✓	✓	✓		✓					
TOTAL																	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic; Y = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulfate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Solids; B = Unpreserved Bag.

Environmental Division
Sydney
Work Order Reference
ES2112928



Telephone : - 61-2-8784 8555

CERTIFICATE OF ANALYSIS

Work Order : **ES2112928**
Client : **ECOZ ENVIRONMENTAL SERVICES**
Contact : MS CORINNE HUTCHINSON
Address : PO BOX 381
 DARWIN NT, AUSTRALIA 0801
Telephone : +61 08 89811100
Project : EZ20207 Archer Waste Surface Water - March 2021
Order number : ----
C-O-C number : ----
Sampler : JACK DYMALLA
Site : ----
Quote number : EN/222
No. of samples received : 3
No. of samples analysed : 3

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 : 09-Apr-2021 07:30
Date Analysis Commenced : 09-Apr-2021
Issue Date : 19-Apr-2021 12:49



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>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW



General Comments

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

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

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

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

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

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

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

- 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	SW01	SW05	SW07	----	----
Sampling date / time					08-Apr-2021 00:00	08-Apr-2021 00:00	08-Apr-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2112928-001	ES2112928-002	ES2112928-003	-----	-----
					Result	Result	Result	----	----
EA025: Total Suspended Solids dried at 104 ± 2°C									
Suspended Solids (SS)	----	5	mg/L		14	11	11	----	----
EG020F: Dissolved 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	<0.005	----	----
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	----	----
EK055G: Ammonia as N by Discrete Analyser									
Ammonia as N	7664-41-7	0.01	mg/L		0.06	0.05	0.09	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	0.01	mg/L		0.02	0.02	0.02	----	----
EP030: Biochemical Oxygen Demand (BOD)									
Biochemical Oxygen Demand	----	2	mg/L		<2	<2	<2	----	----
EP035SF: Total Phenol by Segmented Flow Analyser									
Phenols (Total)	----	0.05	mg/L		<0.05	<0.05	<0.05	----	----
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		<100	<100	<100	----	----
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		<50	<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		<100	<100	<100	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		<100	<100	<100	----	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Sample ID	SW01	SW05	SW07	----	----
Sampling date / time					08-Apr-2021 00:00	08-Apr-2021 00:00	08-Apr-2021 00:00	----	----
Compound	CAS Number	LOR	Unit		ES2112928-001	ES2112928-002	ES2112928-003	-----	-----
					Result	Result	Result	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ >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	----	----
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	2	%		108	102	106	----	----
Toluene-D8	2037-26-5	2	%		108	94.9	99.4	----	----
4-Bromofluorobenzene	460-00-4	2	%		106	97.1	103	----	----



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

QUALITY CONTROL REPORT

Work Order	: ES2112928	Page	: 1 of 6
Client	: ECOZ ENVIRONMENTAL SERVICES	Laboratory	: Environmental Division Sydney
Contact	: MS CORINNE HUTCHINSON	Contact	: Customer Services ES
Address	: PO BOX 381 DARWIN NT, AUSTRALIA 0801	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 08 89811100	Telephone	: +61-2-8784 8555
Project	: EZ20207 Archer Waste Surface Water - March 2021	Date Samples Received	: 09-Apr-2021
Order number	: ----	Date Analysis Commenced	: 09-Apr-2021
C-O-C number	: ----	Issue Date	: 19-Apr-2021
Sampler	: JACK DYMALLA		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 3		
No. of samples analysed	: 3		



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

This Quality Control Report contains the following information:

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Sanjeshni Jyoti	Senior Chemist Volatiles	Sydney Organics, Smithfield, NSW

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

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
= Indicates failed QC

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

Sub-Matrix: WATER				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP035SF: Total Phenol by Segmented Flow Analyser (QC Lot: 3615678)									
EB2109269-001	Anonymous	EP035SF: Phenols (Total)	----	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES2113189-001	Anonymous	EP035SF: Phenols (Total)	----	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3619231)									
ES2112928-001	SW01	EA025H: Suspended Solids (SS)	----	5	mg/L	14	17	15.9	No Limit
ES2112983-003	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	22	21	6.98	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3624000)									
ES2112908-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
ES2112913-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.069	0.066	4.21	0% - 20%
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 3624002)									
ES2112909-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES2112910-005	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3616079)									

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 Work Order : ES2112928
 Client : ECOZ ENVIRONMENTAL SERVICES
 Project : EZ20207 Archer Waste Surface Water - March 2021



Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EK055G: Ammonia as N by Discrete Analyser (QC Lot: 3616079) - continued									
ES2112694-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	0.06	0.04	41.0	No Limit
ES2112944-001	Anonymous	EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	<0.01	0.00	No Limit
EK067G: Total Phosphorus as P by Discrete Analyser (QC Lot: 3617332)									
ES2112756-008	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	160 µg/L	0.16	0.00	No Limit
ES2112644-001	Anonymous	EK067G: Total Phosphorus as P	----	0.01	mg/L	1.17	1.18	0.968	0% - 20%
EP030: Biochemical Oxygen Demand (BOD) (QC Lot: 3612009)									
ES2112683-001	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	14	10	33.3	No Limit
ES2112956-008	Anonymous	EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	<2	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3611811)									
ES2112928-001	SW01	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
ES2112961-006	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3611811)									
ES2112928-001	SW01	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
ES2112961-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EP080: BTEXN (QC Lot: 3611811)									
ES2112928-001	SW01	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
ES2112961-006	Anonymous	EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit



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

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

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%) LCS	Acceptable Limits (%) Low High	
Method: Compound	CAS Number	LOR	Unit	Result				
EP035SF: Total Phenol by Segmented Flow Analyser (QCLot: 3615678)								
EP035SF: Phenols (Total)	----	0.05	mg/L	<0.05	0.2 mg/L	96.6	70.9	123
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3619231)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	105	83.0	129
				<5	1000 mg/L	100	82.0	110
				<5	463 mg/L	99.2	83.0	118
EG020F: Dissolved Metals by ICP-MS (QCLot: 3624000)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	86.0	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	86.4	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	85.2	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	87.2	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	83.8	83.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	87.7	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	83.4	81.0	117
EG035F: Dissolved Mercury by FIMS (QCLot: 3624002)								
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.3	83.0	105
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3616079)								
EK055G: Ammonia as N	7664-41-7	0.01	mg/L	<0.01	1 mg/L	94.6	90.0	114
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3617332)								
EK067G: Total Phosphorus as P	----	0.01	mg/L	<0.01	4.42 mg/L	81.9	71.0	101
				<0.01	0.442 mg/L	92.6	72.0	108
				<0.01	1 mg/L	110	70.0	130
EP030: Biochemical Oxygen Demand (BOD) (QCLot: 3612009)								
EP030: Biochemical Oxygen Demand	----	2	mg/L	<2	200 mg/L	89.5	74.0	112
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3611811)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	260 µg/L	94.3	75.0	127
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3612851)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	70.1	55.8	112
EP071: C15 - C28 Fraction	----	100	µg/L	<100	600 µg/L	94.8	71.6	113
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	101	56.0	121
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3611811)								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	310 µg/L	94.1	75.0	127
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3612851)								
EP071: >C10 - C16 Fraction	----	100	µg/L	<100	500 µg/L	82.1	57.9	119



Sub-Matrix: **WATER**

Method: Compound				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike Concentration	Spike Recovery (%)	Acceptable Limits (%)	
						LCS	Low	High
CAS Number	LOR	Unit	Result					
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3612851) - continued								
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	700 µg/L	99.4	62.5	110
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	300 µg/L	94.7	61.5	121
EP080: BTEXN (QCLot: 3611811)								
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	95.4	70.0	122
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	98.4	69.0	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	101	70.0	120
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	98.1	69.0	121
	106-42-3							
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	10 µg/L	104	72.0	122
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	100	70.0	120

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Sub-Matrix: WATER				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP035SF: Total Phenol by Segmented Flow Analyser (QCLot: 3615678)							
EB2109269-001	Anonymous	EP035SF: Phenols (Total)	----	0.2 mg/L	94.3	65.1	128
EG020F: Dissolved Metals by ICP-MS (QCLot: 3624000)							
ES2112909-002	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	84.3	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	86.2	70.0	130
		EG020A-F: Chromium	7440-47-3	1 mg/L	88.5	70.0	130
		EG020A-F: Copper	7440-50-8	1 mg/L	89.2	70.0	130
		EG020A-F: Lead	7439-92-1	1 mg/L	87.3	70.0	130
		EG020A-F: Nickel	7440-02-0	1 mg/L	89.8	70.0	130
		EG020A-F: Zinc	7440-66-6	1 mg/L	88.1	70.0	130
EG035F: Dissolved Mercury by FIMS (QCLot: 3624002)							
ES2112908-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	86.8	70.0	130
EK055G: Ammonia as N by Discrete Analyser (QCLot: 3616079)							
ES2112694-001	Anonymous	EK055G: Ammonia as N	7664-41-7	1 mg/L	96.8	70.0	130
EK067G: Total Phosphorus as P by Discrete Analyser (QCLot: 3617332)							
ES2112756-001	Anonymous	EK067G: Total Phosphorus as P	----	1 mg/L	102	70.0	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3611811)							
ES2112928-001	SW01	EP080: C6 - C9 Fraction	----	325 µg/L	108	70.0	130

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 Work Order : ES2112928
 Client : ECOZ ENVIRONMENTAL SERVICES
 Project : EZ20207 Archer Waste Surface Water - March 2021



Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3611811)							
ES2112928-001	SW01	EP080: C6 - C10 Fraction	C6_C10	375 µg/L	104	70.0	130
EP080: BTEXN (QCLot: 3611811)							
ES2112928-001	SW01	EP080: Benzene	71-43-2	25 µg/L	99.0	70.0	130
		EP080: Toluene	108-88-3	25 µg/L	95.9	70.0	130
		EP080: Ethylbenzene	100-41-4	25 µg/L	101	70.0	130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	99.5	70.0	130
			106-42-3				
		EP080: ortho-Xylene	95-47-6	25 µg/L	103	70.0	130
		EP080: Naphthalene	91-20-3	25 µg/L	90.1	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2112928	Page	: 1 of 7
Client	: ECOZ ENVIRONMENTAL SERVICES	Laboratory	: Environmental Division Sydney
Contact	: MS CORINNE HUTCHINSON	Telephone	: +61-2-8784 8555
Project	: EZ20207 Archer Waste Surface Water - March 2021	Date Samples Received	: 09-Apr-2021
Site	: ----	Issue Date	: 19-Apr-2021
Sampler	: JACK DYMALLA	No. of samples received	: 3
Order number	: ----	No. of samples analysed	: 3

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

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



Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TRH - Semivolatile Fraction	0	20	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
TRH - Semivolatile Fraction	0	20	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis		
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA025: Total Suspended Solids dried at 104 ± 2°C								
Clear Plastic Bottle - Natural (EA025H)								
SW01,	SW05,	08-Apr-2021	----	----	----	14-Apr-2021	15-Apr-2021	✓
SW07								
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG020A-F)								
SW01,	SW05,	08-Apr-2021	----	----	----	16-Apr-2021	05-Oct-2021	✓
SW07								
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Filtered; Lab-acidified (EG035F)								
SW01,	SW05,	08-Apr-2021	----	----	----	16-Apr-2021	06-May-2021	✓
SW07								
EK055G: Ammonia as N by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK055G)								
SW01,	SW05,	08-Apr-2021	----	----	----	13-Apr-2021	06-May-2021	✓
SW07								
EK067G: Total Phosphorus as P by Discrete Analyser								
Clear Plastic Bottle - Sulfuric Acid (EK067G)								
SW01,	SW05,	08-Apr-2021	13-Apr-2021	06-May-2021	✓	13-Apr-2021	06-May-2021	✓
SW07								
EP030: Biochemical Oxygen Demand (BOD)								
Clear Plastic Bottle - Natural (EP030)								
SW01,	SW05,	08-Apr-2021	----	----	----	09-Apr-2021	10-Apr-2021	✓
SW07								



Matrix: **WATER**

Evaluation: ✖ = Holding time breach ; ✔ = Within holding time.

Method		Sample Date	Extraction / Preparation			Analysis			
Container / Client Sample ID(s)			Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP035SF: Total Phenol by Segmented Flow Analyser									
Clear Plastic Bottle - Sulfuric Acid (EP035SF)	SW01, SW07	SW05,	08-Apr-2021	----	----	----	13-Apr-2021	06-May-2021	✓
EP080/071: Total Petroleum Hydrocarbons									
Amber Glass Bottle - Unpreserved (EP071)	SW01, SW07	SW05,	08-Apr-2021	13-Apr-2021	15-Apr-2021	✓	15-Apr-2021	23-May-2021	✓
Amber TOC Vial - Sulfuric Acid (EP080)	SW01, SW07	SW05,	08-Apr-2021	14-Apr-2021	22-Apr-2021	✓	14-Apr-2021	22-Apr-2021	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
Amber Glass Bottle - Unpreserved (EP071)	SW01, SW07	SW05,	08-Apr-2021	13-Apr-2021	15-Apr-2021	✓	15-Apr-2021	23-May-2021	✓
Amber TOC Vial - Sulfuric Acid (EP080)	SW01, SW07	SW05,	08-Apr-2021	14-Apr-2021	22-Apr-2021	✓	14-Apr-2021	22-Apr-2021	✓
EP080: BTEXN									
Amber TOC Vial - Sulfuric Acid (EP080)	SW01, SW07	SW05,	08-Apr-2021	14-Apr-2021	22-Apr-2021	✓	14-Apr-2021	22-Apr-2021	✓



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)		Quality Control Specification	
Analytical Methods	Method	QC	Regular	Actual	Expected		Evaluation
Laboratory Duplicates (DUP)							
Ammonia as N by Discrete analyser	EK055G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Segmented Flow Analyser	EP035SF	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	3	20	15.00	15.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Segmented Flow Analyser	EP035SF	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	3	20	15.00	15.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Biochemical Oxygen Demand (BOD)	EP030	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Suspended Solids (High Level)	EA025H	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Segmented Flow Analyser	EP035SF	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Ammonia as N by Discrete analyser	EK055G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phenol by Segmented Flow Analyser	EP035SF	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Phosphorus as P By Discrete Analyser	EK067G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	0	20	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard

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Matrix: **WATER**

Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Matrix Spikes (MS) - Continued							
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3).
Ammonia as N by Discrete analyser	EK055G	WATER	In house: Referenced to APHA 4500-NH ₃ G Ammonia is determined by direct colorimetry by Discrete Analyser. This method is compliant with NEPM Schedule B(3)
Total Phosphorus as P By Discrete Analyser	EK067G	WATER	In house: Referenced to APHA 4500-P H, Jirka et al, Zhang et al. This procedure involves sulphuric acid digestion of a sample aliquot to break phosphorus down to orthophosphate. The orthophosphate reacts with ammonium molybdate and antimony potassium tartrate to form a complex which is then reduced and its concentration measured at 880nm using discrete analyser. This method is compliant with NEPM Schedule B(3)
Biochemical Oxygen Demand (BOD)	EP030	WATER	In house: Referenced to APHA 5210 B. The 5-Day BOD test provides an empirical measure of the oxygen consumption capacity of a given water. A portion of the sample is diluted into oxygenated, nutrient rich water, and a seed added to begin biological decay. The initial dissolved oxygen content is measured, then the bottle is sealed and incubated for five days. The remaining dissolved oxygen is measured, and from the difference, the demand for oxygen, by biological decay, is determined. This method is compliant with NEPM Schedule B(3).
Total Phenol by Segmented Flow Analyser	EP035SF	WATER	In house: Referenced to ISO 14402. The sample is in-line-distilled at pH 1- 4. The distillate, containing steam-volatile phenolic compounds is then oxidised by hexacyanoferrate(III). The resulting quinones react with 4-aminoantipyrine forming red condensation products, which are measured spectrometrically in a flow spectrometer at 505 nm.. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	WATER	In house: Referenced to USEPA SW 846 - 8015 The sample extract is analysed by Capillary GC/FID and quantification is by comparison against an established 5 point calibration curve of n-Alkane standards. This method is compliant with the QC requirements of NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260 Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
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Preparation Methods	Method	Matrix	Method Descriptions
TKN/TP Digestion	EK061/EK067	WATER	In house: Referenced to APHA 4500 Norg - D; APHA 4500 P - H. This method is compliant with NEPM Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	In house: Referenced to USEPA SW 846 - 3510 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM Schedule B(3) . ALS default excludes sediment which may be resident in the container.
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for purging.



EcOz Environmental Consultants

EcOz Pty Ltd.

ABN 81 143 989 039

Level 1, 70 Cavenagh St,
GPO Box 381,
Darwin, NT 0801

T: +61 8 8981 1100

E: ecoz@ecoz.com.au

www.ecoz.com.au



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