Environmental Resources Management Australia

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5 May, 2014

Rajan Sinha
Yara Pilbara Nitrates Pty Ltd
5th Floor, 182 St Georges Terrace
PERTH WA 6000

Our Reference: *0220651/01/02*

Attention: **Rajan Sinha**

Dear Rajan,

RE: GROUNDWATER MONITORING EVENT APRIL 2014

1. INTRODUCTION

Environmental Resources Management Australia Pty Ltd (ERM) was engaged by Yara Pilbara Nitrates Pty Ltd (YPNPL) to conduct a Groundwater Monitoring Event (GME) at the proposed site for the YPNPL Technical Ammonium Nitrates Production Facility (TANPF) on 9th of April 2014.

This report outlines the detection of analytes above trigger levels. The site location and layout are illustrated in *Figures 1* and *2*, provided in *Annex A.*

For the convenience of the reader, an acronyms and abbreviations table is provided below.

Table 1 Acronyms and Abbreviations

Acronym /Abbreviation	Expansion	Further Definition (if applicable)
ALS	ALS Environmental (laboratory)	
ANZECC	Australian and New Zealand Environment Conservation Council	
AS/NZS	Australian Standard/New Zealand Standard	
BIE	Burrup Industrial Estate	
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes	
CaCO3	Calcium Carbonate	
CEO	Chief Executive Officer	

Acronym /Abbreviation	Expansion	Further Definition (if applicable)
EQL	Estimated Quantitation Limit	The minimum concentration of an analyte that can be measured within specified limits of precision and accuracy.
ERM	Environmental Resources Management Ltd Pty	
GME	Groundwater Monitoring Event	
H&S	Health and Safety	
ha	Hectare	
mg	Milligram	
L	Litre	
MW	Monitoring Well	
N	Nitrogen	
NATA	National Association of Testing Authorities	The Australian government's endorsed provider of accreditation for laboratories and similar testing facilities.
NO2-	Nitrite	
NO3-	Nitrate	
OEPA	Office of the Environmental Protection Authority	
ORP	Oxidation Reduction Potential (Redox)	A measure of the electrochemical potential or electron availability within the water and soil.
P	Phosphorus	
QA/QC	Quality Assurance / Quality Control	
RPD	Relative Percentage Difference	The relative change or difference between two values, expressed as a percentage.
TANPF	Technical Ammonium Nitrates Production Facility	
TDS	Total dissolved solids	A measure of the organic and inorganic dissolved substances in water,
TPH	Total Petroleum Hydrocarbons	
TSS	Total Suspended Solids	A measure of all particles suspended in water.

Acronym /Abbreviation	Expansion	Further Definition (if applicable)
WARN	Work Activity Risk Assessment	
YPNPL	Yara Pilbara Nitrates Pty Ltd	
µg	Microgram	

2. PROJECT APPRECIATION

The site (including temporary laydown areas) occupies approximately 35 ha of land in the north-western section of Lot 3017. Lot 3017 totals approximately 49 ha and is located within the Burrup Industrial Estate (BIE). The existing ammonia fertiliser plant is situated adjacent to the western boundary of Lot 3017.

The civil works for the TANPF include the following activities:

- excavation and backfilling works;
- foundations of structures, permanent buildings equipment and modules;
- concrete structures (*in situ* and precast);
- pipe racks foundations;
- roads and pavements;
- underground piping and grounding;
- electrical trenches civil works; and
- civil completion.

The construction works are approximately 74% complete with the project on track to commence pre-commissioning activities in January 2015, commissioning from April to June 2015, and operations from July 2015.

3. REGULATORY REQUIREMENTS

Condition 8-4 of Ministerial Statement No. 870 requires YPNPL to sample/monitor all groundwater bores required by Condition 8-3 every six months. The condition sets a trigger value of 10% above the baseline contaminant concentrations which were characterised and established prior to the commencement of works at the site.

In accordance with Condition 8-5 of Ministerial Statement No. 870, YPNPL are required to:

1) report findings to the Chief Executive Officer (CEO) of the Office of the Environmental Protection Authority (OEPA) within 7 days of the exceedence being identified;

2) provide evidence which allows determination of the cause of the exceedence; and

3) if determined by the CEO to be project attributable, take actions to address the exceedence within seven days of the determination being made.

YPNPL reported the exceedences identified in the April 2014 GME by 02 May 2014, within seven days of the exceedences being identified.

4. OBJECTIVES

The primary objective of the April GME was to assess groundwater quality and determine if the site work has impacted the groundwater below the site. Given the variability recorded between previous monitoring events the April GME provides an opportunity to further evaluate natural variability of groundwater conditions.

5. SCOPE OF WORKS

In order to achieve the project objectives, the following scope of work was completed by ERM:

1) Preparation of site works risk/hazard analysis documents (Work Activity Risk Assessment (WARN)) and the preparation of a health and safety plan to oversee safe work practices at the site;

2) Preparation of a travel communication plan to be implemented during field work to maintain contact between site personnel and the ERM project manager;

3) A single GME in April 2014, comprising the sampling of five established on-site wells (*Figure 2*).

   The GME included:

   a) Gauging of groundwater depths;

b) Measurement of groundwater field parameters using a calibrated water quality meter and included temperature, pH, oxygen reduction potential (ORP), electrical conductivity and dissolved oxygen during well purging to determine the stabilisation of field parameters prior to groundwater sampling; and

c) Collection of groundwater samples to assess groundwater conditions.

4) Laboratory analysis of groundwater samples, including a Modified Acid Sulphate Soils Suite and an Extended Groundwater Quality suite. Five primary samples (one from each well), one duplicate sample and relevant quality assurance samples were taken. Analysis was undertaken by ALS Environmental (ALS), a NATA accredited laboratory, to ensure quality assurance;

5) Screening of laboratory results against trigger levels; and

6) The preparation of this short factual report to detail the scope of works undertaken and the results of the investigation.

6. METHODOLGY

6.1 HEALTH AND SAFETY

All works were completed in accordance with ERM health and safety (H&S) procedures. This included the preparation of site works risk/hazard analysis documents and the preparation of an H&S plan to ensure safe work practices at the site. A travel communication plan was also prepared. This was especially important given the level of construction activity on site.

6.2 GAUGING OF GROUNDWATER DEPTHS

Groundwater monitoring wells were gauged during the GME with an interface probe in accordance with ERM's standard operation procedures. Groundwater levels where recorded, are presented in *Table 1* of *Annex B.*

6.3 GROUNDWATER SAMPLING

The five existing groundwater monitoring wells (MW1-MW5) were purged and sampled in accordance with ERM's standard groundwater sampling protocols using low flow methodology.

Field parameters were measured using a calibrated water quality meter and included temperature, pH, oxygen reduction potential, electrical conductivity and dissolved oxygen. The stabilised water quality parameters are detailed in *Table 1* of *Annex B.*

All groundwater samples were collected, stored and transported to the laboratory under strict chain of custody procedures.

Field measured pH has been used in the interpretation of results in this report as, given the location of the TANPF site, it was not possible to deliver the samples to the laboratory within the 6 hour holding time for this parameter.

6.4 QUALITY ASSURANCE AND QUALITY CONTROL

QA/QC samples were collected and analysed in accordance with *Australian Standard AS/NZS 5667.11:1998: Water Quality – Sampling – Guidance on Sampling of Groundwater.* This included the collection of field duplicates at a frequency of no less than 1 in 10 samples as well as a rinsate sample from the interface meter to demonstrate the sufficiency of the decontamination procedure.

A single duplicate sample was collected from MW3 and submitted for laboratory analysis. Of the Relative Percentage Difference (RPD) values able to be calculated, all were within the acceptable limit except Aluminium, Copper, Manganese and Potassium. Given the high level of reproducibility for other analytes, this is not considered to represent an unacceptable level of uncertainty with respect to data quality.

A rinsate sample was collected from the equipment and submitted for laboratory analysis following the GME. The results showed all analytes below the laboratory limit of detection except for Alkalinity and Chloride. Given the majority of analytes were below the limit of detection this is not considered to represent an unacceptable level of uncertainty with respect to data quality.

The trip blank sample stored in the esky during transit did not record any analytes above the limit of detection providing confidence that there has been no cross contamination from samples during transit and storage.

6.5 LABORATORY ANALYSIS

Groundwater samples were submitted to NATA accredited laboratory ALS. Samples were analysed for a suite of compounds including:

- Cations and anions including calcium, magnesium, sodium, potassium, phosphate, ammonia, carbonate, bicarbonate, chloride, sulphate, nitrate, nitrite and silica;
- Total dissolved solids (TDS), and total alkalinity; and
- Dissolved metals including; aluminium, arsenic, cadmium, chromium, iron, lead, manganese, mercury, selenium and zinc.

The water quality parameters analysed are detailed in *Table 2* and *Table 3* of *Annex B*.

7. RESULTS AND DISCUSSION

Depth to groundwater ranged from 2.45 m (MW3) to 5.86 m (MW1) below top of casing. Compared to October 2013, water level has increased in MW1 and MW2 and MW5 and decreased in MW3and MW4. The observed pattern is likely as a result of a combination of increased rainfall over the period and tidal variation.

Groundwater temperature ranged between 29.3 (MW3) and 32.6 (MW1); which is higher than previous monitoring in October 2013 and can most likely be attributed to seasonal changes in weather conditions.

The pH results ranged between 6.98 (MW2) and 7.50 (MW3).

ORP readings were consistent for the duration of the sampling period (approx. 40.20 – 73.10 mV).

Electrical conductivity was consistent across the monitoring wells compared to previous GME's. Electrical conductivity increases with increased salinity towards the tidal flats. MW1 and MW2 are brackish, MW3 is saline and groundwater from MW4 and MW5 is hypersaline.

Dissolved oxygen content was recorded as 0.64 – 1.67 mg/L during the GME. Results are consistent with previous GME's.

The field and laboratory results of the GME are presented in *Annex B* and laboratory analytical reports and chain of custody documentation are presented in *Annex C*. A review of the data displayed a number of low exceedences of the trigger levels (set at 10% above the maximum baseline concentration). The following exceedences of trigger levels were observed.

Table 2 Exceedences of Trigger Levels (April 2014)

Well	Analyte	Exceedence	Trends (over past 8 GMEs)
MW1	Iron (Filtered)	0.437 mg/L compared to the maximum acceptable baseline value of 0.264 mg/L.	Historical results (between <0.005 – 0.437 mg/L) likely represent natural variation in groundwater chemistry.
	Manganese	0.272 mg/L compared to the maximum acceptable baseline value of 0.242 mg/L.	Historical results (between 0.038 – 0.425 mg/L) likely represent natural variation in groundwater chemistry.
MW2	Nitrate (as N)	4.94 mg/L compared to the maximum acceptable baseline value of 3.63 mg/L.	Historical results (between 0.51 – 3.3 mg/L) likely represent natural variation in groundwater chemistry.
	Nitrogen (Total Oxidised)	4.95 mg/L compared to the maximum acceptable baseline value of 3.63 mg/L.	Historical results (between 0.51 – 3.3 mg/L) likely represent natural variation in groundwater chemistry.
MW3	Fluoride	1.7 mg/L compared to the maximum acceptable baseline value of 1.65 mg/L.	Historical results (between <0.1 – 1.6 mg/L) likely represent natural variation in groundwater chemistry and the actual difference between the reported concentration and the baseline value is in fact very small.
	Selenium	0.0035 mg/L compared to the maximum acceptable baseline value of 0.0033 mg/L.	Historical results (between 0.0038 - <0.01 mg/L) likely represent natural variation in groundwater chemistry. Furthermore the actual difference between the reported concentration and the baseline value is very small.
MW4	Nitrogen (Total)	3.8 mg/L compared to the maximum acceptable baseline value of 2.97 mg/L.	Historical results (between 0.31 – 0.72 mg/L) likely represent natural variation in groundwater chemistry.
	Nitrate (as N)	4.07 mg/L compared to the maximum acceptable baseline value of 3.63 mg/L.	Historical results (between 0.17 – 2.89 mg/L) likely represent natural variation in groundwater chemistry.
	Nitrogen (Total Oxidised)	4.07 mg/L compared to the maximum acceptable baseline value of 3.63 mg/L.	Historical results (between 0.17 – 2.89 mg/L) likely represent natural variation in groundwater chemistry.

Well	Analyte	Exceedence	Trends (over past 8 GMEs)
	Nitrogen (Total)	7870 µg/L compared to the maximum acceptable baseline value of 5610 µg/L.	Historical results (between 540 – 3600 µg/L) likely represent natural variation in groundwater chemistry.
	Aluminium (Filtered)	Unable to verify results at MW4 as the detection limit of <0.025 mg/L is higher than the maximum acceptable baseline value of 0.0209 mg/L due to the hyper saline groundwater.	The elevation of the limits of reporting is marginally higher than the baseline value and therefore the actual value may be less than the trigger level. It is considered that any historical exceedence likely to represent natural variation in groundwater chemistry (between <0.005 – 0.3mg/L).
	Selenium	Unable to verify results at MW4 as the detection limit of <0.01 mg/L is higher than the maximum acceptable baseline value of 0.0033 mg/L. The detection limit was affected by the high saline groundwater.	Although the elevation of the limits of reporting are marginally higher than the baseline value and therefore the actual value may be less than the trigger level. It is considered that any potential exceedence is likely to represent natural variation in groundwater chemistry.
MW5	Aluminium (Filtered)	0.086 mg/L is higher than the maximum acceptable baseline value of 0.0209 mg/L due to the hyper saline groundwater.	It is considered that any exceedence would be likely to represent natural variation in groundwater chemistry (between <0.005 – 0.031 mg/L).
	Selenium	Unable to verify results at MW5 as the detection limit of <0.004 mg/L is higher than the maximum acceptable baseline value of 0.0033 mg/L. Due to the hyper saline groundwater.	Although the elevation of the limits of reporting are marginally higher than the baseline value and therefore the actual value may be less than the trigger level. It is considered that any potential exceedence is likely to represent natural variation in groundwater chemistry.

Elsewhere concentrations of analytes were consistent with previously recorded conditions.

There could be natural variations in groundwater chemistry between the original and replacement wells because a different part of the aquifer is being sampled.

8. CONCLUSION

The results of the April 2014 GME display a number of exceedences in the set trigger levels, though exceedences were very small in most of the cases. With the exception of aluminium at MW3, none of the analytes which exceeded a trigger level during the April 2013 GME exceeded the trigger level during the October 2013 GME at the same well location. Sampling methodology has remained consistent. It is noted that the salinity of the groundwater varies from brackish to hypersaline the closer the wells are to the natural surface water drainage systems. Groundwater in the vicinity of MW5 has likely been derived from multiple directions, while those monitoring wells located further away from the main drainage intercept groundwater from more discrete flow directions.

Until the wells are surveyed in, it is not possible to assess actual groundwater flow direction. However, what is likely is that depending on the groundwater flow paths intercepted by the monitoring wells, groundwater chemistry is likely to differ between wells. In addition, rainfall events and cyclonic activity causing localised flooding will result in seasonal changes to groundwater recharge and resultant groundwater chemistry.

The results continue to support the notion that variability in the groundwater chemistry observed both between monitoring wells and between monitoring events with no clear trends suggests the results depict natural variability in groundwater chemistry as opposed to increasing concentrations of analytes associated with site activities. None of the analytes observed exceeding the trigger levels are directly attributed to current on site activities.

Exceedences recorded during April 2014 GME can be attributed to natural variation in groundwater chemistry and are not considered to be the result of activities at the construction site. The inconsistent trends point to variability in groundwater chemistry both at a given point and over time. It is noted that there is a downstream fertiliser manufacturing plant that could contribute to the chemical loading.

Based on the data collected since April 2011, it appears that the trigger levels in their current form, may not be an effective tool in themselves in establishing early indicators of environmental impacts. The most recent results continue to show this variability with still no clear trends established.

The variability in chemistry between monitoring wells and between monitoring events should continue to be assessed biannually in order to build a more comprehensive data set of range in concentration over time focusing any trends of continued increasing concentrations and if so, are they related to any changed site activities.

Should you require any clarification please contact the undersigned.

Yours sincerely,
for Environmental Resources Management Australia Pty Ltd

Sean Scaife
Project Manager

Paul Myers-Allen
Partner

Attachments:
Annex A – Site Location & Well Locations
Annex B – Results Tables
Annex C – Laboratory Analytical Reports

Annex A

SITE LOCATION & WELL LOCATIONS

Legend

- Area of Disturbance 'The Site'
- Lot 3017
- Site D Boundary

N

0 500 1,000 1,500m

Client:	Yarra Pilbara Nitrates Pty Ltd	
Drawing No:	0220651p_GME_April_2014_G001_R0.mxd	
Date:	30/04/2014	Drawing Size: A4
Drawn By:	DN	Reviewed By: SLS

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

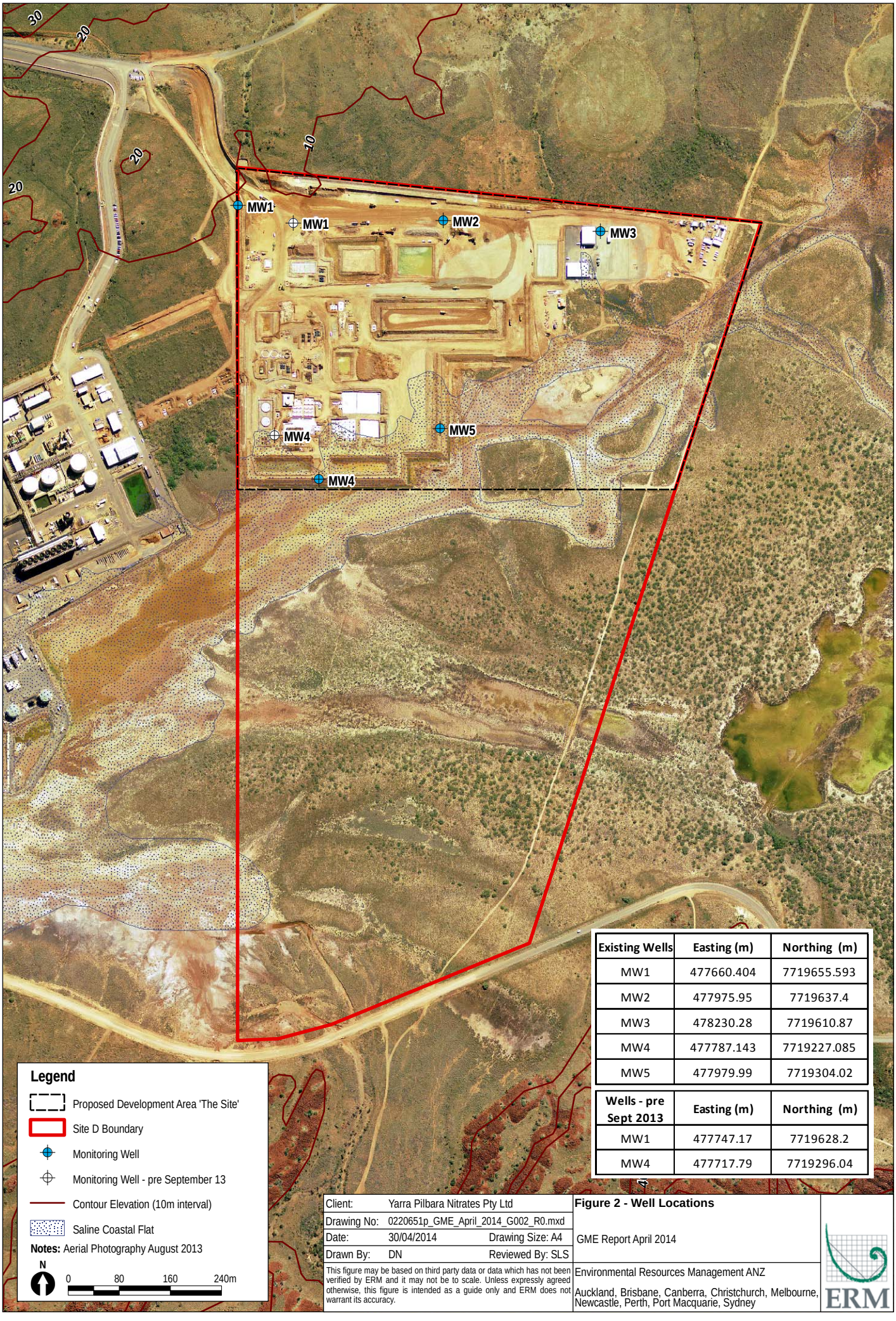
Figure 1 - Site Location

GME Report April 2014

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Existing Wells	Easting (m)	Northing (m)
MW1	477660.404	7719655.593
MW2	477975.95	7719637.4
MW3	478230.28	7719610.87
MW4	477787.143	7719227.085
MW5	477979.99	7719304.02

Wells - pre Sept 2013	Easting (m)	Northing (m)
MW1	477747.17	7719628.2
MW4	477717.79	7719296.04

Legend

- Proposed Development Area 'The Site'
- Site D Boundary
- Monitoring Well
- Monitoring Well - pre September 13
- Contour Elevation (10m interval)
- Saline Coastal Flat

Notes: Aerial Photography August 2013

N

0 80 160 240m

Client:	Yarra Pilbara Nitrates Pty Ltd	
Drawing No:	0220651p_GME_April_2014_G002_R0.mxd	
Date:	30/04/2014	Drawing Size: A4
Drawn By:	DN	Reviewed By: SLS

Figure 2 - Well Locations

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ERM

Annex B

RESULTS TABLES

Well ID	Gauging Date	Event	Depth of Well (mbTOC)	Depth to Water (mbTOC)	DO (mg/L)	EC (mScm-¹)	pH	Eh (mV)	TEMP (°C)	TDS (mg/L)	Method of sampling	Purge Volume (L)	Comments
MW1**	11-Oct-12	Pre	8.72	5.106	3.78	2.30	7.09	149.60	29.8	1495	Bailer	19.0	Slightly turbid, pale grey, becoming turbid at 15L, slight light brown. Dry purged sampled upon recovery
	6-Mar-13	Pre	8.74	4.895	1.82	2.66	7.26	78.50	30.7	1729	Bailer	22.5	Slighl cloudy no odour,
	17-Apr-14	Pre	8.74	4.900	0.58	1.56	6.71	2.69	32.4	1016	Low flow peristaltic pump	4.0	
	17-Oct-13	Pre	17.40	6.440	0.30	1.74	5.60	81.40	31.2	1131	Low flow peristaltic pump	3.5	Clear, colourless no odour
	9-Apr-14	Pre	17.56	5.861	0.64	1.88	7.13	40.20	32.6	1222	Low flow peristaltic pump	2.5	Clear, no odour
MW2	11-Oct-12	Pre	8.20	4.481	2.22	4.29	7.12	142.50	29.2	2789	Bailer	24.0	Turbid, pale brown, no odour, moderate recharge, good yield
	6-Mar-13	Pre	8.20	4.432	1.65	4.21	7.28	37.90	32.0	2737	Bailer	21.0	Turbid, slightly brown no odour
	17-Apr-14	Pre	8.21	4.600	3.44	4.69	6.90	101.00	32.2	3049	Bailer	33.0	
	17-Oct-13	Pre	8.19	5.800	1.17	3.51	5.34	158.60	29.9	2282	Low flow peristaltic pump	3.0	Clear, colourless no odour
	9-Apr-14	Pre	8.21	3.906	0.49	3.10	6.98	66.90	34.7	2015	Low flow peristaltic pump	3.0	Clear, no odour
MW3	11-Oct-12	Pre	8.17	2.867	2.88	14.05	7.47	75.30	28.0	9133	Bailer	44.0	Slightly turbid, grey becoming pale brown, moderate recharge
	6-Mar-13	Pre	7.18	2.801	1.49	20.90	7.32	33.20	31.1	13585	Bailer	24.0	Turbid, Pale brown, no odour
	17-Apr-14	Pre	8.19	3.010	1.78	17.95	7.19	27.50	31.9		Bailer	33.0	
	17-Oct-13	Pre	8.17	2.020	1.75	14.70	6.17	145.90	29.3	9555	Low flow peristaltic pump	3.5	Clear, colourless no odour
	9-Apr-14	Pre	8.12	2.446	1.67	16.08	7.50	73.10	29.3	10452	Low flow peristaltic pump	3.5	Clear, no odour
MW4**	11-Oct-12	Pre	4.64	1.519	2.06	126.60	7.66	123.20	28.7	82290	Bailer	24.0	Highly turbid, silty, orange, no odour, fast recharge
	6-Mar-13	Pre	7.21	3.949	-	-	-	-	-	-	-	-	Unable to be sampled due to curve in PVC Pipe extension
	17-Apr-14	Pre	7.35	4.070	0.13	67.40	7.17	15.72	33.9	43810	Low flow peristaltic pump	2.5	Turbid, red brown
	17-Oct-13	Pre	14.40	3.820	1.99	124.40	4.32	135.00	31.0	80860	Low flow peristaltic pump	4.5	Clear, colourless no odour
	9-Apr-14	Pre	14.53	3.840	1.30	118.10	6.99	62.90	33.0	76765	Low flow peristaltic pump	3.0	Clear, no odour
MW5	11-Oct-12	Pre	5.01	1.054	1.73	145.70	6.90	193.20	29.3	94705	Bailer	24.0	Slightly turbid, pale brown, no odour, recharge becoming turbid, red-brown
	6-Mar-13	Pre	5.07	0.905	0.99	141.20	6.84	135.90	34.3	91780	Bailer	24.0	Turbid, cream to pale colour, no odour
	17-Apr-14	Pre	5.97	2.020	2.24	147.30	6.77	210.70	34.4	95745	Bailer	33.0	
	17-Oct-13	Pre	8.95	4.530	0.51	104.00	6.21	125.60	30.3	67600	Low flow peristaltic pump	5.5	Clear, no odour
	9-Apr-14	Pre	9.01	4.415	1.03	70.80	7.08	69.20	32.0	46020	Low flow peristaltic pump	2.5	Clear, no odour

Notes:
**MW1 and MW4 Were Replaced in September 2013

	BTEX								PAH/Phenols	TPH										
	Benzene	Ethylbenzene	Toluene	Total BTEX	Xylene (m & p)	Xylene (o)	Xylene Total	C6-C10 less BTEX (F1)	Naphthalene	C10-C16	C16-C34	C34-C40	F2-NAPHTHALENE	C6 - C9	C10 - C14	C15 - C28	C29-C36	+C10 - C36 (Sum of total)	C10 - C40 (Sum of total)	C6-C10
	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L
EQL	1	2	2	0.001	2	2	2	0.02	5	0.1	0.1	0.1	0.1	20	50	100	50	50	100	0.02
ANZECC 2000 FW 95%	950					350			16											
ANZECC 2000 MW 95%	700								70											
Trigger Values (Max Baseline + 10%)	1	300	800				600							N/A	89.1	N/A	N/A	309.1		
LocCode	**Field_ID**	**Sampled_Date-Time**																			
MW1	MW1	30/04/2011	-	-	-	-	-	-	-	-	-	-	-	-	<40	<50	<200	<200	<450	-	-
MW1	MW1	17/10/2013	<1	<2	<2	<0.001	<2	<2	<2	<0.02	<5	<0.1	<0.1	<0.1	<0.1	<20	<50	<100	<50	<50	<100	<0.02
MW1	MW1	9/04/2014	<1	<2	<2	<0.001	<2	<2	<2	<0.02	<5	<0.1	<0.1	<0.1	<0.1	<20	<50	<100	<50	<50	<100	<0.02
MW2	MW2	30/04/2011	-	-	-	-	-	-	-	-	-	-	-	-	-	<40	<50	<200	<200	<450	-	-
MW2	MW2	17/10/2013	<1	<2	<2	<0.001	<2	<2	<2	<0.02	<5	<0.1	<0.1	<0.1	<0.1	<20	<50	<100	<50	<50	<100	<0.02
MW2	MW2	9/04/2014	<1	<2	<2	<0.001	<2	<2	<2	<0.02	<5	<0.1	<0.1	<0.1	<0.1	<20	<50	<100	<50	<50	<100	<0.02
MW3	MW3	30/04/2011	-	-	-	-	-	-	-	-	-	-	-	-	-	<40	<50	<200	<200	<450	-	-
MW3	MW3	17/10/2013	<1	<2	<2	<0.001	<2	<2	<2	<0.02	<5	<0.1	<0.1	<0.1	<0.1	<20	<50	<100	<50	<50	<100	<0.02
MW3	MW3	9/04/2014	<1	<2	<2	<0.001	<2	<2	<2	<0.02	<5	<0.1	<0.1	<0.1	<0.1	<20	<50	<100	<50	<50	<100	<0.02
MW4	MW4	30/04/2011	-	-	-	-	-	-	-	-	-	-	-	-	-	<40	<50	<200	<200	<450	-	-
MW4	MW4	17/10/2013	<1	<2	<2	<0.001	<2	<2	<2	<0.02	<5	<0.1	<0.1	<0.1	<0.1	<20	<50	<100	<50	<50	<100	<0.02
MW4	MW4	9/04/2014	<1	<2	<2	<0.001	<2	<2	<2	<0.02	<5	<0.1	<0.1	<0.1	<0.1	<20	<50	<100	<50	<50	<100	<0.02
MW5	MW5	30/04/2011	-	-	-	-	-	-	-	-	-	-	-	-	-	<40	81	<200	<200	281	-	-
MW5	MW5	17/10/2013	<1	<2	<2	<0.001	<2	<2	<2	<0.02	<5	<0.1	<0.1	<0.1	<0.1	<20	<50	<100	<50	<50	<100	<0.02
MW5	MW5	9/04/2014	<1	<2	<2	<0.001	<2	<2	<2	<0.02	<5	<0.1	<0.1	<0.1	<0.1	<20	<50	<100	<50	<50	<100	<0.02
Statistical Summary																					
Number of Results	10	10	10	10	10	10	10	10	10	10	10	10	10	15	15	15	15	15	10	10
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
Minimum Concentration	<1	<2	<2	<0.001	<2	<2	<2	<0.02	<5	<0.1	<0.1	<0.1	<0.1	<20	<50	<100	<50	<50	<100	<0.02
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	81	ND	ND	281	ND	ND
Maximum Concentration	<1	<2	<2	<0.001	<2	<2	<2	<0.02	<5	<0.1	<0.1	<0.1	<0.1	<40	81	<200	<200	<450	<100	<0.02
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	81	ND	ND	281	ND	ND
Average Concentration	0.5	1	1	0.0005	1	1	1	0.01	2.5	0.05	0.05	0.05	0.05	13	29	67	50	95	50	0.01
Median Concentration	0.5	1	1	0.0005	1	1	1	0.01	2.5	0.05	0.05	0.05	0.05	10	25	50	25	25	50	0.01
Standard Deviation	0	0	0	0	0	0	0	0	0	0	0	0	0	4.9	14	24	37	104	0	0
Number of Guideline Exceedances	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

			Organic	Inorganics																												
			Alkalinity (Carbonate)	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Bicarbonate)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Ammonia	Ammonia as N	Anions Total	Cations Total	Chloride	Fluoride	Hydrogen sulfide	Ionic Balance	Kjeldahl Nitrogen Total	Nitrate (as N)	Nitrate (as NO3-)	Nitrite (as N)	Nitrite (as NO2-)	Nitrogen (Total Oxidised)	Nitrogen (Total)	Reactive Phosphorus as P	Silica	Silica (Filtered)	Sodium (Filtered)	Sulphate	Sulphide	TDS	Hardness as CaCO3 (Filtered)	TSS
			mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	µg/L	meq/L	meq/L	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL			1	1	1	5	1000	1	0.005	5	0.01	0.01	1	0.1	0.5	-100	0.05	0.002	0.05	0.002	0.05	0.002	50	0.001	100	50	0.5	1	0.1	10	1	5
ANZECC 2000 FW 95%									0.9						0.001				0.7													
ANZECC 2000 MW 95%									0.91																							
Trigger Values (Max Baseline + 10%)							693	561	814	814			95,700	1.65	N/A		2.97	3.63		N/A		3.63	5610	0.011			62,700	5720	N/A	143,000	20,900	2090
LocCode	**Field_ID**	**Sampled_Date-Time**																														
MW1	MW1	30/04/2011	<1	-	-	420	-	350	-	38	-	-	780	-	<0.5	-	-	1.7	-	<0.005	-	1.7	2500	<0.002	-	30,000	350	170	-	2000	-	-
MW1	MW1	20/09/2011	<1	-	-	390	-	320	-	18	-	-	710	0.4	-	-6	0.28	-	-	-	-	3.1	3400	0.008	-	28,000	300	150	<0.5	-	-	180
MW1	MW1	27/02/2012	<1	-	-	370	-	300	<0.005	<5	-	-	670	0.5	-	-	0.17	2	8.7	<0.005	<0.05	2	2100	<0.002	-	29,000	340	140	<0.5	-	-	220
MW1	MW1	11/10/2012	<1	-	-	370	-	300	0.064	53	-	-	600	0.4	-	1	0.49	1.1	4.7	<0.005	<0.05	1.1	1500	0.003	32,000	-	290	100	<0.5	-	-	520
MW1	MW1	6/03/2013	<1	-	-	370	-	300	0.018	15	-	-	570	0.5	<0.5	-	0.14	1.9	<0.05	0.025	0.08	1.9	2000	0.003	-	32,000	280	100	<0.5	-	-	2900
MW1	MW1	17/04/2013	<1	-	-	350	-	290	<0.005	<5	-	-	560	0.4	-	-	0.15	2.2	9.7	0.022	0.07	2.2	2400	0.004	-	33,000	270	120	<0.5	-	-	16
MW1	MW1	17/10/2013	-	367	<1	-	<1000	367	-	32	17.2	17.5	300	0.8	-	0.87	0.15	0.086	-	<0.002	-	0.086	240	0.007	-	-	265	-	<0.1	940	284	25
MW1	MW1	9/04/2014	-	358	<1	-	<1000	358	-	114	18.1	17.3	345	0.8	-	2.42	0.49	1.6	-	0.004	-	1.6	2090	0.006	-	-	267	-	<0.1	995	270	<5
MW2	MW2	30/04/2011	<1	-	-	340	-	280	-	200	-	-	930	-	<0.5	-	-	3.3	-	<0.005	-	3.3	3900	0.004	-	26,000	570	170	-	2000	-	-
MW2	MW2	20/09/2011	<1	-	-	350	-	290	-	<5	-	-	1200	0.6	-	-3	0.2	-	-	-	-	1.2	1400	0.004	-	24,000	610	210	<0.5	-	-	190
MW2	MW2	27/02/2012	<1	-	-	370	-	300	0.036	30	-	-	1400	0.7	-	-	0.26	0.62	2.7	<0.005	<0.05	0.62	880	<0.002	-	24,000	1000	220	<0.5	-	-	84
MW2	MW2	11/10/2012	<1	-	-	450	-	370	<0.005	<5	-	-	1300	0.5	-	-5	0.51	0.63	2.8	<0.005	<0.05	0.63	1100	<0.002	25,000	-	600	180	<0.5	-	-	440
MW2	MW2	6/03/2013	<1	-	-	440	-	360	<0.005	<5	-	-	1000	0.6	<0.5	-	0.1	0.6	2.7	<0.005	<0.05	0.6	700	<0.002	-	27,000	580	170	<0.5	-	-	320
MW2	MW2	17/04/2013	<1	-	-	410	-	340	<0.005	<5	-	-	1100	0.6	-	-	0.21	0.51	2.3	<0.005	<0.05	0.51	720	0.003	-	28,000	610	200	<0.5	-	-	290
MW2	MW2	9/04/2014	-	250	<1	-	<1000	250	-	<5	28.4	28.8	730	0.8	-	0.7	<0.05	4.94	-	0.007	-	4.95	4960	0.007	-	-	463	-	<0.1	1550	412	<5
MW3	MW3	30/04/2011	<1	-	-	490	-	400	-	54	-	-	5400	-	<0.5	-	-	1.9	-	<0.005	-	1.9	2600	0.003	-	34,000	3400	800	-	9800	-	-
MW3	MW3	20/09/2011	8	-	-	530	-	450	-	57	-	-	3700	1.4	-	2	0.18	-	-	-	-	0.033	220	0.006	-	32,000	2500	810	<0.5	-	-	280
MW3	MW3	27/02/2012	<1	-	-	560	-	460	<0.005	<5	-	-	4000	1.5	-	-	0.29	0.32	1.4	<0.005	<0.05	0.32	610	<0.002	-	33,000	3200	940	<0.5	-	-	230
MW3	MW3	11/10/2012	<1	-	-	660	-	540	0.015	12	-	-	4200	<0.1	-	3	0.22	0.12	0.51	<0.005	<0.05	0.12	330	0.003	33,000	-	2800	710	<0.5	-	-	270
MW3	MW3	6/03/2013	<1	-	-	580	-	470	<0.005	<5	-	-	5900	1.4	<0.5	-	0.16	0.26	1.1	<0.005	<0.05	0.26	420	0.003	-	36,000	3500	670	<0.5	-	-	180
MW3	MW3	17/04/2013	<1	-	-	680	-	560	0.94	770	-	-	28,000	1	-	-	1.5	0.031	0.14	<0.005	<0.05	0.031	1500	0.006	-	30,000	8000	1400	<0.5	-	-	470
MW3	MW3	17/10/2013	-	479	<1	-	<1000	479	-	<5	111	121	3140	1.6	-	4.37	<0.05	0.611	-	0.002	-	0.613	530	<0.001	-	-	2180	-	<0.1	7280	1180	54
MW3	MW3	9/04/2014	-	466	<1	-	<1000	466	-	<5	164	164	5000	1.7	-	0.14	0.35	0.464	-	0.029	-	0.493	840	0.009	-	-	3050	-	<0.1	9050	1440	6
MW4	MW4	30/04/2011	<1	-	-	630	-	510	-	740	-	-	3900	-	<0.5	-	-	0.82	-	<0.005	-	0.82	2100	0.008	-	19,000	2700	350	-	6700	-	-
MW4	MW4	21/09/2011	12	-	-	420	-	370	-	18	-	-	2500	0.7	-	1	0.31	-	-	-	-	0.24	540	0.009	-	16,000	1800	280	<0.5	-	-	670
MW4	MW4	28/02/2012	<1	-	-	480	-	390	<0.005	<5	-	-	3200	0.6	-	-	0.59	0.17	0.74	<0.005	<0.05	0.17	760	0.007	-	19,000	2700	410	<0.5	-	-	1900
MW4	MW4	11/10/2012	<1	-	-	510	-	420	<0.005	<5	-	-	3700	0.4	-	1	0.72	0.44	1.9	<0.005	<0.05	0.44	1200	0.007	19,000	-	2400	380	<0.5	-	-	2900
MW4	MW4	17/04/2013	<1	-	-	470	-	390	<0.005	<5	-	-	4700	0.4	-	-	0.49	0.24	1	<0.005	<0.05	0.24	730	0.01	-	23,000	2600	440	<0.5	-	-	210
MW4	MW4	17/10/2013	-	109	<1	-	<1000	109	-	877	2090	2390	69,800	0.3	-	6.66	0.71	2.89	-	<0.002	-	2.89	3600	<0.001	-	-	45,400	-	<0.1	136,000	18,500	74
MW4	MW4	9/04/2014	-	148	<1	-	<1000	148	-	14	1460	1620	49,000	0.4	-	5.39	3.8	4.07	-	<0.002	-	4.07	7870	<0.001	-	-	31,800	-	<0.1	88,300	10,600	43
MW5	MW5	30/04/2011	<1	-	-	450	-	370	-	56	-	-	87,000	-	<0.5	-	-	1.1	-	<0.005	-	1.1	5100	0.007	-	10,000	48,000	5200	-	130,000	-	-
MW5	MW5	21/09/2011	<1	-	-	250	-	210	-	47	-	-	87,000	0.3	-	0	2.7	-	-	-	-	0.02	2700	0.01	-	9900	48,000	4100	<0.5	-	-	1100
MW5	MW5	28/02/2012	<1	-	-	180	-	150	<0.005	<5	-	-	80,000	0.4	-	-	2.2	1.2	5.5	<0.005	<0.05	1.2	3400	0.006	-	9800	57,000	4400	<0.5	-	-	1400
MW5	MW5	11/10/2012	<1	-	-	200	-	160	0.75	620	-	-	77,000	0.3	-	-4	0.72	1.1	4.7	<0.005	<0.05	1.1	1800	0.005	8000	-	39,000	3500	<0.5	-	-	2600
MW5	MW5	6/03/2013	<1	-	-	210	-	170	1.2	1000	-	-	64,000	0.4	<0.5	-	2.1	1.3	6	<0.005	<0.05	1.3	3400	0.007	-	13,000	36,000	3800	<0.5	-	-	660
MW5	MW5	17/04/2013	<1	-	-	210	-	170	<0.005	<5	-	-	58,000	0.4	-	-	1	1.6	6.9	<0.005	<0.05	1.6	2600	0.014	-	13,000	33,000	3300	<0.5	-	-	1600
MW5	MW5	17/10/2013	-	207	<1	-	<1000	207	-	<5	1210	1340	40,500	0.6	-	5.06	0.17	3.29	-	<0.002	-	3.29	3460	0.005	-	-	25,700	-	<0.1	75,400	9860	63
MW5	MW5	9/04/2014	-	275	<1	-	<1000	275	-	18	774	799	25,700	0.8	-	1.54	2.63	1.54	-	<0.002	-	1.54	4170	0.002	-	-	15,600	-	<0.1	47,100	5040	78
Statistical Summary																																
Number of Results			29	10	10	29	10	39	19	39	10	10	39	34	9	20	34	34	19	34	19	39	39	39	5	24	39	29	34	15	10	34
Number of Detects			2	10	0	29	0	39	7	21	10	10	39	33	0	20	32	34	18	6	2	39	39	30	5	24	39	29	0	15	10	32
Minimum Concentration			<1	109	<1	180	<1000	109	<0.005	<5	17.2	17.3	300	<0.1	<0.5	-6	<0.05	0.031	<0.05	<0.002	<0.05	0.02	220	<0.001	8000	9800	265	100	<0.1	940	270	<5
Minimum Detect			8	109	ND	180	ND	109	0.015	12	17.2	17.3	300	0.3	ND	ND	0.1	0.031	0.14	0.002	0.07	0.02	220	0.002	8000	9800	265	100	ND	940	270	6
Maximum Concentration			12	479	<1	680	<1000	560	1.2	1000	2090	2390	87000	1.7	<0.5	6.66	3.8	4.94	9.7	0.029	0.08	4.95	7870	0.014	33000	36000	57000	5200	<0.5	136000	18500	2900
Maximum Detect			12	479	ND	680	ND	560	1.2	1000	2090	2390	87000	1.7	ND	6.66	3.8	4.94	9.7	0.029	0.08	4.95	7870	0.014	33000	36000	57000	5200	ND	136000	18500	2900
Average Concentration			1.2	294	0.5	419	500	332	0.16	124	590	653	18676	0.67	0.25	1.1	0.72	1.4	3.3	0.0044	0.03	1.3	2130	0.005	23400	24113	10965	1152	0.19	34610	4818	588
Median Concentration			0.5	278	0.5	420	500	340	0.0025	14	137.5	142.5	3700	0.6	0.25	1	0.33	1.1	2.7	0.0025	0.025	1.1	2000	0.004	25000	26500	2500	380	0.25	7280	1310	225
Standard Deviation			2.5	124	0	133	0	114	0.37	270	754	853	28977	0.41	0	3.4	0.91	1.2	2.9	0.0067	0.016	1.2	1642	0.003	10310	8416	17176	1563	0.092	48859	6229	841
Number of Guideline Exceedances			0	0	0	0	10	0	2	2	0	0	0	1	0	0	1	2	16	0	0	2	1	1	0	0	0	0	0	0	0	3
Number of Guideline Exceedances(Detects Only)			0	0	0	0	0	0	2	2	0	0	0	1	0	0	1	2	16	0	0	2	1	1	0	0	0	0	0	0	0	3

			Lead	Metals																			
			Lead (Filtered)	Aluminium	Aluminium (Filtered)	Arsenic (Filtered)	Cadmium (Filtered)	Calcium (Filtered)	Chromium (hexavalent)	Chromium (hexavalent) (Filtered)	Chromium (III+VI) (Filtered)	Chromium (Trivalent) (Filtered)	Copper (Filtered)	Iron	Iron (Filtered)	Magnesium (Filtered)	Manganese (Filtered)	Mercury	Nickel (Filtered)	Phosphorus	Potassium (Filtered)	Selenium (Filtered)	Silicon (Filtered)	Zinc (Filtered)
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L
EQL			0.0001	0.005	0.001	0.0002	0.00005	0.2	0.002	0.001	0.0002	0.001	0.0005	0.005	0.002	0.1	0.0005	0.00005	0.0005	0.005	0.1	0.0002	20	0.001
ANZECC 2000 FW 95%			0.0034	0.055	0.055		0.0002		0.001	0.001			0.0014				1.9	0.0006	0.011			0.011		0.008
ANZECC 2000 MW 95%			0.0044				0.0055		0.0044	0.0044		0.0274	0.0013					0.0004	0.07					0.015
Trigger Values (Max Baseline + 10%)			N/A	90.2	0.0209	N/A	N/A	1210	0.011	0.011	N/A	-	143	143	0.264	5170	0.242	0.000121	N/A	0.869	2310	0.0033	17,600	0.0517
LocCode	**Field_ID**	**Sampled_Date-Time**																						
MW1	MW1	30/04/2011	<0.001	-	0.01	<0.001	<0.0001	200	<0.002	-	<0.001	-	-	-	0.008	63	0.17	<0.00005	-	0.06	10	<0.002	14,000	0.016
MW1	MW1	20/09/2011	-	1.8	0.002	<0.001	<0.0001	170	-	-	<0.001	-	-	1.8	<0.005	54	0.046	-	<0.001	0.05	7.9	<0.002	13,000	0.027
MW1	MW1	27/02/2012	-	3.6	0.002	<0.001	<0.0001	180	-	-	<0.001	-	-	4.2	<0.005	53	0.088	-	<0.001	0.08	7.7	<0.002	-	0.038
MW1	MW1	11/10/2012	-	21	0.005	<0.001	<0.0001	170	-	-	<0.001	-	-	30	0.009	51	0.038	-	<0.001	10	8.6	<0.002	-	0.008
MW1	MW1	6/03/2013	-	10	<0.005	<0.001	<0.0001	160	-	-	<0.001	-	-	14	<0.005	49	0.17	-	<0.001	<0.01	8.2	<0.002	15,000	0.01
MW1	MW1	17/04/2013	<0.001	0.33	<0.005	<0.001	0.0004	160	-	-	<0.001	-	0.001	0.39	<0.005	49	0.087	-	<0.001	0.02	8.2	<0.002	16,000	0.01
MW1	MW1	17/10/2013	<0.0001	0.38	0.006	0.0008	<0.00005	66	-	<0.001	<0.0002	<0.001	<0.0005	1.47	0.437	29	0.425	<0.0001	0.001	0.015	13	0.0005	14,800	0.005
MW1	MW1	9/04/2014	<0.0001	0.06	<0.005	0.0008	<0.00005	57	-	<0.001	<0.0002	<0.001	<0.0005	0.57	0.43	31	0.272	<0.0001	<0.0005	0.049	10	0.001	17,500	<0.001
MW2	MW2	30/04/2011	<0.001	-	0.005	<0.001	<0.0001	99	<0.002	-	<0.001	-	-	-	<0.005	66	<0.005 - 0.00	<0.00005	-	0.09	19	0.003	12,000	0.013
MW2	MW2	20/09/2011	-	4.2	0.002	<0.001	<0.0001	150	-	-	<0.001	-	-	6	<0.005	98	0.001	-	<0.001	0.06	20	<0.002	11,000	0.021
MW2	MW2	27/02/2012	-	3.6	0.005	<0.001	<0.0001	240	-	-	<0.001	-	-	4.6	0.24	140	0.22	-	<0.001	0.03	24	<0.002	-	0.047
MW2	MW2	11/10/2012	-	9.2	0.002	<0.001	<0.0001	160	-	-	<0.001	-	-	12	<0.005	94	0.01	-	<0.001	0.17	21	<0.002	-	0.021
MW2	MW2	6/03/2013	-	10	0.006	<0.001	<0.0001	150	-	-	<0.001	-	-	15	<0.005	87	0.012	-	<0.001	<0.01	21	<0.002	13,000	0.017
MW2	MW2	17/04/2013	<0.001	3.5	<0.005	<0.001	0.0003	160	-	-	<0.001	-	<0.001	5.2	<0.005	100	0.012	-	<0.001	0.1	23	<0.002	13,000	0.012
MW2	MW2	9/04/2014	<0.0001	0.02	<0.005	<0.0002	<0.00005	71	-	<0.001	<0.0002	<0.001	<0.0005	<0.05	<0.002	57	0.0009	<0.0001	<0.0005	0.032	17	0.0011	11,700	<0.001
MW3	MW3	30/04/2011	<0.005	-	0.013	<0.005	<0.0005	120	<0.002	-	<0.005	-	-	-	<0.025	300	0.02 - 0.022	<0.00005	-	0.16	130	<0.01	16,000	0.02
MW3	MW3	20/09/2011	-	5.8	0.019	<0.005	<0.0005	85	-	-	<0.005	-	-	7.4	<0.025	210	0.014	-	<0.005	0.05	90	<0.01	15,000	0.047
MW3	MW3	27/02/2012	-	6.5	0.005	<0.005	<0.0005	95	-	-	<0.005	-	-	6.8	<0.025	210	0.026	-	<0.005	0.05	120	<0.01	-	0.032
MW3	MW3	11/10/2012	-	5	<0.01	<0.01	<0.001	100	-	-	<0.01	-	-	5.8	<0.05	260	0.027	-	<0.01	0.06	120	<0.02	-	0.031
MW3	MW3	6/03/2013	-	5.8	<0.025	<0.005	<0.0005	130	-	-	<0.005	-	-	6.3	<0.025	340	0.018	-	<0.005	1.6	130	<0.01	17,000	<0.025
MW3	MW3	17/04/2013	<0.01	14	0.072	<0.01	<0.001	350	-	-	<0.01	-	<0.01	21	0.52	910	1.7	-	<0.01	0.16	340	<0.02	14,000	<0.05
MW3	MW3	17/10/2013	<0.0001	<0.01	0.021	0.0008	<0.00005	91	-	<0.001	<0.0002	<0.001	0.0005	<0.05	0.01	232	0.0038	<0.0001	0.0006	<0.005	97	0.0038	17,400	<0.001
MW3	MW3	9/04/2014	<0.0001	0.02	<0.005	0.001	<0.00005	104	-	<0.001	<0.0002	<0.001	0.0017	<0.05	<0.002	286	0.0133	<0.0001	<0.0005	0.044	115	0.0035	16,600	<0.001
MW4	MW4	30/04/2011	<0.005	-	<0.005	<0.005	<0.0005	39	<0.002	-	<0.005	-	-	-	<0.025	100	0.013 - 0.014	<0.00005	-	0.79	110	<0.01	8700	0.01
MW4	MW4	21/09/2011	-	21	<0.005	<0.005	<0.0005	28	-	-	<0.005	-	-	31	<0.025	68	0.011	-	<0.005	0.14	69	<0.01	7500	0.029
MW4	MW4	28/02/2012	-	82	<0.005	<0.005	<0.0005	49	-	-	<0.005	-	-	130	<0.025	96	0.033	-	<0.005	0.48	110	<0.01	-	0.047
MW4	MW4	11/10/2012	-	65	<0.01	<0.01	<0.001	69	-	-	<0.01	-	-	130	<0.05	150	0.041	-	<0.01	0.54	110	<0.02	-	0.012
MW4	MW4	17/04/2013	<0.005	4.4	0.031	<0.005	<0.0005	94	-	-	<0.005	-	<0.005	7.4	<0.025	190	0.12	-	<0.005	0.05	120	<0.01	11,000	<0.025
MW4	MW4	17/10/2013	<0.001	1.33	<0.025	<0.0025	<0.001	972	-	<0.01	<0.0025	<0.02	0.005	1.63	<0.025	3900	0.277	<0.0001	0.0479	0.014	1640	<0.01	7380	<0.025
MW4	MW4	9/04/2014	<0.001	0.17	<0.025	<0.0025	<0.001	598	-	<0.001	<0.0025	<0.001	<0.005	<0.5	0.034	2210	0.0029	<0.0001	0.035	<0.005	1200	<0.01	7400	0.042
MW5	MW5	30/04/2011	<0.05	-	<0.05	<0.05	<0.005	1000	0.01	-	<0.05	-	-	-	<0.25	4100	0.2 - 0.22	0.00011	-	0.11	1900	<0.1	4900	<0.05
MW5	MW5	21/09/2011	-	11	<0.1	<0.1	<0.01	1100	-	-	<0.1	-	-	12	<0.5	4300	<0.1	-	<0.1	0.04	1700	<0.2	4600	<0.1
MW5	MW5	28/02/2012	-	18	<0.1	<0.1	<0.01	1100	-	-	<0.1	-	-	25	<0.5	4700	<0.1	-	<0.1	0.21	2100	<0.2	-	<0.1
MW5	MW5	11/10/2012	-	31	<0.05	<0.05	<0.005	970	-	-	<0.05	-	-	37	<0.25	3700	<0.05	-	<0.05	<0.01	1700	<0.1	-	<0.05
MW5	MW5	6/03/2013	-	16	<0.25	<0.05	<0.005	770	-	-	<0.05	-	-	18	<0.25	3000	<0.05	-	<0.05	0.04	1500	<0.1	5900	<0.25
MW5	MW5	17/04/2013	<0.05	33	0.3	<0.05	<0.005	740	-	-	<0.05	-	<0.05	44	<0.25	2900	<0.05	-	<0.05	0.16	1400	<0.1	6000	<0.25
MW5	MW5	17/10/2013	<0.0004	0.74	<0.01	0.0013	<0.0004	599	-	<0.01	<0.01 - 0.012	<0.01	<0.002	0.8	<0.01	2030	0.0013	<0.0001	0.0073	0.011	988	<0.004	6060	<0.01
MW5	MW5	9/04/2014	<0.0004	1.02	0.086	<0.001	<0.0004	303	-	<0.002	<0.01 - 0.007	<0.001	<0.002	1.13	0.015	1040	0.0026	<0.0001	0.0032	<0.005	767	<0.004	6940	0.017
Statistical Summary																								
Number of Results			20	34	39	39	39	39	5	10	39	10	15	34	39	39	39	15	34	39	39	39	29	39
Number of Detects			0	33	18	5	2	39	1	0	2	0	4	30	9	39	33	1	6	33	39	7	29	23
Minimum Concentration			<0.0001	<0.01	0.002	<0.0002	<0.00005	28	<0.002	<0.001	<0.0002	<0.001	<0.0005	<0.05	<0.002	29	<0.0005	<0.00005	<0.0005	<0.005	7.7	0.0005	4600	<0.001
Minimum Detect			ND	0.02	0.002	0.0008	0.0003	28	0.01	ND	ND	ND	0.0005	0.06	0.008	29	0.0009	0.00011	0.0006	0.008	7.7	0.0005	4600	0.005
Maximum Concentration			<0.05	82	0.3	<0.1	<0.01	1100	0.01	<0.01	<0.1	<0.02	<0.05	130	0.52	4700	1.7	0.00011	<0.1	10	2100	<0.2	17500	<0.25
Maximum Detect			ND	82	0.3	0.0013	0.0004	1100	0.01	ND	0.012	ND	0.005	130	0.52	4700	1.7	0.00011	0.0479	10	2100	0.0038	17500	0.047
Average Concentration			0.0033	11	0.024	0.0064	0.00067	303	0.0028	0.0015	0.0066	0.0019	0.0031	17	0.074	932	0.11	0.000047	0.009	0.4	431	0.013	11517	0.026
Median Concentration			0.0005	4.7	0.005	0.00125	0.00025	160	0.001	0.0005	0.00125	0.0005	0.001	6.15	0.0125	150	0.025	0.00005	0.0025	0.05	110	0.0038	12000	0.017
Standard Deviation			0.0075	18	0.052	0.013	0.0013	335	0.004	0.0019	0.013	0.0032	0.0063	31	0.13	1464	0.28	0.000021	0.015	1.6	664	0.025	4160	0.028
Number of Guideline Exceedances			0	30	13	0	0	0	5	3	0	0	8	0	5	0	4	0	0	2	0	23	0	33
Number of Guideline Exceedances(Detects Only)			0	30	5	0	0	0	1	0	0	0	2	0	3	0	4	0	0	2	0	2	0	22

Field Duplicates (WATER)
Filter: SDG in('15430')

SDG	15430	15430	
Field_ID	MW3	DUP01	**RPD**
Sampled_Date-Time	9/04/2014 15:00	9/04/2014 15:00	

Chem_Group	ChemName	Units	EQL			
	Silicon as SiO2 (Filtered)	mg/l	0.1	35.6	38.5	8
	Sulfate as SO4 - Turbidimetric (Filtered)	mg/l	1	647.0	585.0	10
	Unionized Hydrogen Sulfide	mg/l	0.1	<0.1	<0.1	0
BTEX	Benzene	µg/L	1	<1.0	<1.0	0
	Ethylbenzene	µg/L	2	<2.0	<2.0	0
	Toluene	µg/L	2	<2.0	<2.0	0
	Total BTEX	mg/l	0.001	<0.001	<0.001	0
	Xylene (m & p)	µg/L	2	<2.0	<2.0	0
	Xylene (o)	µg/L	2	<2.0	<2.0	0
	Xylene Total	µg/L	2	<2.0	<2.0	0
	C6-C10 less BTEX (F1)	mg/l	0.02	<0.02	<0.02	0
Inorganics	Alkalinity (Bicarbonate as CaCO3)	mg/l	1	466.0	447.0	4
	Alkalinity (Carbonate as CaCO3)	mg/l	1	<1.0	<1.0	0
	Alkalinity (Hydroxide) as CaCO3	µg/l	1000	<1000.0	<1000.0	0
	Alkalinity (total) as CaCO3	mg/l	1	466.0	447.0	4
	Ammonia as N	µg/l	5	<5.0	<5.0	0
	Anions Total	meq/L	0.01	164.0	151.0	8
	Cations Total	meq/L	0.01	164.0	156.0	5
	Chloride	mg/l	1	5000.0	4620.0	8
	Fluoride	mg/l	0.1	1.7	1.6	6
	Kjeldahl Nitrogen Total	mg/l	0.05	0.35	0.34	3
	Nitrate (as N)	mg/l	0.002	0.464	0.531	13
	Nitrite (as N)	mg/l	0.002	0.029	0.029	0
	Nitrogen (Total Oxidised)	mg/l	0.002	0.493	0.56	13
	Nitrogen (Total)	µg/l	50	840.0	900.0	7
	Reactive Phosphorus as P	mg/l	0.001	0.009	0.007	25
	Sodium (Filtered)	mg/l	1	3050.0	2850.0	7
	Sulphide	mg/l	0.1	<0.1	<0.1	0
	TDS	mg/l	10	9050.0	8180.0	10
	Hardness as CaCO3 (Filtered)	mg/l	1	1440.0	1430.0	1
	TSS	mg/l	5	6.0	<5.0	18
Lead	Lead (Filtered)	mg/l	0.0001	<0.0001	<0.0001	0
Metals	Aluminium (Filtered)	mg/l	0.005	<0.005	<0.005	0
	Aluminium	mg/l	0.01	**0.02**	**0.04**	**67**
	Arsenic (Filtered)	mg/l	0.0002	0.001	0.0011	10
	Cadmium (Filtered)	mg/l	0.00005	<0.0001	<0.0001	0
	Calcium (Filtered)	mg/l	1	104.0	103.0	1
	Chromium (hexavalent) (Filtered)	mg/l	0.001	<0.001	<0.001	0
	Chromium (III+VI) (Filtered)	mg/l	0.001	<0.001	<0.001	0
	Chromium (III+VI) (Filtered)	mg/l	0.0002	<0.0002	0.0002	0
	Chromium (Trivalent) (Filtered)	mg/l	0.001	<0.001	<0.001	0
	Copper (Filtered)	mg/l	0.0005	**0.0017**	**0.0012**	**34**
	Iron (Filtered)	mg/l	0.002	<0.002	<0.002	0
	Iron	mg/l	0.05	<0.05	<0.05	0
	Magnesium (Filtered)	mg/l	1	286.0	285.0	0
	Manganese (Filtered)	mg/l	0.0005	**0.0133**	**0.0036**	**115**
	Mercury	mg/l	0.0001	<0.0001	<0.0001	0
	Nickel (Filtered)	mg/l	0.0005	<0.0005	<0.0005	0
	Phosphorus	mg/l	0.005	**0.044**	**0.01**	**126**
	Potassium (Filtered)	mg/l	1	115.0	126.0	9
	Selenium (Filtered)	mg/l	0.0002	0.0035	0.0042	18
	Silicon (Filtered)	µg/l	50	16600.0	18000.0	8
	Zinc (Filtered)	mg/l	0.001	<0.001	<0.001	0
PAH/Phenols	Naphthalene	µg/L	5	<5.0	<5.0	0
TPH	C10-C16	mg/l	0.1	<0.1	<0.1	0
	C16-C34	mg/l	0.1	<0.1	<0.1	0
	C34-C40	mg/l	0.1	<0.1	<0.1	0
	F2-NAPHTHALENE	mg/l	0.1	<0.1	<0.1	0
	C6 - C9	µg/L	20	<20.0	<20.0	0
	C10 - C14	µg/L	50	<50.0	<50.0	0
	C15 - C28	µg/L	100	<100.0	<100.0	0
	C29-C36	µg/L	50	<50.0	<50.0	0
	+C10 - C36 (Sum of total)	µg/L	50	<50.0	<50.0	0
	C10 - C40 (Sum of total)	µg/L	100	<100.0	<100.0	0
	C6-C10	mg/l	0.02	<0.02	<0.02	0

*RPDs have only been considered where a concentration is greater than 1 times the EQL.

**High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 30 (1-10 x EQL); 30 (10-30 x EQL); 30 (> 30 x EQL))

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

Field Blanks (WATER)
Filter: SDG in('15430')

SDG	15430	15430	15430
Field_ID	RIN-01	TBW236	TBW237
Sampled_Date-Time	9/04/2014 15:00	9/04/2014 15:00	9/04/2014 15:00
Sample_Type	Rinsate	Trip_B	Trip_B

Chem_Group	ChemName	Units	EQL			
	Silicon as SiO2 (Filtered)	mg/l	0.1			
	Sulfate as SO4 - Turbidimetric (Filtered)	mg/l	1	<1		
	Unionized Hydrogen Sulfide	mg/l	0.1			
BTEX	Benzene	µg/L	1		<1	<1
	Ethylbenzene	µg/L	2		<2	<2
	Toluene	µg/L	2		<2	<2
	Total BTEX	mg/l	0.001		<0.001	<0.001
	Xylene (m & p)	µg/L	2		<2	<2
	Xylene (o)	µg/L	2		<2	<2
	Xylene Total	µg/L	2		<2	<2
	C6-C10 less BTEX (F1)	mg/l	0.02		<0.02	<0.02
Inorganics	Alkalinity (Bicarbonate as CaCO3)	mg/l	1	**4**		
	Alkalinity (Carbonate as CaCO3)	mg/l	1	**1**		
	Alkalinity (Hydroxide) as CaCO3	µg/l	1000	<1000		
	Alkalinity (total) as CaCO3	mg/l	1	**5**		
	Ammonia as N	µg/l	5			
	Anions Total	meq/L	0.01			
	Cations Total	meq/L	0.01			
	Chloride	mg/l	1	**2**		
	Fluoride	mg/l	0.1	<0.1		
	Ionic Balance	%	0.01			
	Kjeldahl Nitrogen Total	mg/l	0.05			
	Nitrate (as N)	mg/l	0.002			
	Nitrite (as N)	mg/l	0.002			
	Nitrogen (Total Oxidised)	mg/l	0.002			
	Nitrogen (Total)	µg/l	50			
	Reactive Phosphorus as P	mg/l	0.001			
	Sodium (Filtered)	mg/l	1	**2**		
	Sulphide	mg/l	0.1			
	TDS	mg/l	10			
	Hardness as CaCO3 (Filtered)	mg/l	1	<1		
	TSS	mg/l	5			
Lead	Lead (Filtered)	mg/l	0.0001	<0.0001		
Metals	Aluminium	mg/l	0.01			
	Aluminium (Filtered)	mg/l	0.005	<0.005		
	Arsenic (Filtered)	mg/l	0.0002	<0.0002		
	Cadmium (Filtered)	mg/l	0.00005	<0.00005		
	Calcium (Filtered)	mg/l	1	<1		
	Chromium (hexavalent) (Filtered)	mg/l	0.001			
	Chromium (III+VI) (Filtered)	mg/l	0.0002	<0.0002		
	Chromium (Trivalent) (Filtered)	mg/l	0.001			
	Copper (Filtered)	mg/l	0.0005	<0.0005		
	Iron	mg/l	0.05			
	Iron (Filtered)	mg/l	0.002	<0.002		
	Magnesium (Filtered)	mg/l	1	<1		
	Manganese (Filtered)	mg/l	0.0005	<0.0005		
	Mercury	mg/l	0.0001	<0.0001		
	Nickel (Filtered)	mg/l	0.0005	<0.0005		
	Phosphorus	mg/l	0.005			
	Potassium (Filtered)	mg/l	1	<1		
	Selenium (Filtered)	mg/l	0.0002	<0.0002		
	Silicon (Filtered)	µg/l	50			
	Zinc (Filtered)	mg/l	0.001	<0.001		
PAH/Phenols	Naphthalene	µg/L	5		<5	<5
TPH	C10-C16	mg/l	0.1			
	C16-C34	mg/l	0.1			
	C34-C40	mg/l	0.1			
	F2-NAPHTHALENE	mg/l	0.1			
	C6 - C9	µg/L	20		<20	<20
	C10 - C14	µg/L	50			
	C15 - C28	µg/L	100			
	C29-C36	µg/L	50			
	+C10 - C36 (Sum of total)	µg/L	50			
	C10 - C40 (Sum of total)	µg/L	100			
	C6-C10	mg/l	0.02		<0.02	<0.02

Annex C

LABORATORY ANALYTICAL REPORTS

CERTIFICATE OF ANALYSIS

Work Order	: **EP1402737**	Page	: 1 of 10
Client	: **ENVIRO RESOURCES MANAGEMENT**	Laboratory	: Environmental Division Perth
Contact	: SEAN SCAIFE	Contact	: Shuk Hui Li
Address	: LEVEL 6, GRAIN POOL BLDG 172 ST GEORGE TCE WA, AUSTRALIA 6000	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: sean.scaife@erm.com	E-mail	: ShukHui.Li@alsglobal.com
Telephone	: +61 08 9321 5200	Telephone	: 08 9209 7655
Facsimile	: +61 08 9321 5262	Facsimile	: 08 9209 7600
Project	: 0220651 YPNPL GME	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: 15430	Date Samples Received	: 10-APR-2014
Sampler	: S.S./S.N.	Issue Date	: 17-APR-2014
Site	: KARRATHA/ DAMPIER		
		No. of samples received	: 9
Quote number	: EP/901/13	No. of samples analysed	: 9

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

General Comments

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

- **EG020:Metals LOR for particular sample(s) raised due to high TDS content.**
- **EG093: Some samples required dilution (X5) and (X2), due to matrix interference and LOR's have been raised accordingly.**
- **EG094: Iron and Manganese results for sample EP1402737 #001 have been confirmed.**
- **EG094: Manganese results for samples EP1402737 # 003 and # 006 have been confirmed.**
- **EP071 (TRH) : Sample matrix spike not reported in some fractions due to positive sample matrix effects. Chromatogram profiles match.**

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

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

Signatories	*Position*	*Accreditation Category*
Agnes Szilagyi	Senior Organic Chemist	Perth Organics
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics
Chas Tucker	Senior Inorganic Chemist	Perth Inorganics
Efua Wilson	Metals Chemist	Perth Inorganics
Shobhna Chandra	Metals Coordinator	Sydney Inorganics

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID	MW1	MW2	MW3	MW4	MW5
				Client sampling date / time	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00
					EP1402737-001	EP1402737-002	EP1402737-003	EP1402737-004	EP1402737-005
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	----	10	mg/L		995	1550	9050	88300	47100
EA025: Suspended Solids									
Suspended Solids (SS)	----	5	mg/L		<5	<5	6	43	78
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		270	412	1440	10600	5040
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		358	250	466	148	275
Total Alkalinity as CaCO3	----	1	mg/L		358	250	466	148	275
ED040F: Dissolved Major Anions									
Silicon as SiO2	14464-46-1	0.1	mg/L		37.5	25.2	35.6	15.9	14.9
Silicon	7440-21-3	0.05	mg/L		17.5	11.7	16.6	7.40	6.94
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		59	135	647	3540	2110
ED045G: Chloride Discrete analyser									
Chloride	16887-00-6	1	mg/L		345	730	5000	49000	25700
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		57	71	104	598	303
Magnesium	7439-95-4	1	mg/L		31	57	286	2210	1040
Sodium	7440-23-5	1	mg/L		267	463	3050	31800	15600
Potassium	7440-09-7	1	mg/L		10	17	115	1200	767
EG020F: Dissolved Metals by ICP-MS									
Chromium	7440-47-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.010	<0.010
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		0.06	0.02	0.02	0.17	1.02
Iron	7439-89-6	0.05	mg/L		0.57	<0.05	<0.05	<0.50	1.13
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG049G LL-F: Dissolved Trivalent Chromium - Low Level									
Trivalent Chromium	16065-83-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
EG050G LL-F: Dissolved Hexavalent Chromium by Discrete Analyser - Low Level									
Hexavalent Chromium	18540-29-9	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.002

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID	MW1	MW2	MW3	MW4	MW5
				Client sampling date / time	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00
					EP1402737-001	EP1402737-002	EP1402737-003	EP1402737-004	EP1402737-005
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS									
Aluminium	7429-90-5	5	µg/L		----	----	----	<25	**86**
Selenium	7782-49-2	2	µg/L		----	----	----	<10	<4
Iron	7439-89-6	5	µg/L		----	----	----	**34**	**15**
Arsenic	7440-38-2	0.5	µg/L		----	----	----	<2.5	<1.0
Cadmium	7440-43-9	0.2	µg/L		----	----	----	<1.0	<0.4
Chromium	7440-47-3	0.5	µg/L		----	----	----	<2.5	**7.4**
Copper	7440-50-8	1	µg/L		----	----	----	<5	<2
Lead	7439-92-1	0.2	µg/L		----	----	----	<1.0	<0.4
Manganese	7439-96-5	0.5	µg/L		----	----	----	**2.9**	**2.6**
Nickel	7440-02-0	0.5	µg/L		----	----	----	**35.0**	**3.2**
Zinc	7440-66-6	5	µg/L		----	----	----	**42**	**17**
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Aluminium	7429-90-5	5	µg/L		<5	<5	<5	----	----
Iron	7439-89-6	2	µg/L		**430**	<2	<2	----	----
Selenium	7782-49-2	0.2	µg/L		**1.0**	**1.1**	**3.5**	----	----
Arsenic	7440-38-2	0.2	µg/L		**0.8**	<0.2	**1.0**	----	----
Cadmium	7440-43-9	0.05	µg/L		<0.05	<0.05	<0.05	----	----
Chromium	7440-47-3	0.2	µg/L		<0.2	<0.2	<0.2	----	----
Copper	7440-50-8	0.5	µg/L		<0.5	<0.5	**1.7**	----	----
Lead	7439-92-1	0.1	µg/L		<0.1	<0.1	<0.1	----	----
Manganese	7439-96-5	0.5	µg/L		**272**	**0.9**	**13.3**	----	----
Nickel	7440-02-0	0.5	µg/L		<0.5	<0.5	<0.5	----	----
Zinc	7440-66-6	1	µg/L		<1	<1	<1	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**0.8**	**0.8**	**1.7**	**0.4**	**0.8**
EK084: Un-ionized Hydrogen Sulfide									
Unionized Hydrogen Sulfide	----	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**18.1**	**28.4**	**164**	**1460**	**774**
Total Cations	----	0.01	meq/L		**17.3**	**28.8**	**164**	**1620**	**799**
Ionic Balance	----	0.01	%		**2.42**	**0.70**	**0.14**	**5.39**	**1.54**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Client sample ID	MW1	MW2	MW3	MW4	MW5
				Client sampling date / time	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00
					EP1402737-001	EP1402737-002	EP1402737-003	EP1402737-004	EP1402737-005
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	<20	<20	<20	<20
C10 - C14 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	50	µg/L		<50	<50	<50	<50	<50
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013									
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	>C10_C16	100	µg/L		<100	<100	<100	<100	<100
>C16 - C34 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C40 Fraction (sum)**	----	100	µg/L		<100	<100	<100	<100	<100
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	100	µg/L		<100	<100	<100	<100	<100
EP080: BTEXN									
Benzene	71-43-2	1	µg/L		<1	<1	<1	<1	<1
Toluene	108-88-3	2	µg/L		<2	<2	<2	<2	<2
Ethylbenzene	100-41-4	2	µg/L		<2	<2	<2	<2	<2
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L		<2	<2	<2	<2	<2
ortho-Xylene	95-47-6	2	µg/L		<2	<2	<2	<2	<2
^ **Total Xylenes**	1330-20-7	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
Ultra-Trace Nutrients									
Ammonia as N	7664-41-7	0.005	mg/L		**0.114**	<0.005	<0.005	**0.014**	**0.018**
Nitrite as N	----	0.002	mg/L		**0.004**	**0.007**	**0.029**	<0.002	<0.002
Nitrate as N	14797-55-8	0.002	mg/L		**1.60**	**4.94**	**0.464**	**4.07**	**1.54**
Nitrite + Nitrate as N	----	0.002	mg/L		**1.60**	**4.95**	**0.493**	**4.07**	**1.54**
Total Kjeldahl Nitrogen as N	----	0.05	mg/L		**0.49**	<0.05	**0.35**	**3.80**	**2.63**
Total Nitrogen as N	----	0.05	mg/L		**2.09**	**4.96**	**0.84**	**7.87**	**4.17**
Reactive Phosphorus as P	14265-44-2	0.001	mg/L		**0.006**	**0.007**	**0.009**	<0.001	**0.002**
Total Phosphorus as P	----	0.005	mg/L		**0.049**	**0.032**	**0.044**	<0.005	<0.005
EP080S: TPH(V)/BTEX Surrogates									

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	MW1	MW2	MW3	MW4	MW5
			Client sampling date / time	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00
Compound	CAS Number	LOR	Unit	EP1402737-001	EP1402737-002	EP1402737-003	EP1402737-004	EP1402737-005
EP080S: TPH(V)/BTEX Surrogates - Continued								
1.2-Dichloroethane-D4	17060-07-0	0.1	%	**98.6**	**101**	**101**	**91.1**	**92.4**
Toluene-D8	2037-26-5	0.1	%	**103**	**103**	**104**	**106**	**108**
4-Bromofluorobenzene	460-00-4	0.1	%	**88.5**	**88.3**	**88.5**	**81.1**	**82.0**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Client sample ID	DUP01	RIN-01	TBW236	TBW237	----
			Client sampling date / time	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00	----
Compound	CAS Number	LOR	Unit	EP1402737-006	EP1402737-007	EP1402737-008	EP1402737-009	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	----	10	mg/L	**8180**	----	----	----	----
EA025: Suspended Solids								
Suspended Solids (SS)	----	5	mg/L	<5	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	**1430**	<1	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	**1**	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**447**	**4**	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	**447**	**5**	----	----	----
ED040F: Dissolved Major Anions								
Silicon as SiO2	14464-46-1	0.1	mg/L	**38.5**	----	----	----	----
Silicon	7440-21-3	0.05	mg/L	**18.0**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**585**	<1	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	**4620**	**2**	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**103**	<1	----	----	----
Magnesium	7439-95-4	1	mg/L	**285**	<1	----	----	----
Sodium	7440-23-5	1	mg/L	**2850**	**2**	----	----	----
Potassium	7440-09-7	1	mg/L	**126**	<1	----	----	----
EG020F: Dissolved Metals by ICP-MS								
Chromium	7440-47-3	0.001	mg/L	<0.001	----	----	----	----
EG020T: Total Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.04**	----	----	----	----
Iron	7439-89-6	0.05	mg/L	<0.05	----	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	----	----	----
EG049G LL-F: Dissolved Trivalent Chromium - Low Level								
Trivalent Chromium	16065-83-1	0.001	mg/L	<0.001	----	----	----	----
EG050G LL-F: Dissolved Hexavalent Chromium by Discrete Analyser - Low Level								
Hexavalent Chromium	18540-29-9	0.001	mg/L	<0.001	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP01	RIN-01	TBW236	TBW237	----
				Client sampling date / time	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00	----
Compound	CAS Number	LOR	Unit		EP1402737-006	EP1402737-007	EP1402737-008	EP1402737-009	----
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS									
Aluminium	7429-90-5	5	µg/L		<5	<5	----	----	----
Iron	7439-89-6	2	µg/L		<2	<2	----	----	----
Selenium	7782-49-2	0.2	µg/L		**4.2**	<0.2	----	----	----
Arsenic	7440-38-2	0.2	µg/L		**1.1**	<0.2	----	----	----
Cadmium	7440-43-9	0.05	µg/L		<0.05	<0.05	----	----	----
Chromium	7440-47-3	0.2	µg/L		**0.2**	<0.2	----	----	----
Copper	7440-50-8	0.5	µg/L		**1.2**	<0.5	----	----	----
Lead	7439-92-1	0.1	µg/L		<0.1	<0.1	----	----	----
Manganese	7439-96-5	0.5	µg/L		**3.6**	<0.5	----	----	----
Nickel	7440-02-0	0.5	µg/L		<0.5	<0.5	----	----	----
Zinc	7440-66-6	1	µg/L		<1	<1	----	----	----
EK040P: Fluoride by PC Titrator									
Fluoride	16984-48-8	0.1	mg/L		**1.6**	<0.1	----	----	----
EK084: Un-ionized Hydrogen Sulfide									
Unionized Hydrogen Sulfide	----	0.1	mg/L		<0.1	----	----	----	----
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L		<0.1	----	----	----	----
EN055: Ionic Balance									
Total Anions	----	0.01	meq/L		**151**	----	----	----	----
Total Cations	----	0.01	meq/L		**156**	----	----	----	----
Ionic Balance	----	0.01	%		**1.40**	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		<20	----	<20	<20	----
C10 - C14 Fraction	----	50	µg/L		<50	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		<100	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		<50	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	µg/L		<50	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013									
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	>C10_C16	100	µg/L		<100	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		<100	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		<100	----	----	----	----

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)				Client sample ID	DUP01	RIN-01	TBW236	TBW237	----
				Client sampling date / time	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00	09-APR-2014 15:00	----
Compound	CAS Number	LOR	Unit		EP1402737-006	EP1402737-007	EP1402737-008	EP1402737-009	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 - Continued									
^ >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	----	<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	1330-20-7	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	----
Ultra-Trace Nutrients									
Ammonia as N	7664-41-7	0.005	mg/L		<0.005	----	----	----	----
Nitrite as N	----	0.002	mg/L		**0.029**	----	----	----	----
Nitrate as N	14797-55-8	0.002	mg/L		**0.531**	----	----	----	----
Nitrite + Nitrate as N	----	0.002	mg/L		**0.560**	----	----	----	----
Total Kjeldahl Nitrogen as N	----	0.05	mg/L		**0.34**	----	----	----	----
Total Nitrogen as N	----	0.05	mg/L		**0.90**	----	----	----	----
Reactive Phosphorus as P	14265-44-2	0.001	mg/L		**0.007**	----	----	----	----
Total Phosphorus as P	----	0.005	mg/L		**0.010**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**101**	----	**104**	**105**	----
Toluene-D8	2037-26-5	0.1	%		**103**	----	**102**	**98.5**	----
4-Bromofluorobenzene	460-00-4	0.1	%		**82.6**	----	**84.3**	**81.3**	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	60.5	141.2
Toluene-D8	2037-26-5	73.4	126
4-Bromofluorobenzene	460-00-4	59.6	125.3

QUALITY CONTROL REPORT

Work Order	: **EP1402737**	Page	: 1 of 11
Client	: **ENVIRO RESOURCES MANAGEMENT**	Laboratory	: Environmental Division Perth
Contact	: SEAN SCAIFE	Contact	: Shuk Hui Li
Address	: LEVEL 6, GRAIN POOL BLDG 172 ST GEORGE TCE WA, AUSTRALIA 6000	Address	: 10 Hod Way Malaga WA Australia 6090
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Telephone	: +61 08 9321 5200	Telephone	: 08 9209 7655
Facsimile	: +61 08 9321 5262	Facsimile	: 08 9209 7600
Project	: 0220651 YPNPL GME	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: KARRATHA/ DAMPIER		
C-O-C number	: 15430	Date Samples Received	: 10-APR-2014
Sampler	: S.S./S.N.	Issue Date	: 17-APR-2014
Order number	: ----		
		No. of samples received	: 9
Quote number	: EP/901/13	No. of samples analysed	: 9

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

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

General Comments

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

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

Signatories

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

Signatories	Position	Accreditation Category
Agnes Szilagyi	Senior Organic Chemist	Perth Organics
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Canhuang Ke	Metals Instrument Chemist	Perth Inorganics
Chas Tucker	Senior Inorganic Chemist	Perth Inorganics
Efua Wilson	Metals Chemist	Perth Inorganics
Shobhna Chandra	Metals Coordinator	Sydney Inorganics

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA015: Total Dissolved Solids (QC Lot: 3390005)									
EP1402737-001	MW1	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	995	972	2.3	0% - 20%
EP1402751-001	Anonymous	EA015H: Total Dissolved Solids @180°C	----	10	mg/L	1380	1320	4.5	0% - 20%
EA025: Suspended Solids (QC Lot: 3390006)									
EP1402737-001	MW1	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.0	No Limit
EP1402753-001	Anonymous	EA025H: Suspended Solids (SS)	----	5	mg/L	<5	<5	0.0	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3387685)									
EP1402726-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.0	No Limit
EP1402737-003	MW3	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	466	469	0.8	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	466	469	0.8	0% - 20%
ED040F: Dissolved Major Anions (QC Lot: 3394442)									
EP1402737-001	MW1	ED040F: Silicon	7440-21-3	0.05	mg/L	17.5	17.8	1.5	0% - 20%
		ED040F: Silicon as SiO2	14464-46-1	0.1	mg/L	37.5	38.1	1.5	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3394445)									
EP1402737-001	MW1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	59	60	0.0	0% - 20%
ED045G: Chloride Discrete analyser (QC Lot: 3394444)									
EP1402737-001	MW1	ED045G: Chloride	16887-00-6	1	mg/L	345	349	1.0	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3394443)									
EP1402737-001	MW1	ED093F: Calcium	7440-70-2	1	mg/L	57	57	0.0	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	31	32	0.0	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	267	276	3.4	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	10	10	0.0	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3392074)									
ES1408062-001	Anonymous	EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
ES1408042-005	Anonymous	EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3392214)									
EP1402737-001	MW1	EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.06	0.06	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	0.57	0.53	7.4	0% - 50%
EP1402751-001	Anonymous	EG020A-T: Aluminium	7429-90-5	0.01	mg/L	0.06	0.07	0.0	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	22.4	22.6	0.8	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 (%)*
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3392268)									
EP1402737-001	MW1	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EP1402807-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0100	<0.0100	0.0	No Limit
EG050G LL-F: Dissolved Hexavalent Chromium by Discrete Analyser - Low Level (QC Lot: 3394782)									
EP1402737-001	MW1	EG050G: Hexavalent Chromium	18540-29-9	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 3392277)									
EP1402737-004	MW4	EG093A-F: Cadmium	7440-43-9	0.2	µg/L	<1.0	<1.0	0.0	No Limit
		EG093A-F: Lead	7439-92-1	0.2	µg/L	<1.0	<1.0	0.0	No Limit
		EG093A-F: Arsenic	7440-38-2	0.5	µg/L	<2.5	<2.5	0.0	No Limit
		EG093A-F: Chromium	7440-47-3	0.5	µg/L	<2.5	<2.5	0.0	No Limit
		EG093A-F: Manganese	7439-96-5	0.5	µg/L	2.9	2.5	13.9	No Limit
		EG093A-F: Nickel	7440-02-0	0.5	µg/L	35.0	34.8	0.5	0% - 50%
		EG093A-F: Copper	7440-50-8	1	µg/L	<5	<5	0.0	No Limit
		EG093A-F: Aluminium	7429-90-5	5	µg/L	<25	<25	0.0	No Limit
		EG093A-F: Zinc	7440-66-6	5	µg/L	42	43	3.7	No Limit
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QC Lot: 3392278)									
EP1402737-004	MW4	EG093B-F: Selenium	7782-49-2	2	µg/L	<10	<10	0.0	No Limit
		EG093B-F: Iron	7439-89-6	5	µg/L	34	28	17.5	No Limit
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QC Lot: 3392280)									
EP1402737-001	MW1	EG094A-F: Cadmium	7440-43-9	0.05	µg/L	<0.05	<0.05	0.0	No Limit
		EG094A-F: Lead	7439-92-1	0.1	µg/L	<0.1	<0.1	0.0	No Limit
		EG094A-F: Arsenic	7440-38-2	0.2	µg/L	0.8	0.8	0.0	No Limit
		EG094A-F: Chromium	7440-47-3	0.2	µg/L	<0.2	<0.2	0.0	No Limit
		EG094A-F: Copper	7440-50-8	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EG094A-F: Manganese	7439-96-5	0.5	µg/L	272	281	3.5	0% - 20%
		EG094A-F: Nickel	7440-02-0	0.5	µg/L	<0.5	<0.5	0.0	No Limit
		EG094A-F: Zinc	7440-66-6	1	µg/L	<1	1	0.0	No Limit
		EG094A-F: Aluminium	7429-90-5	5	µg/L	<5	<5	0.0	No Limit
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QC Lot: 3392281)									
EP1402737-001	MW1	EG094B-F: Selenium	7782-49-2	0.2	µg/L	1.0	0.8	20.8	No Limit
		EG094B-F: Iron	7439-89-6	2	µg/L	430	450	4.6	0% - 20%
EK040P: Fluoride by PC Titrator (QC Lot: 3387681)									
EP1402699-010	Anonymous	EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EP1402737-003	MW3	EK040P: Fluoride	16984-48-8	0.1	mg/L	1.7	1.7	0.0	0% - 50%
EK085M: Sulfide as S2- (QC Lot: 3392263)									
EP1402737-001	MW1	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3387251)									
EP1402718-002	Anonymous	EP071: C15 - C28 Fraction	----	100	µg/L	560	730	26.4	No Limit
		EP071: C10 - C14 Fraction	----	50	µg/L	70	70	0.0	No Limit
		EP071: C29 - C36 Fraction	----	50	µg/L	270	450	50.7	No Limit

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 (%)*
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3390224)									
EP1402737-001	MW1	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP1402770-004	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QC Lot: 3387251)									
EP1402718-002	Anonymous	EP071: >C10 - C16 Fraction	>C10_C16	100	µg/L	130	120	0.0	No Limit
		EP071: >C16 - C34 Fraction	----	100	µg/L	720	1040	36.8	0% - 50%
		EP071: >C34 - C40 Fraction	----	100	µg/L	<100	180	56.2	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QC Lot: 3390224)									
EP1402737-001	MW1	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP1402770-004	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.0	No Limit
EP080: BTEXN (QC Lot: 3390224)									
EP1402737-001	MW1	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
EP1402770-004	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.0	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.0	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.0	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.0	No Limit
Ultra-Trace Nutrients (QC Lot: 3388369)									
EP1402737-001	MW1	EK262PA-SW: Total Nitrogen as N	----	0.05	mg/L	2.09	2.15	2.8	0% - 20%
Ultra-Trace Nutrients (QC Lot: 3388370)									
EP1402737-001	MW1	EK267PA-SW: Total Phosphorus as P	----	0.005	mg/L	0.049	0.042	15.7	No Limit
Ultra-Trace Nutrients (QC Lot: 3388833)									
EP1402737-001	MW1	EK257A-SW: Nitrite as N	----	0.002	mg/L	0.004	0.005	26.1	No Limit
Ultra-Trace Nutrients (QC Lot: 3388834)									
EP1402737-001	MW1	EK255A-SW: Ammonia as N	7664-41-7	0.005	mg/L	0.114	0.117	2.8	0% - 20%
Ultra-Trace Nutrients (QC Lot: 3388835)									
EP1402737-001	MW1	EK259A-SW: Nitrite + Nitrate as N	----	0.002	mg/L	1.60	1.55	3.1	0% - 20%
Ultra-Trace Nutrients (QC Lot: 3388836)									
EP1402737-001	MW1	EK271A-SW: Reactive Phosphorus as P	14265-44-2	0.001	mg/L	0.006	0.004	39.2	No Limit

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

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

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA015: Total Dissolved Solids (QCLot: 3390005)								
EA015H: Total Dissolved Solids @180°C	----	10	mg/L	<10	293 mg/L	96.8	83	130
EA025: Suspended Solids (QCLot: 3390006)								
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	90.7	70	130
ED037P: Alkalinity by PC Titrator (QCLot: 3387685)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	200 mg/L	95.1	87	121
ED040F: Dissolved Major Anions (QCLot: 3394442)								
ED040F: Silicon as SiO2	14464-46-1	0.1	mg/L	<0.1	----	----	----	----
ED040F: Silicon	7440-21-3	0.05	mg/L	<0.05	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3394445)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	91.2	88	121
ED045G: Chloride Discrete analyser (QCLot: 3394444)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	99.8	84	120
ED093F: Dissolved Major Cations (QCLot: 3394443)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	95.9	91	109
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.2	90	108
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.2	87	111
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.2	90	110
EG020F: Dissolved Metals by ICP-MS (QCLot: 3392074)								
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	97.6	81	113
EG020T: Total Metals by ICP-MS (QCLot: 3392214)								
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	99.0	86	116
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	99.0	83	113
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3392268)								
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.0100 mg/L	108	87	115
EG050G LL-F: Dissolved Hexavalent Chromium by Discrete Analyser - Low Level (QCLot: 3394782)								
EG050G: Hexavalent Chromium	18540-29-9	0.001	mg/L	<0.001	0.05 mg/L	103	70	130
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 3392277)								
EG093A-F: Aluminium	7429-90-5	5	µg/L	<5	50 µg/L	86.1	71	121
EG093A-F: Arsenic	7440-38-2	0.5	µg/L	<0.5	10 µg/L	85.1	76	134

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 3392277) - continued								
EG093A-F: Cadmium	7440-43-9	0.2	µg/L	<0.2	10 µg/L	82.3	69	117
EG093A-F: Chromium	7440-47-3	0.5	µg/L	<0.5	10 µg/L	84.2	73	121
EG093A-F: Copper	7440-50-8	1	µg/L	<1	10 µg/L	85.3	71	129
EG093A-F: Lead	7439-92-1	0.2	µg/L	<0.2	10 µg/L	84.6	74	120
EG093A-F: Manganese	7439-96-5	0.5	µg/L	<0.5	10 µg/L	86.4	72	122
EG093A-F: Nickel	7440-02-0	0.5	µg/L	<0.5	10 µg/L	86.9	72	124
EG093A-F: Zinc	7440-66-6	5	µg/L	<5	10 µg/L	89.0	70	126
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS (QCLot: 3392278)								
EG093B-F: Iron	7439-89-6	5	µg/L	<5	50 µg/L	84.5	70	120
EG093B-F: Selenium	7782-49-2	2	µg/L	<2	10 µg/L	97.1	74	130
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QCLot: 3392280)								
EG094A-F: Aluminium	7429-90-5	5	µg/L	<5	50 µg/L	98.3	84	116
EG094A-F: Arsenic	7440-38-2	0.2	µg/L	<0.2	10 µg/L	91.6	75	129
EG094A-F: Cadmium	7440-43-9	0.05	µg/L	<0.05	10 µg/L	97.8	83	111
EG094A-F: Chromium	7440-47-3	0.2	µg/L	<0.2	10 µg/L	101	83	113
EG094A-F: Copper	7440-50-8	0.5	µg/L	<0.5	10 µg/L	91.7	84	114
EG094A-F: Lead	7439-92-1	0.1	µg/L	<0.1	10 µg/L	96.8	74	118
EG094A-F: Manganese	7439-96-5	0.5	µg/L	<0.5	10 µg/L	102	84	114
EG094A-F: Nickel	7440-02-0	0.5	µg/L	<0.5	10 µg/L	94.7	85	117
EG094A-F: Zinc	7440-66-6	1	µg/L	<1	10 µg/L	97.1	83	121
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS (QCLot: 3392281)								
EG094B-F: Iron	7439-89-6	2	µg/L	<2	50 µg/L	99.1	79	115
EG094B-F: Selenium	7782-49-2	0.2	µg/L	<0.2	10 µg/L	91.2	70	122
EK040P: Fluoride by PC Titrator (QCLot: 3387681)								
EK040P: Fluoride	16984-48-8	0.1	mg/L	<0.1	5 mg/L	94.6	89	115
EK085M: Sulfide as S2- (QCLot: 3392263)								
EK085: Sulfide as S2-	18496-25-8	0.10	mg/L	<0.1	0.50 mg/L	92.4	82	116
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3387251)								
EP071: C10 - C14 Fraction	----	50	µg/L	<50	400 µg/L	70.5	30.7	123
EP071: C15 - C28 Fraction	----	100	µg/L	<100	400 µg/L	75.6	34	142
EP071: C29 - C36 Fraction	----	50	µg/L	<50	400 µg/L	73.8	32	124
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3390224)								
EP080: C6 - C9 Fraction	----	20	µg/L	<20	320 µg/L	97.0	74.2	142
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3387251)								
EP071: >C10 - C16 Fraction	>C10_C16	100	µg/L	<100	400 µg/L	73.2	32	126
EP071: >C16 - C34 Fraction	----	100	µg/L	<100	600 µg/L	74.6	32	136
EP071: >C34 - C40 Fraction	----	100	µg/L	<100	200 µg/L	70.2	28.3	142
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3390224)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3390224) - continued								
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	370 µg/L	96.8	74.2	142
EP080: BTEXN (QCLot: 3390224)								
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	106	72.6	122
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	101	71.1	123
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	102	71.9	121
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	103	72.3	122
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	103	72.3	121
EP080: Naphthalene	91-20-3	5	µg/L	<5	20 µg/L	87.9	78.8	121
Ultra-Trace Nutrients (QCLot: 3388369)								
EK262PA-SW: Total Nitrogen as N	----	0.05	mg/L	<0.05	1.0 mg/L	87.6	65	117
Ultra-Trace Nutrients (QCLot: 3388370)								
EK267PA-SW: Total Phosphorus as P	----	0.005	mg/L	<0.005	0.44 mg/L	97.9	72	136
Ultra-Trace Nutrients (QCLot: 3388833)								
EK257A-SW: Nitrite as N	----	0.002	mg/L	<0.002	0.1 mg/L	116	91	127
Ultra-Trace Nutrients (QCLot: 3388834)								
EK255A-SW: Ammonia as N	7664-41-7	0.005	mg/L	<0.005	0.1 mg/L	103	63	121
Ultra-Trace Nutrients (QCLot: 3388835)								
EK259A-SW: Nitrite + Nitrate as N	----	0.002	mg/L	<0.002	0.1 mg/L	106	87	121
Ultra-Trace Nutrients (QCLot: 3388836)								
EK271A-SW: Reactive Phosphorus as P	14265-44-2	0.001	mg/L	<0.001	0.1 mg/L	89.5	79	113

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3394445)							
EP1402737-001	MW1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	96.5	70	130
ED045G: Chloride Discrete analyser (QCLot: 3394444)							
EP1402737-001	MW1	ED045G: Chloride	16887-00-6	1000 mg/L	99.3	70	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3392074)							
EP1402737-001	MW1	EG020A-F: Chromium	7440-47-3	0.2 mg/L	109	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3392268)							
EP1402737-002	MW2	EG035T: Mercury	7439-97-6	0.0100 mg/L	105	70	130

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
EG050G LL-F: Dissolved Hexavalent Chromium by Discrete Analyser - Low Level (QCLot: 3394782)							
EP1402737-001	MW1	EG050G: Hexavalent Chromium	18540-29-9	0.05 mg/L	101	70	130
EK040P: Fluoride by PC Titrator (QCLot: 3387681)							
EP1402699-008	Anonymous	EK040P: Fluoride	16984-48-8	4.9 mg/L	84.5	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3387251)							
EP1402718-002	Anonymous	EP071: C10 - C14 Fraction	----	400 µg/L	74.7	44.5	122
		EP071: C15 - C28 Fraction	----	400 µg/L	# Not Determined	55.1	143
		EP071: C29 - C36 Fraction	----	400 µg/L	126	53.6	128
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3390224)							
EP1402737-002	MW2	EP080: C6 - C9 Fraction	----	280 µg/L	82.3	77.0	137
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3387251)							
EP1402718-002	Anonymous	EP071: >C10 - C16 Fraction	>C10_C16	400 µg/L	79.0	44.5	122
		EP071: >C16 - C34 Fraction	----	600 µg/L	# Not Determined	55.1	143
		EP071: >C34 - C40 Fraction	----	200 µg/L	127	53.6	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3390224)							
EP1402737-002	MW2	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	81.3	77.0	137
EP080: BTEXN (QCLot: 3390224)							
EP1402737-002	MW2	EP080: Benzene	71-43-2	20 µg/L	107	77.0	122
		EP080: Toluene	108-88-3	20 µg/L	95.3	73.5	126
Ultra-Trace Nutrients (QCLot: 3388369)							
EP1402737-001	MW1	EK262PA-SW: Total Nitrogen as N	----	5.0 mg/L	88.5	70	130
Ultra-Trace Nutrients (QCLot: 3388370)							
EP1402737-001	MW1	EK267PA-SW: Total Phosphorus as P	----	0.5 mg/L	79.7	70	130
Ultra-Trace Nutrients (QCLot: 3388833)							
EP1402737-001	MW1	EK257A-SW: Nitrite as N	----	0.1 mg/L	117	70	130
Ultra-Trace Nutrients (QCLot: 3388834)							
EP1402737-001	MW1	EK255A-SW: Ammonia as N	7664-41-7	0.1 mg/L	78.0	70.	130
Ultra-Trace Nutrients (QCLot: 3388835)							
EP1402737-001	MW1	EK259A-SW: Nitrite + Nitrate as N	----	1.0 mg/L	103	70	130
Ultra-Trace Nutrients (QCLot: 3388836)							
EP1402737-001	MW1	EK271A-SW: Reactive Phosphorus as P	14265-44-2	0.1 mg/L	82.5	70	130

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

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

Sub-Matrix: **WATER**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	MSD	Low	High	Value	Control Limit
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3387251)										
EP1402718-002	Anonymous	EP071: C10 - C14 Fraction	----	400 µg/L	74.7	----	44.5	122	----	----
		EP071: C15 - C28 Fraction	----	400 µg/L	# Not Determined	----	55.1	143	----	----
		EP071: C29 - C36 Fraction	----	400 µg/L	126	----	53.6	128	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3387251)										
EP1402718-002	Anonymous	EP071: >C10 - C16 Fraction	>C10_C16	400 µg/L	79.0	----	44.5	122	----	----
		EP071: >C16 - C34 Fraction	----	600 µg/L	# Not Determined	----	55.1	143	----	----
		EP071: >C34 - C40 Fraction	----	200 µg/L	127	----	53.6	128	----	----
EK040P: Fluoride by PC Titrator (QCLot: 3387681)										
EP1402699-008	Anonymous	EK040P: Fluoride	16984-48-8	4.9 mg/L	84.5	----	70	130	----	----
Ultra-Trace Nutrients (QCLot: 3388369)										
EP1402737-001	MW1	EK262PA-SW: Total Nitrogen as N	----	5.0 mg/L	88.5	----	70	130	----	----
Ultra-Trace Nutrients (QCLot: 3388370)										
EP1402737-001	MW1	EK267PA-SW: Total Phosphorus as P	----	0.5 mg/L	79.7	----	70	130	----	----
Ultra-Trace Nutrients (QCLot: 3388833)										
EP1402737-001	MW1	EK257A-SW: Nitrite as N	----	0.1 mg/L	117	----	70	130	----	----
Ultra-Trace Nutrients (QCLot: 3388834)										
EP1402737-001	MW1	EK255A-SW: Ammonia as N	7664-41-7	0.1 mg/L	78.0	----	70.	130	----	----
Ultra-Trace Nutrients (QCLot: 3388835)										
EP1402737-001	MW1	EK259A-SW: Nitrite + Nitrate as N	----	1.0 mg/L	103	----	70	130	----	----
Ultra-Trace Nutrients (QCLot: 3388836)										
EP1402737-001	MW1	EK271A-SW: Reactive Phosphorus as P	14265-44-2	0.1 mg/L	82.5	----	70	130	----	----
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3390224)										
EP1402737-002	MW2	EP080: C6 - C9 Fraction	----	280 µg/L	82.3	----	77.0	137	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 (QCLot: 3390224)										
EP1402737-002	MW2	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	81.3	----	77.0	137	----	----
EP080: BTEXN (QCLot: 3390224)										
EP1402737-002	MW2	EP080: Benzene	71-43-2	20 µg/L	107	----	77.0	122	----	----
		EP080: Toluene	108-88-3	20 µg/L	95.3	----	73.5	126	----	----
EG020F: Dissolved Metals by ICP-MS (QCLot: 3392074)										
EP1402737-001	MW1	EG020A-F: Chromium	7440-47-3	0.2 mg/L	109	----	70	130	----	----
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3392268)										
EP1402737-002	MW2	EG035T: Mercury	7439-97-6	0.0100 mg/L	105	----	70	130	----	----

Sub-Matrix: **WATER**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	MSD	Low	High	Value	Control Limit
ED045G: Chloride Discrete analyser (QCLot: 3394444)										
EP1402737-001	MW1	ED045G: Chloride	16887-00-6	1000 mg/L	99.3	----	70	130	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3394445)										
EP1402737-001	MW1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	96.5	----	70	130	----	----
EG050G LL-F: Dissolved Hexavalent Chromium by Discrete Analyser - Low Level (QCLot: 3394782)										
EP1402737-001	MW1	EG050G: Hexavalent Chromium	18540-29-9	0.05 mg/L	101	----	70	130	----	----

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **EP1402737**	Page	: 1 of 13
Client	: ENVIRO RESOURCES MANAGEMENT	Laboratory	: Environmental Division Perth
Contact	: SEAN SCAIFE	Contact	: Shuk Hui Li
Address	: LEVEL 6, GRAIN POOL BLDG 172 ST GEORGE TCE WA, AUSTRALIA 6000	Address	: 10 Hod Way Malaga WA Australia 6090
E-mail	: sean.scaife@erm.com	E-mail	: ShukHui.Li@alsglobal.com
Telephone	: +61 08 9321 5200	Telephone	: 08 9209 7655
Facsimile	: +61 08 9321 5262	Facsimile	: 08 9209 7600
Project	: 0220651 YPNPL GME	QC Level	: NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Site	: KARRATHA/ DAMPIER		
C-O-C number	: 15430	Date Samples Received	: 10-APR-2014
Sampler	: S.S./S.N.	Issue Date	: 17-APR-2014
Order number	: ----		
		No. of samples received	: 9
Quote number	: EP/901/13	No. of samples analysed	: 9

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

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

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

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

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA015: Total Dissolved Solids							
Clear Plastic Bottle - Natural (EA015H)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**---**	16-APR-2014	----	**14-APR-2014**	16-APR-2014	✓
EA025: Suspended Solids							
Clear Plastic Bottle - Natural (EA025H)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**---**	16-APR-2014	----	**14-APR-2014**	16-APR-2014	✓
ED037P: Alkalinity by PC Titrator							
Amber Glass Bottle - Unpreserved (ED037-P)							
RIN-01	**09-APR-2014**	**---**	23-APR-2014	----	**11-APR-2014**	23-APR-2014	✓
Clear Plastic Bottle - Natural (ED037-P)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**---**	23-APR-2014	----	**11-APR-2014**	23-APR-2014	✓
ED040F: Dissolved Major Anions							
Clear Plastic Bottle - Natural (ED040F)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**---**	07-MAY-2014	----	**16-APR-2014**	07-MAY-2014	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Amber Glass Bottle - Unpreserved (ED041G)							
RIN-01	**09-APR-2014**	**---**	07-MAY-2014	----	**17-APR-2014**	07-MAY-2014	✓
Clear Plastic Bottle - Natural (ED041G)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**---**	07-MAY-2014	----	**17-APR-2014**	07-MAY-2014	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride Discrete analyser							
Amber Glass Bottle - Unpreserved (ED045G)							
RIN-01	**09-APR-2014**	**---**	07-MAY-2014	----	**17-APR-2014**	07-MAY-2014	✓
Clear Plastic Bottle - Natural (ED045G)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**---**	07-MAY-2014	----	**17-APR-2014**	07-MAY-2014	✓
ED093F: Dissolved Major Cations							
Amber Glass Bottle - Unpreserved (ED093F)							
RIN-01	**09-APR-2014**	**---**	16-APR-2014	----	**16-APR-2014**	16-APR-2014	✓
Clear Plastic Bottle - Natural (ED093F)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**---**	16-APR-2014	----	**16-APR-2014**	16-APR-2014	✓
EA065: Total Hardness as CaCO3							
Amber Glass Bottle - Unpreserved (ED093F)							
RIN-01	**09-APR-2014**	**---**	16-APR-2014	----	**16-APR-2014**	16-APR-2014	✓
Clear Plastic Bottle - Natural (ED093F)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**---**	16-APR-2014	----	**16-APR-2014**	16-APR-2014	✓
EG020F: Dissolved Metals by ICP-MS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG020A-F)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**---**	06-OCT-2014	----	**16-APR-2014**	06-OCT-2014	✓
EG020T: Total Metals by ICP-MS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020A-T)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**15-APR-2014**	06-OCT-2014	✓	**15-APR-2014**	06-OCT-2014	✓
EG035T: Total Recoverable Mercury by FIMS							
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG035T)							
MW1, MW2, MW3, MW4, MW5, DUP01, RIN-01	**09-APR-2014**	**----**	----	----	**15-APR-2014**	07-MAY-2014	✓
EG050G LL-F: Dissolved Hexavalent Chromium by Discrete Analyser - Low Level							
Clear Plastic Bottle - NaOH (EG050G LL-F)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**----**	----	----	**16-APR-2014**	07-MAY-2014	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093A-F)							
MW4, MW5	**09-APR-2014**	---	06-OCT-2014	----	**15-APR-2014**	06-OCT-2014	✓
EG093F: Dissolved Metals in Saline Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG093B-F)							
MW4, MW5	**09-APR-2014**	---	06-OCT-2014	----	**15-APR-2014**	06-OCT-2014	✓
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG094A-F)							
MW1, MW2, MW3, DUP01, RIN-01	**09-APR-2014**	---	06-OCT-2014	----	**15-APR-2014**	06-OCT-2014	✓
EG094F: Dissolved Metals in Fresh Water by ORC-ICPMS							
Clear HDPE (U-T ORC) - Filtered; Lab-acidified (EG094B-F)							
MW1, MW2, MW3, DUP01, RIN-01	**09-APR-2014**	---	06-OCT-2014	----	**15-APR-2014**	06-OCT-2014	✓
EK040P: Fluoride by PC Titrator							
Amber Glass Bottle - Unpreserved (EK040P)							
RIN-01	**09-APR-2014**	---	07-MAY-2014	----	**11-APR-2014**	07-MAY-2014	✓
Clear Plastic Bottle - Natural (EK040P)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	---	07-MAY-2014	----	**11-APR-2014**	07-MAY-2014	✓
EK085M: Sulfide as S2-							
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**----**	----	----	**15-APR-2014**	16-APR-2014	✓
Ultra-Trace Nutrients							
Clear Plastic - Filtered (AS) - for UT Nut. (EK255A-SW)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	---	10-APR-2014	----	**11-APR-2014**	10-APR-2014	×
Ultra-Trace Nutrients							
Clear Plastic - Filtered (AS) - for UT Nut. (EK257A-SW)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	---	10-APR-2014	----	**11-APR-2014**	10-APR-2014	×

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Ultra-Trace Nutrients							
Clear Plastic - Filtered (AS) - for UT Nut. (EK259A-SW)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	---	10-APR-2014	----	**11-APR-2014**	10-APR-2014	×
Ultra-Trace Nutrients							
Clear Plastic Bottle - Natural (EK262PA-SW)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**11-APR-2014**	10-APR-2014	×	**11-APR-2014**	10-APR-2014	×
Ultra-Trace Nutrients							
Clear Plastic Bottle - Natural (EK267PA-SW)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**11-APR-2014**	10-APR-2014	×	**11-APR-2014**	10-APR-2014	×
Ultra-Trace Nutrients							
Clear Plastic - Filtered (AS) - for UT Nut. (EK271A-SW)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	---	10-APR-2014	----	**11-APR-2014**	10-APR-2014	×
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013							
Amber Glass Bottle - Unpreserved (EP071)							
MW1, MW2, MW3, MW4, MW5, DUP01	**09-APR-2014**	**11-APR-2014**	16-APR-2014	✓	**14-APR-2014**	21-MAY-2014	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
MW1, MW2, MW3, MW4, MW5, DUP01, TBW236, TBW237	**09-APR-2014**	**14-APR-2014**	23-APR-2014	✓	**14-APR-2014**	23-APR-2014	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013							
Amber VOC Vial - Sulfuric Acid (EP080)							
MW1, MW2, MW3, MW4, MW5, DUP01, TBW236, TBW237	**09-APR-2014**	**14-APR-2014**	23-APR-2014	✓	**14-APR-2014**	23-APR-2014	✓

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(where) 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)							
Alkalinity by PC Titrator	ED037-P	2	14	**14.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ammonia as N - Ultra-Trace in Saline Waters	EK255A-SW	1	6	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	8	**12.5**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Hexavalent Chromium by DA - Low Level	EG050G LL-F	1	6	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Fresh Water -Suite A by ORC-ICPMS	EG094A-F	1	5	**20.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	5	**20.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	EG093A-F	1	2	**50.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	2	**50.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	2	18	**11.1**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	6	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	10	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N - Ultra-Trace in Saline Waters	EK259A-SW	1	6	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Ultra-Trace in Saline Waters	EK257A-SW	1	6	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P - Ultra-Trace in Saline Water	EK271A-SW	1	6	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	10	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfide as S2-	EK085	1	6	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids (High Level)	EA025H	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	2	13	**15.4**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Nitrogen/Persulfate Digestion/Ultra-Trace/Saline	EK262PA-SW	1	6	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus/Persulfate Digestion/ Ultra Trace /Saline	EK267PA-SW	1	6	**16.7**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	19	**5.3**	**10.0**	×	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	2	19	**10.5**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	14	**14.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ammonia as N - Ultra-Trace in Saline Waters	EK255A-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	2	8	**25.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Hexavalent Chromium by DA - Low Level	EG050G LL-F	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Fresh Water -Suite A by ORC-ICPMS	EG094A-F	1	5	**20.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	5	**20.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	EG093A-F	1	2	**50.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	2	**50.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	18	**5.6**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

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 Control Samples (LCS) - Continued							
Major Anions - Dissolved	ED040F	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	10	**10.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N - Ultra-Trace in Saline Waters	EK259A-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Ultra-Trace in Saline Waters	EK257A-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P - Ultra-Trace in Saline Water	EK271A-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	10	**20.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfide as S2-	EK085	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids (High Level)	EA025H	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	2	20	**10.0**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	13	**7.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Nitrogen/Persulfate Digestion/Ultra-Trace/Saline	EK262PA-SW	2	6	**33.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus/Persulfate Digestion/ Ultra Trace /Saline	EK267PA-SW	2	6	**33.3**	**10.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	14	**7.1**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Ammonia as N - Ultra-Trace in Saline Waters	EK255A-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	8	**12.5**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Hexavalent Chromium by DA - Low Level	EG050G LL-F	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Fresh Water -Suite A by ORC-ICPMS	EG094A-F	1	5	**20.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	1	5	**20.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	EG093A-F	1	2	**50.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	1	2	**50.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	18	**5.6**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Anions - Dissolved	ED040F	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Major Cations - Dissolved	ED093F	1	10	**10.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N - Ultra-Trace in Saline Waters	EK259A-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Ultra-Trace in Saline Waters	EK257A-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P - Ultra-Trace in Saline Water	EK271A-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	10	**10.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfide as S2-	EK085	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Suspended Solids (High Level)	EA025H	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Dissolved Solids (High Level)	EA015H	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	13	**7.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Nitrogen/Persulfate Digestion/Ultra-Trace/Saline	EK262PA-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus/Persulfate Digestion/ Ultra Trace /Saline	EK267PA-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

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*	
Method Blanks (MB) - Continued							
TPH Volatiles/BTEX	EP080	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Matrix Spikes (MS)							
Ammonia as N - Ultra-Trace in Saline Waters	EK255A-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Chloride by Discrete Analyser	ED045G	1	8	**12.5**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Hexavalent Chromium by DA - Low Level	EG050G LL-F	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Fluoride by PC Titrator	EK040P	1	18	**5.6**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite and Nitrate as N - Ultra-Trace in Saline Waters	EK259A-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Nitrite as N - Ultra-Trace in Saline Waters	EK257A-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Reactive Phosphorus as P - Ultra-Trace in Saline Water	EK271A-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	10	**10.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Mercury by FIMS	EG035T	1	13	**7.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	**5.0**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Nitrogen/Persulfate Digestion/Ultra-Trace/Saline	EK262PA-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
Total Phosphorus/Persulfate Digestion/ Ultra Trace /Saline	EK267PA-SW	1	6	**16.7**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH - Semivolatile Fraction	EP071	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement
TPH Volatiles/BTEX	EP080	1	19	**5.3**	**5.0**	✓	NEPM 2013 Schedule B(3) and ALS QCS3 requirement

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Total Dissolved Solids (High Level)	EA015H	WATER	In-House, APHA 21st ed., 2540C A gravimetric procedure that determines the amount of `filterable` residue in an aqueous sample. A well-mixed sample is filtered through a glass fibre filter (1.2um). The filtrate is evaporated to dryness and dried to constant weight at 180+/-5C. This method is compliant with NEPM (2013) Schedule B(3)
Suspended Solids (High Level)	EA025H	WATER	In-House, APHA 21st ed., 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 (2013) Schedule B(3)
Alkalinity by PC Titrator	ED037-P	WATER	APHA 21st ed., 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Major Anions - Dissolved	ED040F	WATER	APHA 21st ed., 3120. The 0.45um filtered samples are determined by ICP/AES for Sulfur and/or Silcon content and reported as Sulfate and/or Silica after conversion by gravimetric factor.
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	APHA 21st ed., 4500-SO4 Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	APHA 21st ed., 4500 Cl - G.The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	Major Cations is determined based on APHA 21st ed., 3120; USEPA SW 846 - 6010 The ICPAES technique ionises the 0.45um filtered sample atoms emitting a characteristic spectrum. This spectrum is then compared against matrix matched standards for quantification. This method is compliant with NEPM (2013) Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-EN/ED093F. This method is compliant with NEPM (2013) Schedule B(3) Hardness parameters are calculated based on APHA 21st ed., 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): Samples are 0.45 um 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.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	(APHA 21st ed., 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020): 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.

Analytical Methods	Method	Matrix	Method Descriptions
Total Mercury by FIMS	EG035T	WATER	AS 3550, APHA 21st ed. 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Trivalent Chromium by DA - Low Level	EG049G LL-F	WATER	APHA 21st ed., 3500 Cr-B & 3120/3125 Trivalent Chromium is the difference between total dissolved and dissolved hexavalent chromium.
Dissolved Hexavalent Chromium by DA - Low Level	EG050G LL-F	WATER	APHA 21st ed., 3500 Cr-A & B. Samples are 0.45 um filtered prior to analysis. Hexavalent chromium is determined directly on water sample by Descrete Analyser as received by pH adjustment and colour development using dephenylcarbazide. Each run of samples is measured against a five-point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals in Saline Water -Suite A by ORC-ICPMS	EG093A-F	WATER	APHA 21st ed., 3125; USEPA SW846 - 6020 Samples are 0.45 um filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals in Saline Water -Suite B by ORC-ICPMS	EG093B-F	WATER	APHA 21st ed., 3125; USEPA SW846 - 6020 Samples are 0.45 um filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals in Fresh Water -Suite A by ORC-ICPMS	EG094A-F	WATER	APHA 21st ed., 3125; USEPA SW846 - 6020 Samples are 0.45 um filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals in Fresh Water -Suite B by ORC-ICPMS	EG094B-F	WATER	APHA 21st ed., 3125; USEPA SW846 - 6020 Samples are 0.45 um filtered prior to analysis. The ORC-ICPMS technique removes interfering species through a series of chemical reactions prior to ion detection. Ions are passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to measurement by a discrete dynode ion detector. This method is compliant with NEPM (2013) Schedule B(3)
Fluoride by PC Titrator	EK040P	WATER	APHA 21st ed., 4500 F--C CDTA is added to the sample to provide a uniform ionic strength background, adjust pH, and break up complexes. Fluoride concentration is determined by either manual or automatic ISE measurement. This method is compliant with NEPM (2013) Schedule B(3)
Un-ionized Hydrogen Sulfide	EK084	WATER	APHA 21st ed., 4500-S2- H. Sulfide in the sample is reported as the ionised / unionised fractions by the use of a nomograph and the initial pH. This method is compliant with NEPM (2013) Schedule B(3)
Sulfide as S2-	EK085	WATER	APHA 21st ed., 4500-S2- D Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. After the supernatant is discarded, the resultant precipitate is then coloured using methylene blue indicator and measured using UV-VIS detection at 664nm. This method is compliant with NEPM (2013) Schedule B(3)
Ammonia as N - Ultra-Trace in Saline Waters	EK255A-SW	WATER	APHA 21st ed., 4500-NH3 H Ammonia is determined by direct colorimetry by FIA. This method is compliant with NEPM (2013) Schedule B(3)

Analytical Methods	Method	Matrix	Method Descriptions
Nitrite as N - Ultra-Trace in Saline Waters	EK257A-SW	WATER	APHA 21st ed., 4500-NO2- B. Nitrite is determined by direct colourimetry by FIA.
Nitrate as N - Ultra-Trace in Saline Waters	EK258A-SW	WATER	APHA 21st ed., 4500-NO3- I Nitrate is reduced to nitrite by way of a cadmium reduction column followed by quantification by FIA. Nitrite is determined seperately by direct colourimetry and result for Nitrate calculated as the difference between the two results.
Nitrite and Nitrate as N - Ultra-Trace in Saline Waters	EK259A-SW	WATER	APHA 21st ed., 4500-NO3- I. Combined oxidised Nitrogen (NO2+NO3) is determined by Cadmium Reduction and direct colourimetry by FIA.
TKN (Total N - NOx-N). (FIA - UT) in Saline Waters	EK261PA-SW	WATER	APHA 21st ed., 4500-P J. & 4500-NO3- I. Calculated by difference from total Nitrogen and NOx. Contributing method parameters are determined by FIA. This method is compliant with NEPM (2013) Schedule B(3)
Total Nitrogen/Persulfate Digestion/Ultra-Trace/Saline	EK262PA-SW	WATER	APHA 21st ed., 4500-P J. Persulfate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus. As sample is digested with persulfate under alkaline conditions yielding orthophosphate and nitrate. Following digestion, analytes are determined by flow injection analysis. This method is compliant with NEPM (2013) Schedule B(3)
Total Phosphorus/Persulfate Digestion/ Ultra Trace /Saline	EK267PA-SW	WATER	APHA 21st ed., 4500-P J. Persulfate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus. As sample is digested with persulfate under alkaline conditions yielding orthophosphate and nitrate. Following digestion, analytes are determined by flow injection analysis. This method is compliant with NEPM (2013) Schedule B(3)
Reactive Phosphorus as P - Ultra-Trace in Saline Water	EK271A-SW	WATER	APHA 21st ed., 4500-P E Ammonium molybdate and potassium antimonyl tartrate reacts in acid medium with othophosphate to form a heteropoly acid -phosphomolybdic acid - which is reduced to intensely coloured molybdenum blue by ascorbic acid. Quantification is by FIA. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	EN055 - PG	WATER	APHA 21st Ed. 1030F. The Ionic Balance is calculated based on the major Anions and Cations. The major anions include Alkalinity, Chloride and Sulfate which determined by PCT and DA. The Cations are determined by Turbi SO4 by DA. This method is compliant with NEPM (2013) Schedule B(3)
TPH - Semivolatile Fraction	EP071	WATER	USEPA SW 846 - 8015A 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 NEPM (2013) Schedule B(3)
TPH Volatiles/BTEX	EP080	WATER	USEPA SW 846 - 8260B 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 NEPM (2013) Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	WATER	USEPA SW846-3005 Method 3005 is a Nitric/Hydrochloric acid digestion procedure used to prepare surface and ground water samples for analysis by ICPAES or ICPMS. This method is compliant with NEPM (2013) Schedule B(3)
Separatory Funnel Extraction of Liquids	ORG14	WATER	USEPA SW 846 - 3510B 100 mL to 1L of sample is transferred to a separatory funnel and serially extracted three times using 60mL DCM for each extract. The resultant extracts are combined, dehydrated and concentrated for analysis. This method is compliant with NEPM (2013) Schedule B(3) . ALS default excludes sediment which may be resident in the container.

Summary of Outliers

Outliers : Quality Control Samples

The following report highlights outliers flagged in the Quality Control (QC) Report. Surrogate recovery limits are static and based on USEPA SW 846 or ALS-QWI/EN/38 (in the absence of specific USEPA limits). This report displays QC Outliers (breaches) only.

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
EP080/071: Total Petroleum Hydrocarbons	EP1402718-002	Anonymous	**C15 - C28 Fraction**	----	Not Determined	----	**Matrix spike recovery not determined due to sample matrix interference.**
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	EP1402718-002	Anonymous	**>C16 - C34 Fraction**	----	Not Determined	----	**Matrix spike recovery not determined due to sample matrix interference.**

- **For all matrices, no Method Blank value outliers occur.**
- **For all matrices, no Duplicate outliers occur.**
- **For all matrices, no Laboratory Control outliers occur.**

Regular Sample Surrogates

- **For all regular sample matrices, no surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

This report displays Holding Time breaches only. Only the respective Extraction / Preparation and/or Analysis component is/are displayed.

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
Ultra-Trace Nutrients						
Clear Plastic - Filtered (AS) - for UT Nut.						
MW1, MW2, MW3, MW4, MW5, DUP01	----	----	----	11-APR-2014	10-APR-2014	**1**
Clear Plastic Bottle - Natural						
MW1, MW2, MW3, MW4, MW5, DUP01	11-APR-2014	10-APR-2014	**1**	11-APR-2014	10-APR-2014	**1**

Outliers : Frequency of Quality Control Samples

The following report highlights breaches in the Frequency of Quality Control Samples.

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
Method	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP)					
TPH - Semivolatile Fraction	1	19	5.3	10.0	NEPM 2013 Schedule B(3) and ALS QCS3 requirement