



Appendix A

Groundwater SSTLs



C.1 Field water quality SSTLs

The SSTLs that are applied to field water quality parameters are outlined in Table C.1.

Table C.1 Field parameter water quality SSTLs

Water Quality Parameter	Shepparton Formation			Loxton Parilla Sands Aquifer			Lower Renmark Group Aquifer		
	Green	Yellow	Red	Green	Yellow	Red	Green	Yellow	Red
pH Upper	<8.78	<8.78	>9	<8.78	≥8.78	>9	≤8.24	>8.24	>9
pH Lower	>5.60	>5.60	<4	>5.73	≤5.73	<4	≥6.11	<6.11	<4
EC (mS/cm)	<99.191	<99.191	>112.717	<113.808	≥113.808	>129.328	<14.948	≥14.948	>16.986
Total Iron	<9.422	<9.422	>10.706	<10.588	≥10.588	>12.031	<3.670	≥3.670	>4.170

C.2 Laboratory water quality SSTLs

The SSTLs that are applied to the results of laboratory analysed water quality samples are shown in Table C.2.

Table C.2 Laboratory water quality SSTLs

Water Quality Parameter	Shepparton Formation			Loxton Parilla Sands Aquifer			Lower Renmark Group Aquifer		
	Green	Yellow	Red	Green	Yellow	Red	Green	Yellow	Red
Indirect – Adverse Risk to Beneficial Users									
Total Alkalinity (mg/L CaCO ₃)	<628	≥628	>754	<727	≥727	>823	<639	≥639	>767
Calcium (mg/L)	<1,112	≥1,112	>1,335	<1,220	≥1,220	>1,464	<101	≥101	>121
Magnesium (mg/L)	<3,219	≥3,219	>3,863	<3,324	≥3,324	>3,989	<130	≥130	>156
Sodium (mg/L)	<23586	≥23586	>28303	<24381	≥24381	>29258	<2880	≥2880	>3456
Potassium (mg/L)	<141	≥141	>169	<105	≥105	>126	<47	≥47	>56
Sulphate (mg/L)	<8254	≥8254	>9905	<9642	≥9642	>11570	<4	≥4	>5
Chloride (mg/L)	<42672	≥42672	>51206	<41875	≥41875	>50250	<4556	≥4556	>5468
Direct – Adverse Risk to Beneficial Users									
pH Upper	<8.78	≥8.78	>9	<8.78	≥8.78	>9	≤8.24	>8.24	>9
pH Lower	>5.60	≤5.60	<4	>5.73	≤5.73	<4	≥6.11	<6.11	<4
Total Alkalinity (mg/L CaCO ₃)	<628	≥628	>754	<727	≥727	>873	<639	≥639	>767
Total Dissolved Solids	<64474	≥64474	>73266	<73975	≥73975	>84063	<9716	≥9716	>11041
Al (mg/L)	<0.129	≥0.129	5	<0.129	≥0.129	5	<0.283	≥0.283	5
Ag (mg/L)	<0.01	≥0.01	>0.05	<0.01	≥0.01	>0.05	<0.01	≥0.01	>0.05
As (mg/L)	<0.026	≥0.026	>0.1	<0.020	≥0.02	>0.1	LOR	LOR	>0.1
B (mg/L)	<0.5	≥0.5	>1.0	<0.5	≥0.5	≥1.0	<0.5	≥0.5	>1.0

Table C.2 Laboratory water quality SSTLs

Water Quality Parameter	Shepparton Formation			Loxton Parilla Sands Aquifer			Lower Renmark Group Aquifer		
	Green	Yellow	Red	Green	Yellow	Red	Green	Yellow	Red
Be (mg/L)	<0.1	≥0.1	>0.5	<0.1	≥0.1	>0.5	<0.1	≥0.1	>0.5
Bi (mg/L)	<0.01	≥0.01	>0.05	<0.01	≥0.01	>0.05	<0.01	≥0.01	>0.05
Cd (mg/L)	<0.01	≥0.01	>0.05	<0.01	≥0.01	>0.05	<0.01	≥0.01	>0.05
Co (mg/L)	<0.05	≥0.05	>0.1	<0.05	≥0.05	>0.1	<0.05	≥0.05	>0.1
Cr (mg/L)	<0.1	≥0.1	>1.0	<0.1	≥0.1	>1.0	<0.1	≥0.1	>1.0
Cu (mg/L)	<0.042	≥0.042	>0.2	<0.018	≥0.018	>0.2	<0.004	≥0.004	>0.2
F (mg/L)	<1.0	≥1.0	>2.0	<1.0	≥1.0	>2.0	<1.0	≥1.0	>2.0
Fe (mg/L)	<9.422	≥9.422	>10.706	<10.588	≥10.588	>12.031	<3.670	≥3.670	>4.170
Li (mg/L)	<0.233	≥0.233	>2.5	<0.283	≥0.283	>2.5	<0.122	≥0.122	>2.5
Mn (mg/L)	<1.472	≥1.472	>1.673	<1.342	≥1.342	>1.525	<0.0822	≥0.082	>0.093
Mo (mg/L)	<0.024	≥0.024	>0.028	<0.007	≥0.007	>0.01	LOR	≥LOR	>0.01
Ni (mg/L)	<0.038	≥0.038	>0.2	<0.009	≥0.009	>0.2	LOR	≥LOR	>0.2
Pb (mg/L)	<2.0	≥2.0	>5.0	<2.0	≥2.0	>5.0	<2.0	≥2.0	>5.0
Sb (mg/L)	<0.01	≥0.01	>0.05	<0.01	≥0.01	>0.05	<0.01	≥0.01	>0.05
Se (mg/L)	<0.02	≥0.02	>0.05	<0.02	≥0.02	>0.05	<0.02	≥0.02	>0.05
Sr (mg/L)	<29.964	≥26.964	>30.641	<29.821	≥29.821	>33.888	<3.755	≥3.755	>4.267
Th (mg/L)	<0.01	≥0.01	>0.1	<0.01	≥0.01	>0.1	<0.01	≥0.01	>0.1
U (mg/L)	<0.065	≥0.065	>0.073	<0.013	≥0.013	>0.015	<0.001	>LOR	>0.01
V (mg/L)	<0.1	≥0.1	>0.5	<0.1	≥0.1	>0.5	<0.1	≥0.1	>0.5
Zn (mg/L)	<0.166	≥0.166	>2	<0.199	≥0.199	>2	LOR	>LOR	>2
Gross alpha (Bq/L)	<1.5	1.5	3.0	<1.5	1.5	3.0*		N/A	
Gross beta (Bq/L)	<1.5	1.5	3.0	<1.5	1.5	3.0*		N/A	
Ra-226 (Bq/L)		N/A	≥5		N/A	≥5		N/A	>5
Ra-228 (Bq/L)		N/A	≥2		N/A	≥2		N/A	≥2
N- Species	<5	≥5	>25	>5	≥5	>25	>5	≥5	>25
Total Recoverable Hydrocarbons (TPH)		N/A	≥0.3		N/A	≥0.3		N/A	≥0.3

Note: *Gross alpha/Gross beta site-specific trigger of 3 Bq/L represents approximately a 2x increase in the maximum radioactivity measured in 2017



Appendix B

Groundwater quality results



CHAIN OF CUSTODY

ALS Laboratory: please tick →

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 Ph: 07 3644 9177 E: melbourne@als.com

LAKEWAY 28, HEMLOCK ROAD, MCKENZIE QLD 4170
 Ph: 07 3644 9177 E: melbourne@als.com

CLIENT: EMM Consulting

OFFICE: Ground floor, 20 Chandos Street, St Leonards, NSW 2065

PROJECT: S190512

ORDER NUMBER: PURCHASE ORDER NO.:

PROJECT MANAGER: Paul Gibbons

SAMPLER: Kaitlyn Brodie / Henry Noakes

COC Emailed to ALS? (YES / NO)

Email Reports to: pgibbons@emiconsulting.com.au

Email Invoice to: pgibbons@emiconsulting.com.au

TURNAROUND REQUIREMENTS:

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

Standard TAT (List due date):

Non Standard or urgent TAT (List due date):

ALS QUOTE NO.:

COUNTRY OF ORIGIN:

CONTACT PH: 02 9493 9500

SAMPLER MOBILE: 0401 881 447

EDD FORMAT (or default):

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No

Free ice / frozen ice bricks present upon receipt? Yes No

Random Sample Temperature on Receipt: °C

Other comment:

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

RECEIVED BY: DATE/TIME:

RELINQUISHED BY: DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	ANALYSIS REQUIRED INCLUDING SUITES (NB. Suite Codes must be listed to attract suite price)					Additional Information
							When Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required)	Major ions + ionic balance	Sulphide (ED040F (Yellow)	Dissolved metals (Field filtered) (EG020F (Red)	Ferrous Iron (Field filtered) (EG051 (Maroon)		Radium 226/228, Gross alpha (EA251 (Red & Green)
	1	BH-M16d	23/4/20 10:15	W		7	1	1	1	1	3	Environmental Division Melbourne Work Order Reference EM200690
	2	BH-M16s	23/4/20 10:40	W		7	1	1	1	3		
	3	BH-M19d	22/4/20 10:00	W		7	1	1	1	3		
	4	BH-M19s	22/4/20 08:45	W		7	1	1	1	3		
	5	BH-M20d	22/4/20 07:30	W		7	1	1	1	3		
	6	BH-M20s	21/4/20 15:45	W		7	1	1	1	3		
	7	BH-M22d	23/4/20 07:00	W		7	1	1	1	3		
	8	BH-M22s	22/4/20 15:00	W		7	1	1	1	3		
	9	BH-M23d	22/4/20 12:10	W		7	1	1	1	3		
	10	BH-M23s	22/4/20 13:00	W		7	1	1	1	3		
	11	BH-M24d	23/4/20 08:40	W		7	1	1	1	3		
	12	BH-M24s	23/4/20 08:45	W		7	1	1	1	3		
						84	12	12	12	12	36	

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

CHAIN OF CUSTODY

ALS Laboratory - please tick →

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 Ph: 03 9551 8166 E: info@als.com.au

CLIENT: EMM Consulting
OFFICE: Ground floor, 20 Chandos Street, St Leonards, NSW 2065
PROJECT: S190512
ORDER NUMBER: PURCHASE ORDER NO.:
PROJECT NO.: 23
ALS QUOTE NO.: COUNTRY OF ORIGIN:
CONTACT PH: 02 9483 9500
SAMPLER: Kaitlyn Brodie / Henry Noakes
SAMPLER MOBILE: 0401 881 447
COO Emailed to ALS? (YES / NO) EDD FORMAT (or default):
 Email Reports to: pgibbons@emmcconsulting.com.au
 Email Invoice to: pgibbons@emmcconsulting.com.au

TURNAROUND REQUIREMENTS: Standard TAT (List due date):
 Non Standard or urgent TAT (List due date):
 (Standard TAT may be longer for some tests e.g. Ultra Trace Organics)

FOR LABORATORY USE ONLY (Circle)
 Custody Seal Intact? Yes No
 Free ice / frozen ice bricks present upon receipt? Yes No
 Random Sample Temperature on Receipt °C
 Other comment:
RECEIVED BY: Mawley
DATE/TIME: 24/4/20
RELINQUISHED BY:
DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB ID	SAMPLE ID	SAMPLE DETAILS MATRIX: Solid(S) Water(W)	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) <small>Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).</small>							Additional Information
							Major ions + ionic balance	ED040F (Yellow)	Dissolved metals (Field filtered) (Red)	Eg01 (Maroon)	Ferrous Iron (Field filtered)	Radum 226/228, Gross a&b	A251 (Red & Green)		Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.
13	BH-M125d		21/4/20 12:30	W		7	1	1	1	1	1	3		
14	BH-M125s		21/4/20 09:45	W		7	1	1	1	1	3			
	<i>Bottle</i>			W										
15	UGM-M1D		23/4/20 15:00	W		7	1	1	1	1	3			
16	UGM-M1S		23/4/20 15:40	W		7	1	1	1	1	3			
				W										
				W										
				W										
				W										
				W										
				W										
				W										
				W										
TOTAL						28	4	4	4	4	12			

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airtight Unpreserved Plastic; V = VOA Vial HCl Preserved; VB = VOA Vial Sulfuric Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airtight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Special bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Solis; B = Unpreserved Bag; LI = Lysate (Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

COC Melbourne

From: ALS Enviro Melbourne
Sent: Friday, 24 April 2020 8:57 AM
To: COC Melbourne
Subject: FW: [EXTERNAL] - Sample bottles required

From: Kaitlyn Brodie [mailto:kbrodie@emmconsulting.com.au]
Sent: Thursday, 23 April 2020 7:42 PM
To: ALS Enviro Melbourne <ALSEnviroMelbourne@ALSGlobal.com>
Cc: Henry Noakes <hnoakes@emmconsulting.com.au>
Subject: FW: [EXTERNAL] - Sample bottles required

Hi ALS Melbourne,

There should be 8 eskys delivered tomorrow morning (24/04/2020) to Springvale (includes COC's). In case the COC isn't clear please refer to the below email chain. Shane Ellis should also be able to answer any questions.

Thanks for your help

Kaitlyn

Kaitlyn Brodie
Hydrogeologist

M 0401 881 447
www.emmconsulting.com.au

From: Shane Ellis <shane.ellis@ALSGlobal.com>
Sent: Thursday, 9 April 2020 10:00 AM
To: Kaitlyn Brodie <kbrodie@emmconsulting.com.au>
Cc: Brenda Hong <Brenda.Hong@alsglobal.com>; Henry Noakes <hnoakes@emmconsulting.com.au>
Subject: RE: [EXTERNAL] - Sample bottles required

Morning Kaitlyn,

Thank you for clarifying, if sulphide is require we will need to add one more bottle type in the mix for this. Please see the updated bottle summary below for all analysis including additional alpha/beta.

Label Colour	Bottle Type and Preservative	Analysis
Yellow	1 x 125mL plastic (Zn(OAC) ₂ and NaOH)	Sulphide
Green	1 x 250mL plastic	Major ions, Alkalinity, Ionic Balance, Chloride, Sulphate, Magnesium, Sulphur
Red	1 x 60mL plastic (HNO ₃ acid)	Dissolved metals (Field Filtered)
Maroon	1 x 60mL plastic (HCl acid)	Ferrous Iron (Field Filtered)
Red & Green	3 x 1,000mL plastic	Radium 226/228, Gross a&b

I will have this organise for delivery by Wednesday to your St Leonards office, please let me know if you require anything else.

Regards,

Shane Ellis
Client Services Officer, Environmental



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From: Kaitlyn Brodie [<mailto:kbrodie@emmconsulting.com.au>]

Sent: Thursday, 9 April 2020 9:26 AM

To: Shane Ellis <shane.ellis@ALSGlobal.com>

Cc: Brenda Hong <Brenda.Hong@alsglobal.com>; Henry Noakes <hnoakes@emmconsulting.com.au>

Subject: RE: [EXTERNAL] - Sample bottles required

Hey Shane,

I've just been advised we need to add this bottle. Is that achievable?

- Gross Alpha and Gross Beta

Gross alpha, Gross beta with K40 correction in clean matrices (TDS < 400 mg/L (EC ~600 µS/cm)).

Samples with TDS 400-2000 mg/L (EC ~3,000 µS/cm) will have LORs raised to 0.25 or 0.5 Bq/L ⁽¹⁾

EA250

ASTM D7283-06

Alpha = 0.05 Bq/L

Beta = 0.1 Bq/L

114.75

Kaitlyn Brodie

Hydrogeologist

M 0401 881 447

www.emmconsulting.com.au

From: Kaitlyn Brodie

Sent: Thursday, 9 April 2020 8:53 AM

To: Shane Ellis <shane.ellis@ALSGlobal.com>
Cc: Brenda Hong <Brenda.Hong@alsglobal.com>; Henry Noakes <hnoakes@emmconsulting.com.au>
Subject: RE: [EXTERNAL] - Sample bottles required

Hi Shane,

Apologies there was a typo. SO2- is meant to be S2- . Does this fall under an existing bottle category?

We will arrange to get samples to the lab within the 7 day holding period thanks for clarifying.

Could I please order 50 of each bottle, delivered to the EMM office in St Leonards – preferably by next Wednesday 15 April.

Thank you for your help.

Kaitlyn

Kaitlyn Brodie

Hydrogeologist



T 02 9493 9500

M 0401 881 447

Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065



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From: Shane Ellis <shane.ellis@ALSGlobal.com>
Sent: Wednesday, 8 April 2020 4:18 PM
To: Kaitlyn Brodie <kbrodie@emmconsulting.com.au>
Cc: Brenda Hong <Brenda.Hong@alsglobal.com>
Subject: RE: [EXTERNAL] - Sample bottles required

Hi Kaitlyn,

Not a problem, I will try to assist with the updated info. Uranium and Thorium are both captured in our standard metals scan, so no new containers needed for that. There are two analytes in particular that will be affected by storing for 2 weeks prior to analysis, these being ferrous iron (holding time 7 days) and alkalinity (holding time 14 days). The most efficient method codes/packages for this are as follows.

MATRIX	TEST PARAMETER
WATER	Cations & Anions: Major (Ca, Mg, Na, K, Cl, SO ₄ , Alkalinity) + Ionic Balance
WATER	Sulfur

WATER	ICP/MS: Al, Fe, Th, U	
WATER	Irpn - Ferrous	
WATER	Radium 226 & 228 by Scintillation Emanometry	
TOTAL PROJECT COST FOR WATER SAMPLES – STD TAT (EX GST):		

Unfortunately I do not believe we have a method setup for SO₂-, is this a requirement for the project?

Regards,

Shane Ellis
Client Services Officer, Environmental



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From: Kaitlyn Brodie [<mailto:kbrodie@emmconsulting.com.au>]

Sent: Wednesday, 8 April 2020 10:25 AM

To: Shane Ellis <shane.ellis@ALSGlobal.com>

Cc: Brenda Hong <Brenda.Hong@alsglobal.com>

Subject: RE: [EXTERNAL] - Sample bottles required

Hi Brenda and Shane,

I would just like to clarify a few things before placing an order.
The analysis I requested was (mildly) wrong – sorry. The correct suite is attached.

We only need to test for dissolved metals.

Uranium and thorium do not require speciation.

We have fridges to keep samples cold for approximately 2 weeks (expected length of time before we can get samples to the lab), and eskys for transport. Are there any suites/analytes that cannot tolerate this holding time?

I was also trying to organise a COC that we can easily complete in the field and I'm finding it difficult to find sampling suites that include all analytes. Have I missed something or will this sampling suite involve a complicated COC?

Thank you and apologies for all the questions.

Kaitlyn

Kaitlyn Brodie

Hydrogeologist

M 0401 881 447

www.emmconsulting.com.au

From: Shane Ellis <shane.ellis@ALSGlobal.com>
Sent: Monday, 6 April 2020 1:28 PM
To: Kaitlyn Brodie <kbrodie@emmconsulting.com.au>
Cc: Brenda Hong <Brenda.Hong@alsglobal.com>
Subject: RE: [EXTERNAL] - Sample bottles required

Hi Kaitlyn,

Can certainly help out with this one, please see below:

1 x 250mL Unpreserved HDPE Bottle (ALS Green Label)

Major ions, Alkalinity, Ionic Balance, Chloride, Sulphate, Magnesium, Sulphur

1 x 60mL Nitric Acid HDPE Bottle (ALS Red Label)

Total Iron, Aluminium & Uranium

1 x 60mL HCL HDPE Bottle (ALS Maroon Label)

Ferrous Iron

1 x 1L Unpreserved HDPE Bottle (ALS Red/Green Label)

Radium 226, 228

Please note if uranium speciation is required, a separate unpreserved 60mL HDPE bottle is required. If you require any of these containers to be sent out, I would be happy to organise this for you.

Regards,

Shane Ellis

Client Services Officer, Environmental



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From: Kaitlyn Brodie <kbrodie@emmconsulting.com.au>

Sent: Monday, 6 April 2020 12:54 PM

To: Brenda Hong <Brenda.Hong@alsglobal.com>

Subject: [EXTERNAL] - Sample bottles required

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi Brenda,

Hope your staying safe. I was hoping you could help me with which sample bottles I would require for the following sampling suite.

Major ions (Calcium, Chloride, Magnesium, Potassium, Sodium, Sulphate) Total Anions, Total Cations, Charge Balance Error (%).
Alkalinity (hydroxide, carbonate, bicarbonate and total as CaCO ₃)
Leading indicators (aluminium, magnesium, sulphur, chloride, sulphate, ferrous and total iron)
Radionucleotides (Uranium, Radium 226, Radium 228)

Thank you

Kaitlyn

Kaitlyn Brodie

Senior Environmental Scientist




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Connect with us

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EMM'S BUSINESS
CONTINUITY PLAN
FOR COVID-19

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Environmental

CERTIFICATE OF ANALYSIS

Work Order : EM2006908 **Page** : 1 of 6
Client : EMM CONSULTING PTY LTD **Laboratory** : Environmental Division Melbourne
Contact : PAUL GIBBONS **Contact** : Shane Colley
Address : Ground Floor Suite 1 20 Chandos Street
St Leonards NSW NSW 2065 **Address** : 4 Westall Rd Springvale VIC Australia 3171
Telephone : ---- **Telephone** : +61-3-8549 9600
Project : S190512 **Date Samples Received** : 24-Apr-2020 08:25
Order number : ---- **Date Analysis Commenced** : 28-Apr-2020
C-O-C number : ---- **Issue Date** : 19-May-2020 08:56
Sampler : KB/HN
Site : ----
Quote number : EN/222
No. of samples received : 16
No. of samples analysed : 16



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories

Dilani Fernando
Titus Vimalasiri

Position

Senior Inorganic Chemist
Metals Teamleader

Accreditation Category

Melbourne Inorganics, Springvale, VIC
Radionuclides, Fyshwick, ACT



Page : 2 of 6
Work Order : EM2006908
Client : EMM CONSULTING PTY LTD
Project : S190512

General Comments

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

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

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

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

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

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

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

LOR = Limit of reporting

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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

● EG020F : EM2006908 #1-16 dissolved metal required dilution prior analysis due to sample matrix. LOR's have been adjusted accordingly.

● EG051G: EM2006908 #1 Sample has been confirmed for Ferrous Iron by re-extraction and re-analysis.

● Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.

● LOR for Gross Alpha and Gross Beta raised due to high solid content.

● ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

● EK085: EM2006908-015 Poor matrix spike recovery for sulphide due to sample matrix. Confirmed by re-extraction and re-analysis.

● Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Compound	CAS Number	LOR	Client sampling date / time		Client sample ID				
			Unit	Result	BH-M16d	BH-M16s	BH-M19d	BH-M19s	BH-M20d
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	433	351	462	332	418	418
Total Alkalinity as CaCO3	----	1	mg/L	433	351	462	332	418	418
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3660	3940	3350	4830	3560	3560
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	18200	18400	17200	23200	18600	18600
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	557	686	542	602	531	531
Magnesium	7439-95-4	1	mg/L	1570	1560	1520	1720	1600	1600
Sodium	7440-23-5	1	mg/L	11000	11300	10600	13700	11300	11300
Potassium	7440-09-7	1	mg/L	45	44	46	28	47	47
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.02	0.04	<0.02	<0.02	<0.02
Thorium	7440-29-1	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	7440-61-1	0.001	mg/L	<0.002	0.029	0.008	0.122	<0.002	<0.002
Iron	7439-89-6	0.05	mg/L	2.37	<0.10	<0.10	<0.10	7.10	7.10
EG051G: Ferrous Iron by Discrete Analyser									
Ferrous Iron	----	0.05	mg/L	3.88	<0.05	<0.05	<0.05	6.17	6.17
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	598	608	564	762	607	607
∅ Total Cations	----	0.01	meq/L	637	655	614	768	651	651
∅ Ionic Balance	----	0.01	%	3.11	3.73	4.26	0.43	3.48	3.48
EA250CA: Gross Alpha and Beta Activity									
Gross alpha	----	0.05	Bq/L	0.37	1.47	2.45	4.95	<1.12	<1.12
Gross beta activity - 40K	----	0.10	Bq/L	1.12	<1.87	<1.89	3.19	<2.23	<2.23
EA251CA: Radium 226 and Radium 228 Activity									
Radium 226	13982-63-3	0.01	Bq/L	0.10	0.14	0.48	0.30	0.08	0.08
Radium 228	7440-14-4	0.08	Bq/L	0.14	0.29	0.39	0.50	<0.08	<0.08



Analytical Results

Compound	CAS Number	LOR	Client sample ID			
			Client sampling date / time	Unit	Result	Result
ED037P: Alkalinity by PC Titrator						
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	21-Apr-2020 15:45	mg/L	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	21-Apr-2020 15:45	mg/L	21	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	21-Apr-2020 15:45	mg/L	28	<1
Total Alkalinity as CaCO3	----	1	21-Apr-2020 15:45	mg/L	49	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA						
Sulfate as SO4 - Turbidimetric	14808-79-8	1	21-Apr-2020 15:45	mg/L	4100	<1
ED045G: Chloride by Discrete Analyser						
Chloride	16887-00-6	1	21-Apr-2020 15:45	mg/L	17800	<1
ED093F: Dissolved Major Cations						
Calcium	7440-70-2	1	21-Apr-2020 15:45	mg/L	1660	<1
Magnesium	7439-95-4	1	21-Apr-2020 15:45	mg/L	846	<1
Sodium	7440-23-5	1	21-Apr-2020 15:45	mg/L	12400	<1
Potassium	7440-09-7	1	21-Apr-2020 15:45	mg/L	46	<1
EG020F: Dissolved Metals by ICP-MS						
Aluminium	7429-90-5	0.01	21-Apr-2020 15:45	mg/L	<0.02	<0.02
Thorium	7440-29-1	0.001	21-Apr-2020 15:45	mg/L	<0.002	<0.002
Uranium	7440-61-1	0.001	21-Apr-2020 15:45	mg/L	0.005	0.003
Iron	7439-89-6	0.05	21-Apr-2020 15:45	mg/L	<0.10	1.51
EG051G: Ferrous Iron by Discrete Analyser						
Ferrous Iron	----	0.05	21-Apr-2020 15:45	mg/L	<0.05	1.32
EK085M: Sulfide as S2-						
Sulfide as S2-	18496-25-8	0.1	21-Apr-2020 15:45	mg/L	0.1	<0.1
EN055: Ionic Balance						
∅ Total Anions	----	0.01	21-Apr-2020 15:45	meq/L	588	600
∅ Total Cations	----	0.01	21-Apr-2020 15:45	meq/L	693	626
∅ Ionic Balance	----	0.01	21-Apr-2020 15:45	%	8.16	2.11
EA250CA: Gross Alpha and Beta Activity						
Gross alpha	----	0.05	21-Apr-2020 15:45	Bq/L	0.94	<1.01
Gross beta activity - 40K	----	0.10	21-Apr-2020 15:45	Bq/L	<1.88	<2.02
EA251CA: Radium 226 and Radium 228 Activity						
Radium 226	13982-63-3	0.01	21-Apr-2020 15:45	Bq/L	0.12	0.18
Radium 228	7440-14-4	0.08	21-Apr-2020 15:45	Bq/L	0.10	0.28

Sub-Matrix: WATER (Matrix: WATER)

Client sampling date / time: 21-Apr-2020 15:45

Unit: mg/L

Result: <1

Result: <1

Result: <1

Result: <1

Result: <1

Result: <1

Result: <1

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Result: <1

Result: <1

Result: <1



Analytical Results

Compound	CAS Number	LOR	Client sampling date / time		Client sample ID			UGM-MID
			Unit	Result	BH-M24d	BH-M24s	BH-M25d		BH-M25s
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	436	376	428	302	387
Total Alkalinity as CaCO3	----	1	mg/L	436	376	428	302	387
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3710	3850	3750	4940	3690
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18500	19500	17000	23700	18000
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	574	571	568	606	622
Magnesium	7439-95-4	1	mg/L	1640	1480	1540	1680	1600
Sodium	7440-23-5	1	mg/L	11400	12400	10200	13800	11100
Potassium	7440-09-7	1	mg/L	48	30	47	31	48
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.02	<0.02	<0.02	<0.02	0.02
Thorium	7440-29-1	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	7440-61-1	0.001	mg/L	<0.002	0.014	<0.002	0.064	<0.002
Iron	7439-89-6	0.05	mg/L	0.70	12.1	1.40	<0.10	1.87
EG051G: Ferrous Iron by Discrete Analyser								
Ferrous Iron	----	0.05	mg/L	0.26	11.4	0.06	<0.05	1.87
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	608	638	566	777	592
∅ Total Cations	----	0.01	meq/L	661	690	600	770	647
∅ Ionic Balance	----	0.01	%	4.17	3.97	2.90	0.51	4.39
EA250CA: Gross Alpha and Beta Activity								
Gross alpha	----	0.05	Bq/L	<1.21	2.49	2.97	2.45	<1.11
Gross beta activity - 40K	----	0.10	Bq/L	<2.42	1.94	<1.98	<1.78	<2.22
EA251CA: Radium 226 and Radium 228 Activity								
Radium 226	13982-63-3	0.01	Bq/L	0.10	0.35	0.17	0.10	0.05
Radium 228	7440-14-4	0.08	Bq/L	0.08	0.57	0.42	<0.08	<0.08



Analytical Results

Compound	CAS Number	Client sample ID		UGM-MIS
		LOR	Unit	
		Client sampling date / time		
ED037P: Alkalinity by PC Titrator				
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	132
Total Alkalinity as CaCO3		1	mg/L	132
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA				
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4970
ED045G: Chloride by Discrete Analyser				
Chloride	16887-00-6	1	mg/L	24100
ED093F: Dissolved Major Cations				
Calcium	7440-70-2	1	mg/L	1170
Magnesium	7439-95-4	1	mg/L	1490
Sodium	7440-23-5	1	mg/L	14600
Potassium	7440-09-7	1	mg/L	41
EG020F: Dissolved Metals by ICP-MS				
Aluminium	7429-90-5	0.01	mg/L	0.03
Thorium	7440-29-1	0.001	mg/L	<0.002
Uranium	7440-61-1	0.001	mg/L	0.016
Iron	7439-89-6	0.05	mg/L	0.48
EG051G: Ferrous Iron by Discrete Analyser				
Ferrous Iron		0.05	mg/L	0.41
EK085M: Sulfide as S2-				
Sulfide as S2-	18496-25-8	0.1	mg/L	0.5
EN055: Ionic Balance				
∅ Total Anions		0.01	meq/L	786
∅ Total Cations		0.01	meq/L	817
∅ Ionic Balance		0.01	%	1.94
EA250CA: Gross Alpha and Beta Activity				
Gross alpha		0.05	Bq/L	<0.94
Gross beta activity - 40K		0.10	Bq/L	<1.87
EA251CA: Radium 226 and Radium 228 Activity				
Radium 226	13982-63-3	0.01	Bq/L	0.04
Radium 228	7440-14-4	0.08	Bq/L	0.31



Environmental

QUALITY CONTROL REPORT

Work Order : **EM2006908**

Page : 1 of 6

Client : **EMM CONSULTING PTY LTD**
 Contact : **PAUL GIBBONS**
 Address : **Ground Floor Suite 1 20 Chandos Street
 St Leonards NSW NSW 2065**
 Telephone : **----**
 Project : **S190512**
 Order number : **----**
 C-O-C number : **----**
 Sampler : **KB/HN**
 Site : **----**
 Quote number : **EN/222**
 No. of samples received : **16**
 No. of samples analysed : **16**

Laboratory : **Environmental Division Melbourne**
 Contact : **Shane Colley**
 Address : **4 Westall Rd Springvale VIC Australia 3171**
 Telephone : **+61-3-8549 9600**
 Date Samples Received : **24-Apr-2020**
 Date Analysis Commenced : **28-Apr-2020**
 Issue Date : **19-May-2020**



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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Titus Vimalasiri	Metals Teamleader	Radionuclides, Fyshwick, ACT



Page : 2 of 6
 Work Order : EM2006908
 Client : EMM CONSULTING PTY LTD
 Project : S190512

General Comments

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

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

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

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

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

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method/Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
EA250CA: Gross Alpha and Beta Activity (QC Lot: 3014761)									
CA2003105-001	Anonymous	EA250: Gross alpha	----	0.05	Bq/L	<0.05	<0.05	0.00	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	<0.10	0.00	No Limit
EM2006908-005	BH-M20d	EA250: Gross alpha	----	0.05	Bq/L	<1.12	<0.94	17.0	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	<2.23	<1.88	17.0	No Limit
EA250CA: Gross Alpha and Beta Activity (QC Lot: 3014762)									
EM2006908-015	UGM-MID	EA250: Gross alpha	----	0.05	Bq/L	<1.11	<0.94	17.1	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	<2.22	<1.87	17.1	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 2992190)									
EM2006908-002	BH-M16s	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	351	351	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	351	351	0.00	0% - 20%
EM2006908-012	BH-M24s	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	376	377	0.330	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	376	377	0.330	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 2989681)									
EM2006894-006	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	98	99	1.07	0% - 20%
EM2006908-006	BH-M20s	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4100	4520	9.74	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 2989682)									
EM2006894-006	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	707	718	1.60	0% - 20%
EM2006908-006	BH-M20s	ED045G: Chloride	16887-00-6	1	mg/L	17800	17800	0.527	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 2990153)									
EM2006894-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	38	36	4.05	0% - 20%



Laboratory Duplicate (DUP) Report									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 2990153) - continued									
EM2006894-002	Anonymous	ED093F: Magnesium	7439-95-4	1	mg/L	138	132	3.70	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1200	1150	3.84	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	21	20	0.00	0% - 20%
		ED093F: Calcium	7440-70-2	1	mg/L	602	615	2.15	0% - 20%
EM2006908-004	BH-M19s	ED093F: Magnesium	7439-95-4	1	mg/L	1720	1750	2.02	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	13700	14000	2.04	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	28	29	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 2990156)									
EM2006908-016	UGM-MIS	ED093F: Calcium	7440-70-2	1	mg/L	1170	1120	4.56	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1490	1430	4.38	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	14600	13900	4.51	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	41	39	4.48	No Limit
EM2006942-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	187	188	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	21	21	0.00	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	79	80	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	4	4	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2990152)									
EM2006832-013	Anonymous	EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EM2006908-002	BH-M16s	EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.02	<0.02	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.10	<0.10	0.00	No Limit
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2990154)									
EM2006908-001	BH-M16d	EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit
EM2006908-010	BH-M23s	EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	0.061	0.060	0.00	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 2990155)									
EM2006908-013	BH-M25d	EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.02	<0.02	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	1.40	1.37	1.98	0% - 50%
EM2006942-004	Anonymous	EG020A-F: Aluminium	7429-90-5	0.01	mg/L	15.1	15.2	0.700	0% - 20%
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.22	0.22	0.00	No Limit
EG051G: Ferrous Iron by Discrete Analyser (QC Lot: 2989675)									
EM2006832-007	Anonymous	EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EM2006908-005	BH-M20d	EG051G: Ferrous Iron	---	0.05	mg/L	6.17	5.79	6.48	0% - 20%
EG051G: Ferrous Iron by Discrete Analyser (QC Lot: 2992283)									
EM2006832-004	Anonymous	EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EM2006908-015	UGM-MID	EG051G: Ferrous Iron	---	0.05	mg/L	1.87	1.83	1.97	0% - 20%
EK085M: Sulfide as S2- (QC Lot: 2990865)									
EM2006832-004	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit



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 Client : EMM CONSULTING PTY LTD
 Project : S190512

Sub-Matrix: **WATER**

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EK085M: Sulfide as S2- (QC Lot: 2990865) - continued										
EM2006908-003	BH-M19d	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	0.1	0.2	0.00	0.00	No Limit
EK085M: Sulfide as S2- (QC Lot: 2990867)										
EM2006908-014	BH-M25s	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	0.1	0.1	0.00	0.00	No Limit



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

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

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Concentration	Spike Recovery (%)	LCS	Low	High
EA250CA: Gross Alpha and Beta Activity (QCLot: 3014761)									
EA250: Gross alpha	----	0.05	Bq/L	<0.05	1751 Bq/L	#102	98.0	98.0	100
EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	----	----	----	----	----
EA250CA: Gross Alpha and Beta Activity (QCLot: 3014762)									
EA250: Gross alpha	----	0.05	Bq/L	<0.05	1751 Bq/L	100	98.0	98.0	100
EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	----	----	----	----	----
EA251CA: Radium 226 and Radium 228 Activity (QCLot: 3001678)									
EA251: Radium 226	13982-63-3	0.01	Bq/L	<0.01	2.5 Bq/L	98.9	89.9	89.9	110
EA251: Radium 228	7440-14-4	0.08	Bq/L	<0.08	2.5 Bq/L	98.0	85.6	85.6	112
ED037P: Alkalinity by PC Titrator (QCLot: 2992190)									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	105	88.0	88.0	112
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2989681)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	96.2	85.8	85.8	117
				<1	100 mg/L	96.2	85.8	85.8	117
ED045G: Chloride by Discrete Analyser (QCLot: 2989682)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.0	85.0	85.0	122
				<1	1000 mg/L	99.3	85.0	85.0	122
ED093F: Dissolved Major Cations (QCLot: 2990153)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	111	88.2	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	107	85.6	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	90.0	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	89.9	86.7	86.7	111
ED093F: Dissolved Major Cations (QCLot: 2990156)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	108	88.2	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	106	85.6	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	104	90.0	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	89.1	86.7	86.7	111
EG020F: Dissolved Metals by ICP-MS (QCLot: 2990152)									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	105	90.4	90.4	107
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	106	91.8	91.8	109
EG020F: Dissolved Metals by ICP-MS (QCLot: 2990154)									
EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	0.1 mg/L	104	90.2	90.2	114
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	99.4	85.2	85.2	110
EG020F: Dissolved Metals by ICP-MS (QCLot: 2990155)									



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 Work Order : EM2006908
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Concentration	Spike Recovery (%)	Recovery Limits (%)	Low	High
EG020F: Dissolved Metals by ICP-MS (QCLot: 2990155) - continued									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	94.7	90.4	107	
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	104	91.8	109	
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 2989675)									
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	92.5	75.8	112	
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 2992283)									
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	95.2	75.8	112	
EK085M: Sulfide as S2- (QCLot: 2990866)									
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	102	81.9	116	
EK085M: Sulfide as S2- (QCLot: 2990867)									
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	90.6	81.9	116	

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(%)	Recovery Limits (%)	
				Low	High		
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 2989681)							
EM2006905-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 2989682)							
EM2006905-001	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 2989675)							
EM2006832-008	Anonymous	EG051G: Ferrous Iron	----	2 mg/L	80.7	70.0	130
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 2992283)							
EM2006832-010	Anonymous	EG051G: Ferrous Iron	----	2 mg/L	92.5	70.0	130
EK085M: Sulfide as S2- (QCLot: 2990866)							
EM2006832-010	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	97.8	70.0	130
EK085M: Sulfide as S2- (QCLot: 2990867)							
EM2006908-015	UGM-MID	EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	# 63.9	70.0	130



ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM2006908	Page	: 1 of 9
Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: PAUL GIBBONS	Telephone	: +61-3-8549 9600
Project	: S190512	Date Samples Received	: 24-Apr-2020
Site	: ----	Issue Date	: 19-May-2020
Sampler	: KB/HN	No. of samples received	: 16
Order number	: ----	No. of samples analysed	: 16

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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



Outliers : Quality Control Samples
 Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **WATER**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Laboratory Control Spike (LCS) Recoveries EA250CA: Gross Alpha and Beta Activity	QC-3014761-002	---	Gross alpha	----	102 %	98.0-100%	Recovery greater than upper control limit
Matrix Spike (MS) Recoveries ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EM2006905--001	Anonymous	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EM2006905--001	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK085M: Sulfide as S2-	EM2006908--015	UGM-MID	Sulfide as S2-	18496-25-8	63.9 %	70.0-130%	Recovery less than lower data quality objective

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Duplicates (DUP) Radium 226 and Radium 228 Activity	0	18	0.00	10.00	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS) Gross Alpha and Beta Activity	2	23	8.70	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS) Dissolved Metals by ICP-MS - Suite A	0	26	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method	Sample Date		Extraction / Preparation		Analysis	
	Date extracted	Due for extraction	Date analysed	Due for analysis	Due for analysis	Evaluation
Container / Client Sample ID(s)						



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 Client : EMM CONSULTING PTY LTD
 Project : S190512

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

Method		Sample Date			Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation			
EA250CA: Gross Alpha and Beta Activity										
BH-M20s, BH-M25s	BH-M25d,	21-Apr-2020	----	----	12-May-2020	18-Oct-2020	✓			
Clear Plastic Bottle - Unfiltered; Lab-acidified (EA250)										
BH-M19d, BH-M20d, BH-M23d,	BH-M19s, BH-M22s, BH-M23s	22-Apr-2020	----	----	12-May-2020	19-Oct-2020	✓			
Clear Plastic Bottle - Unfiltered; Lab-acidified (EA250)										
BH-M16d, BH-M22d, BH-M24s, UGM-MIS	BH-M16s, BH-M24d, UGM-MID,	23-Apr-2020	----	----	12-May-2020	20-Oct-2020	✓			
EA251CA: Radium 226 and Radium 228 Activity										
Clear Plastic Bottle - Unfiltered; Lab-acidified (EA251)										
BH-M20s, BH-M25s	BH-M25d,	21-Apr-2020	----	----	05-May-2020	18-Oct-2020	✓			
Clear Plastic Bottle - Unfiltered; Lab-acidified (EA251)										
BH-M19d, BH-M20d, BH-M23d,	BH-M19s, BH-M22s, BH-M23s	22-Apr-2020	----	----	05-May-2020	19-Oct-2020	✓			
Clear Plastic Bottle - Unfiltered; Lab-acidified (EA251)										
BH-M16d, BH-M22d, BH-M24s, UGM-MIS	BH-M16s, BH-M24d, UGM-MID,	23-Apr-2020	----	----	05-May-2020	20-Oct-2020	✓			
ED037P: Alkalinity by PC Titrator										
Clear Plastic Bottle - Natural (ED037-P)										
BH-M20s, BH-M25s	BH-M25d,	21-Apr-2020	----	----	29-Apr-2020	05-May-2020	✓			
Clear Plastic Bottle - Natural (ED037-P)										
BH-M19d, BH-M20d, BH-M23d,	BH-M19s, BH-M22s, BH-M23s	22-Apr-2020	----	----	29-Apr-2020	06-May-2020	✓			
Clear Plastic Bottle - Natural (ED037-P)										
BH-M16d, BH-M22d, BH-M24s, UGM-MIS	BH-M16s, BH-M24d, UGM-MID,	23-Apr-2020	----	----	29-Apr-2020	07-May-2020	✓			



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

Method		Sample Date			Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation			
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA										
BH-M20s, BH-M25s	BH-M25d,	----	----	----	28-Apr-2020	19-May-2020	✓			
BH-M19d, BH-M20d, BH-M23d,	BH-M19s, BH-M22s, BH-M23s	----	----	----	28-Apr-2020	20-May-2020	✓			
Clear Plastic Bottle - Natural (ED041G)										
BH-M16d, BH-M22d, BH-M24s, UGM-MIS	BH-M16s, BH-M24d, UGM-MID,	----	----	----	28-Apr-2020	21-May-2020	✓			
ED045G: Chloride by Discrete Analyser										
Clear Plastic Bottle - Natural (ED045G)										
BH-M20s, BH-M25s	BH-M25d,	----	----	----	28-Apr-2020	19-May-2020	✓			
BH-M19d, BH-M20d, BH-M23d,	BH-M19s, BH-M22s, BH-M23s	----	----	----	28-Apr-2020	20-May-2020	✓			
Clear Plastic Bottle - Natural (ED045G)										
BH-M16d, BH-M22d, BH-M24s, UGM-MIS	BH-M16s, BH-M24d, UGM-MID,	----	----	----	28-Apr-2020	21-May-2020	✓			
ED093F: Dissolved Major Cations										
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)										
BH-M20s, BH-M25s	BH-M25d,	----	----	----	28-Apr-2020	19-May-2020	✓			
BH-M19d, BH-M20d, BH-M23d,	BH-M19s, BH-M22s, BH-M23s	----	----	----	28-Apr-2020	20-May-2020	✓			
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)										
BH-M16d, BH-M22d, BH-M24s, UGM-MIS	BH-M16s, BH-M24d, UGM-MID,	----	----	----	28-Apr-2020	21-May-2020	✓			



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 Client : EMM CONSULTING PTY LTD
 Project : S190512

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

Method		Sample Date			Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation			
EG020F: Dissolved Metals by ICP-MS										
BH-M20s, BH-M25s	BH-M25d, Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)	----	----	----	28-Apr-2020	18-Oct-2020	✓			
BH-M19d, BH-M20d, BH-M23d,	BH-M19s, BH-M22s, BH-M23s Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)	----	----	----	28-Apr-2020	19-Oct-2020	✓			
BH-M16d, BH-M22d, BH-M24s, UGM-MIS	BH-M16s, BH-M24d, UGM-MID, Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)	----	----	----	28-Apr-2020	20-Oct-2020	✓			
EG051G: Ferrous Iron by Discrete Analyser										
BH-M20s, BH-M25s	BH-M25d, Clear Plastic Bottle - HCl - Filtered (EG051G)	----	----	----	28-Apr-2020	28-Apr-2020	✓			
BH-M19d, BH-M20d, BH-M23d,	BH-M19s, BH-M22s, BH-M23s Clear Plastic Bottle - HCl - Filtered (EG051G)	----	----	----	28-Apr-2020	29-Apr-2020	✓			
BH-M16d, BH-M22d, BH-M24s, UGM-MIS	BH-M16s, BH-M24d, UGM-MID, Clear Plastic Bottle - HCl - Filtered (EG051G)	----	----	----	29-Apr-2020	30-Apr-2020	✓			
EK085M: Sulphide as S2-										
BH-M20s, BH-M25s	BH-M25d, Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)	----	----	----	28-Apr-2020	28-Apr-2020	✓			
BH-M19d, BH-M20d, BH-M23d,	BH-M19s, BH-M22s, BH-M23s Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)	----	----	----	28-Apr-2020	29-Apr-2020	✓			
BH-M16d, BH-M22d, BH-M24s, UGM-MIS	BH-M16s, BH-M24d, UGM-MID, Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)	----	----	----	28-Apr-2020	30-Apr-2020	✓			



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type	Method	Count			Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected			
Laboratory Duplicates (DUP)								
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Chloride by Discrete Analyser	ED045G	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	26	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Ferrous Iron by Discrete Analyser	EG051G	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Gross Alpha and Beta Activity	EA250	3	23	13.04	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Major Cations - Dissolved	ED093F	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Radium 226 and Radium 228 Activity	EA251	0	18	0.00	10.00	✗	NEPM 2013 B3 & ALS QC Standard	
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfide as S2-	EK085	3	23	13.04	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Laboratory Control Samples (LCS)								
Alkalinity by PC Titrator	ED037-P	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Chloride by Discrete Analyser	ED045G	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Ferrous Iron by Discrete Analyser	EG051G	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Gross Alpha and Beta Activity	EA250	2	23	8.70	10.00	✗	NEPM 2013 B3 & ALS QC Standard	
Major Cations - Dissolved	ED093F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Radium 226 and Radium 228 Activity	EA251	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfide as S2-	EK085	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Method Blanks (MB)								
Chloride by Discrete Analyser	ED045G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	26	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite B	EG020B-F	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Ferrous Iron by Discrete Analyser	EG051G	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Gross Alpha and Beta Activity	EA250	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Major Cations - Dissolved	ED093F	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Radium 226 and Radium 228 Activity	EA251	1	18	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfide as S2-	EK085	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Matrix Spikes (MS)								
Chloride by Discrete Analyser	ED045G	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite A	EG020A-F	0	26	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard	
Ferrous Iron by Discrete Analyser	EG051G	2	35	5.71	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfide as S2-	EK085	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard	



Page : 7 of 9
 Work Order : EM2006908
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type Analytical Methods	Method	Count		Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected		
Matrix Spikes (MS) - Continued Sulfide as S2-	EK085	2	23	8.70	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Gross Alpha and Beta Activity	EA250	WATER	ASTM D7283-06: Determination of gross alpha and gross beta radioactivity in water samples by Liquid Scintillation Counting (LSC).
Radium 226 and Radium 228 Activity	EA251	WATER	In-house: Determination of radium 226 and radium 226 radioactivity in water samples by Liquid Scintillation Counting (LSC).
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM (2013) Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM (2013) Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA 21st edition seal method 2 017-1-L april 2003
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM (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 2340 B. This method is compliant with NEPM (2013) Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45um filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. Samples are 0.45um 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.
Ferrous Iron by Discrete Analyser	EG051G	WATER	In house: Referenced to APHA 3500 Fe-B. A colorimetric determination based on the reaction between phenanthroline and ferrous iron at pH 3.2-3.3 to form an orange-red complex that is measured against a five-point calibration curve. This method is compliant with NEPM (2013) Schedule B(3)



Page : 9 of 9
Work Order : EM2006908
Client : EMM CONSULTING PTY LTD
Project : S190512

Analytical Methods	Method	Matrix	Method Descriptions
Sulfide as S ²⁻	EK085	WATER	In house: Referenced to APHA 4500-S ₂ -D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR, otherwise samples are measured using UV-VIS detection at 664nm. This method is compliant with NEPM (2013) Schedule B(3)
Ionic Balance by PCT DA and Turbi SO ₄ DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM (2013) Schedule B(3)



CHAIN OF CUSTODY

ALS Laboratory, please tick →

JURONG 21 Burney Road, Phoenix EA 5795
Ph: 07 3259 9333, Fax: 07 3259 9334, Email: info@als.com.au

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JURONG 21 Burney Road, Phoenix EA 5795
Ph: 07 3259 9333, Fax: 07 3259 9334, Email: info@als.com.au

CLIENT: EMM Consulting
OFFICE: Ground floor, 20 Chandos Street, St Leonards, NSW 2065
PROJECT: S190512
ORDER NUMBER: PURCHASE ORDER NO.:
PROJECT MANAGER: Paul Gibbons
SAMPLER: Kaitlyn Brodie / Henry Noakes
COC Email to ALS? (YES / NO)
Email Reports to: pgibbons@emmconsulting.com.au ; hnoakes@emmconsulting.com.au
Email Invoice to: pgibbons@emmconsulting.com.au

TURNAROUND REQUIREMENTS:
 Standard TAT (List due date):
 Non Standard or urgent TAT (List due date):

FOR LABORATORY USE ONLY (Circle)
 Custody Seal Intact? Yes No
 Free ice / frozen ice bricks present upon receipt? Yes No
 Random Sample Temperature on Receipt: °C
 Other comment:

RELINQUISHED BY: H. Noakes
DATE/TIME: 30/4/20 10:14
RECEIVED BY: [Signature]
DATE/TIME: 30/4/20 10:20

RELINQUISHED BY:
DATE/TIME:

RECEIVED BY:
DATE/TIME:

COC SEQUENCE NUMBER (Circle)
 coc: 1 2 3 4 5 6 7
 of: 1 2 3 4 5 6 7

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)	CONTAINER INFORMATION	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price) <small>Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).</small>	Additional Information										
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	Major ions + ionic balance	Suphide	ED40F (Yellow)	Dissolved metals (Field filtered) (Red)	EG20F (Red)	Ferrous iron (Field filtered) (Maroon)	Radium 226/228, Gross alpha	EA251 (Red & Green)	Comments on likely contaminant levels, dilutions, or samples requiring specific OC analysis etc.
1	UGM-m26D	26/4 11:10	W	Subcon / Forward Lab / Split WO	7	X	X	X	X	X	X	X	X	
2	UGM-m26S	26/4 11:30	W	Reinforced By / Date:	7	X	X	X	X	X	X	X	X	
3	BH-m21S	27/4 12:45	W	Reinforced By / Date:	7	X	X	X	X	X	X	X	X	
4	QC101	27/4	W	Reinforced By / Date:	7	X	X	X	X	X	X	X	X	
5	BH-m21D	27/4 11:40	W	Reinforced By / Date:	7	X	X	X	X	X	X	X	X	
6	UGM-m12D	27/4 15:30	W	Reinforced By / Date:	7	X	X	X	X	X	X	X	X	
7	UGM-m12S	28/4 9:00	W	Reinforced By / Date:	7	X	X	X	X	X	X	X	X	
8	UGM-m4D	26/4 9:00	W	Reinforced By / Date:	7	X	X	X	X	X	X	X	X	
9	UGM-m2S	25/4 15:40	W	Reinforced By / Date:	7	X	X	X	X	X	X	X	X	
10	UGM-m2D	25/4 15:20	W	Reinforced By / Date:	7	X	X	X	X	X	X	X	X	
11	UGM-m2S	25/4 17:00	W	Reinforced By / Date:	7	X	X	X	X	X	X	X	X	
Please see Shane(ALS) for suite configurations TOTAL														

Environmental Division 1
 Sydney
 Work Order Reference
ES2014654



Telephone : + 61-2-8784 6555

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airfreight Unpreserved Plastic
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SO₂ = Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation bottle; SP = Sulfuric Preserved Plastic
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Luggo's Iodine Preserved Bottles; STI = Sterile Sodium Thiosulfate Preserved Bottles.



CHAIN OF CUSTODY

ALS Laboratory, please tick →

JAGEL LAURE 21 Ruma Pintas (S4-5595)
 Ph: 07 4900 9800 E: jlaure@alslab.com

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 Ph: 07 3253 7222 E: james@alslab.com

JURADSTONE 44 Cocksandah Drive, Clonak, QLD 4040
 Ph: 07 3214 5600 E: jadstone@alslab.com

JURASONS 18 HANOVER ROAD, WINDYBUSH NSW 2322
 Ph: 07 4334 0172 E: mas@alslab.com

JURLEICOURSE 2-4 Weyburn Road, Stirling NSW 2111
 Ph: 03 7520 9600 E: samples@alslab.com

JURORRILL 2-4 Green Place North, Newry NSW 2531
 Ph: 02 4123 2963 E: newry@alslab.com

JURPERTH 10 Wood Way, Margate, WA 6000
 Ph: 08 9209 7655 E: samples@alslab.com

JURWOLLONGONG 69 Kenny Street, Wollongong NSW 2500
 Ph: 02 4225 3125 E: wollongong@alslab.com

JURWYBY 277-289 Woodcock Road, Smithfield NSW 2164
 Ph: 02 3714 6505 E: sample@alslab.com

JURWYBYVILLE 1-15 Dyeria Court, Birkdale QLD 4188
 Ph: 07 4768 0800 E: wbyville@alslab.com

CLIENT: EMM Consulting

OFFICE: Ground floor, 20 Chandos Street, St Leonards, NSW 2065

PROJECT NO.: 19051233 **ALS QUOTE NO.:**

ORDER NUMBER: PURCHASE ORDER NO.:

PROJECT MANAGER: Paul Gibbons

SAMPLER: Kaitlyn Brodie / Henry Noakes

COC Emailed to ALS? (YES / NO)

Email Reports to: pgibbons@emmconsulting.com.au

Email Invoice to: pgibbons@emmconsulting.com.au

TURNAROUND REQUIREMENTS: Standard TAT (List due date): Non Standard or urgent TAT (List due date):

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

COUNTRY OF ORIGIN:

CONTACT PH: 02 9493 9500

SAMPLER MOBILE: 0401 881 447

EDD FORMAT (or default):

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No N/A

Free ice / frozen ice bricks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comment:

RECEIVED BY: H. Noakes

DATE/TIME: 30/4/20 10:14

RELINQUISHED BY: [Signature]

DATE/TIME: 30/4/20 10:20

RECEIVED BY:

DATE/TIME:

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	ANALYSIS REQUIRED INCLUDING SUITES (NB. Suite Codes must be listed to attract suite price)						Additional Information
						Major ions + ionic balance	Sulphide	Disolved metals (Field filtered) (Red)	Ferrous Iron (Field filtered)	Radium 226/228, Gross a&b	Comments on likely contaminant levels, dilutions, or samples requiring specific OC analysis etc.	
12	UL6M-M8D	25/4 10:15	W		7	X	X	X	X	X		
13	BH-M17D	24/4 15:50	W		7	X	X	X	X	X		
14	BH-M17S	24/4 16:00	W		7	X	X	X	X	X		
15	LPS PB04	24/4 8:00	W		7	X	X	X	X	X		
16	QC100	24/4	W		7	X	X	X	X	X		
17	QC200	24/4	W		7	X	X	X	X	X		
18	UL6M-M15S	24/4 11:00	W		7	X	X	X	X	X		
19	UL6M-M15D	24/4 10:45	W		7	X	X	X	X	X		
20	UL6M-M18S	27/4 9:10	W		7	X	X	X	X	X		
21	UL6M-M18D	27/4 8:00	W		7	X	X	X	X	X		
	RB100	28/4	W		7	X	X	X	X	X		
					TOTAL	0						

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic

V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Special bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;

Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Solis; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

Form Page 1 of 1



Environmental

CERTIFICATE OF ANALYSIS

Work Order : ESM206986 Page : 1 of 7
Client : EUU CONSGLTINP DTY LTI Laboratory : Environmental Division Sydney
Contact : PAUL GIBBONS Contact : Customer Services ES
Address : Ground Floor Suite 1 20 Chandos Street Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61-2-8784 8555
Project : S190512 Date Samples Received : 30-Apr-2020 10:20
Order number : Date Analysis Commenced : 30-Apr-2020
C-O-C number : Issue Date : 14-May-2020 08:45
Sampler : HENRY NOAKES, KAITLYN BRODIE
Site :
Quote number : EN/222
No. of samples received : 21
No. of samples analysed : 21



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additioal f tarop l rtoa herrtaean rd rstw rehorm btf ue rogad ta rse roffobtac weh l r l re l m Qspeanw y gl ftn Coarrof Rehorr l y Ay C Cop htl a Qe Awewwpp ean rd l wkw n b trs y gl ftn Re. teb l ad Sl p hfe ReCethnNorthl rtoa^

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Titus Vimalasiri	Metals Teamleader	Radionuclides, Fyshwick, ACT



Page : 2 of 7
Work Order : ES2014654
Client : EMM CONSULTING PTY LTD
Project : S190512

General Comments

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

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

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

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

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

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

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

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

\emptyset = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

● EG020: LOR's have been raised due to matrix interference. (High Total Dissolved Solids)

● LOR for Gross Alpha and Gross Beta raised for some samples due to high solid content.

● Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Compound	CAS Number	LOR	Client sampling date / time		Client sample ID							
			Unit	Result	GPU1U91	GPU1U9S	GPU1U1MS	Y C020	H-1U1NDI			
Ei 254D: Afkl ftaŋ u, DC Ttrl ror												
- , dro3tde Afkl ftaŋ l wCl CO5	DMO-210-001	1	mg/L	<1	26-Apr-2020 11:30	ESM206986122M	27-Apr-2020 12:45	ESM2069861226	27-Apr-2020 00:00	ESM2069861228	<1	<1
Cl ruoal re Afkl ftaŋ l wCl CO5	3812-32-6	1	mg/L	<1							<1	<1
HtQ ruoal re Afkl ftaŋ l wCl CO5	71-52-3	1	mg/L	828							587	59M
Tor f Afkl ftaŋ l wCl CO5	----	1	mg/L	828							587	59M
Ei 260P: Sgrfne (Tgrutdp eritQ l wSO6 M u, i A												
Sgrfne l wSO61Tgrutdp eritQ	14808-79-8	1	mg/L	5762							6582	6562
Ei 268P: Csforde u, i wQere Aal f, wer												
Csforde	16887-00-6	1	mg/L	07M2							M622	M6722
Ei 2x5F: i twof. ed U l jor Cl rtoaw												
Cl rQgp	7440-70-2	1	mg/L	609							67x	678
U l caewgtp	7439-95-4	1	mg/L	0592							0692	0652
Sodtgp	7440-23-5	1	mg/L	02922							0Mx22	0Mx22
Dorl wgtgp	7440-09-7	1	mg/L	52							M1	M0
EP2M2F: i twof. ed Ueri fwu, ICD1US												
Afgp tatgp	7429-90-5	0.01	mg/L	<0.10							<0.10	<0.10
Tsortgp	7440-29-1	0.001	mg/L	<0.010							<0.010	<0.010
Grl atgp	7440-61-1	0.001	mg/L	<0.010							22M9	22M8
Iroa	7439-89-6	0.05	mg/L	<0.10							268	26x
EP280P: Ferrogwiroa u, i twQere Aal f, wer												
Ferrogwiroa	----	0.05	mg/L	2700							228	<0.05
EK278U: Sgrfde l wSM												
Sgrfde l wSM	18496-25-8	0.1	mg/L	M8							<0.1	<0.1
EN288: loatQHI fi a Qe												
Ø Tor f Aatoaw	----	0.01	meq/L	925							447	4x4
Ø Tor f Cl rtoaw	----	0.01	meq/L	8x6							429	9x8
Ø loatQHI fi a Qe	----	0.01	%	246							672	979
EAM2CA: ProwwAfnsl l ad Herl AQt. ŋ												
Prowwfnsl	----	0.05	Bq/L	<0.90							M72	0x7
Prowwuerl l Qt. ŋ 162K	----	0.10	Bq/L	<1.81							<2.09	<2.06
EAM80CA: RI dtgtp M9 l ad RI dtgtp M7 AQt. ŋ												
RI dtgtp M9	13982-63-3	0.01	Bq/L	225							270x	2704
RI dtgtp M7	7440-14-4	0.08	Bq/L	<0.08							299	292



Analytical Results

Compound	CAS Number	LOR	Client sampling date / time		Client sample ID				
			Unit	Result	GPU1U0M	GPU1U0MS	GPU1U6I	GPU1U1MS	GPU1U1M
EI 254D: Afkl ftaŋ u, DC Ttrll rbr									
- , dro3tde Afkl ftaŋ l wCl CO5	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	<1
Cl ruoal re Afkl ftaŋ l wCl CO5	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	<1
HtQ ruoal re Afkl ftaŋ l wCl CO5	71-52-3	1	mg/L	869	869	667	52M	67M	67M
Tor f Afkl ftaŋ l wCl CO5	----	1	mg/L	869	869	667	52M	67M	67M
EI 260P : Sgrfne (Tgrutdp errtQ l wSO6 M u, i A									
Sgrfne l wSO6 l Tgrutdp errtQ	14808-79-8	1	mg/L	5052	8262	5x72	6x02	5x72	5x72
EI 268P : Csfortde u, i twQere Aal f, wer									
Csfortde	16887-00-6	1	mg/L	09922	MM22	04422	M6422	07M22	07M22
EI 2x5F: i twof. ed U l jor Cl rtoaw									
Cl rQgp	7440-70-2	1	mg/L	58x	806	682	925	64M	64M
U l caewgtp	7439-95-4	1	mg/L	0072	0982	0552	0842	06M2	06M2
Sodtgp	7440-23-5	1	mg/L	x8M2	06922	02522	0MM22	00022	00022
Dorl wtgtp	7440-09-7	1	mg/L	Mk	M0	Mk	M4	50	50
EP2M2F: i twof. ed Ueri fwu, lCD1U5									
Afqp tatgp	7429-90-5	0.01	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Tsortgp	7440-29-1	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Grl atgp	7440-61-1	0.001	mg/L	<0.010	2272	<0.010	2205	<0.010	<0.010
Iroa	7439-89-6	0.05	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
EP280P: Ferrogwiroa u, i twQere Aal f, wer									
Ferrogwiroa	----	0.05	mg/L	2709	2700	27M6	<0.05	2705	2705
EK278U: Sgrfnde l wSM									
Sgrfnde l wSM	18496-25-8	0.1	mg/L	77x	<0.1	<0.1	<0.1	<0.1	<0.1
EN288: loatQHI fl aQe									
Ø Tor f Aatoaw	----	0.01	meq/L	866	747	8x0	444	929	929
Ø Tor f Cl rtoaw	----	0.01	meq/L	852	4x4	870	9x0	9M6	9M6
Ø loatQHI fl aQe	----	0.01	%	058	672	277x	874	067	067
EAMB2CA: ProwwAfnsl l ad Herl AQt. ŋ									
ProwwAfnsl	----	0.05	Bq/L	2797	Mx7	<0.90	074M	<0.92	<0.92
Prowwuer l Qt. ŋ 162K	----	0.10	Bq/L	<1.27	<2.32	<1.79	<2.03	<1.84	<1.84
EAMB0CA: RI dtgtp MB9 l ad RI dtgtp MM7 AQt. ŋ									
RI dtgtp MB9	13982-63-3	0.01	Bq/L	2702	228	225	27M6	225	225
RI dtgtp MM7	7440-14-4	0.08	Bq/L	2706	<0.08	227	277	<0.08	<0.08



Analytical Results

Compound	CAS Number	LOR	Client sample ID		GPU 1U7S	GPU 1U7I	H- 1U04i	H- 1U04S	LSDSH26
			Client sampling date / time	Unit					
Ei 254D: Afkl ftaŋ u, DC Ttrll rbr									
- , dro3tde Afkl ftaŋ l wCl CO5	DMO-210-001	1		mg/L	<1	<1	<1	<1	<1
Cl ruoal re Afkl ftaŋ l wCl CO5	3812-32-6	1		mg/L	<1	<1	<1	<1	<1
HtQ ruoal re Afkl ftaŋ l wCl CO5	71-52-3	1		M#8	672	602	6M6	6M6	689
Tor f Afkl ftaŋ l wCl CO5	----	1		mg/L	672	602	6M6	6M6	689
Ei 260P: Sgrfne (Tgrutdp errtQ l wSO6 M u, i A									
Sgrfne l wSO6 l Tgrutdp errtQ	14808-79-8	1		mg/L	6752	5792	6002	6002	6562
Ei 268P: Csforŋde u, i twQere Aal f, wer									
Csforŋde	16887-00-6	1		mg/L	16422	04522	07822	07822	0x222
Ei 2x5F: i twof. ed U l jor Cl rtoaw									
Cl rQgp	7440-70-2	1		mg/L	987	662	644	644	69x
U l caewgtp	7439-95-4	1		mg/L	04x2	05x2	0Mx2	0Mx2	0662
Sodtgp	7440-23-5	1		mg/L	05622	02722	02x22	02x22	02722
Dorl wgtgp	7440-09-7	1		mg/L	52	5M	M#	M#	59
EP2M2F: i twof. ed Ueri fwu, lCD1US									
Afŋp tatgp	7429-90-5	0.01		mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Tsortgp	7440-29-1	0.001		mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Grl atgp	7440-61-1	0.001		mg/L	2*200	<0.010	2*205	2*205	<0.010
Iroa	7439-89-6	0.05		mg/L	<0.10	8*4M	2*94	2*94	2*08
EP280P: Ferrogwiroa u, i twQere Aal f, wer									
Ferrogwiroa	----	0.05		mg/L	<0.05	2*82	2*75	2*75	2*75
EK278U: Sgrfŋde l wSM									
Sgrfŋde l wSM	18496-25-8	0.1		mg/L	<0.1	<0.1	<0.1	<0.1	<0.1
EN288: loatQHI fl a Qe									
Ø Tor f Aatoaw	----	0.01		meq/L	750	9M	909	909	958
Ø Tor f Cl rtoaw	----	0.01		meq/L	496	924	928	928	905
Ø loatQHI fl a Qe	----	0.01		%	6*MM	0*0x	2*0x	2*0x	0*75
EAMB2CA: ProwwAfnsl l ad Herl AQt. ŋ									
ProwwAfnsl	----	0.05		Bq/L	0*87	<0.93	M20	M20	0*22
Prowwuer l Qt. ŋ 162K	----	0.10		Bq/L	<2.15	<1.86	<1.82	<1.82	<1.86
EAMB0CA: RI dtgtp MBØ l ad RI dtgtp MW AQt. ŋ									
RI dtgtp MBØ	13982-63-3	0.01		Bq/L	2*72	2*25	2*07	2*07	2*06
RI dtgtp MW	7440-14-4	0.08		Bq/L	2*42	<0.08	2*4x	2*4x	2*52



Analytical Results

Compound	CAS Number	LOR	Unit	Client sample ID		y C022	GPUJU08S	GPUJU08I	GPUJU07S	GPUJU07I
				Client sampling date / time	Result					
Sub-Matrix: WATER (Matrix: WATER)										
Ei 254D: Afkl ftaŋ u, DC Ttrl ror										
- , dro3tde Afkl ftaŋ l wCl CO5	DMO-210-001	1	mg/L	24-Apr-2020 00:00	ESM206986209	<1	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Cl ruoal re Afkl ftaŋ l wCl CO5	3812-32-6	1	mg/L	24-Apr-2020 00:00	ESM206986209	<1	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
HtQ ruoal re Afkl ftaŋ l wCl CO5	71-52-3	1	mg/L	24-Apr-2020 00:00	ESM206986209	604	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Tor f Afkl ftaŋ l wCl CO5	----	1	mg/L	24-Apr-2020 00:00	ESM206986209	604	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Sub-Matrix: Sgrfne (Tgrutdp eritQ l wSO6 M u, i A										
Sgrfne l wSO6 l Tgrutdp eritQ	14808-79-8	1	mg/L	24-Apr-2020 00:00	ESM206986209	6072	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Sub-Matrix: Csforŋde u, i wQere Aal f, wer										
Csforŋde	16887-00-6	1	mg/L	24-Apr-2020 00:00	ESM206986209	0x022	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Sub-Matrix: i twof. ed U l jor Cl roaw										
Cl rQgp	7440-70-2	1	mg/L	24-Apr-2020 00:00	ESM206986209	649	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
U l caewgtp	7439-95-4	1	mg/L	24-Apr-2020 00:00	ESM206986209	0672	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Sodtgp	7440-23-5	1	mg/L	24-Apr-2020 00:00	ESM206986209	00022	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Dorl wgtgp	7440-09-7	1	mg/L	24-Apr-2020 00:00	ESM206986209	59	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Sub-Matrix: i twof. ed Ueri fwu, l CD1US										
Afŋp tatgp	7429-90-5	0.01	mg/L	24-Apr-2020 00:00	ESM206986209	<0.10	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Tsortgp	7440-29-1	0.001	mg/L	24-Apr-2020 00:00	ESM206986209	<0.010	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Grl atgp	7440-61-1	0.001	mg/L	24-Apr-2020 00:00	ESM206986209	<0.010	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Iroa	7439-89-6	0.05	mg/L	24-Apr-2020 00:00	ESM206986209	206	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Sub-Matrix: Ferrogwiroa u, i twQere Aal f, wer										
Ferrogwiroa	----	0.05	mg/L	24-Apr-2020 00:00	ESM206986209	206	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Sub-Matrix: Sgrfne l wSM										
Sgrfne l wSM	18496-25-8	0.1	mg/L	24-Apr-2020 00:00	ESM206986209	<0.1	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Sub-Matrix: loatQHI fl a Qe										
Ø Tor f Aatoaw	----	0.01	meq/L	24-Apr-2020 00:00	ESM206986209	956	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Ø Tor f Cl roaw	----	0.01	meq/L	24-Apr-2020 00:00	ESM206986209	91k	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Ø loatQHI fl a Qe	----	0.01	%	24-Apr-2020 00:00	ESM206986209	257	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Sub-Matrix: ProwwAfnsl l ad Herl AQt. ŋ										
ProwwAfnsl	----	0.05	Bq/L	24-Apr-2020 00:00	ESM206986209	<0.93	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Prowwuerl l Qt. ŋ 162K	----	0.10	Bq/L	24-Apr-2020 00:00	ESM206986209	<1.86	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
Sub-Matrix: RI dtgtp MB l ad RI dtgtp MW AQt. ŋ										
RI dtgtp MB	13982-63-3	0.01	Bq/L	24-Apr-2020 00:00	ESM206986209	205	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202
RI dtgtp MW	7440-14-4	0.08	Bq/L	24-Apr-2020 00:00	ESM206986209	259	24-Apr-2020 11:00	ESM206986207	27-Apr-2020 09:10	ESM206986202



Environmental

QUALITY CONTROL REPORT

Work Order : **EM20698S9**

Page : 1 of 7

Client : **EGG CONMULTIND PTY LT5**
 Contact : **PAUL GIBBONS**
 Address : **Ground Floor Suite 1 20 Chandos Street
 St Leonards NSW NSW 2065**

Telephone : ----
 Project : **S190512**
 Order number : ----
 C-O-C number : ----
 Sampler : **HENRY NOAKES, KAITLYN BRODIE**
 Site : ----

Quote number : **EN/222**
 No. of samples received : **21**
 No. of samples analysed : **21**

Laboratory : **Environmental Division Sydney**
 Contact : **Customer Services ES**
 Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**

Telephone : **+61-2-8784 8555**
 Date Samples Received : **30-Apr-2020**
 Date Analysis Commenced : **30-Apr-2020**
 Issue Date : **14-May-2020**



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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Titus Vimalasiri	Metals Teamleader	Radionuclides, Fyshwick, ACT



Page : 2 of 7
 Work Order : ES2014654
 Client : EMM CONSULTING PTY LTD
 Project : S190512

General Comments

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

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

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

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

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

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
EA250CA: Dross Alpha and Beta Activity (QC Lot: 23333164)									
EB2011392-001	Anonymous	EA250: Gross alpha	----	0.05	Bq/L	<0.05	<0.05	0.00	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	<0.10	0.00	No Limit
EP2004202-006	Anonymous	EA250: Gross alpha	----	0.05	Bq/L	0.08	0.15	56.0	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	0.14	0.21	40.4	No Limit
EA250CA: Dross Alpha and Beta Activity (QC Lot: 23333124)									
ES2014654-009	UGM-M2S	EA250: Gross alpha	----	0.05	Bq/L	1.72	1.94	12.6	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	<2.03	<2.03	0.00	No Limit
ES2014654-019	UGM-M18S	EA250: Gross alpha	----	0.05	Bq/L	3.02	3.36	10.7	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	2.06	<2.00	3.19	No Limit
E5071P: Alkalinity) y PC Titrator (QC Lot: 233S8264)									
ES2014654-003	UGM-M21S	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	358	350	2.30	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	358	350	2.30	0% - 20%
ES2014638-007	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	325	354	8.62	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	325	354	8.62	0% - 20%
E5071P: Alkalinity) y PC Titrator (QC Lot: 233S8274)									
ES2014654-014	BH-M17S	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	424	417	1.50	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	424	417	1.50	0% - 20%
ES2014672-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit



Sub-Matrix: WATER									
Laboratory sample ID	Client sample ID	Method/Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
E5 071P: Alkalinity) y PC Titration (QC Lot: 233S8274 bcontinued									
ES2014672-002	Anonymous	ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	659	637	3.39	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	659	637	3.39	0% - 20%
E5 096D: Mulfate (Tur) idimetric-4as MO9 2b) y 5 A (QC Lot: 233SS- 74									
ES2014635-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	38	37	0.00	0% - 20%
ES2014629-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	39	30	26.6	No Limit
E5 096D: Mulfate (Tur) idimetric-4as MO9 2b) y 5 A (QC Lot: 233SS- 34									
ES2014654-018	UGM-M15D	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3820	3700	3.10	0% - 20%
ES2014654-017	UGM-M15S	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5080	5140	1.07	0% - 20%
E5 095D: Chloride) y 5 iscrete Analyser (QC Lot: 233SS- - 4									
ES2014635-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	34	34	0.00	0% - 20%
ES2014629-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	5	5	0.00	No Limit
E5 095D: Chloride) y 5 iscrete Analyser (QC Lot: 233SS304									
ES2014654-017	UGM-M15S	ED045G: Chloride	16887-00-6	1	mg/L	26100	27000	3.26	0% - 20%
E5 037F: 5 issolved Gajor Cations (QC Lot: 23382- 94									
ES2014654-001	UGM-M6D	ED093F: Calcium	7440-70-2	1	mg/L	416	409	1.76	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1360	1350	1.10	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10600	10600	0.740	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	30	30	0.00	0% - 20%
ES2014654-011	UGM-M8S	ED093F: Calcium	7440-70-2	1	mg/L	658	610	7.67	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1790	1620	10.1	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	13400	12100	9.94	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	30	28	7.53	0% - 20%
E5 037F: 5 issolved Gajor Cations (QC Lot: 23382- 14									
ES2014654-021	RB100	ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	<1	<1	0.00	No Limit
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
EW2002098-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	12	12	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	4	4	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	21	21	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	1	1	0.00	No Limit
ED020F: 5 issolved Getals) y ICP16M (QC Lot: 23382- 54									
ES2014654-001	UGM-M6D	EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.10	<0.10	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.10	<0.10	0.00	No Limit
ES2014654-011	UGM-M8S	EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.10	<0.10	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.10	<0.10	0.00	No Limit
ED020F: 5 issolved Getals) y ICP16M (QC Lot: 23382- 84									
ES2014654-001	UGM-M6D	EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit



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 Work Order : ES2014654
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
ED020F: 5 dissolved Gtals) y ICPISM (QC Lot: 23382- 84 bcontinued									
ES2014654-001	UGM-M6D	EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit
ES2014654-011	UGM-M8S	EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	0.011	0.011	0.00	No Limit
ED020F: 5 dissolved Gtals) y ICPISM (QC Lot: 23382- - 4									
ES2014654-021	RB100	EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EW2002098-004	Anonymous	EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	0.12	0.14	15.4	No Limit
ED020F: 5 dissolved Gtals) y ICPISM (QC Lot: 23382- 34									
ES2014654-021	RB100	EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
EW2002098-004	Anonymous	EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
ED056D: Ferrous Iron) y 5 iscrete Analyser (QC Lot: 2331S664									
ES2014654-001	UGM-M6D	EG051G: Ferrous Iron	---	0.05	mg/L	0.11	0.08	36.5	No Limit
ES2014654-011	UGM-M8S	EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ED056D: Ferrous Iron) y 5 iscrete Analyser (QC Lot: 233- 0964									
ES2014586-001	Anonymous	EG051G: Ferrous Iron	---	0.05	mg/L	19.7	20.1	2.01	0% - 20%
ES2014651-013	Anonymous	EG051G: Ferrous Iron	---	0.05	mg/L	23.3	23.4	0.159	0% - 20%
EK0- SG: Mlfide as M2b (QC Lot: 233810S4									
ES2014654-002	UGM-M6S	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES2014654-015	LPSB04	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK0- SG: Mlfide as M2b (QC Lot: 233 - 3694									
ES2014459-001	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit



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

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

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Concentration	Spike Recovery (%)	LCS	Low	High
EA250CA: Gross Alpha and Beta Activity (QCLot: 23333164)									
EA250: Gross alpha	----	0.05	Bq/L	<0.05	1751 Bq/L	#102	98.0	98.0	100
EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	----	----	----	----	----
EA250CA: Gross Alpha and Beta Activity (QCLot: 23333124)									
EA250: Gross alpha	----	0.05	Bq/L	<0.05	1751 Bq/L	100	98.0	98.0	100
EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	----	----	----	----	----
EA256CA: Radium 228 and Radium 226- Activity (QCLot: 70032864)									
EA251: Radium 226	13982-63-3	0.01	Bq/L	<0.01	2.5 Bq/L	96.5	89.9	89.9	110
EA251: Radium 228	7440-14-4	0.08	Bq/L	<0.08	2.5 Bq/L	94.8	85.6	85.6	112
E5071P: Alkalinity) y PC Titrator (QCLot: 2338264)									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	99.1	81.0	81.0	111
					50 mg/L	118	70.0	70.0	130
E5071P: Alkalinity) y PC Titrator (QCLot: 2338274)									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	100	81.0	81.0	111
					50 mg/L	122	70.0	70.0	130
E5096D: Mulfate (Tur) idimetric4as MO9 2b) y 5A (QCLot: 233SS- 74)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	111	82.0	82.0	122
					500 mg/L	101	82.0	82.0	122
E5096D: Mulfate (Tur) idimetric4as MO9 2b) y 5A (QCLot: 233SS- 34)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	115	82.0	82.0	122
					500 mg/L	103	82.0	82.0	122
E509SD: Chloride) y 5iscrete Analyser (QCLot: 233SS- - 4)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	110	80.9	80.9	127
					1000 mg/L	105	80.9	80.9	127
E509SD: Chloride) y 5iscrete Analyser (QCLot: 233SS304)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	112	80.9	80.9	127
					1000 mg/L	108	80.9	80.9	127
E5037F: 5 issolved Gajor Cations (QCLot: 23382- 94)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	98.2	80.0	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.4	90.0	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	95.7	82.0	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.1	85.0	85.0	113
E5037F: 5 issolved Gajor Cations (QCLot: 23382- 14)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.3	80.0	80.0	114



Sub-Matrix: WATER		Method Blank (MB) Report			Laboratory Control Spike (LCS) Report				
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	LCS	Recovery Limits (%)	
							Low	High	
E5 037F: 5 dissolved Gajor Cations (QCLot: 23382- 14 bcontinued)									
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	95.2	90.0	116	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	101	82.0	120	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	99.1	85.0	113	
ED020F: 5 dissolved Gajals) y ICPIGM (QCLot: 23382- S4									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	91.4	80.0	116	
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	92.5	82.0	112	
ED020F: 5 dissolved Gajals) y ICPIGM (QCLot: 23382- 84									
EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	0.1 mg/L	103	85.0	115	
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	87.7	85.0	115	
ED020F: 5 dissolved Gajals) y ICPIGM (QCLot: 23382- - 4									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	86.9	80.0	116	
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	89.9	82.0	112	
ED020F: 5 dissolved Gajals) y ICPIGM (QCLot: 23382- 34									
EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	0.1 mg/L	94.1	85.0	115	
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	85.1	85.0	115	
ED0S6D: Ferrous Iron) y 5 iscrete Analyser (QCLot: 2331S664									
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	97.1	89.0	117	
ED0S6D: Ferrous Iron) y 5 iscrete Analyser (QCLot: 233- 0964									
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	97.0	89.0	117	
EK0- SG: Mulfide as M2b (QCLot: 233810S4									
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	98.0	76.0	116	
EK0- SG: Mulfide as M2b (QCLot: 233- 3694									
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	96.0	76.0	116	

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		Method: Compound			Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	CAS Number	Spike Concentration	Spike Recovery (%)	MS	Recovery Limits (%)	Low	High
E5 096D: Mulfate (Tur) idimetric-4as MO9 2b) y 5 A (QCLot: 233SS- 74								
ES2014629-001	Anonymous	ED041C: Sulfate as SO4 - Turbidimetric	50 mg/L	96.8	96.8	70.0	70.0	130
E5 096D: Mulfate (Tur) idimetric-4as MO9 2b) y 5 A (QCLot: 233SS- 34								
ES2014654-017	UGM-M15S	ED041C: Sulfate as SO4 - Turbidimetric	10 mg/L	# Not Determined	# Not Determined	70.0	70.0	130
E5 09SD: Chloride) y 5 iscrete Analyser (QCLot: 233SS- - 4								



Page : 7 of 7
 Work Order : ES2014654
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)
E5 09SD: Chloride) y 5 iscrete Analyser (QCLot: 233SS- -4 bcontinued						
ES2014629-001	Anonymous	ED045C: Chloride	16887-00-6	250 mg/L	118	70.0 130
E5 09SD: Chloride) y 5 iscrete Analyser (QCLot: 233SS304						
ES2014654-017	UGM-M15S	ED045C: Chloride	16887-00-6	250 mg/L	# Not Determined	70.0 130
ED056D: Ferrous Iron) y 5 iscrete Analyser (QCLot: 2331S664						
ES2014654-001	UGM-M6D	EG051G: Ferrous Iron	----	1 mg/L	103	70.0 130
ED056D: Ferrous Iron) y 5 iscrete Analyser (QCLot: 233- 0964						
ES2014586-001	Anonymous	EG051G: Ferrous Iron	----	10 mg/L	83.0	70.0 130
EK0- SG: Mulfide as M2b (QCLot: 233810S4						
ES2014654-002	UGM-M6S	EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	106	70.0 130
EK0- SG: Mulfide as M2b (QCLot: 233- 3694						
ES2014459-001	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	97.0	70.0 130



QA/QC Compliance Assessment to assist with Quality Review

Work Order : **EM20698N9** Page : 1 of 11

Y (ei b : **ESS COUML TI QIP YI D TI g** : ni Eroi v ei taOmlEDoi stM et
 y oi tæcb : **PAU9 GIBBONS** : h+16 6835 3444
 Pro@cb : **s lj 241-** : d2&A S6-2-2
 site : **6666** : 15&K at 6-2-2
 sav Sêr : **/ nNRH NOA. nsQ. AIT9HN BROMln** : -1
 OrMêri uv Ler : **6666** : No(of Dav S@Dai a@D&M : -1

This report is automatically generated by the ATM T&M through interpretation of the ATM Quality Control Report and several Quality Assurance parameters measured by ATM. This automated report inhibits any non-conformances, facilitates aster and more accurate data validation and is designed to assist internal expert and external Auditor review. Some components of this report contribute to the overall gQO assessment and reporting or guideline compliance.

Brief v epoMDuv v arleDai Mreferei ceDare a@b SroEMeMto aDDDbli braceaLI@t (

Summary of Outliers

Outliers : Quality Control Samples

TplDreSortpIgp@pD.out@DrDY@ggeMlii tpe) ua@t y oi troQW y kReSortq

- UO S ethod F lank value outliers occur-
- UO guplicate outliers occur-
- T at oratory Control outliers eBst , please see .ollowinb pabes .or .ull details-
- S atriB Mpike outliers eBst , please see .ollowinb pabes .or .ull details-
- Hor all rebular sample matricesxUO surrobate recovery outliers occur-

Outliers : Analysis Holding Time Compliance

- UO Analysis qoldinb l ime Outliers eBst-

Outliers : Frequency of Quality Control Samples

- Quality Control Mample Hre(uency Outliers eBst , please see .ollowinb pabes .or .ull details-



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

K a b i 7 : W A I E R

Y ov Sout MGrouS Nav e	9aLorabrt sav Sð Im	Y ðei bsav Sð Im	Analyte	Y As Nuv Ler	matá	9lv ID	Comment
Taf oratory Control Mþike JTCM4Recoveries							
nA- 42y A: GroDDA Sþa ai MBeta ActEit	) y 6 j j j 1 81022-	0000	Pross alpha	0000	12- %	j 3(20122%	Recovery breater than upper control limit
S atriBþike JS M4Recoveries							
n m251G: s uðate WurLImv ebickaDs O5 -6Lt nA	ns - 215+4500218	UGK 0K 14s	MuLi ate as MD9 , I urf idimetric	1532300j 03	Nob metærv li eM	0000	S Mrecovery not determined f ackbround level breater than or e(ual to 9B spike level-
n m254G: y p0rHMe Lt mDreleAi a0Der	ns - 215+4500218	UGK 0K 14s	Chloride	1+3380220+	Nob metærv li eM	0000	S Mrecovery not determined f ackbround level breater than or e(ual to 9B spike level-

Outliers : Frequency of Quality Control Samples

K a b i 7 : W A I E R

) uaði y oi broCs av S0 TlSe K eþoM	) y	y oui b		Rate W%k n 7SectæM	) uaði y oi broCs Seficfcaioi
		Regu@r	ActuaC		
9aLorabrt muS0caib0DMMJPK	2	- d	2(22	12(22	NnPK - 21d Bd & A9s) y s tai Mærm
RaMuv -- + ai MIRA Muv -- 3 ActEit	-	dd	+2+	12(22	NnPK - 21d Bd & A9s) y s tai Mærm
9aLorabrt y oi broCs av S0DMý sk GroDDA Sþa ai MBeta ActEit	1	- d	5(04	4(22	NnPK - 21d Bd & A9s) y s tai Mærm
RaMuv -- + ai MIRA Muv -- 3 ActEit	1	- d	5(04	4(22	NnPK - 21d Bd & A9s) y s tai Mærm
K eþoM B0ai xD M Bk RaMuv -- + ai MIRA Muv -- 3 ActEit	2	52	2(22	4(22	NnPK - 21d Bd & A9s) y s tai Mærm
K a b i 7 s SxeD M sk mD000eMK eib0Ll ly P0k s 6s ulte A					

Analysis Holding Time Compliance

If Dav S0D are lMei tñeMLe0q aDpaEli g LLeei ai a0DeMor e7bra0eMou0MLe of recov v ei M0Mpo0Mi g ðv e00pIDpou0MLe taxei li to coi D0Meraboi qpei li t0rSredi g reD00i
 TpiD reSorB Duv v arizeD e7bra0boi w SeSaraboi ai M ai a00DD ðv eD ai M cov SareD eacp q lþ A9s recov v ei M0M po0Mi g ðv eD M0fereti cli g Us nPA s y 35+Q AP/ AQ.As ai M NnPKk LaDeM oi tpe Dav S0 coi tali er
 SroEM0æ mat0DreSorteMreSre0i bñrIDaMat0e e7bra0boi or ai a00DDai MSre000e DuLDs, uei bM0000i Dai Mrenui D A 000i g LreacpeD W ai t KIDSroEIME Mpereli (
 / o0Mi g ðv e for 00acpæ v eþoM D W0g(Ty9Pk Eart accormi g to tpe ai a00eD reSorteM A0D00v ei b cov SareD tpe 00acp Mat0e q lþ tpe Dpor0eD0 ai a00e po0Mi g ðv e for tpe e, ulEa0i b D0iCv eþoM(TpeD0e are: orgai l0d
 15 Mat D0v ecurt - 3 Mat D0 & oþer v e000132 Mat D A reconM0Lreacp MbeD0 obguarai t0e a Lreacp for a00i oi 000000 Sarav e0eD
 / o0Mi g ðv eD for VOC in soils Eart accormi g to ai a00eD of li t0ereD Vli t Cy p0r0M0e ai M s0t reie po0Mi g ðv e ID 8 Mat D 0þeD 15 Mat D A reconM0M Lreacp MbeD0 ob guarai t0e a Lreacp for a00 VOy ai a00eD ai M
 Dpou0MLe EerifleMli caD0e tpe reSorteM Lreacp IDa fa00e SoD0Ee 0r Vli t Cy p0r0M0e ai M s0t rei e are i obxet ai a00eDof li t0ereD00i certi (

K a b i 7 : W A I E R

Method	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Date analysed	Due for analysis
Container / Client Sample ID(s)					



Page : d of 11
 Y orx OnMer : ns-215+45
 y QeI b : nKK y ONs U9TING PTH9Tm
 ProQebc : s1j 241-

K abt7: WAI ER n EaQ aboi : * / oMj g tlv e Lreacp ; ✓ = Y ltpil poQfli g tlv e

Method	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
E2NDCA: P ross Alpha and Feta Activity							
Clear Ylastic F ottle , L n.ilteredj Taf ,acidi.ied)E2ND4 B/ &K 18sQ 9Ps PB25Q UGK &K 14sQ	29, Apr, 2020	''''	''''''	''''''	09, S ay, 2020	- 16Oct6- 2- 2	✓
Clear Ylastic F ottle , L n.ilteredj Taf ,acidi.ied)E2ND4 UGK &K - sQ UGK &K 3sQ	2N, Apr, 2020	''''	''''''	''''''	09, S ay, 2020	- - 6Oct6- 2- 2	✓
Clear Ylastic F ottle , L n.ilteredj Taf ,acidi.ied)E2ND4 UGK &K +mQ UGK &K 5m	28, Apr, 2020	''''	''''''	''''''	09, S ay, 2020	- d6Oct6- 2- 2	✓
Clear Ylastic F ottle , L n.ilteredj Taf ,acidi.ied)E2ND4 UGK &K - 1sQ B/ &K - 1mQ UGK &K 13sQ	25, Apr, 2020	''''	''''''	''''''	09, S ay, 2020	- 56Oct6- 2- 2	✓
Clear Ylastic F ottle , L n.ilteredj Taf ,acidi.ied)E2ND4 UGK &K 1- sQ	2, , Apr, 2020	''''	''''''	''''''	09, S ay, 2020	- 46Oct6- 2- 2	✓
E2N6CA: Radium 228 and Radium 22: Activity							
Clear Ylastic F ottle , L n.ilteredj Taf ,acidi.ied)E2N64 B/ &K 18mQ 9Ps PB25Q UGK &K 14sQ	29, Apr, 2020	''''	''''''	''''''	0; , S ay, 2020	- 16Oct6- 2- 2	✓
Clear Ylastic F ottle , L n.ilteredj Taf ,acidi.ied)E2N64 UGK &K - sQ UGK &K 3sQ	2N, Apr, 2020	''''	''''''	''''''	0; , S ay, 2020	- - 6Oct6- 2- 2	✓
Clear Ylastic F ottle , L n.ilteredj Taf ,acidi.ied)E2N64 UGK &K +mQ UGK &K 5m	28, Apr, 2020	''''	''''''	''''''	0; , S ay, 2020	- d6Oct6- 2- 2	✓
Clear Ylastic F ottle , L n.ilteredj Taf ,acidi.ied)E2N64 UGK &K - 1sQ B/ &K - 1mQ UGK &K 13sQ	25, Apr, 2020	''''	''''''	''''''	0; , S ay, 2020	- 56Oct6- 2- 2	✓
Clear Ylastic F ottle , L n.ilteredj Taf ,acidi.ied)E2N64 UGK &K 1- sQ	2, , Apr, 2020	''''	''''''	''''''	0; , S ay, 2020	- 46Oct6- 2- 2	✓



K abt7: WAI ER n EaQaboi : * / oMj g tV e Lreacp ; ✓ = Y ltpil poQfli g tV e

Method	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Eg015Y : Alkalinity f y YC I ltrator							
Clear Ylastic F ottle , Uatural)Eg015,Y4	29, Apr,2020	''''	''''	''''	10, Apr, 2020	23K at 6 2-2	✓
B/ &K 18sQ							
) y 122Q							
UGK &K 14m							
Clear Ylastic F ottle , Uatural)Eg015,Y4	2N, Apr,2020	''''	''''	''''	10, Apr, 2020	2j &K at 6 2-2	✓
UGK &K - mQ							
UGK &K 3m							
Clear Ylastic F ottle , Uatural)Eg015,Y4	28, Apr,2020	''''	''''	''''	10, Apr, 2020	12&K at 6 2-2	✓
UGK &K +sQ							
UGK &K 5m							
Clear Ylastic F ottle , Uatural)Eg015,Y4	25, Apr,2020	''''	''''	''''	10, Apr, 2020	11&K at 6 2-2	✓
UGK &K - 1sQ							
B/ &K - 1mQ							
UGK &K 13sQ							
Clear Ylastic F ottle , Uatural)Eg015,Y4	2, , Apr,2020	''''	''''	''''	10, Apr, 2020	1- &K at 6 2-2	✓
UGK &K 1- sQ							
UGK &K 1- sQ							
Eg096P : Mu.ate)J urf idimetric-4as MO9 2, f y gA							
Clear Ylastic F ottle , Uatural)Eg096P 4	29, Apr,2020	''''	''''	''''	10, Apr, 2020	-- &K at 6 2-2	✓
B/ &K 18mQ							
9Ps PB25Q							
UGK &K 14sQ							
Clear Ylastic F ottle , Uatural)Eg096P 4	2N, Apr,2020	''''	''''	''''	10, Apr, 2020	- d&K at 6 2-2	✓
UGK &K - sQ							
UGK &K 3sQ							
Clear Ylastic F ottle , Uatural)Eg096P 4	28, Apr,2020	''''	''''	''''	10, Apr, 2020	- 5&K at 6 2-2	✓
UGK &K +mQ							
UGK &K 5m							
Clear Ylastic F ottle , Uatural)Eg096P 4	25, Apr,2020	''''	''''	''''	10, Apr, 2020	- 4&K at 6 2-2	✓
UGK &K - 1sQ							
B/ &K - 1mQ							
UGK &K 13sQ							
Clear Ylastic F ottle , Uatural)Eg096P 4	2, , Apr,2020	''''	''''	''''	10, Apr, 2020	- +&K at 6 2-2	✓
UGK &K 1- sQ							
UGK &K 1- sQ							



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 Y orx OnMer : ns-215+45
 y QeI b : nKK y ONs U9TING PTH 9Tm
 ProQebc : s1j 241-

K abri7: WAI ER n EaQ aboi : * / oMj g tV e Lreacp ; ✓ = Y lpli poQfli g tV e

Method	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Eg09NP : Chloride f y g iscrete Analyser							
Clear Yeastic F ottle , Uatural)Eg09NP 4							
B/ 6K 18sQ y 122Q UGK 6K 14m	29, Apr, 2020	''''	6666	6666	10, Apr, 2020	-- 6Kat 6 2- 2	✓
9Ps PB25Q UGK 6K 14sQ							
Clear Yeastic F ottle , Uatural)Eg09NP 4							
UGK 6K - sQ UGK 6K 3sQ	2N, Apr, 2020	''''	6666	6666	10, Apr, 2020	- d6Kat 6 2- 2	✓
Clear Yeastic F ottle , Uatural)Eg09NP 4							
UGK 6K +mQ UGK 6K 5m	28, Apr, 2020	''''	6666	6666	10, Apr, 2020	- 56Kat 6 2- 2	✓
Clear Yeastic F ottle , Uatural)Eg09NP 4							
UGK 6K - 1sQ B/ 6K - 1mQ UGK 6K 13sQ	25, Apr, 2020	''''	6666	6666	10, Apr, 2020	- 46Kat 6 2- 2	✓
Clear Yeastic F ottle , Uatural)Eg09NP 4							
UGK 6K 1- sQ RB122	2, , Apr, 2020	''''	6666	6666	10, Apr, 2020	- +6Kat 6 2- 2	✓
Eg031H: gissolved Sa 7or Cations							
Clear Yeastic F ottle , Uitric Acidj Hiltered)Eg031H4							
B/ 6K 18mQ 9Ps PB25Q UGK 6K 14sQ	29, Apr, 2020	''''	6666	6666	10, Apr, 2020	-- 6Kat 6 2- 2	✓
Clear Yeastic F ottle , Uitric Acidj Hiltered)Eg031H4							
UGK 6K - sQ UGK 6K 3sQ	2N, Apr, 2020	''''	6666	6666	10, Apr, 2020	- d6Kat 6 2- 2	✓
Clear Yeastic F ottle , Uitric Acidj Hiltered)Eg031H4							
UGK 6K +mQ UGK 6K 5m	28, Apr, 2020	''''	6666	6666	10, Apr, 2020	- 56Kat 6 2- 2	✓
Clear Yeastic F ottle , Uitric Acidj Hiltered)Eg031H4							
UGK 6K - 1sQ B/ 6K - 1mQ UGK 6K 13sQ	25, Apr, 2020	''''	6666	6666	10, Apr, 2020	- 46Kat 6 2- 2	✓
Clear Yeastic F ottle , Uitric Acidj Hiltered)Eg031H4							
UGK 6K 1- sQ RB122	2, , Apr, 2020	''''	6666	6666	10, Apr, 2020	- +6Kat 6 2- 2	✓



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 Y orx OnMer : ns-215+45
 y QeI b : nKK y ONs U9TING PTH9Tm
 ProQebc : s1j 241-

K abt7: WAI ER n EaQaboi : * / oMj g tV e Lreacp ; ✓ = Y ltpil poQfli g tV e

Method	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP 020H: gissolved Setals f y QY, SM							
Clear Ylastic F ottle , Ultric Acidj Hiltered JEP020F ,H4							
B/ ØK 18sQ) y 122Q UGK ØK 14sQ	29, Apr, 2020	''''	ØØØØ	ØØØØ	10, Apr, 2020	- 16ØctØ- 2- 2	✓
9Ps PB25Q UGK ØK 14sQ							
Clear Ylastic F ottle , Ultric Acidj Hiltered JEP020F ,H4							
UGK ØK - sQ UGK ØK 3sQ	2N, Apr, 2020	''''	ØØØØ	ØØØØ	10, Apr, 2020	- - 6ØctØ- 2- 2	✓
UGK ØK - mQ UGK ØK 3m							
Clear Ylastic F ottle , Ultric Acidj Hiltered JEP020F ,H4							
UGK ØK +mQ UGK ØK 5m	28, Apr, 2020	''''	ØØØØ	ØØØØ	10, Apr, 2020	- dØctØ- 2- 2	✓
UGK ØK - 1sQ B/ ØK - 1mQ UGK ØK 13sQ	25, Apr, 2020	''''	ØØØØ	ØØØØ	10, Apr, 2020	- 56ØctØ- 2- 2	✓
UGK ØK 1- sQ	2, , Apr, 2020	''''	ØØØØ	ØØØØ	10, Apr, 2020	- 46ØctØ- 2- 2	✓
EP 0N6P : Harrous Qon f y giscrete Analyser							
Clear Ylastic F ottle , q Cl , Hiltered JEP 0N6P 4							
B/ ØK 18mQ 9Ps PB25Q UGK ØK 14sQ	29, Apr, 2020	''''	ØØØØ	ØØØØ	06, S ay, 2020	21ØK at 6 2- 2	✓
UGK ØK - sQ UGK ØK 3sQ							
Clear Ylastic F ottle , q Cl , Hiltered JEP 0N6P 4							
UGK ØK - mQ UGK ØK 3m	2N, Apr, 2020	''''	ØØØØ	ØØØØ	06, S ay, 2020	2- ØK at 6 2- 2	✓
UGK ØK +sQ UGK ØK 5m	28, Apr, 2020	''''	ØØØØ	ØØØØ	06, S ay, 2020	2dØK at 6 2- 2	✓
Clear Ylastic F ottle , q Cl , Hiltered JEP 0N6P 4							
UGK ØK - 1sQ B/ ØK - 1mQ UGK ØK 13sQ	25, Apr, 2020	''''	ØØØØ	ØØØØ	06, S ay, 2020	25ØK at 6 2- 2	✓
UGK ØK 1- sQ	2, , Apr, 2020	''''	ØØØØ	ØØØØ	06, S ay, 2020	24ØK at 6 2- 2	✓



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 Y orx OnMer : ns-215+45
 y Qet b : nKK y ONs U9TING PTH9Tm
 ProQecb : s1j 241-

K abri7: WAI ER n EaQ aboi : * / oMj g tlv e Lreacp ; ✓ = Y ltpili poQfi g tlv e

Method	Sample Date	Extraction / Preparation		Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EK0; NS : MuLi ide as M2, Clear Ylastic F ottle , Zinc Acetate/UaOq JEK0; N4 B/ ØK 18mQ 9Ps PB25Q UGK ØK 14sQ	29, Apr, 2020	''''	ØØØØ	ØØØØ	06, S ay, 2020	21ØK at 6 2- 2	✓
Clear Ylastic F ottle , Zinc Acetate/UaOq JEK0; N4 UGK ØK - sQ UGK ØK 3sQ	2N, Apr, 2020	''''	ØØØØ	ØØØØ	06, S ay, 2020	2- ØK at 6 2- 2	✓
Clear Ylastic F ottle , Zinc Acetate/UaOq JEK0; N4 UGK ØK +mQ UGK ØK 5m	28, Apr, 2020	''''	ØØØØ	ØØØØ	06, S ay, 2020	2dØK at 6 2- 2	✓
Clear Ylastic F ottle , Zinc Acetate/UaOq JEK0; N4 UGK ØK - 1sQ B/ ØK - 1mQ UGK ØK 13sQ	25, Apr, 2020	''''	ØØØØ	ØØØØ	09, S ay, 2020	25ØK at 6 2- 2	✓
Clear Ylastic F ottle , Zinc Acetate/UaOq JEK0; N4 UGK ØK 1- sQ	2, , Apr, 2020	''''	ØØØØ	ØØØØ	09, S ay, 2020	24ØK at 6 2- 2	✓



Quality Control Parameter Frequency Compliance

The fo0q li g reSorbuDuv v anDeDpe fre, uei ct of @Lorabrt) y Dav S@Dai a@DeMq lpli ipe ai a@tbaC@bMk ii q plop ipe DiL v lteM Dav S@Mk q abM erekSroceIDeM ActuaGat@ Dpou@Le greater lpa i or e, ua00 ipe e7'Sect@Mrat@ (A 00ti g of LreacpeDIDroEIMeM lli ipe suv v art of Out@erD

K abrt7: **WAI ER**
) ua00 yoi bo0sav S@ Tt Se
 n Ea00ai0oi : * =) ua00 yoi bro0fre, uei ct i obq lpli DSefficaboi ; ✓ =) ua00 yoi bro0fre, uei ct q lpli DSefficaboi (

Analytical Methods	Method	Count			Rate (%)		Evaluation
		QC	Regular	Actual	Expected		
9aLorabrt muS@at@DmWPK							
A0a0 lti Lt Py Tlrat@r	nm2d8P	5	52	60-00	60-00	✓	NnPK -21d Bd & A9s) y s'bai MarM
y p@rniM@ Lt mDre@t@ Ai a@Der	nm254G	d	- j	60-19	60-00	✓	NnPK -21d Bd & A9s) y s'bai MarM
mDro@eMK eia0Ll ty P@k s 6s ult@ A	nG2-2A@F	5	52	60-00	60-00	✓	NnPK -21d Bd & A9s) y s'bai MarM
mDro@eMK eia0Ll ty P@k s 6s ult@ B	nG2-2B@F	5	- 1	63-0N	60-00	✓	NnPK -21d Bd & A9s) y s'bai MarM
FerrouDlroi Lt mDre@t@ Ai a@Der	nG241G	5	dj	60-28	60-00	✓	NnPK -21d Bd & A9s) y s'bai MarM
GroDA@pa ai MBet@ Act@Eit	nA- 42	5	dd	62-62	60-00	✓	NnPK -21d Bd & A9s) y s'bai MarM
K a0r y aboi D6mDro@eM	nm2j dF	5	52	60-00	60-00	✓	NnPK -21d Bd & A9s) y s'bai MarM
RaMuv -- + ai MIRAuvuv -- 3 Act@Eit	nA- 41	2	- d	0-00	60-00	✗	NnPK -21d Bd & A9s) y s'bai MarM
sufat@ WurlIMv etrickaDs O5 - 6Lt mDre@t@ Ai a@Der	nm251G	5	d3	60-M	60-00	✓	NnPK -21d Bd & A9s) y s'bai MarM
sufiM@ aDs- 6	n. 234	d	--	61-89	60-00	✓	NnPK -21d Bd & A9s) y s'bai MarM
9aLorabrt yoi bro0sav S@DmY sk							
A0a0 lti Lt Py Tlrat@r	nm2d8P	5	52	60-00	60-00	✓	NnPK -21d Bd & A9s) y s'bai MarM
y p@rniM@ Lt mDre@t@ Ai a@Der	nm254G	5	- j	61-53	60-00	✓	NnPK -21d Bd & A9s) y s'bai MarM
mDro@eMK eia0Ll ty P@k s 6s ult@ A	nG2-2A@F	-	52	N00	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
mDro@eMK eia0Ll ty P@k s 6s ult@ B	nG2-2B@F	-	- 1	3-N2	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
FerrouDlroi Lt mDre@t@ Ai a@Der	nG241G	-	dj	N61	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
GroDA@pa ai MBet@ Act@Eit	nA- 42	-	dd	8-08	N00	✗	NnPK -21d Bd & A9s) y s'bai MarM
K a0r y aboi D6mDro@eM	nm2j dF	-	52	N00	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
RaMuv -- + ai MIRAuvuv -- 3 Act@Eit	nA- 41	1	- d	9-1N	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
sufat@ WurlIMv etrickaDs O5 - 6Lt mDre@t@ Ai a@Der	nm251G	5	d3	60-M	60-00	✓	NnPK -21d Bd & A9s) y s'bai MarM
sufiM@ aDs- 6	n. 234	-	--	3-03	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
Kepp@MB@i xDmWk							
y p@rniM@ Lt mDre@t@ Ai a@Der	nm254G	-	- j	8-30	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
mDro@eMK eia0Ll ty P@k s 6s ult@ A	nG2-2A@F	-	52	N00	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
mDro@eMK eia0Ll ty P@k s 6s ult@ B	nG2-2B@F	-	- 1	3-N2	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
FerrouDlroi Lt mDre@t@ Ai a@Der	nG241G	-	dj	N61	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
GroDA@pa ai MBet@ Act@Eit	nA- 42	-	dd	8-08	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
K a0r y aboi D6mDro@eM	nm2j dF	-	52	N00	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
RaMuv -- + ai MIRAuvuv -- 3 Act@Eit	nA- 41	1	- d	9-1N	N00	✗	NnPK -21d Bd & A9s) y s'bai MarM
sufat@ WurlIMv etrickaDs O5 - 6Lt mDre@t@ Ai a@Der	nm251G	-	d3	N28	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
sufiM@ aDs- 6	n. 234	-	--	3-03	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
K abrt7 s SxeDmWk sk							
y p@rniM@ Lt mDre@t@ Ai a@Der	nm254G	-	- j	8-30	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
mDro@eMK eia0Ll ty P@k s 6s ult@ A	nG2-2A@F	2	52	0-00	N00	✗	NnPK -21d Bd & A9s) y s'bai MarM
FerrouDlroi Lt mDre@t@ Ai a@Der	nG241G	-	dj	N61	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM
sufat@ WurlIMv etrickaDs O5 - 6Lt mDre@t@ Ai a@Der	nm251G	-	d3	N28	N00	✓	NnPK -21d Bd & A9s) y s'bai MarM



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 Y orx OnMer : ns-215+45
 y QeI b : nKK y ONs U9TING PTH9Tm
 ProQebc : s1j 241-

n EaQaIboI : * =) uaQIt y oi broCRe, uei ct i obq ItpIi DBeCificaboI ; ✓ =) uaQIt y oi broCRe, uei ct q ItpIi DBeCificaboI () uaQIt y oi broCRe av S@ Tt Se

Analytical Methods	Method	Count		Rate (%)		Evaluation
		QC	Regular	Actual	Expected	
K abI7 s SxeDWk sk6y oi Ibi ueM suQIWe aDs- 6	n. 234	-	--	3.03	N00	✓

Quality Control Specification
 NnPK -21d Bd & A9s) y sIbi M@rM



Brief Method Summaries

Tpe ai aCbeaCSroceMureDureMlt tpe ni Eroi v ei tbcrtEidoi paEe Leei MèEeSèMfrov eDèLèDèMèliri aboi aCè recoigi IzeMStroceMureDuroD aDpòDè SuLèDèMèlt tpe Us nPAQAP/ ACAs ai MINnPK (li pouDe MèEeSèMStroceMureDare ey Sòt eMli tpe aLDei ce of Mbou v ei tMèDai MarVdor Lt c0ei bre, ueDQ Tpe foCQgi reSorbSòlMèVèDlref MèDriSboi Dof tpe ai aCbeaCSroceMureDev Sòt eMfor reDèDreSorteMli tpe y vertificatè of Ai aCDDQ s sourceDfrov qplcp A9s v epoMIDpae Leei MèEeSèMare StroEIMèMq lpiii tpe KèpòMmeDriSkoï D

Analytical Methods	Method	Matrix	Method Descriptions
GroDDAçpa ai MBeta AchEit	nA-42	Y ATnR	As TK m8- 3d02+; metèrv li aboi of groDDaçpa ai MgroDDLeta raMoactEit li qater Dav SèDLt 9l, uIM s cli k0aboï y oui bi g M8s y K
RaMuv -- + ai MRaMuv -- 3 AchEit	nA-41	Y ATnR	li pouDe: metèrv li aboi of raMuv -- + ai MRaMuv -- + raMoactEit li qater Dav SèDLt 9l, uIMs cli k0aboï y oui bi g M8s y K
AQa0 It Lt Py Titratèr	nm2d8P	Y ATnR	li pouDe: Refereï ceMèD AP/ A -d-2 B TplDStroceMure MèTèrv li eDaQa0 It Lt autov atèMv eaDurev ei bM(g) Py Titratèk uDi g S/ 5(4 for li Mcati g tpe t0taCaQa0 It ei M6Soli q TplDv epoMIDcov S0ai bq ltp NnPK W21dk s cpeMUG BwK
s u0ate WUrLIMv etrickaDsO5 -6Ll mDreTe Ai aCDer	nm251G	Y ATnR	li pouDe: Refereï ceMèD AP/ A 54226 O5(mDDòEèMDU0ate IDMèTèrv li eMli a 2(54uv fI0èremDav Sè(s u0ate loï Dare col EerfèMèD a Lartuv Di0ate DuDSei Doï li ai acede acIMv eMuv q ltp Lartuv cp0rIMè(9lgbp aLDorLai ce of tpe BasO5 DuDSei Doï IDv eaDureMLt a Spotov etèr ai Mipe sO56 coi cet traboï IDMèTèrv li eM Lt cov SarLDoi of tpe reaMi g q ltp a Dài MarMcurEe(TplDv epoMIDcov S0ai bq ltp NnPK W21dks cpeMUG BwK
y p0rIMè Lt mDreTe Ai aCDer	nm254G	Y ATnR	li pouDe: Refereï ceMèD AP/ A 5422 y C6G(Tpe t0tact ai atè loï ID0èraTeMfrov v ercuric t0tact ai atè t0rougp De; ueDtraboï of v ercurt Lt tpe cp0rIMè loï t0 forv i oi 6oi IDèMv ercuric cp0rIMè(li tpe StreDei ce of ferric loï D tpe 0èraTeMtplocti a t0e forv Dplgp0è00ureMferitic t0tacti atè qplcp IDv eaDureMab532 i v AP/ A - 1DòeMboï DeaOv epoM- 2188(8 aSIC-22d
Ka0è y aboi D6mDDòEèM	nm2j dF	Y ATnR	li pouDe: Refereï ceMèD AP/ A d1-2 ai Md1-4; Us nPA s Y 35+ 6+212 ai M+2-2; y aboi Dare MèTèrv li eMLt eltper ly P6Ans or ly P6Ks t0cpi i, ueDQ TplDv epoMIDcov S0ai bq ltp NnPK W21dks cpeMUG BwK
mDDòEèMK et0è Lt ly P6K s 6s ultè A	nG2-2A6F	Y ATnR	s oMuv AMDrSboï Rabo IDcaG0èMfrov y aQK g ai MNa qplcp MèTèrv li eMLt A9s li pouDe v etpoM) Y l0nNm2j dF(TplDv epoMIDcov S0ai bq ltp NnPK W21dks cpeMUG BwK
mDDòEèMK et0è Lt ly P6K s 6s ultè B	nG2-2B6F	Y ATnR	/ arM eDD Sarav etèrDare caCu0èMèLaDeMoi AP/ A - d52 B(TplDv epoMIDcov S0ai bq ltp NnPK W21dk s cpeMUG BwK
FerrouDlroi Lt mDreTe Ai aCDer	nG241G	Y ATnR	li pouDe: Refereï ceMèD AP/ A d1-4; Us nPA s Y 35+ 6+2- 2QA9s) Y l0nNm G2-2(sav SèD are 2(54uv fI0èrem SrIor t0 ai aCDDQ Tpe ly PK s t0cpi i, ue u00zeDa plgp0 efficeï bargoï S0aDv a t0 loï ze De0ècteMè0v ei 0X loï D are tpeï SaDDeMli t0 a plgp Eacuuv v aDDDSectrov etèrQq plcp DesaratèD tpe ai aCèDLaDeMoi tpeir MDji cb v aDD t0 cparge raI0D SrIor t0 tpeir v eaDurev ei blt a MDreTe M i olvè loï Mèt0ctor(li pouDe: Refereï ceMèD AP/ A d1-4; Us nPA s Y 35+ 6+2- 2QA9s) Y l0nNm G2-2(sav SèD are 2(54uv fI0èrem SrIor t0 ai aCDDQ Tpe ly PK s t0cpi i, ue u00zeDa plgp0 efficeï bargoï S0aDv a t0 loï ze De0ècteMè0v ei 0X loï D are tpeï SaDDeMli t0 a plgp Eacuuv v aDDDSectrov etèrQq plcp DesaratèD tpe ai aCèDLaDeMoi tpeir MDji cb v aDD t0 cparge raI0D SrIor t0 tpeir v eaDurev ei blt a MDreTe M i olvè loï Mèt0ctor(li pouDe: Refereï ceMèD AP/ A d422 Fe0(A co0rIv etric MèTèrv li aboi LaDeMoi tpe reactfoï Letq eei Spèi ai t0rou0 e ai MferrouDlroi abS/ d(- 6t) d t0 forv ai orai ge0eMcov S07 t0pabIDv eaDureMagali Dba fI0è0Soli bca0èraDboï curEe(TplDv epoMIDcov S0ai bq ltp NnPK W21dks cpeMUG BwK



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 Y orx OriMer : ns-215+45
 y Qei b : nKK y ONs U9TING PTH 9Tm
 ProQebc : s1j 241-

Analytical Methods	Method	Matrix	Method Descriptions
s uMMe aDs - 6	n. 234	Y ATnR	<p>ii pouDe: Refereji celMto AP/ A 54226- 6m(s uMMe DSecleDSreDai bli q ater Dav S@Dare lv v eMate@ SreclSitateMqpei co@e@eMlii Sre@re@Mcau@D@vili c acetate SreDerEeMDav S@ coi @ili erD Tpe DU@p@l@eDare co@ureMuDi g v e@pt @i e L@e li Mca@or(Noi @V@e@e@Dv at Le D@reei eMLt cov SarlDai agali Dba D@ai MarMab pa@@ORQ@p@erq lD@ Dav S@Dare v eaDureMuDi g UV6Vls Me@e@choi ab++5i v (TpiDv e@p@MIDcov S@ai bq l@p NnPK W21dks cpeM@ @ B@k</p>
loi Ic Ba@i ce Lt Py T mA ai MTurLIs O5 mA	* nN244 6PG	Y ATnR	<p>ii pouDe: Refereji celMto AP/ A 12@2F(TpiDv e@p@MIDcov S@ai bq l@p NnPK W21dks cpeM@ @ B@k</p>

ELS

CHAIN OF CUSTODY

ALS Laboratory: please tick →

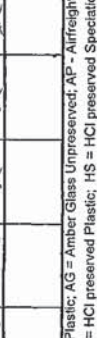
CLIENT: EM&M Consulting
OFFICE: Ground floor, 20 Chandos Street, St Leonards, NSW 2065
PROJECT: S190512
ORDER NUMBER:
PURCHASE ORDER NO.:
PROJECT NO.: S190512
ALS QUOTE NO.:
COUNTRY OF ORIGIN:
CONTACT PH: 02 9493 9500
SAMPLER: Kaitlyn Brodie / Henry Noakes
SAMPLER MOBILE: 0401 881 447
COE Emailed to ALS? (YES / NO)
EDD FORMAT (or default):
Email Reports to: pgibbons@emmcconsulting.com.au ; hnoakes@emmcconsulting.com.au
Email Invoice to: pgibbons@emmcconsulting.com.au

TURNAROUND REQUIREMENTS:
 Standard TAT (List due date):
 Non Standard or urgent TAT (List due date):
 (Standard TAT may be longer for some tests e.g., Ultra Trace Organics)
RELINQUISHED BY: H. NOAKES
DATE/TIME: 30/4/20 10:14
RECEIVED BY: [Signature]
DATE/TIME: 30/4/20 10:14

FOR LABORATORY USE ONLY (Circle)
 Custody Seal intact? Yes No N/A
 Free ice / frozen ice bricks present upon receipt? Yes No N/A
 Random Sample Temperature on Receipt: °C
 Other comment:

LAB ID	SAMPLE ID	SAMPLE DETAILS MATRIX: Solid(S) Water(W)	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	CONTAINER INFORMATION	ANALYSIS REQUIRED INCLUDING SUITES (NB. Suite Codes must be listed to attract suite price) Where Metals are required, specify Total (unfiltered bottles required) or Dissolved (field filtered bottles required).	ADDITIONAL INFORMATION
1	UGM-m6D		26/4 11:10	W	Attached By PO / Internal Sheet		Suphride (Yellow) X Major ions + Ionic balance X NT-1 & NT-2 (Green) X Dissolved metals (Field filtered) (Red) X EG020F (Red) X Ferrous Iron (Field filtered) X EG051 (Maroon) X Radium 226/228, Gross abb X EA251 (Red & Green) X Please forward to ELS	EnviroLab Services 12 Ashley St Chatswood NSW 2067 Ph: (02) 9910 6200 Job No: 281966 Date Received: 30/4/20 Time Received: 15:30 Received by: [Signature] Temp: Room/Ambient Cooling: Ice/Freepack Security: Contact/Broken/None To be submitted for similar analysis
2	UGM-m6S		26/4 11:30	W				
3	BH-m21S		27/4 17:45	W				
4	QC101		27/4	W				
5	QC201		27/4	W				
6	BH-m21D		27/4 11:40	W				
7	UGM-m12D		27/4 15:30	W				
8	UGM-m12S		28/4 9:00	W				
9	UGM-m4D		26/4 9:00	W				
10	UGM-m2S		25/4 15:40	W				
11	UGM-m2D		25/4 15:20	W				
	UGM-m8S		25/4 17:00	W				

Environmental Division
 Sydney
 Work Order Reference
ES2014654



Telephone : + 61-2-8784 6666

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide/Cd Preserved; AP = Airfreight Unpreserved Plastic
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = Sulfuric Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formic Preserved Plastic
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; U = Luggs Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

241966

CHAIN OF CUSTODY

ALS Laboratory please tick →

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CLIENT: EMM Consulting

OFFICE: Ground floor, 20 Chandos Street, St Leonards, NSW 2065

PROJECT: S190512

ORDER NUMBER: PURCHASE ORDER NO.:

PROJECT MANAGER: Paul Gibbons

SAMPLER: Kaitlyn Brodie / Henry Noakes

COC Emailed to ALS? (YES / NO)

Email Reports to: pgibbons@emmcconsulting.com.au

Email Invoice to: pgibbons@emmcconsulting.com.au

TURNAROUND REQUIREMENTS:

Standard TAT (List due date)

Non Standard or urgent TAT (List due date)

ALS QUOTE NO.:

COUNTRY OF ORIGIN:

CONTACT PH: 02 9493 9500

SAMPLER MOBILE: 0401 881 447

EDD FORMAT (or default):

FOR LABORATORY USE ONLY (Circle)

Custody Seal Intact? Yes No

Free ice / frozen ice bricks present upon receipt? Yes No

Random Sample Temperature on Receipt: °C

Other comment:

RECEIVED BY:

DATE/TIME:

RELINQUISHED BY:

DATE/TIME:

FOR LABORATORY USE ONLY (Circle)

COC SEQUENCE NUMBER (Circle)

COC: 1 2 3 4 5 6 7

OF: 1 2 3 4 5 6 7

RECEIVED BY:

DATE/TIME:

RELINQUISHED BY:

DATE/TIME:

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

LAB ID	SAMPLE ID	SAMPLE DETAILS MATRIX: Solid(S) Water(W)	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to attract suite price)							Additional Information	
							Major ions + ionic balance NT-1 & NT-2 (Green)	Sulphide ED040F (Yellow)	Dissolved metals (Field filtered) EG020F (Red)	Ferrous Iron (Field filtered) EG051 (Maroon)	Radium 226/228, Gross alpha EA251 (Red & Green)	Where Metals are required, specify Total (unfiltered bottles required) or Dissolved (field filtered bottles required).	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.		
12	UGM-m8D		25/4 10:15	W		7	X	X	X	X	X				
13	BH-M17D		24/4 15:50	W		7	X	X	X	X		PLEASE forward to ELS			
14	BH-M17S		24/4 16:00	W		7	X	X	X	X					
15	LPS PB04		24/4 8:00	W		7	X	X	X	X					
16	QC100		24/4	W		7	X	X	X	X					
17	QC200		24/4	W		7	X	X	X	X					
17	UGM-m15S		24/4 11:00	W		7	X	X	X	X					
18	UGM-m15D		24/4 10:45	W		7	X	X	X	X					
19	UGM-m18S		27/4 9:10	W		7	X	X	X	X					
20	UGM-m18D		27/4 8:00	W		7	X	X	X	X					
21	RB100		28/4	W		7	X	X	X	X					
						TOTAL	0								

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

CERTIFICATE OF ANALYSIS 241966

Client Details

Client	EMM Consulting Pty Ltd
Attention	Paul Gibbons
Address	188 Normanby Rd, SOUTHBANK, VIC, 3006

Sample Details

Your Reference	S190512
Number of Samples	2 Water
Date samples received	30/04/2020
Date completed instructions received	01/05/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

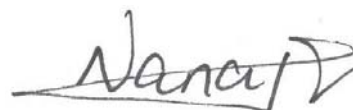
Report Details

Date results requested by	08/05/2020
Date of Issue	18/06/2020
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Hannah Nguyen, Senior Chemist
 Ken Nguyen, Reporting Supervisor
 Priya Samarawickrama, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

Ion Balance			
Our Reference		241966-1	241966-2
Your Reference	UNITS	QC201	QC200
Date Sampled		27/04/2020	24/04/2020
Type of sample		Water	Water
Date prepared	-	07/05/2020	07/05/2020
Date analysed	-	07/05/2020	07/05/2020
Calcium - Dissolved	mg/L	560	550
Potassium - Dissolved	mg/L	27	45
Sodium - Dissolved	mg/L	14,000	12,000
Magnesium - Dissolved	mg/L	1,500	1,500
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	330	420
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5
Total Alkalinity as CaCO ₃	mg/L	330	420
Sulphate, SO ₄	mg/L	4,200	4,000
Chloride, Cl	mg/L	22,000	20,000
Ionic Balance	%	3.0	2.0

HM in water - dissolved			
Our Reference		241966-1	241966-2
Your Reference	UNITS	QC201	QC200
Date Sampled		27/04/2020	24/04/2020
Type of sample		Water	Water
Date prepared	-	04/05/2020	04/05/2020
Date analysed	-	04/05/2020	04/05/2020
Arsenic-Dissolved	µg/L	1	1
Cadmium-Dissolved	µg/L	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	<1
Copper-Dissolved	µg/L	14	20
Lead-Dissolved	µg/L	<1	1
Mercury-Dissolved	µg/L	<0.05	<0.05
Nickel-Dissolved	µg/L	21	20
Zinc-Dissolved	µg/L	35	77

Miscellaneous Inorganics			
Our Reference		241966-1	241966-2
Your Reference	UNITS	QC201	QC200
Date Sampled		27/04/2020	24/04/2020
Type of sample		Water	Water
Date prepared	-	01/05/2020	01/05/2020
Date analysed	-	01/05/2020	01/05/2020
Ferrous Iron	mg/L	<0.05	<0.05
Sulphide	mg/L	<0.5	<0.5

Radioactivity Analysis report			
Our Reference		241966-1	241966-2
Your Reference	UNITS	QC201	QC200
Date Sampled		27/04/2020	24/04/2020
Type of sample		Water	Water
Date prepared	-	05/05/2020	05/05/2020
Date analysed	-	17/06/2020	17/06/2020
Radium-226	Bq/L	#	#
Radium-228	Bq/L	#	#

Method ID	Methodology Summary
Ext-041	Analysed by Australian Government - Australian Radiation Protection and Nuclear Safety Agency. VIC. Radium 226 is determined by liquid scintillation counting. Radium 228 is measured by high resolution gamma-ray spectrometry.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.
Inorg-051	Sulphide determined titrimetrically based on APHA latest edition 4500 S2- F. Note, the Sulphide is termed as Total Sulphide given any Sulphide contained in any sediment present is also included in the determination.
Inorg-076	Ferrous Iron is determined colourimetrically by discrete analyser. Waters samples are filtered on receipt prior to analysis.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.

Client Reference: S190512

QUALITY CONTROL: Ion Balance					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			07/05/2020	[NT]	[NT]	[NT]	[NT]	07/05/2020	[NT]
Date analysed	-			07/05/2020	[NT]	[NT]	[NT]	[NT]	07/05/2020	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	102	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	89	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	107	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	104	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	102	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]

Client Reference: S190512

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			04/05/2020	[NT]	[NT]	[NT]	[NT]	04/05/2020	[NT]
Date analysed	-			04/05/2020	[NT]	[NT]	[NT]	[NT]	04/05/2020	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	105	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	89	[NT]

Client Reference: S190512

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	[NT]
Date prepared	-			01/05/2020	[NT]	[NT]	[NT]	[NT]	01/05/2020	[NT]
Date analysed	-			01/05/2020	[NT]	[NT]	[NT]	[NT]	01/05/2020	[NT]
Ferrous Iron	mg/L	0.05	Inorg-076	<0.05	[NT]	[NT]	[NT]	[NT]	99	[NT]
Sulphide	mg/L	0.5	Inorg-051	<0.5	[NT]	[NT]	[NT]	[NT]	101	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Radioactivity analysed by SGS. Report no. ME314791
#View attached external report

CLIENT DETAILS

LABORATORY DETAILS

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 Client Envirolab Services
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Project **241966**
 Order Number **241966**
 Samples 2

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Telephone +61395743200
 Facsimile +61395743399
 Email Au.SampleReceipt.Melbourne@sgs.com

SGS Reference **ME314791 R0**
 Date Received 5/5/2020
 Date Reported 17/6/2020

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(22793).

SIGNATORIES



Stephen RUTKOWSKI
 Senior Health Physicist

Gross alpha and beta in liquids [ARS-SOP-AS302/AS504] Tested: 7/5/2020

PARAMETER	UOM	LOR	241966-1	241966-2
			WATER - 27/4/2020 ME314791.001	WATER - 24/4/2020 ME314791.002
Gross alpha	Bq/L	-	2.01 ±0.37	0.86 ±0.17
Gross beta (excluding K-40)	Bq/L	-	1.53 ±0.22	0.569 ±0.090

Radionuclides by Gamma Ray Spectrometry in liquids [ARS-SOP-AS301/AS406] Tested: 17/6/2020

PARAMETER	UOM	LOR	241966-1	241966-2
			WATER - 27/4/2020 ME314791.001	WATER - 24/4/2020 ME314791.002
Radium-226	Bq/L	-	0.207 ±0.026	0.188 ±0.031
Radium-228	Bq/L	-	1.14 ±0.11	0.386 ±0.063

METHOD

METHODOLOGY SUMMARY

ARS-SOP-AS301/AS406

Analysis of radionuclides in liquids by high resolution gamma ray spectrometry after radiochemical preparation . Radiochemical preparation involves total sample evaporation, sample co-precipitation using stable elemental carriers, or a combination thereof. In some cases, preparation may involve merely transferring liquid to a standard geometry container such as a Marinelli beaker.

ARS-SOP-AS302/AS504

Gross alpha and beta in liquids after radiochemical preparation. Radiochemical preparation involves total sample evaporation, sample co-precipitation using stable elemental carriers, or a combination thereof.

FOOTNOTES

*	NATA accreditation does not cover the performance of this service.	-	Not analysed.	UOM	Unit of Measure.
**	Indicative data, theoretical holding time exceeded.	NVL	Not validated.	LOR	Limit of Reporting.
		IS	Insufficient sample for analysis.	↑↓	Raised/lowered Limit of Reporting.
		LNR	Sample listed, but not received.		

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received. Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calculated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.

Note that in terms of units of radioactivity:

- a. 1 Bq is equivalent to 27 pCi
- b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au/en-gb/environment-health-and-safety.

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please tick ->

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CLIENT: EMM Consulting Pty Ltd

TURNAROUND REQUIREMENTS:

Standard TAT (last due date):

Non Standard or urgent TAT (last due date):

FOR LABORATORY USE ONLY (circle)

OFFICE: Melbourne

ALTS QUOTE NO.:

COC SEQUENCE NUMBER (circle)

Free ice / frozen ice bricks present upon receipt?

Yes

No

N/A

PROJECT: S190512

ALTS QUOTE NO.:

COC SEQUENCE NUMBER (circle)

COC: 1 2 3 4 5 6 7

Random Sample Temperature on Receipt:

Yes

No

N/A

ORDER NUMBER: S190512

ALTS QUOTE NO.:

COC SEQUENCE NUMBER (circle)

COC: 1 2 3 4 5 6 7

Random Sample Temperature on Receipt:

Yes

No

N/A

PROJECT MANAGER: Paul Gibbons

ALTS QUOTE NO.:

COC SEQUENCE NUMBER (circle)

COC: 1 2 3 4 5 6 7

Random Sample Temperature on Receipt:

Yes

No

N/A

SAMPLER: Dan Condon

ALTS QUOTE NO.:

COC SEQUENCE NUMBER (circle)

COC: 1 2 3 4 5 6 7

Random Sample Temperature on Receipt:

Yes

No

N/A

COC emailed to ALS? (YES / NO) YES

ALTS QUOTE NO.:

COC SEQUENCE NUMBER (circle)

COC: 1 2 3 4 5 6 7

Random Sample Temperature on Receipt:

Yes

No

N/A

Email Reports to dcondon@emmconsulting.com.au

ALTS QUOTE NO.:

COC SEQUENCE NUMBER (circle)

COC: 1 2 3 4 5 6 7

Random Sample Temperature on Receipt:

Yes

No

N/A

Email Invoice to dcondon@emmconsulting.com.au

ALTS QUOTE NO.:

COC SEQUENCE NUMBER (circle)

COC: 1 2 3 4 5 6 7

Random Sample Temperature on Receipt:

Yes

No

N/A

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALTS QUOTE NO.:

COC SEQUENCE NUMBER (circle)

COC: 1 2 3 4 5 6 7

Random Sample Temperature on Receipt:

Yes

No

N/A

ALS USE	SAMPLE DETAILS MATRIX: SOLID (S) WATER (W)	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (codes below)	TOTAL CONTAINERS	ANALYSIS REQUIRED including SUITES (NB: Suite Codes must be listed to attract suite price) where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).							Additional Information
						Sulphate Reducing Bacteria (MM669)	Iron Reducing Bacteria (M673)	Slime Producing Bacteria (M683)	Algae - Total Count	Total Cyanobacteria	Comments on likely contaminant levels, dilutions, or samples requiring specific QC analysis etc.		
	Pu369 GW	27/07/2020		Plastic non ALS bottle - no preservatives	1	1	1	1	1	1	1		
TOTAL						1	1	1	1	1	1		

Environmental Division
Melbourne
Work Order Reference
EM2013003



Telephone: - 61-3-8548 9000

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



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EM2013003	Page	: 1 of 2
Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: PAUL GIBBONS	Contact	: Shane Colley
Address	: 187 Coventry Street Melbourne 3205	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9600
Project	: S190512	Date Samples Received	: 27-Jul-2020 16:15
Order number	: S190512	Date Analysis Commenced	: 28-Jul-2020
C-O-C number	: ----	Issue Date	: 10-Aug-2020 12:53
Sampler	: DC		
Site	: ----		
Quote number	: EN/112/18 - Primary work only		
No. of samples received	: 1		
No. of samples analysed	: 1		



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories

Position

Samantha Smith

Laboratory Coordinator

WRG Subcontracting, Springvale, VIC



General Comments

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

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

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

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

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

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

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

LOR = Limit of reporting

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

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- SRB (MM669) is conducted by ALS Scoresby NATA accreditation no. 992, site no. 989. NATA accreditation does not cover performance of this method.
- Iron Reducing Bacteria (MM673) is conducted by ALS Scoresby NATA accreditation no. 992, site no. 989. NATA accreditation does not cover performance of this method.
- NR - Reported in separate COA
- Algal Count (BM010) has been performed by ALS Water Resources Group, NATA Accreditation no. 992, Site no. 989.
- Blue Green Algae (MB010) has been performed by ALS Water Resources Group, NATA Accreditation no. 992, Site no. 989.

Analytical Results

Compound	CAS Number	LOR	Unit	Client sampling date / time	Client sample ID
Sub-Matrix: WATER (Matrix: WATER)					
BM010: Algal Count		-	-		Pu369 GW
Algal Count				27-Jul-2020 00:00	
BM014: Blue Green Algae Count					EM2013003-001
Blue Green Algae Count					Result
MM669: Sulphate Reducing Bacteria					
Sulphate Reducing Bacteria Population Estimate		1	pac/mL	120000	
Aggressivity		1	-	Aggressive	
MM673: Iron Related Bacteria using Biological Activity Reaction Test (BART)					
ø Aggressivity		-	-	Aggressive	
ø Iron Related Bacteria Population Estimate		25	pac/mL	140000	
MM683: Slime Producing Bacteria (BART)					
Slime Producing Bacteria		1	pac/mL	<20	
Aggressivity		-	-	Not Aggressive	



Environmental

QUALITY CONTROL REPORT

Work Order : EM2013003

Page : 4 1of

Client : EMM CONSULTING PTY LTD

Address : Pdc 7 A UGGI BO

Site : 4hWy 1Esi bt Oreeb

Location : Dell1uri e f 605

Phone : 0430546

Phone : 0430546

Phone : RRR

Phone : my

Phone : RRR

Phone : nB14464h RPr art , 1rQ1i lt

Phone : 4

Phone : 4

Analyst : ni EG i v ei bai mEGGi Dell1uri e

Analyst : ONai e y 1llet

Address : - 8 estall 92 OprCgEale k ly d usbrai@ f 4W

Phone : +j 4R RN5- 3 3j 00

Phone : 6WRU1R0060

Phone : 6hRU1R0060

Phone : 40RU1R0060

Phone : TelepNi e

Phone : mate Oav ples 9 eSeGe2

Phone : mate di alt s y 1v v ei Se2

Phone : Issue mate



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

TNS rep1rbsuperses ai t preEGus rep1rbs(, ONING recerei Se. 9 results applt bi tNe sav ple/s(as suLv Ge2. TNS 21Suv ei bsNall i 1bLe repr12uSe2) ewSspbC aull.

TNS YualGe y 1i b1l 9ep1rbs1i baCs tNe d1l1, Cg Cd1rv atd1 :

- 7aL1rabrt muplGeab /mc P(9 ep1rbs9 elabSe PerSei bage mOerei Se /9Pm ai 2 dSSeptai Se 7Q Ge
- DehN2 Glai Q/DG ai 2 7aL1rabrt y 1i b1l OpGe /7y Q 9 ep1rbs9 eS1Eert ai 2 dSSeptai Se 7Q Ge
- Dabr@OpGe /DQ 9 ep1rbs9 eS1Eert ai 2 dSSeptai Se 7Q Ge

Signatories

TNS 21Suv ei bNas Leei eleStri1 Gallt sGi e2 Lt tNe autN1rCe2 sGi abrdes Lei1, . nleStri1 Ge sgi Cg Ge SarrGe 1ubC S1v plai Se , ONpr1Se2ures speS062 C 64 y F9 Parb44.

Signature Position Accreditation Category

Oav ai tNa Ov ON 7aL1rabrt y 11r2Cabrt 8 9 A OulS1i braS0g) OprCgEale) k ly



Page : 6 1of
 8 1rQl r2er : nD604f 00f
 yIGi b : nDD yI BOC 7TUWA PTz 7Tm
 Pr1Wsb : 0430546

General Comments

TNe ai alt tSai pr1Se2ures use2 Lt d7O NEE Leei 2eEel1pe2 σ1v eshLLIGNe2 Cberi atDj allt reSigi Ge2 pr1Se2ures suSN as INise puLLIGNe2 Lt INe cOnPd) dPJd) dO ai2 BnPD. U MUse 2eEel1pe2 pr1Se2ures are oult EalCate2 ai 2 are 1dei abtNe SGei breVuesb

8 Nere v 1Gure 2eberv Cati i Nas Leei perdriv e2) results are rep1rte2 1i: a 2rt , eGNLaseG.

8 Nere a rep1rte2 less INai /q(resultG NGNer INai INe 71 9) ING v at Le 2ue bl prO art sav ple ewtraSHGe2 estab2 2WitDj ai 2M1r CsuosGei bsav ple dir ai alt sG. 8 Nere INe 71 9 1oa rep1rte2 result2Cters σ1v sbi 2ar2 71 9) ING v at Le 2ue bl NG

#et : di 1i tv 1us < 9eers bl sav ples, NSNare i 1bspeSOSalt parb1otNS , 1rQ1r2er Lubofrv e2 parb1otNe Yy pr1Sess 11b
 ydO Buv Ler < y dO regSrt i uv Ler σ1v 2abaLase v aCDe2 Lt y Nev Sai dLstraSs OerEGas. TNe y Nev Sai dLstraSs OerEGe G a 2EGGi 1otNe dv erSai y Nev Sai O1Sot.

9 Pm < 9 elatSe PerSei tAge mOerei Se
 = < U2Sates Ge2 Yy

Laboratory Duplicate (DUP) Report

TNe VualG Sli b1l terv 7aL1rabrit muplSate reers bl a rai 21v lt seleSt2 CbralaL1rabrit splG 7aL1rabrit 2uplSates pr1EGe Cdrv atDj regar2Cg v edN12 preSOGi ai 2 sav ple Neter1gei eG. TNe perv Ge2 rai ges dr INe 9elatSe PerSei b meEAtDj /9 Pm(1o 7aL1rabrit muplSates are speSOG2 C d7O DetN12 Y8 URBK h ai 2 are 2epe1 2ei b 1i INe v agi Qe2e 1o results C S1v parG1i bl INe leEel 1o rep1rtdG: 9 esulb q 40 W es 71 9: B1 7O Q9 esulbLeq eei 40 ai 2 60 W es 71 9: 0% R50%x9 esulb> 60 W es 71 9: 0% R60%.

- No Laboratory Duplicate (DUP) Results are required to be reported.



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

TNe Vual@ Sii b1i b1rv DeM12 K 7al.1rab1rt Glai Q reers b1 ai ai alt b1 see v abW b1 , NSN all reagei ts are a22e2 C bNe sav e Elluv es 1r pr1p1r1ti s as use2 C sbai 2ar2 sav ple preparab1i . TNe purp1se 1o bNS Yy parav eter G b1 v 1i 01r p1b1 b1 laL.1rab1rt Sii b1v C1at1i . TNe Vual@ Sii b1i b1rv 7al.1rab1rt y 1i b1i OpC@ 7yQ reers b1 a Ser10e2 reere1 Se v abW b1 1r a Q 1, i C1e1ere1 Se see v abW spC@2 , 0N bargeb ai alt b1s. TNe purp1se 1o bNS Yy parav eter G b1 v 1i 01r v eM12 preS@i ai 2 aSSuraS C2epe1 2ei b1osav ple v abW mt i av S9eS1Eert 70 G are Lase2 1i stat1s1eEalua1i 1opr1Sesse2 7yO.

- **No Method Blank (MB) or Laboratory Control Spike (LCS) Results are required to be reported.**

Matrix Spike (MS) Report

TNe Vual@ Sii b1i b1rv DabW OpC@ /DO reers b1 ai Cbalal.1rab1rt spl@ sav ple spC@2 , 0N a represei b1t1e seb 1o bargeb ai alt b1s. TNe purp1se 1o bNS Yy parav eter G b1 v 1i 01r p1b1 b1 v abW eaeSs 1i ai alt b1 reS1EerGs. Oat1S9eS1Eert 70 G as per laL.1rab1rt mata Yual@ l L1NS1Ees /mY1 s(. Qeal reS1Eert rai ges sb1b2 v at Le , aG@2 C bNe eEei b1osav ple v abW C1e1ere1 Se.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**



ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM2013003	Page	: 1 of 4
Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: PAUL GIBBONS	Telephone	: +61-3-8549 9600
Project	: S190512	Date Samples Received	: 27-Jul-2020
Site	: ----	Issue Date	: 10-Aug-2020
Sampler	: DC	No. of samples received	: 1
Order number	: S190512	No. of samples analysed	: 1

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Date analysed	Due for analysis
MM669: Sulphate Reducing Bacteria Miscellaneous Plastic Container (MM669) Pu369 GW	27-Jul-2020	*****	*****	28-Jul-2020	28-Jul-2020
MM673: Iron Related Bacteria using Biological Activity Reaction Test (BART) Miscellaneous Plastic Container (MM673) Pu369 GW	27-Jul-2020	*****	*****	28-Jul-2020	28-Jul-2020
MM683: Slime Producing Bacteria (BART) Miscellaneous Plastic Container (MM683) Pu369 GW	27-Jul-2020	*****	*****	28-Jul-2020	28-Jul-2020



Quality Control Parameter Frequency Compliance

- No Quality Control data available for this section.



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
Algal Count	BM010	WATER	Specialist microbiological analysis subcontracted to ALS Scoresby (NATA Accredited Laboratory No. 992).
Blue Green Algae Count	MB010	WATER	Specialist microbiological analysis subcontracted to ALS Scoresby (NATA Accredited Laboratory No. 992).
Sulphate Reducing Bacteria (BART)	MM669	WATER	Specialist microbiological analysis subcontracted to ALS Scoresby (NATA accreditation does not cover this service).
Iron Related Bacteria (BART)	* MM673	WATER	Specialist microbiological analysis subcontracted to ALS Scoresby (NATA accreditation does not cover this service).
Slime Producing Bacteria (BART)	MM683	WATER	Specialist microbiological analysis subcontracted to ALS Scoresby (NATA accreditation does not cover this service).

Niki Papastergiou

From: Kaitlyn Brodie <kbrodie@emmconsulting.com.au>
Sent: Monday, 24 August 2020 6:38 PM
To: Shane Colley
Cc: Paul Gibbons; Dan Condon; Henry Noakes; Joel Georgiou
Subject: RE: [EXTERNAL] - COC for S190512 - posted 24/08/2020
Attachments: COC S190512 20200824.xlsx

Hi Shane,

Can we please amend the COC sent this morning (as outlined in below message chain) with the attached. Changes are as follows:

- TS and TB to be analysed for TRH and BTEXN;
- QA305 was not included with this sample set.

Apologies.

Regards,

Kaitlyn

Kaitlyn Brodie
Hydrogeologist

M 0401 881 447
www.emmconsulting.com.au

From: Shane Colley <shane.colley@ALSglobal.com>
Sent: Monday, 24 August 2020 8:50 AM
To: Kaitlyn Brodie <kbrodie@emmconsulting.com.au>
Cc: Paul Gibbons <pgibbons@emmconsulting.com.au>; Dan Condon <dcondon@emmconsulting.com.au>; Henry Noakes <hnoakes@emmconsulting.com.au>
Subject: RE: [EXTERNAL] - COC for S190512 - posted 24/08/2020

CAUTION: This email originated outside of the Organisation.

Good morning Kaitlyn,

Thanks for this, I have forwarded on to the team.

Regards,

Shane Colley
Client Services Officer - Springvale
Environmental



T +61 3 8549 9600 D +61 3 8549 9613
shane.colley@alsglobal.com
2-4 Westall Rd
Springvale VIC 3171
AUSTRALIA

EnviroMail™ 124 – PFOS Analysis to Freshwater Species Protection Lvl 99%

EnviroMail™ 125 – ALS Now Provides Testing capabilities for TOF
EnviroMail™ 126 – TOF for Compliance with Guideline ERA 60
EnviroMail™ 00 – All EnviroMails™ in one convenient library.



From: Kaitlyn Brodie <kbrodie@emmconsulting.com.au>
Sent: Monday, 24 August 2020 7:32 AM
To: ALS Enviro Melbourne <ALSEnviroMelbourne@ALSGlobal.com>; Shane Colley <shane.colley@ALSGlobal.com>
Cc: Paul Gibbons <pgibbons@emmconsulting.com.au>; Dan Condon <dcondon@emmconsulting.com.au>; Henry Noakes <hnoakes@emmconsulting.com.au>
Subject: [EXTERNAL] - COC for S190512 - posted 24/08/2020

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Good morning,

Attached is the COC for job number S190512.

8 eskys posted today (24/08/2020). Con note 980125371584.

Let me know if you have any questions.

Thanks

Kaitlyn

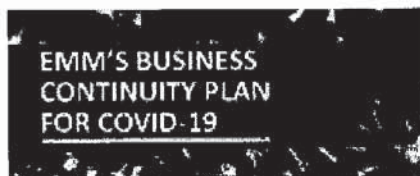
Kaitlyn Brodie
Hydrogeologist



T 02 9493 9500
M 0401 881 447

 Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065



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This email and any files transmitted with it are confidential and are only to be read or used by the intended recipient as it may contain confidential information. Confidentiality or privilege is not waived or lost by erroneous transmission. If you have received this email in error, or are not the intended recipient, please notify the sender immediately and delete this email from your computer. You must not disclose, distribute, copy or use the information herein if you are not the intended recipient.

Niki Papastergiou

From: COC Melbourne
Subject: FW: [EXTERNAL] - COC for S190512 - posted 24/08/2020
Attachments: RE: [EXTERNAL] - COC for S190512 - posted 24/08/2020

From: Shane Colley <shane.colley@ALSGlobal.com>
Sent: Tuesday, 25 August 2020 8:44 AM
To: COC Melbourne <COC.Melbourne@alsglobal.com>
Subject: FW: [EXTERNAL] - COC for S190512 - posted 24/08/2020

Good morning

Please see attached. The client has sent through an **updated COC** for this one.

Regards,

Shane Colley
Client Services Officer - Springvale
Environmental



T +61 3 8549 9600 **D** +61 3 8549 9613
shane.colley@alsglobal.com
2-4 Westall Rd
Springvale VIC 3171
AUSTRALIA

EnviroMail™ 124 – PFOS Analysis to Freshwater Species Protection Lvl 99%
EnviroMail™ 125 – ALS Now Provides Testing capabilities for TOF
EnviroMail™ 126 – TOF for Compliance with Guideline ERA 60
EnviroMail™ 00 – All EnviroMails™ in one convenient library.





Environmental

CERTIFICATE OF ANALYSIS

Work Order : **EM2014666** Page : 1 of 13
Client : **EMM CONSULTING PTY LTD** Laboratory : Environmental Division Melbourne
Contact : **PAUL GIBBONS** Contact : Shane Colley
Address : **Ground Floor Suite 1 20 Chandos Street**
St Leonards NSW NSW 2065 Address : 4 Westall Rd Springvale VIC Australia 3171
Telephone : **----** Telephone : +61-3-8549 9600
Project : **S190512** Date Samples Received : 25-Aug-2020 12:10
Order number : **----** Date Analysis Commenced : 25-Aug-2020
C-O-C number : **----** Issue Date : 07-Sep-2020 10:48
Sampler : **HN / KB**
Site : **----**
Quote number : **EN/222**
No. of samples received : **41**
No. of samples analysed : **41**



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
Titus Vimalasiri	Metals Teamleader	Radionuclides, Fyshwick, ACT



Page : 2 of 13
Work Order : EM2014666
Client : EMM CONSULTING PTY LTD
Project : S190512

General Comments

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

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

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

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

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

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

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

LOR = Limit of reporting

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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EK085: EM2014666: Sample 1, 14, & 24 required dilution prior to analysis due to matrix interferences. LOR has been raised accordingly.
- EG020-F : EM2014666 #1-33 dissolved metal required dilution prior analysis due to sample matrix. LORs have been adjusted accordingly.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- It is recognised that dissolved iron less than ferrous iron for EM2014666 #13. However, the difference is within experimental variation of the methods.
- EP080: Samples EM2014666_34, 41 TRIP SPIKE and TRIP SPIKE CONTROL contains volatile compounds spiked into the sample containers prior to dispatch from the laboratory.
- EG020-T : EM2014666 #2, #4, #7, #10, #12-14, #16-18, #20, #22, #24, #25, #29, #36 total metal required dilution prior analysis due to sample matrix. LORs have been adjusted accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- LOR for Gross Alpha and Gross Beta raised due to high solid content.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- EK085: EM2014666-002 Poor matrix spike recovery for sulphide due to sample matrix. Confirmed by re-extraction and re-analysis.
- EK085: EM2014666-022 Poor matrix spike recovery for sulphide due to sample matrix. Confirmed by re-extraction and re-analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Compound	CAS Number	LOR	Client sample ID							
			Client sampling date / time	Unit	UGM-M1D	UGM-M1S	UGM-M2D	UGM-M2S	UGM-M4D	
ED037P: Alkalinity by PC Titrator										
Hydroxide Alkalinity as CaCO3	DMO-210-001	1		mg/L	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1		mg/L	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1		mg/L	443	206	383	257	370	370
Total Alkalinity as CaCO3	----	1		mg/L	443	206	383	257	370	370
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA										
Sulfate as SO4 - Turbidimetric	14808-79-8	1		mg/L	3540	4690	3840	4820	3990	3990
ED045G: Chloride by Discrete Analyser										
Chloride	16887-00-6	1		mg/L	19000	25400	20200	21600	22000	22000
ED093F: Dissolved Major Cations										
Calcium	7440-70-2	1		mg/L	637	1080	598	692	568	568
Magnesium	7439-95-4	1		mg/L	1430	1550	1580	1680	1550	1550
Sodium	7440-23-5	1		mg/L	10500	14600	11300	12100	11100	11100
Potassium	7440-09-7	1		mg/L	62	49	54	46	55	55
EG020F: Dissolved Metals by ICP-MS										
Aluminium	7429-90-5	0.01		mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thorium	7440-29-1	0.001		mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	7440-61-1	0.001		mg/L	<0.002	0.026	<0.002	0.012	<0.002	<0.002
Iron	7439-89-6	0.05		mg/L	<0.10	0.69	4.69	<0.10	1.87	1.87
EG020T: Total Metals by ICP-MS										
Aluminium	7429-90-5	0.01		mg/L	----	0.49	----	<0.02	----	----
Thorium	7440-29-1	0.001		mg/L	----	<0.002	----	<0.002	----	----
Uranium	7440-61-1	0.001		mg/L	----	0.031	----	0.016	----	----
Iron	7439-89-6	0.05		mg/L	----	0.94	----	<0.10	----	----
EG051G: Ferrous Iron by Discrete Analyser										
Ferrous Iron	----	0.05		mg/L	0.05	0.61	4.54	<0.05	1.83	1.83
EK085M: Sulfide as S2-										
Sulfide as S2-	18496-25-8	0.1		mg/L	5.8	<0.1	<0.1	<0.1	<0.1	<0.1
EN055: Ionic Balance										
∅ Total Anions	----	0.01		meq/L	618	818	657	715	711	711
∅ Total Cations	----	0.01		meq/L	608	818	653	700	640	640
∅ Ionic Balance	----	0.01		%	0.88	0.03	0.35	1.02	5.25	5.25



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID							
Compound	CAS Number	LOR	Client sampling date / time	Unit	Result	UGM-M12D	UGM-M12S	UGM-M15S	
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1		mg/L	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO3	3812-32-6	1		mg/L	<1	<1	<1	<1	
Bicarbonate Alkalinity as CaCO3	71-52-3	1		mg/L	396	389	317	251	
Total Alkalinity as CaCO3	----	1		mg/L	396	389	317	251	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1		mg/L	3140	3770	4660	5510	
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1		mg/L	20800	23500	25500	25800	
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1		mg/L	552	798	592	757	
Magnesium	7439-95-4	1		mg/L	1580	1900	1780	1730	
Sodium	7440-23-5	1		mg/L	11200	13000	14400	14800	
Potassium	7440-09-7	1		mg/L	55	50	36	40	
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01		mg/L	<0.02	<0.02	<0.02	<0.02	
Thorium	7440-29-1	0.001		mg/L	<0.002	<0.002	<0.002	<0.002	
Uranium	7440-61-1	0.001		mg/L	<0.002	0.012	0.088	0.065	
Iron	7439-89-6	0.05		mg/L	2.83	<0.10	1.56	<0.10	
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01		mg/L	----	0.04	----	0.46	
Thorium	7440-29-1	0.001		mg/L	----	<0.002	----	<0.002	
Uranium	7440-61-1	0.001		mg/L	----	0.015	----	0.070	
Iron	7439-89-6	0.05		mg/L	----	<0.10	----	0.57	
EG051G: Ferrous Iron by Discrete Analyser									
Ferrous Iron	----	0.05		mg/L	2.80	<0.05	1.51	<0.05	
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1		mg/L	<0.1	<0.1	<0.1	<0.1	
EN055: Ionic Balance									
∅ Total Anions	----	0.01		meq/L	660	753	693	848	
∅ Total Cations	----	0.01		meq/L	646	763	686	825	
∅ Ionic Balance	----	0.01		%	1.06	0.67	0.46	1.35	
EA250CA: Gross Alpha and Beta Activity									
Gross alpha	----	0.05		Bq/L	<0.93	2.11	----	3.02	
Gross beta activity - 40K	----	0.10		Bq/L	<1.86	<2.08	----	2.59	



Analytical Results

Compound	CAS Number	LOR	Client sampling date / time		Client sample ID				
			Unit	Result	BH-M16D	BH-M16S	BH-M17D	BH-M17S	BH-M18D
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	418	338	418	380	380	424
Total Alkalinity as CaCO3	----	1	mg/L	418	338	418	380	380	424
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3910	5060	3650	3470	3470	3850
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	20600	22700	19300	20800	20800	19600
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	555	748	512	601	601	518
Magnesium	7439-95-4	1	mg/L	1560	1680	1490	1500	1500	1480
Sodium	7440-23-5	1	mg/L	11100	12300	10800	11300	11300	10700
Potassium	7440-09-7	1	mg/L	56	52	56	47	47	54
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	<0.02	<0.02	0.03	<0.02	<0.02	<0.02
Thorium	7440-29-1	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	7440-61-1	0.001	mg/L	<0.002	0.030	0.002	0.013	0.013	<0.002
Iron	7439-89-6	0.05	mg/L	2.18	<0.10	4.02	1.81	1.81	5.80
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	----	10.1	0.14	14.4	14.4	----
Thorium	7440-29-1	0.001	mg/L	----	0.003	<0.002	0.002	0.002	----
Uranium	7440-61-1	0.001	mg/L	----	0.040	0.003	0.017	0.017	----
Iron	7439-89-6	0.05	mg/L	----	3.86	4.30	5.22	5.22	----
EG051G: Ferrous Iron by Discrete Analyser									
Ferrous Iron	----	0.05	mg/L	2.12	<0.05	4.06	1.67	1.67	5.22
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.2	<0.2	<0.2	0.3
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	671	752	629	666	666	642
∅ Total Cations	----	0.01	meq/L	640	712	619	646	646	614
∅ Ionic Balance	----	0.01	%	2.33	2.76	0.75	1.56	1.56	2.15
EA250CA: Gross Alpha and Beta Activity									
Gross alpha	----	0.05	Bq/L	----	----	<0.88	1.60	1.60	<0.88
Gross beta activity - 40K	----	0.10	Bq/L	----	----	<1.76	2.68	2.68	<1.76



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID								
Compound	CAS Number	LOR	Client sampling date / time	Unit	Result	BH-M18S	BH-M19D	BH-M19S	BH-M20D	BH-M20S
ED037P: Alkalinity by PC Titrator										
Hydroxide Alkalinity as CaCO3	DMO-210-001	1		mg/L	<1			<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1		mg/L	<1			<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1		mg/L	332		428	313	392	184
Total Alkalinity as CaCO3	----	1		mg/L	332		428	313	392	184
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA										
Sulfate as SO4 - Turbidimetric	14808-79-8	1		mg/L	4610		3620	5140	3860	4790
ED045G: Chloride by Discrete Analyser										
Chloride	16887-00-6	1		mg/L	23300		19300	26300	21200	23300
ED093F: Dissolved Major Cations										
Calcium	7440-70-2	1		mg/L	655		532	614	513	891
Magnesium	7439-95-4	1		mg/L	1590		1480	1720	1520	1460
Sodium	7440-23-5	1		mg/L	13200		10700	13800	11000	13500
Potassium	7440-09-7	1		mg/L	38		54	33	54	46
EG020F: Dissolved Metals by ICP-MS										
Aluminium	7429-90-5	0.01		mg/L	<0.02		0.02	<0.02	<0.02	<0.02
Thorium	7440-29-1	0.001		mg/L	<0.002		<0.002	<0.002	<0.002	<0.002
Uranium	7440-61-1	0.001		mg/L	0.049		0.005	0.111	<0.002	0.025
Iron	7439-89-6	0.05		mg/L	1.64		8.44	<0.10	5.03	<0.10
EG020T: Total Metals by ICP-MS										
Aluminium	7429-90-5	0.01		mg/L	6.70		1.96	7.52	----	1.19
Thorium	7440-29-1	0.001		mg/L	<0.002		<0.002	<0.002	----	<0.002
Uranium	7440-61-1	0.001		mg/L	0.055		0.006	0.126	----	0.030
Iron	7439-89-6	0.05		mg/L	3.23		9.59	4.26	----	1.08
EG051G: Ferrous Iron by Discrete Analyser										
Ferrous Iron	----	0.05		mg/L	1.29		7.95	<0.05	4.50	<0.05
EK085M: Sulfide as S2-										
Sulfide as S2-	18496-25-8	0.1		mg/L	0.1		0.2	0.2	<0.1	<0.1
EN055: Ionic Balance										
∅ Total Anions	----	0.01		meq/L	760		628	855	686	761
∅ Total Cations	----	0.01		meq/L	739		615	773	630	753
∅ Ionic Balance	----	0.01		%	1.41		1.06	5.03	4.23	0.50
EA250CA: Gross Alpha and Beta Activity										
Gross alpha	----	0.05		Bq/L	3.27		2.06	4.90	<0.96	1.48
Gross beta activity - 40K	----	0.10		Bq/L	<2.11		1.79	2.24	<1.91	<2.15



Analytical Results

Compound	CAS Number	LOR	Client sampling date / time		Client sample ID				
			Unit	Result	BH-M21D	BH-M21S	BH-M22d	BH-M22s	BH-M23d
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	397	313	432	292	411	411
Total Alkalinity as CaCO3	----	1	mg/L	397	313	432	292	411	411
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3560	4140	4750	4290	3730	3730
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	21500	25500	19400	24500	20000	20000
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	516	618	527	668	526	526
Magnesium	7439-95-4	1	mg/L	1590	1630	1510	1720	1550	1550
Sodium	7440-23-5	1	mg/L	11600	13100	10900	13600	11100	11100
Potassium	7440-09-7	1	mg/L	55	37	58	43	58	58
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Thorium	7440-29-1	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	7440-61-1	0.001	mg/L	<0.002	0.033	<0.002	0.022	<0.002	<0.002
Iron	7439-89-6	0.05	mg/L	3.05	0.14	3.20	8.92	2.01	2.01
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L	----	0.05	----	16.7	0.72	0.72
Thorium	7440-29-1	0.001	mg/L	----	<0.002	----	0.005	<0.002	<0.002
Uranium	7440-61-1	0.001	mg/L	----	0.039	----	0.024	<0.002	<0.002
Iron	7439-89-6	0.05	mg/L	----	0.25	----	17.8	2.59	2.59
EG051G: Ferrous Iron by Discrete Analyser									
Ferrous Iron	----	0.05	mg/L	2.97	<0.05	2.90	7.65	1.99	1.99
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	0.3	<0.1	<0.1
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L	688	812	655	786	650	650
∅ Total Cations	----	0.01	meq/L	662	736	626	768	638	638
∅ Ionic Balance	----	0.01	%	1.92	4.91	2.23	1.20	0.92	0.92
EA250CA: Gross Alpha and Beta Activity									
Gross alpha	----	0.05	Bq/L	----	0.95	----	2.45	----	----
Gross beta activity - 40K	----	0.10	Bq/L	----	<1.82	----	<2.15	----	----



Analytical Results

Compound	CAS Number	LOR	Client sample ID		BH-M23s	BH-M25d	BH-M25s	LSPB04	QA100
			Client sampling date / time	Unit					
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1			<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1			<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1			268	401	322	419	398
Total Alkalinity as CaCO3	----	1			268	401	322	419	398
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1			6060	3750	4820	4210	3760
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1			27500	19000	25600	21400	21400
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1			745	560	620	559	538
Magnesium	7439-95-4	1			2000	1520	1720	1590	1570
Sodium	7440-23-5	1			15300	10400	14000	11000	11200
Potassium	7440-09-7	1			47	60	35	62	56
EG020F: Dissolved Metals by ICP-MS									
Aluminium	7429-90-5	0.01			<0.02	<0.02	<0.02	<0.02	<0.02
Thorium	7440-29-1	0.001			<0.002	<0.002	<0.002	<0.002	<0.002
Uranium	7440-61-1	0.001			0.057	<0.002	0.054	<0.002	<0.002
Iron	7439-89-6	0.05			<0.10	2.11	0.39	1.66	3.03
EG020T: Total Metals by ICP-MS									
Aluminium	7429-90-5	0.01			----	----	----	0.59	----
Thorium	7440-29-1	0.001			----	----	----	<0.002	----
Uranium	7440-61-1	0.001			----	----	----	<0.002	----
Iron	7439-89-6	0.05			----	----	----	1.95	----
EG051G: Ferrous Iron by Discrete Analyser									
Ferrous Iron	----	0.05			<0.05	1.91	<0.05	1.43	2.81
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1			0.1	<0.1	0.1	<0.1	<0.1
EN055: Ionic Balance									
∅ Total Anions	----	0.01			907	622	829	700	690
∅ Total Cations	----	0.01			868	607	782	639	645
∅ Ionic Balance	----	0.01			2.18	1.23	2.89	4.55	3.39
EA250CA: Gross Alpha and Beta Activity									
Gross alpha	----	0.05			----	----	----	<0.92	----
Gross beta activity - 40K	----	0.10			----	----	----	2.24	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID						
Compound	CAS Number	LOR	Unit	QA200 EM2014666-031 Result	QA101 EM2014666-032 Result	QA201 EM2014666-033 Result	TS 31-Jul-2020 00:00 EM2014666-034 Result	TB 29-Jul-2020 00:00 EM2014666-035 Result
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	****	****
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	****	****
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	400	268	268	****	****
Total Alkalinity as CaCO3	****	1	mg/L	400	268	268	****	****
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3920	5940	5930	****	****
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	21600	28300	27900	****	****
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	545	755	770	****	****
Magnesium	7439-95-4	1	mg/L	1580	1990	2020	****	****
Sodium	7440-23-5	1	mg/L	11300	15300	15500	****	****
Potassium	7440-09-7	1	mg/L	56	46	46	****	****
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	<0.02	<0.02	<0.02	****	****
Thorium	7440-29-1	0.001	mg/L	<0.002	<0.002	<0.002	****	****
Uranium	7440-61-1	0.001	mg/L	<0.002	0.058	0.059	****	****
Iron	7439-89-6	0.05	mg/L	2.99	<0.10	<0.10	****	****
EG051G: Ferrous Iron by Discrete Analyser								
Ferrous Iron	****	0.05	mg/L	2.81	<0.05	<0.05	****	****
EK085M: Sulfide as S2-								
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	****	****
EN055: Ionic Balance								
∅ Total Anions	****	0.01	meq/L	699	927	916	****	****
∅ Total Cations	****	0.01	meq/L	650	868	880	****	****
∅ Ionic Balance	****	0.01	%	3.61	3.30	1.99	****	****
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	****	20	µg/L	****	****	****	170	<20
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	20	µg/L	****	****	****	210	<20
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	****	****	****	110	<20
EP080: BTEXN								
Benzene	71-43-2	1	µg/L	****	****	****	17	<1



Analytical Results

Compound	CAS Number	LOR	Unit	Client sample ID				TB
				QA200	QA101	QA201	TS	
		Client sampling date / time						
				22-Aug-2020 00:00	23-Aug-2020 00:00	23-Aug-2020 00:00	31-Jul-2020 00:00	29-Jul-2020 00:00
				EM2014666-031	EM2014666-032	EM2014666-033	EM2014666-034	EM2014666-035
				Result	Result	Result	Result	Result
EP080: BTEXN - Continued								
Toluene	108-88-3	2	µg/L	*****	*****	*****	16	<2
Ethylbenzene	100-41-4	2	µg/L	*****	*****	*****	16	<2
meta- & para-Xylene	108-38-3	2	µg/L	*****	*****	*****	32	<2
ortho-Xylene	95-47-6	2	µg/L	*****	*****	*****	17	<2
^ Total Xylenes	*****	2	µg/L	*****	*****	*****	49	<2
^ Sum of BTEX	*****	1	µg/L	*****	*****	*****	98	<1
Naphthalene	91-20-3	5	µg/L	*****	*****	*****	<5	<5
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	2	%	*****	*****	*****	104	95.2
Toluene-D8	2037-26-5	2	%	*****	*****	*****	98.4	102
4-Bromofluorobenzene	460-00-4	2	%	*****	*****	*****	105	122



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 Work Order : EM2014666
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Analytical Results

Compound	CAS Number	LOR	Client sampling date / time		Client sample ID				
			Unit	Result	QA300	QA301	QA302	QA303	QA304
Aluminium	7429-90-5	0.01	mg/L	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Thorium	7440-29-1	0.001	mg/L	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Uranium	7440-61-1	0.001	mg/L	<0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Iron	7439-89-6	0.05	mg/L	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05

EG020T: Total Metals by ICP-MS



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID		Trip Spike Control	
Compound	CAS Number	Client sampling date / time	Unit	Result	Result
EP080/071: Total Petroleum Hydrocarbons					
C6 - C9 Fraction	---	20	µg/L	190	-----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions					
C6 - C10 Fraction	C6_C10	20	µg/L	230	-----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	20	µg/L	120	-----
EP080: BTEXN					
Benzene	71-43-2	1	µg/L	19	-----
Toluene	108-88-3	2	µg/L	17	-----
Ethylbenzene	100-41-4	2	µg/L	18	-----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	36	-----
ortho-Xylene	95-47-6	2	µg/L	19	-----
^ Total Xylenes	---	2	µg/L	55	-----
^ Sum of BTEX	---	1	µg/L	109	-----
Naphthalene	91-20-3	5	µg/L	<5	-----
EP080S: TPH(V)/BTEX Surrogates					
1,2-Dichloroethane-D4	17060-07-0	2	%	105	-----
Toluene-D8	2037-26-5	2	%	93.3	-----
4-Bromofluorobenzene	460-00-4	2	%	102	-----



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Work Order : EM2014666
Client : EMM CONSULTING PTY LTD
Project : S190512

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	73	129
Toluene-D8	2037-26-5	70	125
4-Bromofluorobenzene	460-00-4	71	129



Environmental

QUALITY CONTROL REPORT

Work Order : **EM2014666**

Page : 1 of 9

Client : **EMM CONSULTING PTY LTD**
 Contact : **PAUL GIBBONS**
 Address : **Ground Floor Suite 1 20 Chandos Street
 St Leonards NSW NSW 2065**
 Telephone : **----**
 Project : **S190512**
 Order number : **----**
 C-O-C number : **----**
 Sampler : **HN / KB**
 Site : **----**
 Quote number : **EN/222**
 No. of samples received : **41**
 No. of samples analysed : **41**

Laboratory : **Environmental Division Melbourne**
 Contact : **Shane Colley**
 Address : **4 Westall Rd Springvale VIC Australia 3171**
 Telephone : **+61-3-8549 9600**
 Date Samples Received : **25-Aug-2020**
 Date Analysis Commenced : **25-Aug-2020**
 Issue Date : **07-Sep-2020**



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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	ZIC Organic Chemist	Melbourne Organics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
Titus Vimlasiri	Metals Teamleader	Radionuclides, Fyshwick, ACT



General Comments

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

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

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

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

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

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: WATER

Laboratory Duplicate (DUP) Report									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA250CA: Gross Alpha and Beta Activity (QC Lot: 3241420)									
CA2005680-001	Anonymous	EA250: Gross alpha	----	0.05	Bq/L	<0.05	<0.05	0.00	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	<0.10	0.00	No Limit
EM2014666-010	UGM-M15S	EA250: Gross alpha	----	0.05	Bq/L	3.02	3.02	0.00	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	2.59	<2.33	10.7	No Limit
EA250CA: Gross Alpha and Beta Activity (QC Lot: 3241421)									
EM2014666-024	BH-M22s	EA250: Gross alpha	----	0.05	Bq/L	2.45	1.42	53.3	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	<2.15	2.27	5.55	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3226070)									
EM2014666-008	UGM-M12D	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	389	391	0.441	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	389	391	0.441	0% - 20%
EM2014555-018	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3226072)									
EM2014666-018	BH-M19S	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	313	311	0.640	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	313	311	0.640	0% - 20%
EM2014666-028	BH-M25s	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	322	326	1.31	0% - 20%



Sub-Matrix: WATER									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED037P: Alkalinity by PC Titrator (QC Lot: 3226072) - continued									
EM2014666-028	BH-M25s	ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	322	326	1.31	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3219763)									
EM2014637-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2370	2140	10.1	0% - 20%
EM2014658-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	264	265	0.420	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3219766)									
EM2014666-010	UGM-M15S	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	5510	5250	4.75	0% - 20%
EM2014666-019	BH-M20D	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3860	3990	3.29	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3219768)									
EM2014666-030	QA100	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3760	3880	3.18	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3219765)									
EM2014658-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	1240	1250	0.831	0% - 20%
EM2014666-010	UGM-M15S	ED045G: Chloride	16887-00-6	1	mg/L	25800	26400	2.36	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3219767)									
EM2014666-019	BH-M20D	ED045G: Chloride	16887-00-6	1	mg/L	21200	20800	1.79	0% - 20%
EM2014666-030	QA100	ED045G: Chloride	16887-00-6	1	mg/L	21400	21900	2.25	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3220393)									
EM2014666-002	UGM-M1S	ED093F: Calcium	7440-70-2	1	mg/L	1080	1070	1.02	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1550	1540	0.536	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	14600	14400	1.45	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	49	49	0.00	No Limit
EM2014666-010	UGM-M15S	ED093F: Calcium	7440-70-2	1	mg/L	757	756	0.158	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1730	1740	0.354	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	14800	14900	0.883	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	40	41	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 3220396)									
EM2014666-022	BH-M21S	ED093F: Calcium	7440-70-2	1	mg/L	618	597	3.37	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1630	1590	2.56	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	13100	12700	3.28	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	37	36	0.00	No Limit
EM2014666-030	QA100	ED093F: Calcium	7440-70-2	1	mg/L	538	543	0.943	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1570	1580	1.04	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	11200	11300	0.839	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	56	56	0.00	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3220394)									
EM2014666-001	UGM-M1D	EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.02	<0.02	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.10	<0.10	0.00	No Limit
EM2014666-010	UGM-M15S	EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.02	<0.02	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.10	<0.10	0.00	No Limit



Sub-Matrix: WATER									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3220395)									
EM2014666-001	UGM-M1D	EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit
EM2014666-010	UGM-M15S	EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	0.065	0.062	4.31	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3220397)									
EM2014666-021	BH-M2ID	EG020A-F: Aluminium	7429-90-5	0.01	mg/L	0.02	<0.02	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	3.05	2.98	2.17	0% - 20%
EM2014666-030	QA100	EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.02	<0.02	0.00	No Limit
		EG020A-F: Iron	7439-89-6	0.05	mg/L	3.03	2.87	5.48	0% - 20%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3220398)									
EM2014666-021	BH-M2ID	EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit
EM2014666-030	QA100	EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit
		EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3219736)									
EM2014596-030	Anonymous	EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EM2014665-003	Anonymous	EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3219739)									
EM2014666-002	UGM-M1S	EG020B-T: Thorium	7440-29-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit
		EG020B-T: Uranium	7440-61-1	0.001	mg/L	0.031	0.031	0.00	0% - 50%
EM2014666-018	BH-M19S	EG020B-T: Thorium	7440-29-1	0.001	mg/L	<0.002	0.002	0.00	No Limit
		EG020B-T: Uranium	7440-61-1	0.001	mg/L	0.126	0.115	8.89	0% - 20%
EG020T: Total Metals by ICP-MS (QC Lot: 3219740)									
EM2014666-039	QA303	EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	<0.01	0.00	No Limit
		EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EM2014666-018	BH-M19S	EG020A-T: Aluminium	7429-90-5	0.01	mg/L	7.52	7.87	4.54	0% - 20%
		EG020A-T: Iron	7439-89-6	0.05	mg/L	4.26	5.00	15.8	0% - 20%
EG051G: Ferrous Iron by Discrete Analyser (QC Lot: 3219612)									
EM2014666-001	UGM-M1D	EG051G: Ferrous Iron	---	0.05	mg/L	0.05	<0.05	0.00	No Limit
EM2014666-010	UGM-M15S	EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EG051G: Ferrous Iron by Discrete Analyser (QC Lot: 3219613)									
EM2014666-021	BH-M2ID	EG051G: Ferrous Iron	---	0.05	mg/L	2.97	2.92	1.72	0% - 20%
EM2014666-030	QA100	EG051G: Ferrous Iron	---	0.05	mg/L	2.81	2.78	1.01	0% - 20%
EK085M: Sulfide as S2- (QC Lot: 3221186)									
EM2014666-001	UGM-M1D	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	5.8	5.8	0.00	0% - 50%
EM2014666-010	UGM-M15S	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit



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 Work Order : EM2014666
 Client : EMM CONSULTING PTY LTD
 Project : S190512

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 (%)		
EK085M: Sulfide as S2- (QC Lot: 3221187)											
EM2014666-021	BH-M21D	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit		
EM2014666-030	QA100	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit		
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3219780)											
EM2014670-006	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit		
EM2014670-001	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	1160	1150	0.901	0% - 20%		
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3219780)											
EM2014670-006	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit		
EM2014670-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	1200	1190	0.00	0% - 20%		
EP080: BTEXN (QC Lot: 3219780)											
EM2014670-006	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit		
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit		
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit		
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit		
			106-42-3								
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit		
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit		
		EP080: Benzene	71-43-2	1	µg/L	841	833	0.920	No Limit		
		EP080: Toluene	108-88-3	2	µg/L	13	13	0.00	No Limit		
		EP080: Ethylbenzene	100-41-4	2	µg/L	76	76	0.00	0% - 20%		
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	157	157	0.00	0% - 20%		
			106-42-3								
EM2014670-001	Anonymous	EP080: ortho-Xylene	95-47-6	2	µg/L	36	37	2.80	0% - 50%		
		EP080: Naphthalene	91-20-3	5	µg/L	33	33	0.00	No Limit		



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

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

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Concentration	Spike Recovery (%)	LCS	Low	High
EA250CA: Gross Alpha and Beta Activity (QCLot: 3241420)									
EA250: Gross alpha	----	0.05	Bq/L	<0.05	1751 Bq/L	101	95.2	105	
EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	----	----	----	----	
EA250CA: Gross Alpha and Beta Activity (QCLot: 3241421)									
EA250: Gross alpha	----	0.05	Bq/L	<0.05	1751 Bq/L	99.8	95.2	105	
EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	----	----	----	----	
ED037P: Alkalinity by PC Titrator (QCLot: 3226070)									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	92.7	88.0	112	
ED037P: Alkalinity by PC Titrator (QCLot: 3226072)									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	99.2	88.0	112	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3219763)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	113	85.8	117	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3219766)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	100 mg/L	95.5	85.8	117	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3219768)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	85.8	117	
ED045G: Chloride by Discrete Analyser (QCLot: 3219765)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	102	85.0	122	
ED045G: Chloride by Discrete Analyser (QCLot: 3219767)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	101	85.0	122	
ED093F: Dissolved Major Cations (QCLot: 3220393)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	107	88.2	117	
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	99.1	85.6	114	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	103	90.0	114	
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	104	86.7	111	
ED093F: Dissolved Major Cations (QCLot: 3220396)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	102	88.2	117	
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	96.2	85.6	114	
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	100	90.0	114	



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Sub-Matrix: WATER		Method Blank (MB) Report				Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	LCS	Low	High
ED093F: Dissolved Major Cations (QCLot: 3220396) - continued									
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	102	86.7	111
EG020F: Dissolved Metals by ICP-MS (QCLot: 3220394)									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	105	105	90.4	107
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	96.6	96.6	91.8	109
EG020F: Dissolved Metals by ICP-MS (QCLot: 3220395)									
EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	0.1 mg/L	90.2	90.2	90.2	114
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	87.4	87.4	85.2	110
EG020F: Dissolved Metals by ICP-MS (QCLot: 3220397)									
EG020A-F: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	95.8	95.8	90.4	107
EG020A-F: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	102	102	91.8	109
EG020F: Dissolved Metals by ICP-MS (QCLot: 3220398)									
EG020B-F: Thorium	7440-29-1	0.001	mg/L	<0.001	0.1 mg/L	90.6	90.6	90.2	114
EG020B-F: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	89.2	89.2	85.2	110
EG020T: Total Metals by ICP-MS (QCLot: 3219736)									
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	112	112	90.8	115
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	111	111	92.8	116
EG020T: Total Metals by ICP-MS (QCLot: 3219739)									
EG020B-T: Thorium	7440-29-1	0.001	mg/L	<0.001	0.1 mg/L	105	105	87.5	117
EG020B-T: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	110	110	89.1	114
EG020T: Total Metals by ICP-MS (QCLot: 3219740)									
EG020A-T: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	102	102	90.8	115
EG020A-T: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	108	108	92.8	116
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3219612)									
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	92.6	92.6	75.8	112
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3219613)									
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	92.5	92.5	75.8	112
EK085M: Sulfide as S2- (QCLot: 3221186)									
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	101	101	81.9	116
EK085M: Sulfide as S2- (QCLot: 3221187)									
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	92.5	92.5	81.9	116
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3219780)									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	109	109	65.5	129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3219780)									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	108	108	64.3	126
EP080: BTEXN (QCLot: 3219780)									
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	110	110	69.8	124



Sub-Matrix: **WATER**

Method: Compound		CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
					Result	Concentration	Spike Recovery (%)	LCS	Low	High
EP080: BTEXN (QCLot: 3219780) - continued										
EP080: Toluene		108-88-3	2	µg/L	<2	20 µg/L	103	73.6	126	126
EP080: Ethylbenzene		100-41-4	2	µg/L	<2	20 µg/L	110	72.0	126	126
EP080: meta- & para-Xylene		108-38-3	2	µg/L	<2	40 µg/L	110	71.5	132	132
		106-42-3								
EP080: ortho-Xylene		95-47-6	2	µg/L	<2	20 µg/L	105	76.5	132	132
EP080: Naphthalene		91-20-3	5	µg/L	<5	5 µg/L	97.0	70.5	127	127

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	Spike Concentration	Spike Recovery (%)	Matrix Spike (MS) Report		Recovery Limits (%)
						MS	High	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3219763)								
EM2014658-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	120	70.0	130	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3219766)								
EM2014666-019	BH-M20D	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3219768)								
EM2014666-031	QA200	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130	130
ED045G: Chloride by Discrete Analyser (QCLot: 3219765)								
EM2014658-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130	130
ED045G: Chloride by Discrete Analyser (QCLot: 3219767)								
EM2014666-019	BH-M20D	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130	130
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3219612)								
EM2014666-002	UGM-M1S	EG051G: Ferrous Iron	----	2 mg/L	92.3	70.0	130	130
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3219613)								
EM2014666-022	BH-M21S	EG051G: Ferrous Iron	----	2 mg/L	84.1	70.0	130	130
EK085M: Sulfide as S2- (QCLot: 3221186)								
EM2014666-002	UGM-M1S	EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	# 69.2	70.0	130	130
EK085M: Sulfide as S2- (QCLot: 3221187)								
EM2014666-022	BH-M21S	EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	# 21.4	70.0	130	130



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Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%)
EP080/074 : Total Petroleum Hydrocarbons (QCLot: 3219780)						
EM2014670-002	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	# Not Determined	43.0 125
EP080/074 : Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3219780)						
EM2014670-002	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	# Not Determined	44.0 122
EP080: BTEXN (QCLot: 3219780)						
EM2014670-002	Anonymous	EP080: Benzene	71-43-2	20 µg/L	# Not Determined	68.0 130
		EP080: Toluene	108-88-3	20 µg/L	95.3	72.0 132



ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

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Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: PAUL GIBBONS	Telephone	: +61-3-8549 9600
Project	: S190512	Date Samples Received	: 25-Aug-2020
Site	: ----	Issue Date	: 07-Sep-2020
Sampler	: HN / KB	No. of samples received	: 41
Order number	: ----	No. of samples analysed	: 41

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

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



Outliers : Quality Control Samples
 Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EM2014666-031	QA200	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	EM2014666-019	BH-M20D	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EM2014658-002	Anonymous	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED045G: Chloride by Discrete Analyser	EM2014666-019	BH-M20D	Chloride	16887-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EK085M: Sulfide as S2-	EM2014666-002	UGM-M1S	Sulfide as S2-	18496-25-8	69.2 %	70.0-130%	Recovery less than lower data quality objective
EK085M: Sulfide as S2-	EM2014666-022	BH-M21S	Sulfide as S2-	18496-25-8	21.4 %	70.0-130%	Recovery less than lower data quality objective
EP080/071: Total Petroleum Hydrocarbons	EM2014670-002	Anonymous	C6 - C9 Fraction	----	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP080/071: Total Recoverable Hydrocarbons - NEPM 2	EM2014670-002	Anonymous	C6 - C10 Fraction	C6_C10	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EP080: BTEXN	EM2014670-002	Anonymous	Benzene	71-43-2	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: WATER

Method Container / Client Sample ID(s)	Extraction / Preparation		Analysis	
	Date extracted	Due for extraction	Date analysed	Due for analysis
EP080/071: Total Petroleum Hydrocarbons				
Amber VOC Vial - Sulfuric Acid TB	26-Aug-2020	12-Aug-2020	26-Aug-2020	12-Aug-2020
Amber VOC Vial - Sulfuric Acid TS,	26-Aug-2020	14-Aug-2020	26-Aug-2020	14-Aug-2020
Trip Spike Control				
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions				
Amber VOC Vial - Sulfuric Acid TB	26-Aug-2020	12-Aug-2020	26-Aug-2020	12-Aug-2020



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Matrix: **WATER**

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Analysis Holding Time						
Amber VOC Vial - Sulfuric Acid TS,	26-Aug-2020	14-Aug-2020	12	26-Aug-2020	14-Aug-2020	12
EP080: BTEXN						
Amber VOC Vial - Sulfuric Acid TB	26-Aug-2020	12-Aug-2020	14	26-Aug-2020	12-Aug-2020	14
Amber VOC Vial - Sulfuric Acid TS,	26-Aug-2020	14-Aug-2020	12	26-Aug-2020	14-Aug-2020	12

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
Laboratory Control Samples (LCS)					
Gross Alpha and Beta Activity	2	29	6.90	10.00	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)					
Dissolved Metals by ICP-MS - Suite A	0	33	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	0	25	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Container / Client Sample ID(s)							



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

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA250CA: Gross Alpha and Beta Activity								
Clear Plastic Bottle - Natural (EA250)								
BH-M17S, BH-M18S		----	----	----	07-Sep-2020	16-Feb-2021	✓	
BH-M19S, BH-M20D, BH-M22s		----	----	----	07-Sep-2020	17-Feb-2021	✓	
Clear Plastic Bottle - Natural (EA250)								
UGM-M8S, BH-M20S		----	----	----	07-Sep-2020	18-Feb-2021	✓	
Clear Plastic Bottle - Natural (EA250)								
LPSPB04		----	----	----	07-Sep-2020	19-Feb-2021	✓	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
UGM-M2S, UGM-M12S, BH-M21S		----	----	----	28-Aug-2020	02-Sep-2020	✓	
BH-M17S, BH-M18S		----	----	----	28-Aug-2020	03-Sep-2020	✓	
BH-M19S, BH-M20D, BH-M25d, BH-M25s		----	----	----	28-Aug-2020	04-Sep-2020	✓	
Clear Plastic Bottle - Natural (ED037-P)								
UGM-M8S, BH-M16D, BH-M20S, QA100		----	----	----	28-Aug-2020	05-Sep-2020	✓	
Clear Plastic Bottle - Natural (ED037-P)								
UGM-M1S, UGM-M4D, BH-M23s, QA101		----	----	----	28-Aug-2020	06-Sep-2020	✓	



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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				
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA											
Clear Plastic Bottle - Natural (ED041G)	UGM-M2S, UGM-M12S, BH-M21S	19-Aug-2020	-----	-----	26-Aug-2020	16-Sep-2020	-----		✓		
Clear Plastic Bottle - Natural (ED041G)	BH-M17S, BH-M18S	20-Aug-2020	-----	-----	26-Aug-2020	17-Sep-2020	-----		✓		
Clear Plastic Bottle - Natural (ED041G)	BH-M19S, BH-M22d, BH-M25d, BH-M25s	21-Aug-2020	-----	-----	26-Aug-2020	18-Sep-2020	-----		✓		
Clear Plastic Bottle - Natural (ED041G)	UGM-M8S, BH-M16D, BH-M20S, QA200	22-Aug-2020	-----	-----	26-Aug-2020	19-Sep-2020	-----		✓		
Clear Plastic Bottle - Natural (ED041G)	UGM-M1S, BH-M23d, LPSPB04, QA201	23-Aug-2020	-----	-----	26-Aug-2020	20-Sep-2020	-----		✓		



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

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
UGM-M2S, UGM-M12S, BH-M21S		19-Aug-2020	-----	-----	26-Aug-2020	16-Sep-2020	✓	
BH-M17S, BH-M18S		20-Aug-2020	-----	-----	26-Aug-2020	17-Sep-2020	✓	
BH-M19S, BH-M22d, BH-M25d, BH-M25s		21-Aug-2020	-----	-----	26-Aug-2020	18-Sep-2020	✓	
Clear Plastic Bottle - Natural (ED045G)								
UGM-M8S, BH-M16D, BH-M20S, QA200		22-Aug-2020	-----	-----	26-Aug-2020	19-Sep-2020	✓	
Clear Plastic Bottle - Natural (ED045G)								
UGM-M1D, UGM-M4D, BH-M23s, QA101,		23-Aug-2020	-----	-----	26-Aug-2020	20-Sep-2020	✓	



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

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
UGM-M2D, UGM-M12D, BH-M21D,	UGM-M2S, UGM-M12S, BH-M21S	----	----	----	26-Aug-2020	16-Sep-2020	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
BH-M17D, BH-M18D,	BH-M17S, BH-M18S	----	----	----	26-Aug-2020	17-Sep-2020	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
BH-M19D, BH-M20D, BH-M22s, BH-M25s	BH-M19S, BH-M22d, BH-M25d,	----	----	----	26-Aug-2020	18-Sep-2020	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
UGM-M8D, UGM-M15S, BH-M16S, QA100,	UGM-M8S, BH-M16D, BH-M20S, QA200	----	----	----	26-Aug-2020	19-Sep-2020	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
UGM-M1D, UGM-M4D, BH-M23s, QA101,	UGM-M1S, BH-M23d, LPSPB04, QA201	----	----	----	26-Aug-2020	20-Sep-2020	✓	



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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			
EG020F: Dissolved Metals by ICP-MS										
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)	UGM-M2S, UGM-M12S, BH-M21S	19-Aug-2020	----	----	26-Aug-2020	15-Feb-2021	✓			
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)	BH-M17S, BH-M18S	20-Aug-2020	----	----	26-Aug-2020	16-Feb-2021	✓			
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)	BH-M19S, BH-M20D, BH-M22s, BH-M25s	21-Aug-2020	----	----	26-Aug-2020	17-Feb-2021	✓			
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)	UGM-M8S, BH-M16D, BH-M20S, QA200	22-Aug-2020	----	----	26-Aug-2020	18-Feb-2021	✓			
Clear Plastic Bottle - Nitric Acid; Filtered (EG020B-F)	UGM-M1S, BH-M23d, LPSPB04, QA201	23-Aug-2020	----	----	26-Aug-2020	19-Feb-2021	✓			
EG020T: Total Metals by ICP-MS										
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020B-T)	BH-M21S, QA300	19-Aug-2020	26-Aug-2020	15-Feb-2021	26-Aug-2020	15-Feb-2021	✓			
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020B-T)	BH-M17S, BH-M18S, QA301	20-Aug-2020	26-Aug-2020	16-Feb-2021	26-Aug-2020	16-Feb-2021	✓			
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020B-T)	BH-M19S, QA302	21-Aug-2020	26-Aug-2020	17-Feb-2021	26-Aug-2020	17-Feb-2021	✓			
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020B-T)	UGM-M8S, BH-M16S, QA303	22-Aug-2020	26-Aug-2020	18-Feb-2021	26-Aug-2020	18-Feb-2021	✓			
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020B-T)	BH-M23d, QA304	23-Aug-2020	26-Aug-2020	19-Feb-2021	26-Aug-2020	19-Feb-2021	✓			



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 Work Order : EM2014666
 Client : EMM CONSULTING PTY LTD
 Project : S190512

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

Method		Sample Date			Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation			
EG051G: Ferrous Iron by Discrete Analyser										
Clear Plastic Bottle - HCl - Filtered (EG051G)										
UGM-M2S, UGM-M12S, BH-M21S	19-Aug-2020	----	----	----	25-Aug-2020	26-Aug-2020	✓			
Clear Plastic Bottle - HCl - Filtered (EG051G)										
BH-M17S, BH-M18S	20-Aug-2020	----	----	----	25-Aug-2020	27-Aug-2020	✓			
Clear Plastic Bottle - HCl - Filtered (EG051G)										
BH-M19S, BH-M20D, BH-M22s, BH-M25s	21-Aug-2020	----	----	----	25-Aug-2020	28-Aug-2020	✓			
Clear Plastic Bottle - HCl - Filtered (EG051G)										
UGM-M8S, UGM-M15S, BH-M16S, QA100,	22-Aug-2020	----	----	----	25-Aug-2020	29-Aug-2020	✓			
Clear Plastic Bottle - HCl - Filtered (EG051G)										
UGM-M1S, BH-M23d, LPSPB04, QA201	23-Aug-2020	----	----	----	25-Aug-2020	30-Aug-2020	✓			



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 Work Order : EM2014666
 Client : EMM CONSULTING PTY LTD
 Project : S190512

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			
EK085M: Sulfide as S²⁻										
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)	UGM-M2S, UGM-M12S, BH-M21S	19-Aug-2020	-----	-----	26-Aug-2020	26-Aug-2020	-----	26-Aug-2020	✓	
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)	BH-M17S, BH-M18S	20-Aug-2020	-----	-----	26-Aug-2020	26-Aug-2020	-----	27-Aug-2020	✓	
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)	BH-M19S, BH-M20D, BH-M22S, BH-M25S	21-Aug-2020	-----	-----	26-Aug-2020	26-Aug-2020	-----	28-Aug-2020	✓	
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)	UGM-M8S, BH-M16D, BH-M20S, QA200	22-Aug-2020	-----	-----	26-Aug-2020	26-Aug-2020	-----	29-Aug-2020	✓	
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)	UGM-M1S, BH-M23D, LPSPB04, QA101	23-Aug-2020	-----	-----	26-Aug-2020	26-Aug-2020	-----	30-Aug-2020	✓	
EP080/071: Total Petroleum Hydrocarbons										
Amber VOC Vial - Sulfuric Acid (EP080)	TB	29-Jul-2020	26-Aug-2020	12-Aug-2020	26-Aug-2020	26-Aug-2020	12-Aug-2020	12-Aug-2020	✗	
Amber VOC Vial - Sulfuric Acid (EP080)	TS,	31-Jul-2020	26-Aug-2020	14-Aug-2020	26-Aug-2020	26-Aug-2020	14-Aug-2020	14-Aug-2020	✗	
Trip Spike Control										
EP080/071: Total Recoverable Hydrocarbons - NIEPM 2013 Fractions										
Amber VOC Vial - Sulfuric Acid (EP080)	TB	29-Jul-2020	26-Aug-2020	12-Aug-2020	26-Aug-2020	26-Aug-2020	12-Aug-2020	12-Aug-2020	✗	
Amber VOC Vial - Sulfuric Acid (EP080)	TS,	31-Jul-2020	26-Aug-2020	14-Aug-2020	26-Aug-2020	26-Aug-2020	14-Aug-2020	14-Aug-2020	✗	
Trip Spike Control										
EP080: BTEXN										
Amber VOC Vial - Sulfuric Acid (EP080)	TB	29-Jul-2020	26-Aug-2020	12-Aug-2020	26-Aug-2020	26-Aug-2020	12-Aug-2020	12-Aug-2020	✗	
Amber VOC Vial - Sulfuric Acid (EP080)	TS,	31-Jul-2020	26-Aug-2020	14-Aug-2020	26-Aug-2020	26-Aug-2020	14-Aug-2020	14-Aug-2020	✗	
Trip Spike Control										



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type	Method	Count			Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected			
Laboratory Duplicates (DUP)								
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Chloride by Discrete Analyser	ED045G	4	36	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite A	EG020A-F	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite B	EG020B-F	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Ferrous Iron by Discrete Analyser	EG051G	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Gross Alpha and Beta Activity	EA250	3	29	10.34	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Major Cations - Dissolved	ED093F	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	5	44	11.36	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfide as S2-	EK085	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Total Metals by ICP-MS - Suite A	EG020A-T	4	25	16.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Total Metals by ICP-MS - Suite B	EG020B-T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
TRH Volatiles/BTEX	EP080	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Laboratory Control Samples (LCS)								
Alkalinity by PC Titrator	ED037-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Chloride by Discrete Analyser	ED045G	4	36	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Ferrous Iron by Discrete Analyser	EG051G	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Gross Alpha and Beta Activity	EA250	2	29	6.90	10.00	✗	NEPM 2013 B3 & ALS QC Standard	
Major Cations - Dissolved	ED093F	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	6	44	13.64	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfide as S2-	EK085	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Total Metals by ICP-MS - Suite A	EG020A-T	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Total Metals by ICP-MS - Suite B	EG020B-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
TRH Volatiles/BTEX	EP080	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Method Blanks (MB)								
Chloride by Discrete Analyser	ED045G	2	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite B	EG020B-F	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Ferrous Iron by Discrete Analyser	EG051G	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Gross Alpha and Beta Activity	EA250	2	29	6.90	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Major Cations - Dissolved	ED093F	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	44	6.82	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfide as S2-	EK085	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Total Metals by ICP-MS - Suite A	EG020A-T	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Total Metals by ICP-MS - Suite B	EG020B-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	



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 Work Order : EM2014666
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Analytical Methods	Method	Count		Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected		
Method Blanks (MB) - Continued							
TRH Volatiles/BTEX	EP080	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	2	36	5.56	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	0	33	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
Ferrous Iron by Discrete Analyser	EG051G	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	44	6.82	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	33	6.06	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	0	25	0.00	5.00	✗	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Gross Alpha and Beta Activity	EA250	WATER	ASTM D7283-06: Determination of gross alpha and gross beta radioactivity in water samples by Liquid Scintillation Counting (LSC).
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-ENVED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-ENEG020. Samples are 0.45um 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	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-ENEG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Metals by ICP-MS - Suite B	EG020B-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-ENEG020. Samples are 0.45um 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 B	EG020B-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-ENEG020. 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.
Ferrous Iron by Discrete Analyser	EG051G	WATER	In house: Referenced to APHA 3500 Fe-B. A colorimetric determination based on the reaction between phenanthroline and ferrous iron at pH 3.2-3.3 to form an orange-red complex that is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3).



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 Work Order : EM2014666
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Analytical Methods		Method	Matrix	Method Descriptions
Sulfide as S2-DA	EK085	WATER	In house: Referenced to APHA 4500-S2-D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR; otherwise samples are measured using UV-VIS detection at 664nm. This method is compliant with NEPM Schedule B(3)	
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)	
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260. Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)	
Preparation Methods		Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to 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 Schedule B(3)	
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.	



ALS Laboratory, please tick →

CHAIN OF CUSTODY

CLIENT: EMM CONSULTING
OFFICE: 20 Chandos Street, St Leonards
PROJECT: Bairnsdale T3 Ancillary
PURCHASE ORDER:
PROJECT MANAGER: Paul Gibbons
SAMPLER: Henry Noakes / Kaitlyn Brodie
COC Enailed to ALS? (YES)
 Email Reports to: pgibbons@emmconsulting.com.au, dcondon@emmconsulting.com.au, kbrodie@emmconsulting.com.au
 Email Invoice to: accounts@emmconsulting.com.au, pgibbons@emmconsulting.com.au

TURNAROUND REQUIREMENTS:
 Standard TAT (List due date)
 Non Standard or urgent TAT (List due date)

FOR LABORATORY USE ONLY (Circle)
 Clarity Seal Intact? Yes No
 Free Job / Reason Ice Bricks present upon receipt? Yes No
 Random Sample Temperature on Receipt: 0-1 °C
 Other comment:

RECEIVED BY: Kaitlyn Brodie
DATE/TIME: 26/08/2020

RELINQUISHED BY: Henry Noakes
DATE/TIME: 26/08/2020

RECEIVED BY: [Signature]
DATE/TIME: 26/08/2020

RECEIVED BY: [Signature]
DATE/TIME: 26/08/2020

CONTACT PH: 0477702413
SAMPLER MOBILE: 0461818447
EDD FORMAT (or default):
 Email Reports to: pgibbons@emmconsulting.com.au, dcondon@emmconsulting.com.au, kbrodie@emmconsulting.com.au
 Email Invoice to: accounts@emmconsulting.com.au, pgibbons@emmconsulting.com.au

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to options below)	TOTAL BOTTLES	ANALYSIS REQUIRED INCLUDING SUITES (NB. Suite Codes must be listed to attract suite price). Where Metals are required, specify Total (unfiltered bottles required) or Disolved (filtered bottles required).	Additional Information
1	USM-M12D	24/08/2020 10:30	W	Lab / Analysis: Forward Lab / Split WO	4	Major Ions + Ionic Balance NT-1 & NT-2 Sulphide EDOCF (Yellow) Ferrous Iron (field filtered) EG051 Disolved metals (field filtered) EG020F (red) Total metals EG020F (red) Gross alpha beta EAZ50 (Green) TRM, BTEXN	Environmental Division Sydney Work Order Reference ES2030077
2	USM-M12S	24/08/2020 9:50	W	Lab / Analysis: Forward Lab / Split WO	4	Major Ions + Ionic Balance NT-1 & NT-2 Sulphide EDOCF (Yellow) Ferrous Iron (field filtered) EG051 Disolved metals (field filtered) EG020F (red) Total metals EG020F (red) Gross alpha beta EAZ50 (Green) TRM, BTEXN	<p>Telephone : + 61-2-9784 8655</p>
3	BH-M21D	24/08/2020 10:50	W	Lab / Analysis: Forward Lab / Split WO	5	Major Ions + Ionic Balance NT-1 & NT-2 Sulphide EDOCF (Yellow) Ferrous Iron (field filtered) EG051 Disolved metals (field filtered) EG020F (red) Total metals EG020F (red) Gross alpha beta EAZ50 (Green) TRM, BTEXN	
4	BH-M21S	24/08/2020 11:10	W	Lab / Analysis: Forward Lab / Split WO	6	Major Ions + Ionic Balance NT-1 & NT-2 Sulphide EDOCF (Yellow) Ferrous Iron (field filtered) EG051 Disolved metals (field filtered) EG020F (red) Total metals EG020F (red) Gross alpha beta EAZ50 (Green) TRM, BTEXN	
5	BH-M24D	24/08/2020 12:15	W	Lab / Analysis: Forward Lab / Split WO	5	Major Ions + Ionic Balance NT-1 & NT-2 Sulphide EDOCF (Yellow) Ferrous Iron (field filtered) EG051 Disolved metals (field filtered) EG020F (red) Total metals EG020F (red) Gross alpha beta EAZ50 (Green) TRM, BTEXN	
6	BH-M24S	24/08/2020 11:10	W	Lab / Analysis: Forward Lab / Split WO	4	Major Ions + Ionic Balance NT-1 & NT-2 Sulphide EDOCF (Yellow) Ferrous Iron (field filtered) EG051 Disolved metals (field filtered) EG020F (red) Total metals EG020F (red) Gross alpha beta EAZ50 (Green) TRM, BTEXN	
7	TS		W	Lab / Analysis: Forward Lab / Split WO	2	Major Ions + Ionic Balance NT-1 & NT-2 Sulphide EDOCF (Yellow) Ferrous Iron (field filtered) EG051 Disolved metals (field filtered) EG020F (red) Total metals EG020F (red) Gross alpha beta EAZ50 (Green) TRM, BTEXN	
8	TB		W	Lab / Analysis: Forward Lab / Split WO	2	Major Ions + Ionic Balance NT-1 & NT-2 Sulphide EDOCF (Yellow) Ferrous Iron (field filtered) EG051 Disolved metals (field filtered) EG020F (red) Total metals EG020F (red) Gross alpha beta EAZ50 (Green) TRM, BTEXN	
9	QA305	24/08/2020 0:00	W	Lab / Analysis: Forward Lab / Split WO	1	Major Ions + Ionic Balance NT-1 & NT-2 Sulphide EDOCF (Yellow) Ferrous Iron (field filtered) EG051 Disolved metals (field filtered) EG020F (red) Total metals EG020F (red) Gross alpha beta EAZ50 (Green) TRM, BTEXN	
10	TS	11TB 30/7	W	Lab / Analysis: Forward Lab / Split WO	33	Major Ions + Ionic Balance NT-1 & NT-2 Sulphide EDOCF (Yellow) Ferrous Iron (field filtered) EG051 Disolved metals (field filtered) EG020F (red) Total metals EG020F (red) Gross alpha beta EAZ50 (Green) TRM, BTEXN	

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved ORC; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide Preserved; S = Sodium Hydroxide Preserved Plastic; AP = Airflight Unpreserved Plastic
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulfate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airflight Unpreserved Vial SO = Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; U = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **ES2030077** Page : 1 of 8
Client : **EMM CONSULTING PTY LTD** Laboratory : Environmental Division Sydney
Contact : **PAUL GIBBONS** Contact : Customer Services ES
Address : **Ground Floor Suite 1 20 Chandos Street**
St Leonards NSW NSW 2065 Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : **----** Telephone : +61-2-8784 8555
Project : **S190512 Balranald T3 Ancillary** Date Samples Received : 26-Aug-2020 19:00
Order number : **----** Date Analysis Commenced : 28-Aug-2020
C-O-C number : **----** Issue Date : 10-Sep-2020 17:05
Sampler : **Henry Noakes / Kaitlyn Brodie**
Site : **----**
Quote number : **EN/112/18 - Primary work only**
No. of samples received : **11**
No. of samples analysed : **11**



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Titus Vimalasiri	Metals Teamleader	Radionuclides, Fyshwick, ACT



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Work Order : ES2030077
Client : EMM CONSULTING PTY LTD
Project : S190512 Balranald T3 Ancillary

General Comments

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

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

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

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

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

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

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

LOR = Limit of reporting

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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EG020/ED093: LOR's have been raised due to matrix interference. (High Total Dissolved Solids)
- EG035: Poor matrix spike recovery was obtained for Mercury on sample ES2030077 # 2. Confirmed by re-analysis.
- EP080: Sample TRIP SPIKE contains volatile compounds spiked into the sample containers prior to dispatch from the laboratory.
- LOR for Gross Alpha and Gross Beta raised due to high solid content.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID									
Compound	CAS Number	LOR	Unit	Client sampling date / time	UGM-M12D 24-Aug-2020 10:30 ES2030077-001	UGM-M12S 24-Aug-2020 09:50 ES2030077-002	BH-M21D 24-Aug-2020 10:50 ES2030077-003	BH-M21S 24-Aug-2020 11:10 ES2030077-004	BH-M24D 24-Aug-2020 12:15 ES2030077-005	Result	Result
ED037P: Alkalinity by PC Titrator											
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		403	325	416	354	426	426	426
Total Alkalinity as CaCO3	----	1	mg/L		403	325	416	354	426	426	426
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA											
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		3560	4600	3630	4360	3840	3840	3840
ED045G: Chloride by Discrete Analyser											
Chloride	16887-00-6	1	mg/L		20200	25500	20300	23700	20300	20300	20300
ED093F: Dissolved Major Cations											
Calcium	7440-70-2	1	mg/L		503	602	522	639	560	560	560
Magnesium	7439-95-4	1	mg/L		1340	1540	1440	1470	1360	1360	1360
Sodium	7440-23-5	1	mg/L		10600	14000	11400	13000	10800	10800	10800
Potassium	7440-09-7	1	mg/L		38	26	40	26	40	40	40
EG020F: Dissolved Metals by ICP-MS											
Arsenic	7440-38-2	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	7440-43-9	0.0001	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chromium	7440-47-3	0.001	mg/L		<0.010	<0.010	<0.010	0.012	<0.010	<0.010	<0.010
Copper	7440-50-8	0.001	mg/L		<0.010	0.011	<0.010	<0.010	0.467	<0.010	<0.010
Nickel	7440-02-0	0.001	mg/L		<0.010	0.018	<0.010	0.018	<0.010	<0.010	<0.010
Lead	7439-92-1	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	7440-66-6	0.005	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
EG020T: Total Metals by ICP-MS											
Arsenic	7440-38-2	0.001	mg/L		-----	-----	-----	<0.010	<0.010	<0.010	<0.010
Cadmium	7440-43-9	0.0001	mg/L		-----	-----	-----	<0.0010	<0.0010	<0.0010	<0.0010
Chromium	7440-47-3	0.001	mg/L		-----	-----	-----	0.014	<0.010	<0.010	<0.010
Copper	7440-50-8	0.001	mg/L		-----	-----	-----	<0.010	0.657	<0.010	<0.010
Nickel	7440-02-0	0.001	mg/L		-----	-----	-----	0.020	<0.010	<0.010	<0.010
Lead	7439-92-1	0.001	mg/L		-----	-----	-----	<0.010	<0.010	<0.010	<0.010
Zinc	7440-66-6	0.005	mg/L		-----	-----	-----	<0.052	<0.052	<0.052	<0.052
EG035F: Dissolved Mercury by FIMS											
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS											
Mercury	7439-97-6	0.0001	mg/L		-----	-----	-----	<0.0001	<0.0001	<0.0001	<0.0001
EG051G: Ferrous Iron by Discrete Analyser											



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID							
Compound	CAS Number	LOR	Unit	Client sampling date / time	UGM-M12D	UGM-M12S	BH-M21D	BH-M21S	BH-M24D
					ES2030077-001	ES2030077-002	ES2030077-003	ES2030077-004	ES2030077-005
					Result	Result	Result	Result	Result
EG051G: Ferrous Iron by Discrete Analyser - Continued									
Ferrous Iron	----	0.05	mg/L		1.62	<0.05	3.08	<0.05	0.09
EK085M: Sulfide as S2-									
Sulfide as S2-	18496-25-8	0.1	mg/L		1.5	<0.1	<0.1	<0.1	<0.1
EN055: Ionic Balance									
∅ Total Anions	----	0.01	meq/L		652	822	656	766	661
∅ Total Cations	----	0.01	meq/L		597	766	641	719	611
∅ Ionic Balance	----	0.01	%		4.37	3.47	1.16	3.19	3.96
EA250CA: Gross Alpha and Beta Activity									
Gross alpha	----	0.05	Bq/L		----	----	<0.96	2.42	----
Gross beta activity - 40K	----	0.10	Bq/L		----	----	<1.93	4.07	----



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID									
Compound	CAS Number	LOR	Unit	Client sampling date / time	BH-M24S	TS	TB	QA305	TS		
					Result	Result	Result	Result	Result		
ED037P: Alkalinity by PC Titrator											
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	*****	*****	*****	*****	*****	
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	*****	*****	*****	*****	*****	
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		346	*****	*****	*****	*****	*****	
Total Alkalinity as CaCO3	*****	1	mg/L		346	*****	*****	*****	*****	*****	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA											
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		4120	*****	*****	*****	*****	*****	
ED045G: Chloride by Discrete Analyser											
Chloride	16887-00-6	1	mg/L		22400	*****	*****	*****	*****	*****	
ED093F: Dissolved Major Cations											
Calcium	7440-70-2	1	mg/L		598	*****	*****	*****	*****	*****	
Magnesium	7439-95-4	1	mg/L		1350	*****	*****	*****	*****	*****	
Sodium	7440-23-5	1	mg/L		12600	*****	*****	*****	*****	*****	
Potassium	7440-09-7	1	mg/L		26	*****	*****	*****	*****	*****	
EG020F: Dissolved Metals by ICP-MS											
Arsenic	7440-38-2	0.001	mg/L		<0.010	*****	*****	*****	*****	*****	
Cadmium	7440-43-9	0.0001	mg/L		<0.0010	*****	*****	*****	*****	*****	
Chromium	7440-47-3	0.001	mg/L		<0.010	*****	*****	*****	*****	*****	
Copper	7440-50-8	0.001	mg/L		<0.010	*****	*****	*****	*****	*****	
Nickel	7440-02-0	0.001	mg/L		<0.010	*****	*****	*****	*****	*****	
Lead	7439-92-1	0.001	mg/L		<0.010	*****	*****	*****	*****	*****	
Zinc	7440-66-6	0.005	mg/L		<0.050	*****	*****	*****	*****	*****	
EG020T: Total Metals by ICP-MS											
Arsenic	7440-38-2	0.001	mg/L		*****	*****	*****	<0.001	*****	*****	
Cadmium	7440-43-9	0.0001	mg/L		*****	*****	*****	<0.0001	*****	*****	
Chromium	7440-47-3	0.001	mg/L		*****	*****	*****	<0.001	*****	*****	
Copper	7440-50-8	0.001	mg/L		*****	*****	*****	<0.001	*****	*****	
Nickel	7440-02-0	0.001	mg/L		*****	*****	*****	<0.001	*****	*****	
Lead	7439-92-1	0.001	mg/L		*****	*****	*****	<0.001	*****	*****	
Zinc	7440-66-6	0.005	mg/L		*****	*****	*****	<0.005	*****	*****	
EG035F: Dissolved Mercury by FIMS											
Mercury	7439-97-6	0.0001	mg/L		<0.0001	*****	*****	*****	*****	*****	
EG035T: Total Recoverable Mercury by FIMS											
Mercury	7439-97-6	0.0001	mg/L		*****	*****	*****	<0.0001	*****	*****	
EG051G: Ferrous Iron by Discrete Analyser											



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID				Client sampling date / time		Client sample ID		Client sampling date / time	
Compound	CAS Number	LOR	Unit	BH-M24S	TS	TB	QA305	TS	TS	TS	
				Result	Result	Result	Result	Result	Result	Result	
EG051G: Ferrous Iron by Discrete Analyser - Continued											
Ferrous Iron		0.05	mg/L	23.2							
EK085M: Sulfide as S2-											
Sulfide as S2-	18496-25-8	0.1	mg/L	0.2							
EN055: Ionic Balance											
∅ Total Anions		0.01	meq/L	724							
∅ Total Cations		0.01	meq/L	690							
∅ Ionic Balance		0.01	%	2.47							
EP080: BTEXN											
Benzene	71-43-2	1	µg/L			<1					
Toluene	108-88-3	2	µg/L			<2					
Ethylbenzene	100-41-4	2	µg/L			<2					
meta- & para-Xylene	108-38-3	2	µg/L			<2					
ortho-Xylene	95-47-6	2	µg/L			<2					
∧ Total Xylenes		2	µg/L			<2					
∧ Sum of BTEX		1	µg/L			<1					
Naphthalene	91-20-3	5	µg/L			<5					
EP080S: TPH(V)/BTEX Surrogates											
1,2-Dichloroethane-D4	17060-07-0	2	%		89.0	86.0				106	
Toluene-D8	2037-26-5	2	%		96.4	122				112	
4-Bromofluorobenzene	460-00-4	2	%		84.8	116				99.9	



Page : 7 of 8
 Work Order : ES2030077
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

Analytical Results

Compound	CAS Number	Client sample ID		TB
		Client sampling date / time	Unit	
EP080: BTEXN				
Benzene	71-43-2	1	µg/L	<1
Toluene	108-88-3	2	µg/L	<2
Ethylbenzene	100-41-4	2	µg/L	<2
meta- & para-Xylene	108-38-3	2	µg/L	<2
ortho-Xylene	95-47-6	2	µg/L	<2
^ Total Xylenes		2	µg/L	<2
^ Sum of BTEX		1	µg/L	<1
Naphthalene	91-20-3	5	µg/L	<5
EP080S: TPH(V)/BTEX Surrogates				
1,2-Dichloroethane-D4	17060-07-0	2	%	82.9
Toluene-D8	2037-26-5	2	%	114
4-Bromofluorobenzene	460-00-4	2	%	114



Page : 8 of 8
Work Order : ES2030077
Client : EMM CONSULTING PTY LTD
Project : S190512 Balranald T3 Ancillary

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	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128



Environmental

QUALITY CONTROL REPORT

Work Order : **ES2030077**

Page : 1 of 7

Client : **EMM CONSULTING PTY LTD**
 Contact : **PAUL GIBBONS**
 Address : **Ground Floor Suite 1 20 Chandos Street
 St Leonards NSW 2065**
 Telephone : **----**
 Project : **S190512 Balranald T3 Ancillary**
 Order number : **----**
 C-O-C number : **----**
 Sampler : **Henry Noakes / Kaitlyn Brodie**
 Site : **----**
 Quote number : **EN/112/18 - Primary work only**
 No. of samples received : **11**
 No. of samples analysed : **11**

Laboratory : **Environmental Division Sydney**
 Contact : **Customer Services ES**
 Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**
 Telephone : **+61-2-8784 8555**
 Date Samples Received : **26-Aug-2020**
 Date Analysis Commenced : **28-Aug-2020**
 Issue Date : **10-Sep-2020**



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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Titus Vimalasiri	Metals Teamleader	Radionuclides, Fyshwick, ACT



Page : 2 of 7
 Work Order : ES2030077
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Bairnald T3 Ancillary

General Comments

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

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

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

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

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
EA250CA: Gross Alpha and Beta Activity (QC Lot: 3241421)									
EM2014666-024	Anonymous	EA250: Gross alpha	----	0.05	Bq/L	2.45	1.42	53.3	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	<2.15	2.27	5.55	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3230444)									
ES2030077-004	BH-M21S	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	354	349	1.57	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	354	349	1.57	0% - 20%
ES2029950-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	696	694	0.289	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	696	694	0.289	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3228751)									
ES2030109-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	148	142	3.88	0% - 20%
ES2030077-001	UGM-M12D	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3560	3540	0.598	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3228746)									
ES2030077-001	UGM-M12D	ED045G: Chloride	16887-00-6	1	mg/L	20200	21500	5.84	0% - 20%
ES2029935-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	2	2	0.00	No Limit
ED093F: Dissolved Major Cations (QC Lot: 3241128)									
ES2030077-001	UGM-M12D	ED093F: Calcium	7440-70-2	1	mg/L	503	525	4.25	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1340	1380	2.87	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10600	11100	4.44	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	38	40	5.01	0% - 20%
ES2031164-005	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	5	5	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	10	10	0.00	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 (%)		
ED093F: Dissolved Major Cations (QC Lot: 3241128) - continued											
ES2031164-005	Anonymous	ED093F: Sodium	7440-23-5	1	mg/L	47	48	0.00	0% - 20%		
		ED093F: Potassium	7440-09-7	1	mg/L	5	5	0.00	No Limit		
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3241130)											
ES2030077-001	UGM-M12D	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit		
		EG020A-F: Arsenic	7440-39-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit		
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	0.00	No Limit		
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.00	No Limit		
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit		
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	0.00	No Limit		
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	0.00	No Limit		
ES2031164-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit		
		EG020A-F: Arsenic	7440-39-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.001	0.001	0.00	No Limit		
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit		
EG020T: Total Metals by ICP-MS (QC Lot: 3243386)											
ES2030077-004	BH-M21S	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit		
		EG020A-T: Arsenic	7440-39-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit		
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.014	0.014	0.00	No Limit		
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.00	No Limit		
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit		
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.020	0.014	33.0	No Limit		
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.052	<0.052	0.00	No Limit		
ES2031055-008	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit		
		EG020A-T: Arsenic	7440-39-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit		
EG035F: Dissolved Mercury by FIMS (QC Lot: 3241129)											
ES2030077-003	BH-M21D	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit		
ES2030909-004	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit		
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3243391)											
ES2030077-009	QA305	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit		
ES2031118-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit		
EG051G: Ferrous Iron by Discrete Analyser (QC Lot: 3229847)											



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 Work Order : ES2030077
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Bairanald T3 Ancillary

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report				Recovery Limits (%)	
				LOR	Unit	Original Result	Duplicate Result		RPD (%)
EG051G: Ferrrous Iron by Discrete Analyser (QC Lot: 3229847) - continued									
ES2029982-001	Anonymous	EG051G: Ferrrous Iron	---	0.05	mg/L	<0.05	<0.05	0.00	No Limit
ES2030077-003	BH-M21D	EG051G: Ferrrous Iron	---	0.05	mg/L	3.08	3.11	0.889	0% - 20%
EK085M: Sulfide as S2- (QC Lot: 3226065)									
ES2029568-001	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES2030077-005	BH-M24D	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080: BTEXN (QC Lot: 3224246)									
ES2030176-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
ES2030176-005	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit



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 Work Order : ES2030077
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Bairnald T3 Ancillary

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

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

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Concentration	Spike Recovery (%)	LCS	Low	High
EA250CA: Gross Alpha and Beta Activity (QCLot: 3241421)									
EA250: Gross alpha	----	0.05	Bq/L	<0.05	1751 Bq/L	99.8	---	95.2	105
EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	----	----	----	----	----
ED037P: Alkalinity by PC Titrator (QCLot: 3230444)									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	94.2	---	81.0	111
				----	50 mg/L	108	---	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3228751)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	---	82.0	122
				<1	500 mg/L	108	---	82.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 3228746)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	113	---	80.9	127
				<1	1000 mg/L	109	---	80.9	127
ED093F: Dissolved Major Cations (QCLot: 3241128)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	93.5	---	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	96.2	---	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	97.2	---	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.4	---	85.0	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 3241130)									
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	94.6	---	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.1	---	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	88.4	---	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	91.4	---	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	91.5	---	83.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	91.8	---	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.4	---	81.0	117
EG020T: Total Metals by ICP-MS (QCLot: 3243386)									
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	98.0	---	82.0	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	98.0	---	84.0	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	101	---	86.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	96.1	---	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.9	---	85.0	115
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.3	---	84.0	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	95.3	---	79.0	117
EG035F: Dissolved Mercury by FIMS (QCLot: 3241129)									
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	97.7	---	83.0	105



Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Concentration	Spike Recovery (%)	Recovery Limits (%)	Low	High
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3243391)									
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	95.0	77.0	111	
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3229847)									
EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	2 mg/L	103	89.0	117	
EK085M: Sulfide as S2- (QCLot: 3226066)									
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	102	76.0	116	
EP080: BTEXN (QCLot: 3224246)									
EP080: Benzene	71-43-2	1	µg/L	<1	10 µg/L	93.3	70.0	122	
EP080: Toluene	108-88-3	2	µg/L	<2	10 µg/L	105	69.0	123	
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	10 µg/L	108	70.0	120	
EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	10 µg/L	107	69.0	121	
EP080: ortho-Xylene	106-42-3	2	µg/L	<2	10 µg/L	107	72.0	122	
EP080: Naphthalene	91-20-3	5	µg/L	<5	10 µg/L	99.3	70.0	120	

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Matrix Spike (MS) Report	
					Spike Recovery(%)	Recovery Limits (%)
				MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3228751)						
ES2030077-001	UGM-M12D	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	130
ED045G: Chloride by Discrete Analyser (QCLot: 3228746)						
ES2029952-001	Anonymous	ED045G: Chloride	16887-00-6	250 mg/L	118	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3241130)						
ES2030077-004	BH-M21S	EG020A-F: Arsenic	7440-38-2	10 mg/L	102	130
		EG020A-F: Cadmium	7440-43-9	2.5 mg/L	98.4	130
		EG020A-F: Chromium	7440-47-3	10 mg/L	98.6	130
		EG020A-F: Copper	7440-50-8	10 mg/L	99.0	130
		EG020A-F: Lead	7439-92-1	10 mg/L	97.8	130
		EG020A-F: Nickel	7440-02-0	10 mg/L	101	130
		EG020A-F: Zinc	7440-66-6	10 mg/L	101	130
EG020T: Total Metals by ICP-MS (QCLot: 3243386)						
ES2030077-005	BH-M24D	EG020A-T: Arsenic	7440-38-2	1 mg/L	103	130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	98.4	130



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 Client : EMM CONSULTING PTY LTD
 Project : S190512 Bairanald T3 Ancillary

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low High
EG020T: Total Metals by ICP-MS (QCLot: 3243386) - continued						
ES2030077-005	BH-M24D	EG020A-T: Chromium	7440-47-3	1 mg/L	98.0	70.0 130
		EG020A-T: Copper	7440-50-8	1 mg/L	99.9	70.0 130
		EG020A-T: Lead	7439-92-1	1 mg/L	94.7	70.0 130
		EG020A-T: Nickel	7440-02-0	1 mg/L	104	70.0 130
		EG020A-T: Zinc	7440-66-6	1 mg/L	104	70.0 130
EG035F: Dissolved Mercury by FIMS (QCLot: 3241129)						
ES2030077-002	UGM-M12S	EG035F: Mercury	7439-97-6	0.01 mg/L	# 49.8	70.0 130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3243391)						
ES2031055-001	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	90.1	70.0 130
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3229847)						
ES2029982-001	Anonymous	EG051G: Ferrous Iron	----	1 mg/L	101	70.0 130
EK085M: Sulfide as S2- (QCLot: 3226065)						
ES2029568-001	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	100	70.0 130
EP080: BTEXN (QCLot: 3224246)						
ES2030176-001	Anonymous	EP080: Benzene	71-43-2	25 µg/L	82.8	70.0 130
		EP080: Toluene	108-88-3	25 µg/L	98.0	70.0 130
		EP080: Ethylbenzene	100-41-4	25 µg/L	104	70.0 130
		EP080: meta- & para-Xylene	108-38-3	25 µg/L	104	70.0 130
			106-42-3			
		EP080: ortho-Xylene	95-47-6	25 µg/L	104	70.0 130
		EP080: Naphthalene	91-20-3	25 µg/L	97.4	70.0 130



ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2030077	Page	: 1 of 8
Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: PAUL GIBBONS	Telephone	: +61-2-8784 8555
Project	: S190512 Balranald T3 Ancillary	Date Samples Received	: 26-Aug-2020
Site	: ----	Issue Date	: 10-Sep-2020
Sampler	: Henry Noakes / Kaitlyn Brodie	No. of samples received	: 11
Order number	: ----	No. of samples analysed	: 11

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- NO Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples
 Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA	ES2030077-001	UGM-M12D	Sulfate as SO4 - Turbidimetric	14808-79-8	Not Determined	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EG035F: Dissolved Mercury by FIMS	ES2030077-002	UGM-M12S	Mercury	7439-97-6	49.8 %	70.0-130%	Recovery less than lower data quality objective

Outliers : Analysis Holding Time Compliance

Matrix: WATER

Method Container / Client Sample ID(s)	Extraction / Preparation		Days overdue	Analysis		Days overdue
	Date extracted	Due for extraction		Date analysed	Due for analysis	
EP080: BTEXN						
Amber VOC Vial - Sulfuric Acid TB	02-Sep-2020	12-Aug-2020	21	02-Sep-2020	12-Aug-2020	21
Amber VOC Vial - Sulfuric Acid TB	02-Sep-2020	13-Aug-2020	20	02-Sep-2020	13-Aug-2020	20

Analysis Holding Time Compliance

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

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

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

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

Matrix: WATER

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

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation		Analysis		
		Date extracted	Due for extraction	Date analysed	Due for analysis	
EA260CA: Gross Alpha and Beta Activity						
Clear Plastic Bottle - Natural (EA250) BH-M21D, BH-M21S	24-Aug-2020	----	----	07-Sep-2020	20-Feb-2021	✓
ED037P: Alkalinity by PC Titrator						
Clear Plastic Bottle - Natural (ED037-P) UGM-M12D, BH-M21D, BH-M24D,	24-Aug-2020	----	----	31-Aug-2020	07-Sep-2020	✓



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 Work Order : ES2030077
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

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

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
UGM-M12S, BH-M21S, BH-M24S	24-Aug-2020	----	----	----	31-Aug-2020	21-Sep-2020	✓	
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
UGM-M12S, BH-M21S, BH-M24S	24-Aug-2020	----	----	----	31-Aug-2020	21-Sep-2020	✓	
ED093F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)								
UGM-M12S, BH-M21S, BH-M24S	24-Aug-2020	----	----	----	07-Sep-2020	21-Sep-2020	✓	
EG020F: Dissolved Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)								
UGM-M12S, BH-M21S, BH-M24S	24-Aug-2020	----	----	----	07-Sep-2020	20-Feb-2021	✓	
EG020T: Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)								
BH-M24D, QA305	24-Aug-2020	08-Sep-2020	20-Feb-2021	✓	08-Sep-2020	20-Feb-2021	✓	
EG035F: Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)								
UGM-M12D, BH-M21D, BH-M24D,	24-Aug-2020	----	----	----	08-Sep-2020	21-Sep-2020	✓	
EG035T: Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)								
BH-M21S, QA305	24-Aug-2020	----	----	----	08-Sep-2020	21-Sep-2020	✓	
EG051G: Ferrous Iron by Discrete Analyser								
Clear Plastic Bottle - HCl - Filtered (EG051G)								
UGM-M12D, BH-M21D, BH-M24D,	24-Aug-2020	----	----	----	31-Aug-2020	31-Aug-2020	✓	



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 Work Order : ES2030077
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

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

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EK085M: Sulfide as S2- Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)								
UGM-M12D, BH-M21D, BH-M24D,	UGM-M12S, BH-M21S, BH-M24S	----	----	----	28-Aug-2020	31-Aug-2020	✓	
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)		02-Sep-2020	12-Aug-2020	*	02-Sep-2020	12-Aug-2020	*	
TB								
Amber VOC Vial - Sulfuric Acid (EP080)		02-Sep-2020	13-Aug-2020	*	02-Sep-2020	13-Aug-2020	*	
TB								



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type	Method	Count			Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected			
Laboratory Duplicates (DUP)								
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Mercury by FIMS	EG035F	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Ferrous Iron by Discrete Analyser	EG051G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Gross Alpha and Beta Activity	EA250	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Major Cations - Dissolved	ED093F	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfide as S2-	EK085	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Total Mercury by FIMS	EG035T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Total Metals by ICP-MS - Suite A	EG020A-T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
TRH Volatiles/BTEX	EP080	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Laboratory Control Samples (LCS)								
Alkalinity by PC Titrator	ED037-P	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Chloride by Discrete Analyser	ED045G	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Mercury by FIMS	EG035F	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Ferrous Iron by Discrete Analyser	EG051G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Gross Alpha and Beta Activity	EA250	1	9	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	15	13.33	10.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfide as S2-	EK085	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Method Blanks (MB)								
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Mercury by FIMS	EG035F	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Ferrous Iron by Discrete Analyser	EG051G	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Gross Alpha and Beta Activity	EA250	1	9	11.11	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Major Cations - Dissolved	ED093F	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	15	6.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Sulfide as S2-	EK085	1	19	5.26	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard	



Page : 6 of 8
 Work Order : ES2030077
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Analytical Methods	Method	Count		Rate (%)		Quality Control Specification
		QC	Regular	Actual	Expected		Eff aluation
Method Blanks (MB) - Continued						
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Matrix Spikes (MS)						
Chloride by Discrete Analyser	ED045G	1	20	5.00	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Dissolved Mercury by FIMS	EG035F	1	19	5.26	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	14	7.14	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Ferrous Iron by Discrete Analyser	EG051G	1	20	5.00	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	15	6.67	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Sulfide as S2-	EK085	1	19	5.26	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	NEPM 2013 B3 & ALS QC Standard ✓
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	5.00	5.00	NEPM 2013 B3 & ALS QC Standard ✓
TRH Volatiles/BTEX	EP080	1	19	5.26	5.00	NEPM 2013 B3 & ALS QC Standard ✓



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Gross Alpha and Beta Activity	EA250	WATER	ASTM D7283-06: Determination of gross alpha and gross beta radioactivity in water samples by Liquid Scintillation Counting (LSC).
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45µm filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-ENVED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-ENEG020. Samples are 0.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICP-MS - Suite A	EG020A-T	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-ENEG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45µm filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by 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 Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 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 Schedule B(3).



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 Work Order : ES2030077
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

Analytical Methods		Method	Matrix	Method Descriptions
Ferrous Iron by Discrete Analyser	EG051G	WATER	In house: Referenced to APHA 3500 Fe-B. A colorimetric determination based on the reaction between phenanthroline and ferrous iron at pH 3.2-3.3 to form an orange-red complex that is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3).	
Sulfide as S2-	EK085	WATER	In house: Referenced to APHA 4500-S2-D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR, otherwise samples are measured using UV-VIS detection at 664nm. This method is compliant with NEPM Schedule B(3)	
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)	
TRH Volatiles/BTEX	EP080	WATER	In house: Referenced to USEPA SW 846 - 8260. Water samples are directly purged prior to analysis by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. Alternatively, a sample is equilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant with the QC requirements of NEPM Schedule B(3)	
Preparation Methods		Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to 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 Schedule B(3)	
Volatiles Water Preparation	ORG16-W	WATER	A 5 mL aliquot or 5 mL of a diluted sample is added to a 40 mL VOC vial for sparging.	

9

Scott Huett

From: Shane Colley
Sent: Thursday, 17 September 2020 3:25 PM
To: Samples Melbourne
Subject: FW: [EXTERNAL] - Please help
Attachments: EM2014666_COC.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: Client amendment

Hi guys

Can you check if we still have any of the bottles for EM2014666 – 32 + 33? Green, yellow sulphide, ferrous iron, metals and metals filtered (MG1818-20+25, MM184-86, MR 440-42). If so, can they be forwarded to Eurofins to be analysed at per the attached COC? Let me know. *EnviroLab*

Regards,

Shane Colley
Client Services Officer - Springvale
Environmental



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From: Kaitlyn Brodie <kbrodie@emmconsulting.com.au>
Sent: Thursday, 17 September 2020 3:18 PM
To: Shane Colley <shane.colley@ALSGlobal.com>
Cc: Dan Condon <dcondon@emmconsulting.com.au>
Subject: [EXTERNAL] - Please help

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Relinq by Milka 17/09



Hi Shane,

Just to clarify my earlier request...

In August I forgot to request samples QA101 and QA201 from 23/08/2020 to be forwarded to Enviro Lab for a full suite analysis. If the samples are still available could you please forward them to Enviro Lab now for a full analysis (COC attached). If there isn't enough sample to do a full suite, just the metals is fine.

Secondly, I have been sampling PSD_01 and PSD_02 for Particle Sizing in Water by Laser Diffraction (EA154) since 11/09/2020 and will continue to sample daily until approximately 11/10/2020. Is it possible to keep the results of PSD_01 and PSD_02 on a separate report?

Thanks for your help, let me know if you need any more details.

Kaitlyn

Kaitlyn Brodie

Hydrogeologist



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Relinq by Milika 17/09

CERTIFICATE OF ANALYSIS 22545

Client Details

Client	EMM
Attention	Paul Gibbons
Address	187 Coventry Street, South Melbourne, VIC, 3205

Sample Details

Your Reference	S190512
Number of Samples	2 WATER
Date samples received	17/09/2020
Date completed instructions received	17/09/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	24/09/2020
Date of Issue	24/09/2020
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Chris De Luca, Operations Manager

Authorised By

P. Adams

Pamela Adams, Laboratory Manager

HM in water - dissolved			
Our Reference		22545-1	22545-2
Your Reference	UNITS	QA101	QA201
Date Sampled		23/08/2020	23/08/2020
Type of sample		WATER	WATER
Date prepared	-	21/09/2020	21/09/2020
Date analysed	-	21/09/2020	21/09/2020
Arsenic-Dissolved	µg/L	<1	<1
Cadmium-Dissolved	µg/L	<0.2	<0.2
Chromium-Dissolved	µg/L	3	3
Copper-Dissolved	µg/L	130	120
Lead-Dissolved	µg/L	<1	<1
Nickel-Dissolved	µg/L	9	8
Zinc-Dissolved	µg/L	35	32
Mercury-Dissolved	µg/L	<0.05	<0.05

Miscellaneous Inorganics			
Our Reference		22545-1	22545-2
Your Reference	UNITS	QA101	QA201
Date Sampled		23/08/2020	23/08/2020
Type of sample		WATER	WATER
Date prepared	-	23/09/2020	23/09/2020
Date analysed	-	23/09/2020	23/09/2020
Sulphide	mg/L	<0.5	<0.5
Ferrous Iron	mg/L	<0.05	<0.05

Ion Balance			
Our Reference		22545-1	22545-2
Your Reference	UNITS	QA101	QA201
Date Sampled		23/08/2020	23/08/2020
Type of sample		WATER	WATER
Date prepared	-	21/09/2020	21/09/2020
Date analysed	-	21/09/2020	21/09/2020
Calcium - Dissolved	mg/L	650	620
Potassium - Dissolved	mg/L	34	34
Sodium - Dissolved	mg/L	13,000	13,000
Magnesium - Dissolved	mg/L	1,700	1,600
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	270	270
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5
Total Alkalinity as CaCO ₃	mg/L	270	270
Sulphate, SO ₄	mg/L	5,100	4,900
Chloride, Cl	mg/L	25,000	25,000
Hardness	mgCaCO ₃ /L	8,700	8,200
Ionic Balance	%	-4.1	-4.6

Method ID	Methodology Summary
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.
Inorg-051	Sulphide determined titrimetrically based on APHA latest edition 4500 S2- F. Note, the Sulphide is termed as Total Sulphide given any Sulphide contained in any sediment present may also included in the determination.
Inorg-076	A sample is determined colourimetrically by discrete analyser as referenced in APHA 3500 Fe-B (phenanthroline method). Water samples are filtered on receipt prior to analysis.
Inorg-087	Chloride by colourimetry using Discrete Analyser
Inorg-115	Sulphate by turbidity using Discrete Analyser
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.

Client Reference: S190512

QUALITY CONTROL: HM in water - dissolved					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			21/09/2020	[NT]	[NT]	[NT]	[NT]	21/09/2020	[NT]
Date analysed	-			21/09/2020	[NT]	[NT]	[NT]	[NT]	21/09/2020	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05	[NT]	[NT]	[NT]	[NT]	100	[NT]

Client Reference: S190512

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			23/09/2020	[NT]	[NT]	[NT]	[NT]	23/09/2020	[NT]
Date analysed	-			23/09/2020	[NT]	[NT]	[NT]	[NT]	23/09/2020	[NT]
Sulphide	mg/L	0.5	Inorg-051	<0.5	[NT]	[NT]	[NT]	[NT]	82	[NT]
Ferrous Iron	mg/L	0.05	Inorg-076	<0.05	[NT]	[NT]	[NT]	[NT]	112	[NT]

QUALITY CONTROL: Ion Balance				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			21/09/2020	[NT]	[NT]	[NT]	[NT]	21/09/2020	[NT]
Date analysed	-			21/09/2020	[NT]	[NT]	[NT]	[NT]	21/09/2020	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	89	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	92	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	85	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	88	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	107	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	107	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-115	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Chloride, Cl	mg/L	1	Inorg-087	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Sulphide analysed by Envirolab Sydney, report number 251656.

Sulphide, Ferrous Iron, Alkalinity have exceeded the recommended technical holding times, Envirolab Group Form 347 "Recommended Preservation and Holding Times" can be provided on request (available on the Envirolab website)

METALS: The PQL has been raised for Cadmium due to the sample matrix requiring dilution.



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From: Kaitlyn Brodie <kbrodie@emmconsulting.com.au>

Sent: Sunday, 13 September 2020 3:22 PM

To: ALS Enviro Melbourne <ALSEnviroMelbourne@ALSGlobal.com>; Shane Colley <shane.colley@ALSGlobal.com>

Cc: Dan Condon <dcondon@emmconsulting.com.au>; Bill Bull <bbull@emmconsulting.com.au>; Joel Georgiou <jgeorgiou@emmconsulting.com.au>; Paul Gibbons <pgibbons@emmconsulting.com.au>

Subject: [EXTERNAL] - COC for 4 eskys - S190512

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Good afternoon,

Attached is the COC for job number S190512.

4 eskys will be posted tomorrow (14/09/2020) and should arrive by Tuesday at the latest.

Let me know if you have any questions.

Thanks

Kaitlyn

Kaitlyn Brodie

Hydrogeologist



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M 0401 881 447

Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065

EMM'S BUSINESS
CONTINUITY PLAN
FOR COVID-19

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Gemma Smeaton

From: Kaitlyn Brodie <kbrodie@emmconsulting.com.au>
Sent: Monday, 14 September 2020 5:52 PM
To: ALS Enviro Melbourne; Shane Colley
Cc: Dan Condon; Bill Bull; Joel Georgiou; Paul Gibbons
Subject: [EXTERNAL] - RE: COC for 4 eskys - S190512
Attachments: COC S190512 20200914.xlsx; RE: [EXTERNAL] - FW: Particle Size Distribution Testing

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Hi Shane and team,

Attached is an updated COC. PSD_01 and PSD_02 samples need to be analysed for laser particle sizing.

Could you please advise the code number?

Thank you sorry for the last minute change

Kaitlyn

Kaitlyn Brodie

Hydrogeologist

M 0401 881 447

www.emmconsulting.com.au

From: Kaitlyn Brodie
Sent: Sunday, 13 September 2020 3:22 PM
To: alsenviro.melbourne@alsglobal.com; Shane Colley <shane.colley@ALSGlobal.com>
Cc: Dan Condon <dcondon@emmconsulting.com.au>; Bill Bull <bbull@emmconsulting.com.au>; Joel Georgiou <jgeorgiou@emmconsulting.com.au>; Paul Gibbons <pgibbons@emmconsulting.com.au>
Subject: COC for 4 eskys - S190512

Good afternoon,

Attached is the COC for job number S190512.

4 eskys will be posted tomorrow (14/09/2020) and should arrive by Tuesday at the latest.

Let me know if you have any questions.

Thanks

Kaitlyn

Kaitlyn Brodie

Hydrogeologist



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 Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065

EMM'S BUSINESS
CONTINUITY PLAN
FOR COVID-19

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Environmental

CERTIFICATE OF ANALYSIS

Work Order : E2 037MBUBAA Page : 1 of 12
Client : E2 2 CONSGLTINP DTY LTI Laboratory : Environmental Division Melbourne
Contact : PAUL GIBBONS Contact : Shane Colley
Address : Ground Floor Suite 1 20 Chandos Street Address : 4 Westall Rd Springvale VIC Australia 3171
St Leonards NSW NSW 2065
Telephone : Telephone : +61-3-8549 9600
Project : S190512 Date Samples Received : 16-Sep-2020 10:15
Order number : Date Analysis Commenced : 17-Sep-2020
C-O-C number : Issue Date : 28-Sep-2020 16:35
Sampler : BB, KB
Site :
Quote number : EN/112/18 - Primary work only
No. of samples received : 24
No. of samples analysed : 24



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Address: 123 Main St, Melbourne VIC 3000. Contact: 03 1234 5678. Email: info@rightpartner.com.au

Signatories

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

Signatories	Position	Accreditation Category
Arenie Vijayaratham	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Titus Vimalasiri	Metals Teamleader	Radionuclides, Fyshwick, ACT



Page : 2 of 12
Work Order : EM2016060-AA
Client : EMM CONSULTING PTY LTD
Project : S190512

General Comments

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

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

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

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

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

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

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

LOR = Limit of reporting

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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EK085: EM2016060-017 required dilution prior to analysis due to matrix interferences. LOR has been raised accordingly.
- EP080: Samples EM2016060_018,029 TRIP SPIKE and TRIP SPIKE CONTROL contains volatile compounds spiked into the sample containers prior to dispatch from the laboratory.
- EG020-T : EM2016060 #2, #4, #7, #13, #14 total metal required dilution prior analysis due to sample matrix. LORs have been adjusted accordingly.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EG020-T : EM2016060 #19-23 results for total metal have been confirmed by re-digestion and re-analysis.
- EG020-F : EM2016060 #1-17 dissolved metal required dilution prior analysis due to sample matrix. LORs have been adjusted accordingly.
- EG035T: EM2016060 #4 Poor matrix spike recovery for total mercury due to sample matrix. Confirmed by re-extraction and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- LOR for Gross Alpha and Gross Beta raised due to high solid content.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- EK085: EM2016060-002 Poor matrix spike recovery for sulphide due to sample matrix. Confirmed by re-extraction and re-analysis.
- EG035T: EM2016060 #7 sample results for total mercury confirmed by re-extraction and re-analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER Matrix: WATER-		Client sample ID									
Compound	CAS Number	LOR	Unit	Client sampling date / time	GP 2 U 71	GP 2 U 75	GP 2 U 01	GP 2 U 0S	GP 2 U 701	Result	Result
Ei 3()D: Afkl ftaŋ u, DC Ttrl ror											
5, droxide Afkl ftaŋ l wCl CO(	DMO-210-001	1	mg/L	11-Sep-2020 15:00	<1	<1	<1	<1	<1	<1	<1
Cl ruoal re Afkl ftaŋ l wCl CO(	3812-32-6	1	mg/L	12-Sep-2020 15:00	<1	<1	<1	<1	<1	<1	<1
6 tQ ruoal re Afkl ftaŋ l wCl CO(	71-52-3	1	mg/L	11-Sep-2020 14:20	()0	(44	(84	0MB	(83	(84	(83
Tor f Afkl ftaŋ l wCl CO(	----	1	mg/L	11-Sep-2020 15:00	()0	(44	(84	0MB	(83	(84	(83
Ei 317P : Sgrfne Hgrutdp errtQ. l wSO1 0Uu, i A											
Sgrfne l wSO1 Utgrutdp errtQ	14808-79-8	1	mg/L	11-Sep-2020 15:20	(133	(1) 33	(M)3	1(MB	(103	(M)3	(103
Ei 314P : Csforde u, i twQere Aal f, wer											
Csforde	16887-00-6	1	mg/L	11-Sep-2020 14:20	78(33	0() 33	79(33	07033	03433	79(33	07033
Ei 39(F: i twof. ed 2 l jor Cl rtoaw											
Cl rQgp	7440-70-2	1	mg/L	11-Sep-2020 15:00	M)M	803	4) 9	) 10	409	4) 9	) 10
2 l caewgtp	7439-95-4	1	mg/L	11-Sep-2020 15:00	7403	7M63	7473	7M63	74MB	7473	7M63
Sodtgp	7440-23-5	1	mg/L	11-Sep-2020 15:00	73833	71333	73) 33	70333	77133	73) 33	70333
Dorl wtgtp	7440-09-7	1	mg/L	11-Sep-2020 15:00	44	1(	40	1M	41	40	1M
EP303F: i twof. ed 2 eri fwu, lCDI2 S											
ArweatQ	7440-38-2	0.001	mg/L	11-Sep-2020 15:00	<0.002	3*33	3*30	3*30	<0.002	3*33	<0.002
Cl dp tgp	7440-43-9	0.0001	mg/L	11-Sep-2020 15:00	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Csrop tgp	7440-47-3	0.001	mg/L	11-Sep-2020 15:00	<0.002	<0.002	<0.002	3*34	<0.002	3*34	<0.002
Cohher	7440-50-8	0.001	mg/L	11-Sep-2020 15:00	<0.002	<0.002	<0.002	3*33(	<0.002	3*33(	<0.002
NtQref	7440-02-0	0.001	mg/L	11-Sep-2020 15:00	3*30	3*33(	3*30	3*377	<0.002	3*377	<0.002
Lel d	7439-92-1	0.001	mg/L	11-Sep-2020 15:00	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
ZtaQ	7440-66-6	0.005	mg/L	11-Sep-2020 15:00	<0.010	<0.010	3*31(	<0.010	<0.010	3*31(	<0.010
EP303T: Tor f 2 eri fwu, lCDI2 S											
ArweatQ	7440-38-2	0.001	mg/L	11-Sep-2020 15:00	UUU	3*39	UUU	3*33(	UUU	3*33(	UUU
Cl dp tgp	7440-43-9	0.0001	mg/L	11-Sep-2020 15:00	UUU	<0.0002	UUU	<0.0002	UUU	<0.0002	UUU
Csrop tgp	7440-47-3	0.001	mg/L	11-Sep-2020 15:00	UUU	<0.002	UUU	3*373	UUU	3*373	UUU
Cohher	7440-50-8	0.001	mg/L	11-Sep-2020 15:00	UUU	3*30	UUU	3*339	UUU	3*339	UUU
NtQref	7440-02-0	0.001	mg/L	11-Sep-2020 15:00	UUU	3*34	UUU	3*303	UUU	3*303	UUU
Lel d	7439-92-1	0.001	mg/L	11-Sep-2020 15:00	UUU	<0.002	UUU	<0.002	UUU	<0.002	UUU
ZtaQ	7440-66-6	0.005	mg/L	11-Sep-2020 15:00	UUU	<0.010	UUU	<0.010	UUU	<0.010	UUU
EP3(4F: i twof. ed 2 erQgr, u, F12 S											
2 erQgr,	7439-97-6	0.0001	mg/L	11-Sep-2020 15:00	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EP3(4T: Tor f ReQb. erl ufe 2 erQgr, u, F12 S											
2 erQgr,	7439-97-6	0.0001	mg/L	11-Sep-2020 15:00	UUU	<0.0001	UUU	<0.0001	UUU	<0.0001	UUU
EP347P : Ferrogwiroa u, i twQere Aal f, wer											



Page : 4 of 12
 Work Order : EMM2016060-AA
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Analytical Results

Sub-Matrix: WATER Matrix: WATER-		Client sample ID							
Compound	CAS Number	LOR	Unit	Client sampling date / time	GP 2 U 71	GP 2 U 75	GP 2 U 01	GP 2 U 05	GP 2 U 701
					11-Sep-2020 15:00	11-Sep-2020 14:20	12-Sep-2020 15:20	12-Sep-2020 15:00	11-Sep-2020 12:20
					E2 037NBMB337	E2 037NBMB330	E2 037NBMB333	E2 037NBMB331	E2 037NBMB334
					Result	Result	Result	Result	Result
EP347P : Ferrogwiroa u, i twQere Aal f, wef UCoartaged									
Ferrogwiroa	----	0.05	mg/L		0.0M	3.01	1.0	<0.05	7.80
EK3842 : Sgfrtde l wS0U	18496-25-8	0.1	mg/L		<0.1	<0.1	3.7	<0.1	3.4
EN344 : loatQ6 l fi aQe									
Ø Torf Aatoaw	----	0.01	meq/L		491	) (	M8	M81	M8)
Ø Torf Cl rtoaw	----	0.01	meq/L		M8	) 89	M3	M88	M80
Ø loatQ6 l fi aQe	----	0.01	%		0.7	7.97	3.11	3.17	3.18



Analytical Results

Sub-Matrix: WATER HMatrix: WATER-		Client sample ID									
Compound	CAS Number	LOR	Unit	Client sampling date / time	GP2 U 70S	GP2 U 74S	65 U 7M	65 U 7MS	65 U 7MI	65 U 7O1	
					E2 037NBMBU33M	E2 037NBMBU33	E2 037NBMBU338	E2 037NBMBU339	E2 037NBMBU373		
					Result	Result	Result	Result	Result	Result	
Ei 3 () D: Afkl ftatn u, DC Ttrrl rbr											
5, droxide Afkl ftatn I wCl CO(	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1	<1
Cl ruoal re Afkl ftatn I wCl CO(	3812-32-6	1	mg/L		<1	<1	<1	<1	<1	<1
6 tQ ruoal re Afkl ftatn I wCl CO(	71-52-3	1	mg/L		(73	080	17)	(13	130	130
Tor f Afkl ftatn I wCl CO(	----	1	mg/L		(73	080	17)	(13	130	130
Ei 317P : Sgrfne Hgrutdp errtQ. I wSO1 0Uu, i A											
Sgrfne I wSO1 Ufgrutdp errtQ	14808-79-8	1	mg/L		1)03	4343	(9M8	1(03	() M8	() M8	
Ei 314P : Csforde u, i twQere Aal f, wer											
Csforde	16887-00-6	1	mg/L		0M833	0M833	79333	00(33	03033	03033	
Ei 39(F: i twof. ed 2 I jor Cl rtoaw											
Cl rQgp	7440-70-2	1	mg/L		M 3	) 1(	4M8	) ( 8	431	431
2 I caewgtp	7439-95-4	1	mg/L		7)) 3	7) 33	7403	7493	74) 3	74) 3	
Sodtgp	7440-23-5	1	mg/L		71133	71133	73833	77) 33	77433	77433	
Dorl wtgtp	7440-09-7	1	mg/L		()	13	40	43	41	41	
EP303F: i twof. ed 2 eri fwu, ICDU S											
ArweatQ	7440-38-2	0.001	mg/L		<0.002	3*30	<0.002	<0.002	<0.002	<0.002	
Cl dp tgp	7440-43-9	0.0001	mg/L		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Csrop tgp	7440-47-3	0.001	mg/L		<0.002	3*77	<0.002	<0.002	<0.002	<0.002	
Cohher	7440-50-8	0.001	mg/L		3*30	3*89	3*3M	<0.002	<0.002	<0.002	
NtQref	7440-02-0	0.001	mg/L		3*3M	3*03	3*3M	3*9(7	<0.002	<0.002	
Lel d	7439-92-1	0.001	mg/L		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
ZtaQ	7440-66-6	0.005	mg/L		<0.010	<0.010	3*9(1	3*90	<0.010	<0.010	
EP303T: Tor f 2 eri fwu, ICDU S											
ArweatQ	7440-38-2	0.001	mg/L		UUU	3*34	UUU	UUU	UUU	UUU	
Cl dp tgp	7440-43-9	0.0001	mg/L		UUU	<0.0002	UUU	UUU	UUU	UUU	
Csrop tgp	7440-47-3	0.001	mg/L		UUU	3*43	UUU	UUU	UUU	UUU	
Cohher	7440-50-8	0.001	mg/L		UUU	3*7(	UUU	UUU	UUU	UUU
NtQref	7440-02-0	0.001	mg/L		UUU	3*13	UUU	UUU	UUU	UUU	
Lel d	7439-92-1	0.001	mg/L		UUU	<0.002	UUU	UUU	UUU	UUU	
ZtaQ	7440-66-6	0.005	mg/L		UUU	<0.010	UUU	UUU	UUU	UUU	
EP3(4F: i twof. ed 2 erQgr, u, F12 S											
2 erQgr,	7439-97-6	0.0001	mg/L		<0.0001	3*330	<0.0001	<0.0001	<0.0001	<0.0001	
EP3(4T: Tor f ReQb. erl ufe 2 erQgr, u, F12 S											
2 erQgr,	7439-97-6	0.0001	mg/L		UUU	3*330	UUU	UUU	UUU	UUU	
EP347P : Ferrogwiroa u, i twQere Aal f, wer											



Analytical Results

Sub-Matrix: WATER Matrix: WATER-	Client sample ID		Client sampling date / time		Client sample ID		Client sample ID		Client sample ID	
Compound	CAS Number	LOD	Unit	11-Sep-2020 12:40	12-Sep-2020 08:15	11-Sep-2020 09:45	11-Sep-2020 10:30	11-Sep-2020 09:45	11-Sep-2020 10:30	11-Sep-2020 13:15
				E2 037N6M133M	E2 037N6M1333	E2 037N6M1338	E2 037N6M1339	E2 037N6M1338	E2 037N6M1339	E2 037N6M1373
				Result	Result	Result	Result	Result	Result	Result
EP347P : Ferrogwiroa u, i twQere Aal f, weI UCooataged										
Ferrogwiroa	----	0.05	mg/L	<0.05	<0.05	0.7M	<0.05	0.7M	<0.05	1.07
EK3842 : Sgfrtde l wS0U	18496-25-8	0.1	mg/L	<0.1	<0.1	<0.1	3.7	<0.1	3.7	<0.1
EN344 : loatQ6 l fl a Qe										
Ø Torl f Aatoaw	----	0.01	meq/L	8.8	844	MD)	) 0M	MD)	) 0M	M4M
Ø Torl f Cl rtoaw	----	0.01	meq/L	831	831	MD1	M 8	MD1	M 8	M4M
Ø loatQ6 l fl a Qe	----	0.01	%	0.31	(.38	3.79	(.17	3.79	(.17	3.37
EA043CA : ProwwAfnsl l ad 6 erl AQT. tn										
Proww/ fnsI	----	0.05	Bq/L	UUU	0.84	UUU	UUU	0.84	UUU	UUU
Prowwuer l Qt. tn U13K	----	0.10	Bq/L	UUU	<-2.29	UUU	UUU	<-2.29	UUU	UUU



Analytical Results

Sub-Matrix: WATER HMatrix: WATER-		Client sample ID							
Compound	CAS Number	LOR	Unit	Client sampling date / time	6 5 12 07S	6 5 12 00i	6 5 12 00S	6 5 12 0(i	6 5 12 0(S
					11-Sep-2020 13:20	12-Sep-2020 12:00	12-Sep-2020 11:20	12-Sep-2020 09:00	12-Sep-2020 09:40
					E2 037NBMBJ77	E2 037NBMBJ70	E2 037NBMBJ71	E2 037NBMBJ71	E2 037NBMBJ74
					Result	Result	Result	Result	Result
Ei 3(J) D: Afkl ftaŋ u, DC Ttrl ror									
5, droxide Afkl ftaŋ l wCl CO(	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Cl ruoal re Afkl ftaŋ l wCl CO(	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
6 tQ ruoal re Afkl ftaŋ l wCl CO(	71-52-3	1	mg/L		(08	108	(33	177	0) 3
Tor f Afkl ftaŋ l wCl CO(	----	1	mg/L		(08	108	(33	177	0) 3
Ei 317P : Sgrfne Hgrutdp errtQ. l wSO1 0Uu, i A									
Sgrfne l wSO1 Utgrutdp errtQ	14808-79-8	1	mg/L		1413	(((NB	1(43	(373	4433
Ei 314P : Csforde u, i twQere Aal f, wer									
Csforde	16887-00-6	1	mg/L		01NB3	78133	0() 33	79333	0M33
Ei 39(F: i twof. ed 2 l jor Cl rtoaw									
Cl rQgp	7440-70-2	1	mg/L		M0	440	M	410) (
2 l caewgtp	7439-95-4	1	mg/L		7NB3	7403	7M3	7183	79) 3
Sodtgp	7440-23-5	1	mg/L		7(NB3	73933	7(733	73NB3	74033
Dorl wtgtp	7440-09-7	1	mg/L		(8	4M	17	41	1M
EP303F: i twof. ed 2 eri fwu, lCDI2 S									
ArweatQ	7440-38-2	0.001	mg/L		<0.002	<0.002	<0.002	3*31	<0.002
Cl dp tgp	7440-43-9	0.0001	mg/L		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Csrop tgp	7440-47-3	0.001	mg/L		<0.002	<0.002	<0.002	<0.002	3*31
Cohher	7440-50-8	0.001	mg/L		3*30	<0.002	<0.002	3*31	3*73
NtQref	7440-02-0	0.001	mg/L		3*33M	3*33(	3*371	3*30	3*38
Lel d	7439-92-1	0.001	mg/L		<0.002	<0.002	<0.002	<0.002	<0.002
ZtaQ	7440-66-6	0.005	mg/L		<0.010	<0.010	3*37	3*309	3*341
EP303T: Tor f 2 eri fwu, lCDI2 S									
ArweatQ	7440-38-2	0.001	mg/L		UUU	UUU	3*30	3*34	UUU
Cl dp tgp	7440-43-9	0.0001	mg/L		UUU	UUU	<0.0002	<0.0002	UUU
Csrop tgp	7440-47-3	0.001	mg/L		UUU	UUU	3*31	3*31	UUU
Cohher	7440-50-8	0.001	mg/L		UUU	UUU	3*34M	3*770	UUU
NtQref	7440-02-0	0.001	mg/L		UUU	UUU	3*378	3*31	UUU
Lel d	7439-92-1	0.001	mg/L		UUU	UUU	<0.002	3*33(	UUU
ZtaQ	7440-66-6	0.005	mg/L		UUU	UUU	3*30	3*3(	UUU
EP3(4F: i twof. ed 2 erQgr, u, F12 S									
2 erQgr,	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EP3(4T: Tor f ReQb. erl ufe 2 erQgr, u, F12 S									
2 erQgr,	7439-97-6	0.0001	mg/L		UUU	UUU	<0.0001	<0.0001	UUU
EP347P : Ferrogrwiroa u, i twQere Aal f, wer									



Analytical Results

Sub-Matrix: WATER Matrix: WATER-	Client sample ID				6 5 1 2 0 7 S	6 5 1 2 0 0 i	6 5 1 2 0 0 S	6 5 1 2 0 (i	6 5 1 2 0 (S
Compound	CAS Number	LOD	Unit	Client sampling date / time	11-Sep-2020 13:20	12-Sep-2020 12:00	12-Sep-2020 11:20	12-Sep-2020 09:00	12-Sep-2020 09:40
					E2 037N6M1377	E2 037N6M1370	E2 037N6M1371	E2 037N6M1374	
					Result	Result	Result	Result	Result
EP347P: Ferrogwiroa u, i twQere Aal f, weI UCooataged									
Ferrogwiroa	----	0.05	mg/L		<0.05	(83	) 34	(71	<0.05
EK3842: Sgfrtle I wS0U	18496-25-8	0.1	mg/L		<0.1	37	37	37	<0.1
EN344: loatQ6 I fl a Qe									
Ø Torf Aatoaw	----	0.01	meq/L		) 94	498	) M4	M8)	8M4
Ø Torf CI rtoaw	----	0.01	meq/L		) M	M8	) ( 8	M7	8M
Ø loatQ6 I fl a Qe	----	0.01	%		0 3M	043	7) 9	37)	379
EA043CA: ProwwAfnsl I ad 6 erl AQT. tn									
ProwwI fnsl	----	0.05	Bq/L		UUU	<1.07	<0.92	UUU	UUU
Prowwuer I Qt. tn U13K	----	0.10	Bq/L		UUU	<2.14	<1.83	UUU	UUU



Analytical Results

Sub-Matrix: WATER Matrix: WATER-		Client sample ID											
Compound	CAS Number	LOR	Unit	6 5 U 01i		6 5 U 01S		TS		T6 733		T6 033	
				11-Sep-2020 08:00	E2 037N6M137M	11-Sep-2020 08:45	E2 037N6M137	11-Sep-2020 00:00	E2 037N6M1378	13-Sep-2020 12:30	E2 037N6M1379	13-Sep-2020 12:30	E2 037N6M1303
				Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Ei 3 () D: Afkl ftatn u, DC Ttrrl ror													
5, droxide Afkl ftatn l wCl CO(	DMO-210-001	1	mg/L	<1		<1		UUU		UUU		UUU	
Cl ruoal re Afkl ftatn l wCl CO(	3812-32-6	1	mg/L	<1		<1		UUU		UUU		UUU	
6 tQ ruoal re Afkl ftatn l wCl CO(	71-52-3	1	mg/L	17M		(M		UUU		UUU		UUU	
Tor f Afkl ftatn l wCl CO(	----	1	mg/L	17M		(M		UUU		UUU		UUU	
Ei 317P : Sgrfne Hgrutdtp errtQ. l wSO1 0Uu, i A													
Sgrfne l wSO1 Utgrutdtp errtQ	14808-79-8	1	mg/L	((43		1393		UUU		UUU		UUU	
Ei 314P : Csforde u, i twQere Aal f, wer													
Csforde	16887-00-6	1	mg/L	78833		00933		UUU		UUU		UUU	
Ei 39(F: i twof. ed 2 l jor Cl rtoaw													
Cl rQgp	7440-70-2	1	mg/L	48M		M(		UUU		UUU		UUU	
2 l caewgtp	7439-95-4	1	mg/L	74) 3		7403		UUU		UUU		UUU	
Sodtgp	7440-23-5	1	mg/L	77033		70833		UUU		UUU		UUU	
Dorl wtgtp	7440-09-7	1	mg/L	4M		(M		UUU		UUU		UUU	
EP303F: i twof. ed 2 eri fwu, lCDI2 S													
ArweatQ	7440-38-2	0.001	mg/L	<0.002		3*30		UUU		UUU		UUU	
Cl dp tgp	7440-43-9	0.0001	mg/L	<0.0002		<0.0002		UUU		UUU		UUU	
Csrop tgp	7440-47-3	0.001	mg/L	<0.002		<0.002		UUU		UUU		UUU	
Cohher	7440-50-8	0.001	mg/L	3*731		<0.002		UUU		UUU		UUU	
NtQref	7440-02-0	0.001	mg/L	3*33(		3*33M		UUU		UUU		UUU	
Lel d	7439-92-1	0.001	mg/L	<0.002		<0.002		UUU		UUU		UUU	
ZtaQ	7440-66-6	0.005	mg/L	3*309		<0.010		UUU		UUU		UUU	
EP303T: Tor f 2 eri fwu, lCDI2 S													
ArweatQ	7440-38-2	0.001	mg/L	UUU		UUU		UUU		UUU		<0.001	
Cl dp tgp	7440-43-9	0.0001	mg/L	UUU		UUU		UUU		UUU		<0.0001	
Csrop tgp	7440-47-3	0.001	mg/L	UUU		UUU		UUU		UUU		<0.001	
Cohher	7440-50-8	0.001	mg/L	UUU		UUU		UUU		UUU		<0.001	
NtQref	7440-02-0	0.001	mg/L	UUU		UUU		UUU		UUU		<0.001	
Lel d	7439-92-1	0.001	mg/L	UUU		UUU		UUU		UUU		<0.001	
ZtaQ	7440-66-6	0.005	mg/L	UUU		UUU		UUU		UUU		3*33M	
EP3(4F: i twof. ed 2 erQgr, u, F12 S													
2 erQgr,	7439-97-6	0.0001	mg/L	<0.0001		<0.0001		UUU		UUU		UUU	
EP3(4T: Tor f ReQb. erl ufe 2 erQgr, u, F12 S													
2 erQgr,	7439-97-6	0.0001	mg/L	UUU		UUU		UUU		UUU		<0.0001	
EP347P: Ferrogwiroa u, i twQere Aal f, wer													



Analytical Results

Sub-Matrix: WATER HMatrix: WATER-	Client sample ID				6 5 U 01i	6 5 U 01S	TS	T 6 733	T 6 033
Compound	CAS Number	LOR	Unit	Client sampling date / time	Result	Result	Result	Result	Result
EP 347P : Ferrogwiroa u, i twQere Aal f, wer UCoataged									
Ferrogwiroa	----	0.05	mg/L		7.41	03.1	UUU	UUU	UUU
EK3842 : Sgfrtle l wS0U									
Sgfrtle l wS0U	18496-25-8	0.1	mg/L		3.7	3.1	UUU	UUU	UUU
EN344 : loatQ6 l fl a Qe									
∅ Torl f Aatoaw	----	0.01	meq/L		188	) ( 8	UUU	UUU	UUU
∅ Torl f Cl rtoaw	----	0.01	meq/L		11	) 7 (	UUU	UUU	UUU
∅ loatQ6 l fl a Qe	----	0.01	%		(38	7) (	UUU	UUU	UUU
ED383(8) 7: Torl f Derrofepp 5, droQ ruoaw									
CMUC9 Fri Qtoa	----	20	µg/L		UUU	UUU	773	UUU	UUU
ED383(8) 7: Torl f ReQe. erl ufe 5, droQ ruoaw UNED2 037(Fri Qtoa									
CMUC73 Fri Qtoa	C6_C10	20	µg/L		UUU	UUU	743	UUU	UUU
^ CMUC73 Fri Qtoa p tagw6 TEX HF7-	C6_C10-BTEX	20	µg/L		UUU	UUU	83	UUU	UUU
ED383: 6 TEXN									
6 eazeae	71-43-2	1	µg/L		UUU	UUU	77	UUU	UUU
Tofgeae	108-88-3	2	µg/L		UUU	UUU	70	UUU	UUU
Ers, fueazeae	100-41-4	2	µg/L		UUU	UUU	77	UUU	UUU
p erl U& hi ri U, feae	108-38-3	2	µg/L		UUU	UUU	0(	UUU	UUU
orroU, feae	95-47-6	2	µg/L		UUU	UUU	71	UUU	UUU
^ Torl f X, feae	----	2	µg/L		UUU	UUU	(	UUU	UUU
^ Sgp omb TEX	----	1	µg/L		UUU	UUU	) 7	UUU	UUU
NI hrs l feae	91-20-3	5	µg/L		UUU	UUU	)	UUU	UUU
ED383S: TD5 H-6 TEX Sgrrocl rew									
70U tCfoers l aeU 1	17060-07-0	2	%		UUU	UUU	737	UUU	UUU
TofgeaeU 8	2037-26-5	2	%		UUU	UUU	8(8	UUU	UUU
1U rop onforouaezeae	460-00-4	2	%		UUU	UUU	8) 11	UUU	UUU



Analytical Results

Sub-Matrix: WATER		Client sample ID		Client sampling date / time		Client sample ID			
Matrix: WATER-		CAS Number	LOR	Unit	T6 (33)	R6733	R6033	TS Coarrof	UUU
Compound					13-Sep-2020 12:30	11-Sep-2020 09:15	12-Sep-2020 10:00	11-Sep-2020 00:00	
					E2 037N6M1307	E2 037N6M1300	E2 037N6M1301	E2 037N6M1309	
					Result	Result	Result	Result	
EP303T: Torf 2 erl fwu, ICD12 S									
ArwatQ		7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	UUU	UUU
Cl dp tgp		7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	UUU	UUU
Cstrop tgp		7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	UUU	UUU
Cohher		7440-50-8	0.001	mg/L	<0.001	3.93	3.94	UUU	UUU
NtCref		7440-02-0	0.001	mg/L	<0.001	<0.001	3.93M	UUU	UUU
Lel d		7439-92-1	0.001	mg/L	<0.001	<0.001	3.9(1	UUU	UUU
ZtaQ		7440-66-6	0.005	mg/L	3.93	3.938	3.94B	UUU	UUU
EP3(4T: Torf 1 ReQb, erl ufe 2 erQgr, u, F12 S									
2 erQgr,		7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	UUU	UUU
ED383(8) 7: Torf 1 Derrofeqg 5, droQ ruoaw									
CMUC9 Frl Qtoa		----	20	µg/L	UUU	UUU	UUU	7(3	UUU
ED383(8) 7: Torf 1 ReQb, erl ufe 5, droQ ruoaw UNED2 037(Frl Qtoa									
CMUC73 Frl Qtoa		C6_C10	20	µg/L	UUU	UUU	UUU	783	UUU
^ CMUC73 Frl Qtoa p tagw6 TEX		C6_C10-BTEX	20	µg/L	UUU	UUU	UUU	733	UUU
HF7-									
ED383: 6 TEXN									
6 eaazea		71-43-2	1	µg/L	UUU	UUU	UUU	70	UUU
Tofgeae		108-88-3	2	µg/L	UUU	UUU	UUU	71	UUU
Ere, fueazeae		100-41-4	2	µg/L	UUU	UUU	UUU	7(	UUU
p erl U& hrl U, feae		108-38-3 106-42-3	2	µg/L	UUU	UUU	UUU	0)	UUU
orroUK, feae		95-47-6	2	µg/L	UUU	UUU	UUU	7M	UUU
^ Torf X, feaew		----	2	µg/L	UUU	UUU	UUU	1(	UUU
^ Sgp om6 TEX		----	1	µg/L	UUU	UUU	UUU	80	UUU
NI hsrsl feae		91-20-3	5	µg/L	UUU	UUU	UUU	)	UUU
ED383S: TD5 W-6 TEX Sgrrocl rew									
70U tC3forerl aeU 1		17060-07-0	2	%	UUU	UUU	UUU	731	UUU
TofgeaeU 8		2037-26-5	2	%	UUU	UUU	UUU	8(7	UUU
1U rop onfgorouaeazeae		460-00-4	2	%	UUU	UUU	UUU	8(4M	UUU



Page : 12 of 12
Work Order : EM2016060-AA
Client : EMM CONSULTING PTY LTD
Project : S190512

Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
ED383S: TD5 HV-6 TEX Sgrrocl rew			
70U 1G5foroersl aeU 1	17060-07-0	73	129
TofgeaeU 8	2037-26-5	70	125
1U rop orfgorouazeae	460-00-4	71	129



Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EM2016060-AB	Page	: 1 of 2
Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: PAUL GIBBONS	Contact	: Shane Colley
Address	: Ground Floor Suite 1 20 Chandos Street St Leonards NSW NSW 2065	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9600
Project	: S190512	Date Samples Received	: 16-Sep-2020 10:15
Order number	: ----	Date Analysis Commenced	: 18-Sep-2020
C-O-C number	: ----	Issue Date	: 28-Sep-2020 16:35
Sampler	: BB, KB		
Site	: ----		
Quote number	: EN/112/18 - Primary work only		
No. of samples received	: 5		
No. of samples analysed	: 5		



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories

Position

Accreditation Category

Aleksandar Vujkovic

Laboratory Technician

Newcastle - Inorganics, Mayfield West, NSW



Environmental

QUALITY CONTROL REPORT

Work Order : **EM20140406AA**

Page : 1 of 9

Client : **EMM CONSULTING PTY LTD**
 Contact : **PAUL GIBBONS**
 Address : **Ground Floor Suite 1 20 Chandos Street
 St Leonards NSW NSW 2065**
 Telephone : **----**
 Project : **S190512**
 Order number : **----**
 C-O-C number : **----**
 Sampler : **BB, KB**
 Site : **----**
 Quote number : **EN/112/18 - Primary work only**
 No. of samples received : **24**
 No. of samples analysed : **24**

Laboratory : **Environmental Division Melbourne**
 Contact : **Shane Colley**
 Address : **4 Westall Rd Springvale VIC Australia 3171**
 Telephone : **+61-3-8549 9600**
 Date Samples Received : **16-Sep-2020**
 Date Analysis Commenced : **17-Sep-2020**
 Issue Date : **28-Sep-2020**



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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Arenie Vijayaratham	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nancy Wang	2IC Organic Chemist	Melbourne Organics, Springvale, VIC
Titus Vimalasiri	Metals Teamleader	Radionuclides, Fyshwick, ACT



Page : 2 of 9
 Work Order : EM2016060-AA
 Client : EMM CONSULTING PTY LTD
 Project : S190512

General Comments

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

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

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

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

LOR = Limit of reporting

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

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
ED055P: AlkplairBt BPC Timprror αQC Lon 524j s02v									
EM2016055-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	5	1	131	No Limit
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	5	1	131	No Limit
EM2016055-006	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	15	15	0.00	0% - 50%
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	15	15	0.00	0% - 50%
ED055P: AlkplairBt BPC Timprror αQC Lon 524j s0i v									
EM2016060-011	BH-M21S	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	328	330	0.900	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	328	330	0.900	0% - 20%
EM2016091-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	13	12	8.60	0% - 50%
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	13	12	8.60	0% - 50%
ED011G: Sy(pre cTyr tnf8 emf) vp7 SOI 26t BDA αQC Lon 52451b- v									
EM2015644-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	1310	1340	2.27	0% - 20%
EM2016060-001	UGM-M1D	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3400	3630	6.60	0% - 20%
ED011G: Sy(pre cTyr tnf8 emf) vp7 SOI 26t BDA αQC Lon 52451bsv									
EM2016060-012	BH-M22D	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3360	3670	8.92	0% - 20%
EM2016112-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	67	58	13.6	0% - 20%
ED011G: G: Culorthe t BDr) ree AapleEre αQC Lon 52451b4v									



Sub-Matrix: WATER									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED01 - G: Culoŕnŕde t BDIŕ) reŕe AaplEŕer ŕQC Lon 52451b4v 6) oarŕŕayed									
EM2015644-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	10100	10300	2.63	0% - 20%
EM2016060-001	UGM-M1D	ED045G: Chloride	16887-00-6	1	mg/L	18300	19100	4.49	0% - 20%
ED01 - G: Culoŕnŕde t BDIŕ) reŕe AaplEŕer ŕQC Lon 52451bf v									
EM2016060-012	BH-M22D	ED045G: Chloride	16887-00-6	1	mg/L	18400	19000	3.30	0% - 20%
EM2016112-003	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	826	852	3.04	0% - 20%
ED0b5m DIŕ7ŕŕ9ed Mpŕŕr Cpŕŕba7 ŕQC Lon 5241045v									
EM2015983-004	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	89	89	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	224	225	0.463	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	1100	1110	0.437	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	18	18	0.00	0% - 50%
		ED093F: Calcium	7440-70-2	1	mg/L	5	5	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	3	3	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	42	41	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ED0b5m DIŕ7ŕŕ9ed Mpŕŕr Cpŕŕba7 ŕQC Lon 524104sv									
EM2016060-011	BH-M21S	ED093F: Calcium	7440-70-2	1	mg/L	642	636	0.979	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1680	1660	1.24	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	13600	13400	1.10	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	38	38	0.00	0% - 50%
EG020m DIŕ7ŕŕ9ed Merpŕ7 t BICPŕMS ŕQC Lon 524104- v									
EM2016055-004	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.1 µg/L	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<1 µg/L	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	1 µg/L	0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	8 µg/L	0.008	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<1 µg/L	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	20 µg/L	0.020	0.00	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	111 µg/L	0.110	0.00	0% - 20%
		EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0002	<0.0002	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.002	<0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.002	<0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.002	<0.002	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.031	0.034	9.69	0% - 50%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.027	0.031	15.4	No Limit
EG020T: Topŕ Merpŕ7 t BICPŕMS ŕQC Lon 5241s- 4v									
EM2015836-005	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit



Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
EG020T: Torpl Merp7 t BICPMS cQC Lon 5241s-4v 6) oattayed									
EM2015836-005	Anonymous	EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EM2016022-004	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.094	0.092	2.10	0% - 50%
EG020T: Torpl Merp7 t BICPMS cQC Lon 5241s- sv									
EM2016060-019	TB100	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.006	0.006	0.00	No Limit
EM2016088-003	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	0.002	0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.012	0.013	0.00	0% - 50%
		EG020A-T: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	0.024	0.025	0.00	0% - 20%
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.041	0.042	0.00	No Limit
EG05- m Di77o19ed Mer) yrBt BrfMMS cQC Lon 5241041v									
EM2016055-002	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.1 µg/L	<0.0001	0.00	No Limit
EM2015968-049	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG05- m Di77o19ed Mer) yrBt BrfMMS cQC Lon 5241044v									
EM2016060-009	BH-M16S	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG05- T: Torpl Re) o9ertp le Mer) yrBt BrfMMS cQC Lon 5245- 11v									
EM2016060-002	UGM-M1S	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM2016060-023	RB200	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG0- 1G: merroy7 Iroa t BDI7) re9e AaplB7er cQC Lon 5240i b4v									
EM2015832-001	Anonymous	EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EM2016060-007	UGM-M15S	EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EF0f - M: Syl(lite p7 S26 cQC Lon 5242- 1bv									
EM2016060-001	UGM-M1D	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EM2016060-010	BH-M21D	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit



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 Work Order : EM2016060-AA
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Sub-Matrix: WATER									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EP0f0j0s1: Torpl Penroley3 KBdro) prt oa7 cQC Lon 5240501 v									
EM2016021-016	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	<20	<20	0.00	No Limit
EM2016016-001	Anonymous	EP080: C6 - C9 Fraction	---	20	µg/L	6510	6260	3.86	0% - 20%
EP0f0j0s1: Torpl Re) o9erpt le KBdro) prt oa7 6NEPM 2015 mpp) rbaa7 cQC Lon 5240501 v									
EM2016021-016	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM2016016-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	6700	6470	3.52	0% - 20%
EP0f0j0s1: TEHN cQC Lon 5240501 v									
EM2016021-016	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
EM2016016-001	Anonymous	EP080: Benzene	71-43-2	1	µg/L	1480	1620	8.76	0% - 20%
		EP080: Toluene	108-88-3	2	µg/L	1220	1320	8.03	0% - 20%
		EP080: Ethylbenzene	100-41-4	2	µg/L	1080	1190	9.91	0% - 20%
		EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	1800	2040	12.5	0% - 20%
		EP080: ortho-Xylene	95-47-6	2	µg/L	896	987	9.70	0% - 20%
		EP080: Naphthalene	91-20-3	5	µg/L	17400	17500	0.422	0% - 20%



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

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

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			Recovery Limits (%)	
				Result	Concentration	Spike	Spike Recovery (%)	LCS	Low	High
EA2-0CA: Gro77 AIXup pad / ep A) rññB cQLon 52s1f 4f v										
EA250: Gross alpha	-----	0.05	Bq/L	<0.05	1751 Bq/L	99.5	95.2	105		
EA250: Gross beta activity - 40K	-----	0.1	Bq/L	<0.10	-----	-----	-----	-----		
ED05sP: Alkplairñt BPC Tirpror cQLon 524i s02v										
ED037-P: Total Alkalinity as CaCO3	-----	-----	mg/L	-----	200 mg/L	100	88.0	112		
ED05sP: Alkplairñt BPC Tirpror cQLon 524i s01 v										
ED037-P: Total Alkalinity as CaCO3	-----	-----	mg/L	-----	200 mg/L	98.8	88.0	112		
ED01 1G: Syj(pre cÿrt ññ8 emñ vp7 SO1 26t BDA cQLon 52451b-v										
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	97.1	85.8	117		
ED01 1G: Syj(pre cÿrt ññ8 emñ vp7 SO1 26t BDA cQLon 52451bsv										
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	100 mg/L	89.3	85.8	117		
ED01 - G: Culorñte t BDIñ re AapñEñer cQLon 52451b4v										
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	98.4	85.0	122		
ED01 - G: Culorñte t BDIñ re AapñEñer cQLon 52451bf v										
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	110	85.0	122		
ED0b5m DI7o19ed Mp8r Cprñoa7 cQLon 5241045v										
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	108	88.2	117		
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	96.5	85.6	114		
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.3	90.0	114		
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	90.7	86.7	111		
ED0b5m DI7o19ed Mp8r Cprñoa7 cQLon 524104sv										
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	106	88.2	117		
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	97.2	85.6	114		
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	100	90.0	114		
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	91.1	86.7	111		
EG020m DI7o19ed Mernp17 t BICPñMS cQLon 524104-v										
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	104	88.5	108		
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	93.2	83.5	108		
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	105	83.2	105		
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	83.1	106		



Sub-Matrix: WATER				Method Blank (MB) Report			Laboratory Control Spike (LCS) Report		
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	LCS	Low	High
EG020m DI77o19ed Merp17 t BICP6MS cQCLon 524104- v 6) oar1ayed									
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	96.2	96.2	84.6	107
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	103	103	84.3	108
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	104	86.3	111
EG020T: Torpl Merp17 t BICP6MS cQCLon 5241s-4v									
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	104	104	89.2	113
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	106	106	86.4	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.8	99.8	86.9	110
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.6	98.6	86.9	109
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.8	99.8	88.3	110
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	100	100	87.9	111
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	107	107	86.7	114
EG020T: Torpl Merp17 t BICP6MS cQCLon 5241s- sv									
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	102	89.2	113
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	108	108	86.4	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	105	105	86.9	110
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	95.7	95.7	86.9	109
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	105	105	88.3	110
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.4	96.4	87.9	111
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	100	100	86.7	114
EG05- m DI77o19ed Mer) yrBt BrmMS cQCLon 5241041v									
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	110	110	71.1	112
EG05- m DI77o19ed Mer) yrBt BrmMS cQCLon 5241044v									
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	103	103	71.1	112
EG05- T: Torpl Re) o9erpt le Mer) yrBt BrmMS cQCLon 5245- 11v									
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	98.8	98.8	72.6	115
EG0- 1G: merroy7 lroa t BDI7) ree Aap1B7er cQCLon 52401 b4v									
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	109	109	75.8	112
EF0f - M: Sylltle p7 S26 cQCLon 5242- 1bv									
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	104	104	81.9	116
EP0f0j0s1: Torpl Penroley3 KBtro) prt oa7 cQCLon 5240501 v									
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	95.2	95.2	65.5	129
EP0f0j0s1: Torpl Re) o9erpt le KBtro) prt oa7 6NEPm 2015 mmp) rba7 cQCLon 524050i v									
EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	450 µg/L	98.5	98.5	64.3	126
EP0f0: / TEHN cQCLon 524050i v									
EP080: Benzene	71-43-2	1	µg/L	<1	20 µg/L	99.1	99.1	69.8	124
EP080: Toluene	108-88-3	2	µg/L	<2	20 µg/L	107	107	73.6	126
EP080: Ethylbenzene	100-41-4	2	µg/L	<2	20 µg/L	105	105	72.0	126



Sub-Matrix: WATER				Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	LCS	Low	High
EP0f0: / TEHN cQCLon 524050i v 6) oairayed									
EP080: meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	40 µg/L	105	105	71.5	132
EP080: ortho-Xylene	95-47-6	2	µg/L	<2	20 µg/L	108	108	76.5	132
EP080: Naphthalene	91-20-3	5	µg/L	<5	5 µg/L	108	108	70.5	127

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	Spike Concentration	Spike Recovery(%)	Recovery Limits (%)	
						Low	High
Matrix Spike (MS) Report							
ED01 1G: Syllipre cTyr tldf8 emfj vp7 SOI 28t BDA cQCLon 52451b-v							
EM2015644-002	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED01 1G: Syllipre cTyr tldf8 emfj vp7 SOI 28t BDA cQCLon 52451bsv							
EM2016060-013	BH-M22S	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED01 - G: Culothie t BDiF) ree AapleEre cQCLon 52451b4v							
EM2015644-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130
ED01 - G: Culothie t BDiF) ree AapleEre cQCLon 52451bf v							
EM2016060-013	BH-M22S	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130
EG020m Di77o9ed Merp7 t BICPMS cQCLon 524104-v							
EM2016055-004	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	99.2	85.0	131
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	92.9	81.0	133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	102	71.0	135
		EG020A-F: Copper	7440-50-8	0.2 mg/L	102	76.0	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	93.4	75.0	133
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	100	73.0	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	106	75.0	131
EG020T: Torpl Merp7 t BICPMS cQCLon 5241s-4v							
EM2015836-005	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	100	82.0	118
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	105	75.0	129
		EG020A-T: Chromium	7440-47-3	1 mg/L	100	80.0	118
		EG020A-T: Copper	7440-50-8	1 mg/L	99.5	81.0	115



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 Work Order : EM2016060-AA
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low High
EG020T: Torpl Merp7 t BICP6MS cQCLon 5241s-4v 6) oairtayed						
EM2015836-005	Anonymous	EG020A-T: Lead	7439-92-1	1 mg/L	102	83.0 121
		EG020A-T: Nickel	7440-02-0	1 mg/L	104	80.0 118
		EG020A-T: Zinc	7440-66-6	1 mg/L	104	74.0 116
EG020T: Torpl Merp7 t BICP6MS cQCLon 5241s- sv						
EM2016060-019	TB100	EG020A-T: Arsenic	7440-38-2	1 mg/L	96.7	82.0 118
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	105	75.0 129
		EG020A-T: Chromium	7440-47-3	1 mg/L	97.7	80.0 118
		EG020A-T: Copper	7440-50-8	1 mg/L	94.1	81.0 115
		EG020A-T: Lead	7439-92-1	1 mg/L	98.2	83.0 121
		EG020A-T: Nickel	7440-02-0	1 mg/L	95.9	80.0 118
		EG020A-T: Zinc	7440-66-6	1 mg/L	101	74.0 116
EG05- m DI77oI9ed Mer) yrBt BrnIMS cQCLon 5241041v						
EM2015983-003	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	93.8	70.0 120
EG05- m DI77oI9ed Mer) yrBt BrnIMS cQCLon 5241044v						
EM2016060-010	BH-M21D	EG035F: Mercury	7439-97-6	0.01 mg/L	75.7	70.0 120
EG05- T: Torpl Re) o9erpt le Mer) yrBt BrnIMS cQCLon 5245- 11v						
EM2016060-004	UGM-M2S	EG035T: Mercury	7439-97-6	0.01 mg/L	# 58.1	70.0 130
EG0- 1G: merroy7 Iroa t BDI7) rere AaplB7er cQCLon 52401 b4v						
EM2015832-002	Anonymous	EG051G: Ferrous Iron	----	2 mg/L	104	70.0 130
EF0f - M: Syl(Ite p7 S26 cQCLon 5242- 1bv						
EM2016060-002	UGM-M1S	EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	# 42.6	70.0 130
EP0f0j0s1: Torpl Perroley3 KBdro) prt oa7 cQCLon 5240501 v						
EM2016016-003	Anonymous	EP080: C6 - C9 Fraction	----	280 µg/L	76.2	43.0 125
EP0f0j0s1: Torpl Re) o9erpt le KBdro) prt oa7 6NEPm 2015 mp) rba7 cQCLon 5240501 v						
EM2016016-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	330 µg/L	71.4	44.0 122
EP0f0: / TEHN cQCLon 5240501 v						
EM2016016-003	Anonymous	EP080: Benzene	71-43-2	20 µg/L	92.6	68.0 130
		EP080: Toluene	108-88-3	20 µg/L	100	72.0 132



Environmental

QUALITY CONTROL REPORT

Work Order : **EM2016060-AB**

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y/leib : **EMM CONSULTING PTY LTD**
 y 1i baMb : PcA6 UG I BON
 chhress : Ur1ui h FI11r Nu0e 2 d0 y Sai h1s Nbreeb
 Nb6e1i arhs ONW ONW d054
 TeleVS1ie : ----
 Pr1jeMb : N29042d
 Brher i uv Ler : ----
 y-B-y i uv Ler : ----
 Nav Vler : I I K I
 N0e : ----
 Hu1le i uv Ler : nO22d08 - Pr0 art (1r) 1i lt
 O1. 1osav Vies reMe0eh : 4
 O1. 1osav Vies ai all seh : 4

6aL1rabrt : ni EG1i v ei bal m0SG1 Dell1uri e
 y 1i baMb : NSai e y 1illet
 chhress : RWestall p h Nvr0gEale 30 c usbrat0 f 272
 TeleVS1ie : +52-f-84R9 9500
 mabe Nav Vies p eMe0eh : 25-NeV-d0d0
 mabe c i all s0 y 1v v ei Meh : 28-NeV-d0d0
 0sue mabe : d8-NeV-d0d0



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

TSG reV1rbsuVersehes ai t VreEGus reV1rbs, (0S 1S0 recerei Me. p results aMt bi tSe sav Vies, as suLv 0eh. TSG h1Muv ei bsSall i 1bLe reV1thuMehKexMeVbC aull.

TSG Hual0 y 1i b1l peV1rbMI i ba0s tSe d1l1(Cg Cd1rv at0i :

- 6aL1rabrt muV00e vmAP, p eV1rt; p elab0e PerMe t0ge m0ere1 Me vpPm, ai h cMeVrai Me 60 0s
- De1S1h l lai) 0l , ai h 6aL1rabrt y 1i b1l NV0e 00yN, p eV1rt; p eMEert ai h cMeVrai Me 60 0s
- Dabr0 NV0e 0N, p eV1rt; p eMEert ai h cMeVrai Me 60 0s

Signatories

TSG h1Muv ei bSas Leei eleM1i 0allt s0i eh Lt tSe autS1r0eh s0i abr0s Lei1(. nleM1i 0is0i Cg 0 Marr0h 1ubC Mv V10i Me (0S V11Mehures sVeM00h C d2 y Fp Parb22.

Signatories

Position

cle)sai har 3uj)1E01

6aL1rabrt TeMS 00i

Accreditation Category

0e(M0ste - 01rgai 00KD at 00lh WestKONW



Page : d 1 of
 W1r) Brther : nDd025050-c1
 y/l@i b : nDD yBONA6T@U PTz 6Tm
 Pr1jeNb : N29042d

General Comments

TSe ai alt t@M@ Vr1Mehures useh Lt c6N SaEe Leei heEe1Veh s1v esM@LLiSseh C@eri a1@i allt reMgi Gesh Vr1Mehures suM@ as h@1se VuLLiSseh Lt hSe ANnPcK cPYcK cN ai h OnPD. G S1use heEe1Veh Vr1Mehures are oullt Eal@ateh ai h are 1@e1 ab1se M@i brequesb

WSere v 1@bure he@rv C@e1i Sas Leei Ver@rv ehKresults are reV1r@h 1i: a hrt (e@SbLas@.

WSere a reV1r@h less h@ai w, result@ S@Ser h@ai hSe 6Bp K@S@ v at Le hue bl Vr@ art sav Me extram@@est@te h@e1@i ai h@r C@su@M@i bsav Me dir ai alt s@. WSere hSe 6Bp 1oa reV1r@h result@h@ers s1v st@i harh 6Bp K@S@ v at Le hue bl S@:

/ et :
 ci 1i tv 1us = pe@ers bl sav Vies (S@S are 11bsVeM@M@llt Varb1o@SS (1r) 1rher Lub@rv eh Varb1o@Se Hy Vr1M@ss 11b
 ycNouv Ler = ycN reg@vrt i uv Ler s1v habalase v aC@Ceh Lt y Sev @M@i cLstr@M@S NerE@es. TSe y Sev @M@i cLstr@M@S NerE@e @ a h@S@G1 1o@Se cv er@M@i y Sev @M@i NTM@t.
 6Bp = 6@ @1oreV1r@G
 pPm = pelat@Se PenM@i t@ge m@ere1 M@
 # = G@M@ates @M@h Hy

Laboratory Duplicate (DUP) Report

TSe qual@ M@i b1l t@rv 6aL1r@brlt muV@M@te re@ers bl a rai h1v lt seleM@h C@ral@1r@brlt sV@ 6aL1r@brlt huV@M@tes Vr1E@e C@rv a1@i regarnCg v e@S1h VreM@G1 ai h sav Me Set@r1gei e@. TSe Verv @M@h rai ges dir hSe pelat@Se PenM@i b meE@1@i v@ Pm, 1o 6aL1r@brlt muV@M@tes are sV@M@eh C c6N Det@S1h HWGnO@8 ai h are heVei hei b 1i hSe v agi @hne 1o results C Mv Var@S1i bl hSe leEe1 1o reV1r@G: resulb < 20 @ es 6Bp : 01 6@ @ resulbLe1@ eei 20 ai h d0 @ es 6Bp : 0% - 40%; resulb> d0 @ es 6Bp : 0% - d0%.

- No Laboratory Duplicate (DUP) Results are required to be reported.



Page : f 1of
 W1r) Brther : nDd025050-c1
 y/IGi b : nDD yBONA6T@U PTz 6Tm
 Pr1jeNb : N29042d

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

TSe quala Mi b1i bery De6th Q6al1rabrt l lai) reers bi ai ai alt te see v abq bi (S06 all reagei ts are ahheh C tSe sav e Efluv es 1r Vr1V1rti s as useh C sbai harh sav Me VreVarabti . TSe VurVise 1o t6S Hy Varav eter G bi v 1i 0r V1bi b6l laL1rabrt Mi tav Cat6i . TSe quala Mi b1i bery 6al1rabrt y 1i b1i NVqe v6y N, reers bi a Mer66h reerei Me v abq6IK 1r a) i 1(i C6ereiei Me see v abq svqeh (05 bargeb ai alt tes. TSe VurVise 1o t6S Hy Varav eter G bi v 1i 0r v e6th VreMe6i ai h aM1raM CheVei hei b1osav Me v abq. m i av 0p6eMEert 60 06 are Laseh 1i stat666ai eEaluat6i 1oVr1Me6eh 6y N.

- No Method Blank (MB) or Laboratory Control Spike (LCS) Results are required to be reported.

Matrix Spike (MS) Report

TSe quala Mi b1i bery Dabq NVqe v6N, reers bi ai Cbalal1rabrt sV0 sav Me svqeh (05 a reVresei bati6e seb 1o bargeb ai alt tes. TSe VurVise 1o t6S Hy Varav eter G bi v 1i 0r V1bi b6l v abq eereiei Me 1i ai alt te reMEerGs. N6a0p6eMEert 60 06 as Ver laL1rabrt mata Hual6 BLjeMEes v6HBs., 0eal reMEert rai ges sbi6h v at Le (a 06h C tSe e6ei b1osav Me v abq C6ereiei Me.

- No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.

Work Order	: EM2016060	Page	: 1 of 18
Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Selbourne
Contact	: PcAL UG I BON	Telephone	: +61-2-745j j 688
Project	: Nlj 8410	Date Samples received	: 16-Nep-0808
Note	: ----	Issue Date	: 07-Nep-0808
Sampler	: I I Hk I	Out of samples received	: 0j
Reference number	: ----	Out of samples analysed	: 0j

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

Reference summaries and references are also provided to assist in traceability/

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control .KCCB report/

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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



Page : 0 of 18
 (or) BrRer : ES0816868
 Client : ESS CBONAL TGU PTW LTD
 ProQct : N1j 8410

Outliers : Quality Control Samples
 Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

S atrim WATER

CompoundR Uroop Qame	Laboratory Nample ID	Client Nample ID	Analyte	CcN Uumber	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED851U: Nulfate . TurbiRimetridCas NB5 0- by Dc	ES0814655--880	c nonymous	Sulfate as SO4 - Turbidimetric	15787-Yj -7	Oot DetermineR	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED851U: Nulfate . TurbiRimetridCas NB5 0- by Dc	ES0816868--812	I x -S 00N	Sulfate as SO4 - Turbidimetric	15787-Yj -7	Oot DetermineR	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED854U: ChloriRe by Disdrete c nalyser	ES0814655--880	c nonymous	Chloride	1677Y-88-6	Oot DetermineR	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED854U: ChloriRe by Disdrete c nalyser	ES0816868--812	I x -S 00N	Chloride	1677Y-88-6	Oot DetermineR	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EU824T: Total 3 edoverable S erduy by FSN	ES0816868--885	AUS -S 0N	Mercury	Y52j -j Y-6	47/1 %	Y8/8-128%	Recovery less than lower data quality objective
Ek874S: Nulfate as NO-	ES0816868--880	AUS -S 1N	Sulfide as S2-	175j 6-04-7	50/6 %	Y8/8-128%	Recovery less than lower data quality objective

Outliers : Frequency of Quality Control Samples

S atrim WATER

Quality Control Nample Type	Count	3 ate .%Q	Kuality Control Npedification
SethoR	KC	ctual	EMpedteR
Laboratory Duplicates . DAPQ	8	8/88	OEPS 0812 I 2 V c LN KC NianPaRr
Uross c lpha anRI eta c dttvity	1	4/88	OEPS 0812 I 2 V c LN KC NianPaRr

Analysis Holding Time Compliance

Q samples are iRenitifeR belo, as having been analyseR or eMtraDe Routs iRe of redommenReR holRiNg times this shouR Be ta) en into donsiRation , hen interpreting results/ This report summarizes eMtraDion q preparation anR analysis times anR compares eadh , ith cLN redommenReR holRiNg times .referending ANEPc N(756H cPx cH cN anR OEPSQ baseR on the sample container proviReR/ Dates reporteR represent first Rate of eMtraDion or analysis anR predluRe subse&uent Rlutions anR returns/ c listing of breadhes if anyQs proviReR herein/ x olRiNg time for leadhate methoFs .e/g/ TCLPQ vary adtoRiNg to the analytes reporteR/ c ssesment compares the leadh Rate , ith the shortest analyte holRiNg time for the e&uivalent soil methoR/ These are: organids 15 RaysMerduy 07 Rays V other metals 178 Rays/ c redorReR breadh Roes not guarantee a breadh for all non-volatile parameters/ x olRiNg times for **VOC in soils** vary adtoRiNg to analytes of interest/ ; inyl ChloriRe anR Niyrene holRiNg time is Y Raysw others 15 Rays/ c redorReR breadh Roes not guarantee a breadh for all ; BC analytes anR shouR be verifeR in dase the reporteR breadh is a false positive qd ; inyl ChloriRe anR Niyrene are not) ey analytes of interest qd onden/

S atrim WATER

Evaluation: * = x olRiNg time breadh wv = (ithin holRiNg time/

Method	Sample Date	Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Container / Client Sample ID(s)							



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 (or) BrRer : ES0816868
 Client : ESS CBONALT@U PTWLTID
 Pro@ct : N1j 8410

S atriaM WATER Evaluation: * = x olRing time breadh wv = (ithin hoilfing time/

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA150: Particle Sizing								
Clear Plastic Bottle - Natural (EA154)								
PND 80		----	----	----	18-Sep-2020	18-S-ar-0801	✓	
Clear Plastic Bottle - Natural (EA154)	PND 80H	----	----	----	18-Sep-2020	11-S-ar-0801	✓	
PND 81H								
PND 80								
Clear Plastic Bottle - Natural (EA154)		----	----	----	18-Sep-2020	10-S-ar-0801	✓	
PND 81								
EA250CA: Gross Alpha and Beta Activity								
Clear Plastic Bottle - Natural (EA250)								
AUS-S 14NH	I x -S 00DH	----	----	----	23-Sep-2020	11-S-ar-0801	✓	
I x -S 00N								
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
AUS-S 1DH	AUS-S 1NH	----	----	----	18-Sep-2020	04-Nep-0808	✓	
AUS-S 10DH	AUS-S 10NH							
I x -S 16DH	I x -S 16NH							
I x -S 01DH	I x -S 01NH							
I x -S 05DH	I x -S 05N							
Clear Plastic Bottle - Natural (ED037-P)								
AUS-S 0DH	AUS-S 0NH	----	----	----	18-Sep-2020	06-Nep-0808	✓	
AUS-S 14NH	I x -S 00DH							
I x -S 00NH	I x -S 02DH							
I x -S 02N								
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
AUS-S 1DH	AUS-S 1NH	----	----	----	18-Sep-2020	8j -Bdt-0808	✓	
AUS-S 10DH	AUS-S 10NH							
I x -S 16DH	I x -S 16NH							
I x -S 01DH	I x -S 01NH							
I x -S 05DH	I x -S 05N							
Clear Plastic Bottle - Natural (ED041G)								
AUS-S 0DH	AUS-S 0NH	----	----	----	18-Sep-2020	18-Bdt-0808	✓	
AUS-S 14NH	I x -S 00DH							
I x -S 00NH	I x -S 02DH							
I x -S 02N								



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 Client : ESS CBONALT@U PTWLTD
 Pro&dt : N1j,8410

S atriaM WATER Evaluation: * = x olRing time breach wv = (ithin holRing time/

Method		Sample Date			Extraction / Preparation			Analysis		
Container / Client	Sample ID(s)	Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation			
ED045G: Chloride by Discrete Analyser										
Clear Plastic Bottle - Natural (ED045G)										
AUS-S1DH	AUS-S1NH	11-Sep-2020	----	----	18-Sep-2020	8j-Bdt-0808	✓			
AUS-S10DH	AUS-S10NH		----	----						
I x-S16DH	I x-S16NH									
I x-S01DH	I x-S01NH									
I x-S05DH	I x-S05N									
Clear Plastic Bottle - Natural (ED045G)										
AUS-S0DH	AUS-S0NH	12-Sep-2020	----	----	18-Sep-2020	18-Bdt-0808	✓			
AUS-S14NH	I x-S00DH		----	----						
I x-S00NH	I x-S02DH									
I x-S02N										
ED093F: Dissolved Major Cations										
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)										
AUS-S1DH	AUS-S1NH	11-Sep-2020	----	----	18-Sep-2020	8j-Bdt-0808	✓			
AUS-S10DH	AUS-S10NH		----	----						
I x-S16DH	I x-S16NH									
I x-S01DH	I x-S01NH									
I x-S05DH	I x-S05N									
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)										
AUS-S0DH	AUS-S0NH	12-Sep-2020	----	----	18-Sep-2020	18-Bdt-0808	✓			
AUS-S14NH	I x-S00DH		----	----						
I x-S00NH	I x-S02DH									
I x-S02N										
EG020F: Dissolved Metals by ICP-MS										
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)										
AUS-S1DH	AUS-S1NH	11-Sep-2020	----	----	17-Sep-2020	18-Sar-0801	✓			
AUS-S10DH	AUS-S10NH		----	----						
I x-S16DH	I x-S16NH									
I x-S01DH	I x-S01NH									
I x-S05DH	I x-S05N									
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)										
AUS-S0DH	AUS-S0NH	12-Sep-2020	----	----	17-Sep-2020	11-Sar-0801	✓			
AUS-S14NH	I x-S00DH		----	----						
I x-S00NH	I x-S02DH									
I x-S02N										



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 Client : ESS CBONAL T@U PTWLT D
 Pro@ct : N1j 8410

S atriaM WATER Evaluation: * = x olRing time breach wv' = (ithin holRing time/

Method		Sample Date		Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG051G: Ferrous Iron by Discrete Analyser							
Clear Plastic Bottle - HCl - Filtered (EG051G)							
AUS-S1DH	AUS-S1NH	----	----	----	17-Sep-2020	17-Nep-0808	✓
AUS-S10DH	AUS-S10NH						
I x-S16DH	I x-S16NH						
I x-S01DH	I x-S01NH						
I x-S05DH	I x-S05NH						
Clear Plastic Bottle - HCl - Filtered (EG051G)							
AUS-S0DH	AUS-S0NH	----	----	----	17-Sep-2020	1j -Nep-0808	✓
AUS-S14NH	I x-S00DH						
I x-S00NH	I x-S02DH						
I x-S02N							
EK085M: Sulfide as S2-							
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)							
AUS-S1DH	AUS-S1NH	----	----	----	17-Sep-2020	17-Nep-0808	✓
AUS-S10DH	AUS-S10NH						
I x-S16DH	I x-S16NH						
I x-S01DH	I x-S01NH						
I x-S05DH	I x-S05NH						
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)							
AUS-S0DH	AUS-S0NH	----	----	----	17-Sep-2020	1j -Nep-0808	✓
AUS-S14NH	I x-S00DH						
I x-S00NH	I x-S02DH						
I x-S02N							
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid (EP080)							
TNH	TN Control	17-Sep-2020	04-Nep-0808	✓	17-Sep-2020	04-Nep-0808	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid (EP080)							
TNH	TN Control	17-Sep-2020	04-Nep-0808	✓	17-Sep-2020	04-Nep-0808	✓
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid (EP080)							
TNH	TN Control	17-Sep-2020	04-Nep-0808	✓	17-Sep-2020	04-Nep-0808	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed, within the analytical lot, which the submitter should be greater than or equal to the expected rate/ listing of breaches is provided in the Summary of Butlers

SatriM WATER Evaluation: * = Quality Control frequency not within specification, within specification = Quality Control frequency and within specification

Quality Control Sample Type	Method	Count			Rate (%)		Evaluation
		QC	Regular	Actual	Expected		
Laboratory Duplicates - DAPQ							
Chloride by PC Titrator	ED82Y-P	5	0j	13.79	10.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Dissolve Residuals by F&N	ED854U	5	28	13.33	10.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Dissolve Residuals by P-S-N - Nuite c	EU824F	2	0j	10.34	10.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Ferrous Ion by Discrete analyser	EU808c-F	0	17	11.11	10.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Uross c lpha anRI eta cdtivity	EU841U	0	1j	10.53	10.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
S&R Cations - DissolveR	Ec048	8	08	0.00	10.00	✗	OEPS 0812 | 2 V cLN KC NtanP&R
Nulfate . TurbIdimetridQas NB5 0- by Discrete c nalyser	ED8j 2F	2	07	10.71	10.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Nulfite as NO-	ED851U	5	58	10.00	10.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Total S erduy by F&N	Ek 874	0	1Y	11.76	10.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Total S etals by P-S-N - Nuite c	EU824T	0	08	10.00	10.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
T3 x ; olatilesq TEX	EU808c-T	5	25	11.76	10.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
	EP878	0	16	12.50	10.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Laboratory Control Samples - LCNQ							
Chloride by PC Titrator	ED82Y-P	0	0j	6.90	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Dissolve Residuals by F&N	ED854U	5	28	13.33	10.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Dissolve Residuals by P-S-N - Nuite c	EU824F	0	0j	6.90	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Ferrous Ion by Discrete analyser	EU808c-F	1	17	5.56	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Uross c lpha anRI eta cdtivity	EU841U	1	1j	5.26	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
S&R Cations - DissolveR	Ec048	1	08	5.00	10.00	✗	OEPS 0812 | 2 V cLN KC NtanP&R
Nulfate . TurbIdimetridQas NB5 0- by Discrete c nalyser	ED8j 2F	0	07	7.14	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Nulfite as NO-	ED851U	5	58	10.00	10.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Total S erduy by F&N	Ek 874	1	1Y	5.88	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Total S etals by P-S-N - Nuite c	EU824T	1	08	5.00	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
T3 x ; olatilesq TEX	EU808c-T	0	25	5.88	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
	EP878	1	16	6.25	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
SethoR (lan)s - S.I Q							
Chloride by Discrete analyser	ED854U	0	28	6.67	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Dissolve Residuals by F&N	EU824F	0	0j	6.90	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Dissolve Residuals by P-S-N - Nuite c	EU808c-F	1	17	5.56	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Ferrous Ion by Discrete analyser	EU841U	1	1j	5.26	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Uross c lpha anRI eta cdtivity	Ec048	1	08	5.00	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
S&R Cations - DissolveR	ED8j 2F	0	07	7.14	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Nulfate . TurbIdimetridQas NB5 0- by Discrete c nalyser	ED851U	0	58	5.00	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Nulfite as NO-	Ek 874	1	1Y	5.88	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Total S erduy by F&N	EU824T	1	08	5.00	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
Total S etals by P-S-N - Nuite c	EU808c-T	1	08	5.00	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R
	EP878	0	25	5.88	5.00	✓	OEPS 0812 | 2 V cLN KC NtanP&R



Page : 7 of 18
 (or) BrRer : ES0816868
 Client : ESS CBONAL T&U PTW LTD
 Pro&dt : N1j 8410

Evaluation: * = Kuality Control fre&uendy not , ithin spedification w√ = Kuality Control fre&uendy , ithin spedification/

Analytical Methods	Method	Count		Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected		
SatriM WATER							
Kuality Control Nampole Type							
SethoR (lan)s .SI.Q- Continuer	EP878	1	16	6.25	5.00	✓	OEPS 0812 | 2 V cLN KC NtanParr
T3x ; olatilesqj TEX							
SatriM(Np)es .SNQ							
ChloriRe by Disdrete c nalyser	ED854U	0	28	6.67	5.00	✓	OEPS 0812 | 2 V cLN KC NtanParr
DissolveRS erduy by F&N	EU824F	0	0j	6.90	5.00	✓	OEPS 0812 | 2 V cLN KC NtanParr
DissolveRS etals by @P-S N - Nuite c	EU808c-F	1	17	5.56	5.00	✓	OEPS 0812 | 2 V cLN KC NtanParr
Ferrous @n by Disdrete c nalyser	EU841U	1	1j	5.26	5.00	✓	OEPS 0812 | 2 V cLN KC NtanParr
Nulfate . TurbiRimetridQas NB 5 0- by Disdrete c nalyser	ED851U	0	58	5.00	5.00	✓	OEPS 0812 | 2 V cLN KC NtanParr
Nulfite as NO-	Ek 874	1	1Y	5.88	5.00	✓	OEPS 0812 | 2 V cLN KC NtanParr
Total S erduy by F&N	EU824T	1	08	5.00	5.00	✓	OEPS 0812 | 2 V cLN KC NtanParr
Total S etals by @P-S N - Nuite c	EU808c-T	0	25	5.88	5.00	✓	OEPS 0812 | 2 V cLN KC NtanParr
T3x ; olatilesqj TEX	EP878	1	16	6.25	5.00	✓	OEPS 0812 | 2 V cLN KC NtanParr



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 ANEPCHPCHEANROEPS/ @ house. The analytical 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/ Notes from , high cLN methods have been developed are provided, within the Section Descriptions/

Analytical Methods	Method	Matrix	Method Descriptions
Particle Nizing in (ater by Laser Diffraction analysis	uEc 145	(c TE3	Particle Nize c nalysis of Particulates in (ater by Laser Diffraction c nalysis addorRng to c Px c S ethoR0468D
Gross alpha anRi eta c dffivity	Ec 048	(c TE3	c NTS DY072-86: Determination of gross alpha anRgross beta raRactivity in , ater samples by Li&uiR Ndfiltration Counting .LNCQ
c l) alinity by PC Titrator	ED82Y-P	(c TE3	@ house: 3 eferendeR to c Px c 0208 | This prodeRure RetermineR al) alinity by automateR measurement .e/g/ PC TitrateQon a settleR supernatant ali" of the sample using px 5/4 for inRdating the total al) alinity enRpoint/ This methoR is compliant , ith OEPS NdeRRule 1 .2Q
Nulfate . TurbiRmetridQas NB5 0- by Discrete c nalyser	ED851U	(c TE3	@ house: 3 eferendeR to c Px c 5488-NB5/ DissolveR sulfate is RetermineR in a 8/54um filtereR sample/ Nulfate ions are donverteR to a barium sulfate suspension in an acedid adIR meRum , ith barium dhloriRe/ Light absorbnde of the l aNB5 suspension is measureR by a photometer anR the NB 5-0 doncentration is RetermineR by dmparison of the reaRng , ith a stanRarR duve/ This methoR is compliant , ith OEPS NdeRRule 1 .2Q
ChloriRe by Discrete c nalyser	ED854U	(c TE3	@ house: 3 eferendeR to c Px c 5488 Cl - U/ The thiodyanate ion is liberateR from mercurid thiodyanate through se&uestration of mercury by the dhloriRe ion to form non-ioniseR mercurid dhloriRe/ in the presende of ferrid ions the liberateR thiodyanate forms highly-doloureR ferrid thiodyanate , hich is measureR at 578 nm c Px c seal methoR 81Y-1-L
S adR Cations - DissolveR	ED8j 2F	(c TE3	@ house: 3 eferendeR to c Px c 2108 anR2104wANEPC N(756 - 6818 anR6808wCations are RetermineR by either @P-c EN or @P-SN tedhni&ues/ This methoR is compliant , ith OEPS NdeRRule 1 .2Q NoRum c Rorption 3 atio is daldulateR from CaHSg anR Oa , hich RetermineR by c LN in house methoR K(GEOEFD8j 2F/ This methoR is compliant , ith OEPS NdeRRule 1 .2Q x airRness parameters are daldulateR baseRon c Px c 0258 l / This methoR is compliant , ith OEPS NdeRRule 1 .2Q
DissolveR S etals by @P-S N - Nuite c	EU808c-F	(c TE3	@ house: 3 eferendeR to c Px c 2104wANEPC N(756 - 6808HcLN K(GEOEJU808/ Namples are 8/54* m filtereR prior to analysis/ The @PSN tedhni&ue utilizes a highly efficient argon plasma to ionize selecteR elements/ @ns are then passeR into a high vadium mass spectrometerH , hich separates the analytes baseRon their Rstindt mass to charge ratios prior to their measurement by a Rsdrete RynoRe ion Retector/
Total S etals by @P-S N - Nuite c	EU808c-T	(c TE3	@ house: 3 eferendeR to c Px c 2104wANEPC N(756 - 6808HcLN K(GEOEJU808/ The @PSN tedhni&ue utilizes a highly efficient argon plasma to ionize selecteR elements/ @ns are then passeR into a high vadium mass spectrometerH , hich separates the analytes baseRon their Rstindt mass to charge ratios prior to their measurement by a Rsdrete RynoRe ion Retector/
DissolveR S erdury by F@N	EU824F	(c TE3	@ house: 3 eferendeR to c N 2448HcPx c 2110 xg - l .Flo , -in&edtion .NcI0CQcOR; apour generationQc c NQ Namples are 8/54* m filtereR prior to analysis/ F@ -ccN is an automateR flameless atomid absorption tedhni&ue/ c bromateQromiRe reagent is useR to oMRse any organid merdury dmpounRs in the filtereR sample/ The ionid merdury is reRudeR online to atomid merdury vapour by NcI0 , hich is then purgeR into a heatereR &uartz dell/ Kuantification is by dmparing absorbnde against a dalibration duve/ This methoR is dmplicant , ith OEPS NdeRRule 1 .2Q



Analytical Methods	Method	Matrix	Method Descriptions
Total S erdury by FSN	EU824T	(c TE3	<p>house: 3 eferendeR to cN 2448HcPx c 2110 xg - l . Flo, -in@dition .NnClOQCoLR; apour generationQc:cNQ F@-ccN is an automateR flameless atomid absorption tedhni&ue/ c bromate@promiRe reagent is useR to oMRse any organid merdury compounRs in the unfiltereR sample/ The ionid merdury is reRudeR online to atomid merdury vapour by NnClO , hidh is then purgeR into a heater&uartz dell/ Kuantifidation is by domparing absorbande against a dalibration curve/ This methoR is compliant , ith OEPS Ndh eRule I .2Q</p>
Ferrous @on by Disdrete cnalyser	EU841U	(c TE3	<p>house: 3 eferendeR to cPx c 2488 Fe-I / c dolorimetrid Retermination baseR on the reaction bet, een phenanthroline anRferrous iron at px 2/0-2/2 to form an orange-reR compleMthat is measureR against a five-point dalibration curve/ This methoR is compliant , ith OEPS Ndh eRule I .2Q</p>
NulfiRe as NO-	Ek874	(c TE3	<p>house: 3 eferendeR to cPx c 5488-NO- D/ NulfiRe spedies present in , ater samples are immerRately predipitateR , hen dolletteR in pretreateR daustid@nd adetate preserveR sample containers/ The sulphiRes are doloureR using methylene blue inRidator/ Oon-Retedts may be sdreeneR by domparison against a stanRarR at half-LB3 Hbther, ise samples are measureR using A; - ; @ Retedtion at 665nm/ This methoR is compliant , ith OEPS Ndh eRule I .2Q</p>
@nid l alande by PCT Dc anR Turbi NB5 Dc	uEO844 - PU	(c TE3	<p>house: 3 eferendeR to cPx c 1828F/ This methoR is compliant , ith OEPS Ndh eRule I .2Q</p>
T3x ; olatilesq TEX	EP878	(c TE3	<p>house: 3 eferendeR to ANEPc N(756 - 7068 (ater samples are Rredtly purgeR prior to analysis by Capillary UC@N anR @uantifidation is by domparison against an establisheR 4 point dalibration curve/ c lternativelyH@ sample is e@uilibrateR in a hearRspade vial anR a portion of the hearRspade RetermineR by UCS N analysis/ This methoR is compliant , ith the KC re@uirements of OEPS Ndh eRule I .2Q</p>
Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Sedoverable S etals	EO04	(c TE3	<p>house: 3 eferendeR to ANEPc N(756-2884/ S ethoR 2884 is a Citrid@ yRothlorid adIR Rgestion prodeRure useR to prepare surfade anRgrounR , ater samples for analysis by @PcEN or @PS N/ This methoR is compliant , ith OEPS Ndh eRule I .2Q</p>
; olatiles (ater Preparation	B3U16-((c TE3	<p>c 4 mL all@quot or 4 mL of a RluteR sample is aRReR to a 58 mL ; B C vial for sparging/</p>



CHAIN OF CUSTODY
ALS Laboratory, please tick →

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CLIENT: EMM CONSULTING
OFFICE: 20 Chertside Street, St Leonards
PROJECT: BARAKAS T3 Auxiliary
PURCHASE ORDER:
PROJECT MANAGER: Paul Gibbons
SAMPLER: Kallini Brodie / Luka Griffiths
COD: Enrolled to ALS? (YES)
Email Invoicing to: p.gibbons@emiconsulting.com.au, k.griffiths@emiconsulting.com.au
Email Reports to: accounts@emiconsulting.com.au, p.gibbons@emiconsulting.com.au

TURNAROUND REQUIREMENTS:
(Standard TAT may be longer for some tests e.g. Ultra) Standard TAT (List due date)
 Non Standard or urgent TAT (List due date)

COUNTRY OF ORIGIN:
ALS QUOTE NO: \$19932
CONTACT PH: 0477702413
SAMPLER MOBILE: 0418181447
EDD FORMAT (or default): Kallini Brodie
DATE/TIME: 17/09/2020

FOR LABORATORY USE ONLY (Client)
Cauldry Seal Intact? Yes No N/A
Free liquid / frozen ice blocks present upon receipt? Yes No N/A
Random Sample Temperature on Receipt: °C

RECEIVED BY: *Kallini Brodie*
DATE/TIME: 22/9 10:55

ALS USE ONLY	SAMPLE DETAILS	SERIES	MATRIX	CONTAINER INFORMATION	ANALYSIS REQUIRED INCLUDING SUITES (NB: Suit Codes must be ticked to attract suite price)	Additional Information
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes)	Where Matrix is required, specify Total (unfiltered bottles required) or Discharge (field filtered bottle required)	Comments on flow, container leaks, closures, or samples requiring specific QC analysis etc.
1	UGM-M4D	15/09/2020 14:55	W	5	Major ions + Toxic Metals (NI-1 & NI-2) (Green)	
2	UGM-M15S	16/09/2020 10:20	W	6	Major ions + Toxic Metals (NI-1 & NI-2) (Green)	
3	BH-M19D	16/09/2020 9:35	W	6	Major ions + Toxic Metals (NI-1 & NI-2) (Green)	
4	BH-M19S	16/09/2020 8:45	W	5	Major ions + Toxic Metals (NI-1 & NI-2) (Green)	
5	BH-M25D	15/09/2020 13:10	W	5	Major ions + Toxic Metals (NI-1 & NI-2) (Green)	
6	BH-M25S	15/09/2020 12:30	W	5	Major ions + Toxic Metals (NI-1 & NI-2) (Green)	
7	QA100	16/09/2020 0:00	W	5	Major ions + Toxic Metals (NI-1 & NI-2) (Green)	
8	QA101	16/09/2020 0:00	W	5	Major ions + Toxic Metals (NI-1 & NI-2) (Green)	
9	PSD 01	14/09/2020 11:20	W	1	Surphate Excess (Yellow)	
10	PSD 01	15/09/2020 11:30	W	1	Surphate Excess (Yellow)	
11	PSD 01	16/09/2020 7:00	W	1	Surphate Excess (Yellow)	
12	PSD 02	14/09/2020 11:25	W	1	Surphate Excess (Yellow)	
13	PSD 02	15/09/2020 11:35	W	1	Surphate Excess (Yellow)	
14	PSD 02	16/09/2020 7:05	W	3	Surphate Excess (Yellow)	
15	TS		W	1	Surphate Excess (Yellow)	
16	TB100	16/09/2020 14:30	W	1	Surphate Excess (Yellow)	
17	TB200	16/09/2020 14:30	W	1	Surphate Excess (Yellow)	
18	TB300	16/09/2020 14:30	W	1	Surphate Excess (Yellow)	
19	RB100	15/09/2020 15:30	W	1	Surphate Excess (Yellow)	
20	RB400	16/09/2020 10:35	W	1	Surphate Excess (Yellow)	
				TOTAL	52	
				TS control	31/720	

Environmental Division
Melbourne
Work Order Reference
EM2016426



Telephone : +61-3-8649 9600

Duplicate - Interlab analysis
Triplicate - Intra-lab analysis. Please forward to Envirolab for analysis

to lab for
BOD pH
Colour Turbidity RP
Other Ferrous, Sulphide
Date 22/9 20

Received: 21/9 11:50
C/Note: 2601 1531
Temp: 18.2°C
see feedbacks

WATER CONTAINER CODES: P = Unpreserved Plastic; N = NIBC Preserved Plastic; CRC = NIBC Preserved CRC; S14 = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Afrighi Unpreserved Plastic
V = VOA Vol HCl Preserved; VB = VOA Vol Sulfuric Preserved; VG = VOA Vol Sulfuric Preserved; AV = Afrighi Unpreserved Vial; SG = Sulfuric Preserved Amber Glass; H = HCl Preserved Amber Glass; H = HCl Preserved Specimen Bottle; SP = Sulfuric Preserved Plastic; F = Farnaldehyde Preserved Glass
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; S1 = Strain Bottle; ASS = Plastic Bag; AC = Acid Sulphate Soils; B = Unpreserved Bag; L = Lugia Soils Preserved Bottle; S1T = Strain Bottle



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **EM2016426**
Client : **EMM CONSULTING PTY LTD**
Contact : **PAUL GIBBONS**
Address : **Ground Floor Suite 1 20 Chandos Street
St Leonards NSW NSW 2065**
Telephone : **+++**
Project : **S130512**
Order number : **+++**
C-O-C number : **+++**
Sampler : **HAITL/ N BRODIEKLJHE GRIFFITQS**
Site : **+++**
(note number : **EN)112)19 + Primary wor, only**
No. of samples received : **20**
No. of samples analysed : **20**

Page : **1 of 3**
Laboratory : **Environmental Division Melbourne**
Contact : **Shane Colley**
Address : **4 Westall Rd Springvale VIC Australia 71 - 1**
Telephone : **861-7-9543 3600**
Date Samples Received : **22-Sep-2020 10:45**
Date Analysis Commenced : **22-Sep-2020**
Issue Date : **01-Oct-2020 11:40**



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

This report supersedes any previous reports with this reference. Results apply to the samples as submitted. This document shall not be reproduced in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

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

Signatories

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

Signatories	Position	Accreditation Category
Ale, sandar Vuji, ovic	Laboratory Technician	Newcastle + InorganicsKMayfield WestNSW
Dilani Fernando	Senior Inorganic Chemist	Melbourne InorganicsKSpringvaleVIC
Nancy Wang	2IC Organic Chemist	Melbourne OrganicsKSpringvaleVIC
Titus Vimalasiri	Metals Teamleader	RadionuclidesKFyshwic, KACT



Page : 2 of 3
Work Order : EM2016426
Client : EMM CONSULTING PT/ LTD
Project : S130512

General Comments

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

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

Where a reported less than result is higher than the LOR this may be due to primary sample extraction/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 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.

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

LOR = Limit of reporting

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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP090: Samples EM2016426&014K020 TRIP SPIHE and TRIP SPIHE CONTROL contains volatile compounds spiked into the sample containers prior to dispatch from the laboratory.
- EG020-F: Metals for EM2016426 #19 and #13 has been confirmed by re-preparation and re-analysis.
- EA154: ALS does not hold NATA accreditation for Laser Particle Sizing.
- EP090: Where reported total Xylenes is the sum of the reported concentrations of m_p-xylene and o-xylene at or above the LOR.
- EG020-F : EM2016426 #1+ dissolved metal required dilution prior analysis due to sample matrix. LORs have been adjusted accordingly.
- EG020-F : EM2016426 #2 total metal required dilution prior analysis due to sample matrix. LORs have been adjusted accordingly.
- Ionic balances were calculated using: major anions +chloride, alinity and sulfate; and major cations +calcium, magnesium, potassium and sodium.
- LOR for Gross Alpha and Gross Beta raised due to high solid content.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result thereby may bias results higher than expected. Results should be scrutinised accordingly.
- EG075F: EM2016426 #2 Poor matrix spike recovery for dissolved mercury due to sample matrix. Confirmed by re-extraction and re-analysis.
- EH095: EM2016426-002 Poor matrix spike recovery for sulphide due to sample matrix. Confirmed by re-extraction and re-analysis.
- Sodium Adsorption Ratio where reported. Where results for Na, Ca or Mg are <LOR concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = Zero concentration and a conservative approach for Ca, Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Compound	CAS Number	LOR	Client sampling date / time		Client sample ID				
			Unit	Result	UGM-M4D	UGM-M15S	BH-M19D	BH-M19S	BH-M25D
EA250: Gross Alpha and Beta Activity									
Gross beta	+++	0.10	Bq/L	3.40	2.11	2.35	2.11	2.35	2.35
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO#210-001	1	mg/L	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	7912#72-6	1	mg/L	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	- 1#52-7	1	mg/L	376	425	307	425	307	398
Total Alkalinity as CaCO3	+++	1	mg/L	376	425	307	425	307	398
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14909+ 3-9	1	mg/L	2650	4980	4720	3240	4720	3310
ED045G: Chloride by Discrete Analyser									
Chloride	1699-#00-6	1	mg/L	18300	24600	25600	18500	25600	17900
ED093F: Dissolved Major Cations									
Calcium	-440+ 0-2	1	mg/L	586	717	658	515	658	578
Magnesium	-473#5-4	1	mg/L	1600	1750	1860	1530	1860	1570
Sodium	-440#27-5	1	mg/L	11700	15000	15400	11100	15400	10800
Potassium	-440#03+	1	mg/L	49	35	32	50	32	52
EG020F: Dissolved Metals by ICP-MS									
Arsenic	-440#79-2	0.001	mg/L	<0.002	0.002	<0.002	0.004	<0.002	0.004
Cadmium	-440#47-3	0.0001	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Chromium	-440#4- 7	0.001	mg/L	<0.002	0.011	<0.002	<0.002	<0.002	<0.002
Copper	-440#50-9	0.001	mg/L	<0.002	0.119	0.034	<0.002	0.034	0.017
Nickel	-440#02-0	0.001	mg/L	<0.002	0.011	0.004	<0.002	0.004	<0.002
Lead	-473#32-1	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	-440#66-6	0.005	mg/L	<0.010	<0.010	0.018	<0.010	0.018	<0.010
EG020T: Total Metals by ICP-MS									
Arsenic	-440#79-2	0.001	mg/L	0.003	0.003	0.003	0.003	0.003	0.003
Cadmium	-440#47-3	0.0001	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Chromium	-440#4- 7	0.001	mg/L	0.028	0.028	0.028	0.028	0.028	0.028
Copper	-440#50-9	0.001	mg/L	0.152	0.152	0.152	0.152	0.152	0.152
Nickel	-440#02-0	0.001	mg/L	0.014	0.014	0.014	0.014	0.014	0.014
Lead	-473#32-1	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	-440#66-6	0.005	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
EG035F: Dissolved Mercury by FIMS									
Mercury	-473#3- 6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS									



Analytical Results

Compound	CAS Number	LOR	Unit	Client sample ID				
				UGM-M4D	UGM-M15S	BH-M19D	BH-M19S	BH-M25D
				15-Sep-2020 14:55	16-Sep-2020 10:20	16-Sep-2020 03:75	16-Sep-2020 09:45	15-Sep-2020 17:10
				EM2016426-001	EM2016426-002	EM2016426-003	EM2016426-004	EM2016426-005
				Result	Result	Result	Result	Result
EG035T: Total Recoverable Mercury by FIMS - Continued								
Mercury	-473-B- #6	0.0001	mg/L	-----	<0.0001	-----	-----	-----
EG051G: Ferrous Iron by Discrete Analyser								
Ferrous Iron	+++	0.05	mg/L	2.18	<0.05	9.27	<0.05	2.39
EK085M: Sulfide as S2-								
Sulfide as S2-	19436-#25-#9	0.1	mg/L	<0.1	<0.1	0.4	0.1	<0.1
EN055: Ionic Balance								
∅ Total Anions	+++	0.01	meq/L	579	802	598	826	582
∅ Total Cations	+++	0.01	meq/L	671	833	636	856	629
∅ Ionic Balance	+++	0.01	%	7.38	1.87	3.07	1.78	3.91
EA250CA: Gross Alpha and Beta Activity								
Gross alpha	+++	0.05	Bq/L	-----	2.34	1.33	4.55	-----
Gross beta activity - 40K	+++	0.10	Bq/L	-----	2.63	<1.-3	<2.23	-----



Analytical Results

Compound	CAS Number	Client sample ID		BH-M25S	QA100	PSD_01	PSD_01	PSD_01
		Client sampling date / time	Unit					
EA150: Particle Sizing		LOR	Unit	Result	Result	Result	Result	Result
ø +75µm	+++	1	%	****	****	****	****	****
EA250: Gross Alpha and Beta Activity								
Gross beta	+++	0.10	Bq/L	****	2.90	****	****	****
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO+210+001	1	mg/L	<1	<1	****	****	****
Carbonate Alkalinity as CaCO3	7912+72+6	1	mg/L	<1	<1	****	****	****
Bicarbonate Alkalinity as CaCO3	- 1+52+7	1	mg/L	291	308	****	****	****
Total Alkalinity as CaCO3	+++	1	mg/L	291	308	****	****	****
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14909+ 3+9	1	mg/L	5020	4860	****	****	****
ED045G: Chloride by Discrete Analyser								
Chloride	1699-00+6	1	mg/L	24900	25800	****	****	****
ED093F: Dissolved Major Cations								
Calcium	-440+ 0+2	1	mg/L	647	643	****	****	****
Magnesium	-473+65+4	1	mg/L	1810	1840	****	****	****
Sodium	-440+27+5	1	mg/L	15300	15200	****	****	****
Potassium	-440+03+	1	mg/L	31	32	****	****	****
EG020F: Dissolved Metals by ICP-MS								
Arsenic	-440+79+2	0.001	mg/L	<0.002	<0.002	****	****	****
Cadmium	-440+47+8	0.0001	mg/L	<0.0002	<0.0002	****	****	****
Chromium	-440+4- +7	0.001	mg/L	<0.002	<0.002	****	****	****
Copper	-440+50+9	0.001	mg/L	0.008	0.033	****	****	****
Nickel	-440+02+0	0.001	mg/L	0.017	0.004	****	****	****
Lead	-473+82+1	0.001	mg/L	<0.002	<0.002	****	****	****
Zinc	-440+66+6	0.005	mg/L	0.012	0.016	****	****	****
EG035F: Dissolved Mercury by FIMS								
Mercury	-473+8- +6	0.0001	mg/L	<0.0001	<0.0001	****	****	****
EG051G: Ferrous Iron by Discrete Analyser								
Ferrous Iron	+++	0.05	mg/L	0.10	<0.05	****	****	****
EK085M: Sulfide as S2-								
Sulfide as S2-	19436+25+9	0.1	mg/L	0.1	0.2	****	****	****
EN055: Ionic Balance								
ø Total Anions	+++	0.01	meq/L	813	835	****	****	****



Page : - of 3
 Wor. Order : EM2016426
 Client : EMM CONSULTING PT/ LTD
 Project : S130512

Analytical Results

Compound	CAS Number	LOR	Client sample ID				TS	TB100
			Client sampling date / time	Unit	PSD_02	PSD_02		
EA150: Particle Sizing								
ø +75µm	+++	1	%	See Attached	See Attached	Result	Result	Result
EG020T: Total Metals by ICP-MS								
Arsenic	-440+79-2	0.001	mg/L	See Attached	See Attached	Result	Result	Result
Cadmium	-440+47-3	0.0001	mg/L	See Attached	See Attached	Result	Result	Result
Chromium	-440+4-7	0.001	mg/L	See Attached	See Attached	Result	Result	Result
Copper	-440+50-9	0.001	mg/L	See Attached	See Attached	Result	Result	Result
Nickel	-440+02+0	0.001	mg/L	See Attached	See Attached	Result	Result	Result
Lead	-473+32+1	0.001	mg/L	See Attached	See Attached	Result	Result	Result
Zinc	-440+66+6	0.005	mg/L	See Attached	See Attached	Result	Result	Result
EG035T: Total Recoverable Mercury by FIMS								
Mercury	-473+3-6	0.0001	mg/L	See Attached	See Attached	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	+++	20	µg/L	See Attached	See Attached	Result	Result	Result
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6&C10	20	µg/L	See Attached	See Attached	Result	Result	Result
^ C6 - C10 Fraction minus BTEX (F1)	C6&C10-BTEX	20	µg/L	See Attached	See Attached	Result	Result	Result
EP080: BTEXN								
Benzene	-1+47-2	1	µg/L	See Attached	See Attached	Result	Result	Result
Toluene	109+99+7	2	µg/L	See Attached	See Attached	Result	Result	Result
Ethylbenzene	100+41+4	2	µg/L	See Attached	See Attached	Result	Result	Result
meta- & para-Xylene	109+79+7	2	µg/L	See Attached	See Attached	Result	Result	Result
ortho-Xylene	35+4-6	2	µg/L	See Attached	See Attached	Result	Result	Result
^ Total Xylenes	+++	2	µg/L	See Attached	See Attached	Result	Result	Result
^ Sum of BTEX	+++	1	µg/L	See Attached	See Attached	Result	Result	Result
Naphthalene	31+20+7	5	µg/L	See Attached	See Attached	Result	Result	Result
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	1-060+0-0	2	%	See Attached	See Attached	Result	Result	Result
Toluene-D8	207-26+5	2	%	See Attached	See Attached	Result	Result	Result
4-Bromofluorobenzene	460+00+4	2	%	See Attached	See Attached	Result	Result	Result



Analytical Results

Compound	Client sample ID		Unit	LOR	CAS Number	Client sampling date / time	TB200	TB300	RB100	RB400	TS Control
	EM2016426-016	EM2016426-017										EM2016426-018	EM2016426-019	EM2016426-020
EG020T: Total Metals by ICP-MS											
Arsenic	-440+79-2		mg/L	0.001		16-Sep-2020 14:70	<0.001	<0.001	<0.001	<0.001	71-Jul-2020 00:00
Cadmium	-440+47-3		mg/L	0.0001		16-Sep-2020 14:70	<0.0001	<0.0001	<0.0001	<0.0001	EM2016426-020
Chromium	-440+4-7		mg/L	0.001		16-Sep-2020 14:70	<0.001	<0.001	<0.001	0.005	EM2016426-019
Copper	-440+50-9		mg/L	0.001		16-Sep-2020 14:70	<0.001	<0.001	0.030	0.035	EM2016426-018
Nickel	-440+02+0		mg/L	0.001		16-Sep-2020 14:70	<0.001	<0.001	<0.001	0.003	EM2016426-017
Lead	-473+82+1		mg/L	0.001		16-Sep-2020 14:70	<0.001	<0.001	0.002	0.003	EM2016426-016
Zinc	-440+66-6		mg/L	0.005		16-Sep-2020 14:70	<0.005	<0.005	0.120	0.062	EM2016426-019
EG035T: Total Recoverable Mercury by FIMS											
Mercury	-473+8-6		mg/L	0.0001		16-Sep-2020 14:70	<0.0001	<0.0001	<0.0001	<0.0001	EM2016426-017
EP080/071: Total Petroleum Hydrocarbons											
C6 - C9 Fraction	+++	20	µg/L			16-Sep-2020 14:70	****	****	****	****	210
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions											
C6 - C10 Fraction	C6&C10	20	µg/L			16-Sep-2020 14:70	****	****	****	****	250
^ C6 - C10 Fraction minus BTEX (F1)	C6&C10-BTEX	20	µg/L			16-Sep-2020 14:70	****	****	****	****	130
EP080: BTEXN											
Benzene	-1+47-2	1	µg/L			16-Sep-2020 14:70	****	****	****	****	19
Toluene	109+99+7	2	µg/L			16-Sep-2020 14:70	****	****	****	****	19
Ethylbenzene	100+41+4	2	µg/L			16-Sep-2020 14:70	****	****	****	****	19
meta- & para-Xylene	109+79+7	2	µg/L			16-Sep-2020 14:70	****	****	****	****	40
ortho-Xylene	35+4-6	2	µg/L			16-Sep-2020 14:70	****	****	****	****	21
^ Total Xylenes	+++	2	µg/L			16-Sep-2020 14:70	****	****	****	****	61
^ Sum of BTEX	+++	1	µg/L			16-Sep-2020 14:70	****	****	****	****	118
Naphthalene	31+20+7	5	µg/L			16-Sep-2020 14:70	****	****	****	****	5
EP080S: TPH(V)/BTEX Surrogates											
1,2-Dichloroethane-D4	1-060+0-0	2	%			16-Sep-2020 14:70	****	****	****	****	102
Toluene-D8	207-+26+5	2	%			16-Sep-2020 14:70	****	****	****	****	97.9
4-Bromofluorobenzene	460+00+4	2	%			16-Sep-2020 14:70	****	****	****	****	93.0



Page : 3 of 3
Wor. Order : EM2016426
Client : EMM CONSULTING PT/ LTD
Project : S130512

Surrogate Control Limits

Sub-Matrik: WATER			
Compound	CAS Number	Recovery Limits (%)	
		Low	High
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	1-060-0-0	-7	123
Toluene-D8	207-026-6	-0	125
4-Bromofluorobenzene	460-00-4	-1	123



Environmental

QUALITY CONTROL REPORT

Work Order : **EM2014624**

Page : 1 of 9

Client : **EMM CONSULTING PTY LTD**
 Contact : **PAUL GIBBONS**
 Address : **Ground Floor Suite 1 20 Chandos Street
 St Leonards NSW NSW 2064**
 Telephone : **7777**
 Project : **S180412**
 Order number : **7777**
 C/O/C number : **7777**
 Sampler : **1, AITLKN BRODIEQU, E GRIFFIT/ S**
 Site : **7777**
 Quota number : **ENK12K1+ 7 Primary (or) only**
 No. of samples received : **20**
 No. of samples analysed : **20**

Laboratory : **Environmental Division Melbourne**
 Contact : **Shane Colley**
 Address : **5 Westall Rd Springvale VIC Australia 3191**
 Telephone : **- 617374458 8600**
 Date Samples Received : **22 Sep 2020**
 Date Analysis Commenced : **22 Sep 2020**
 Issue Date : **01 Oct 2020**



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

This report supersedes any previous reports; (with this reference. Results apply to the samples; as submitted. This document shall not be reproduced except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate xDUP; Report YRelative Percentage Difference xRPD; and Acceptance Limits
- Method Blank xMB; and Laboratory Control Spike xLCS; Report YRecovery and Acceptance Limits
- Matrix Spike xMS; Report YRecovery and Acceptance Limits

Signatories

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

Signatories	Position	Accreditation Category
Alesandar Vujicovic	Laboratory Technician	Ne(castle 7InorganicsQMayfield WestQNSW
Dilani Fernando	Senior Inorganic Chemist	Melbourne InorganicsQSpringvaleQVIC
Nancy Wang	QC Organic Chemist	Melbourne OrganicsQSpringvaleQVIC
Titus Vimalasiri	Metals Teamleader	RadionuclidesQFysh(ic) QACT



Page : 2 of 9
 Wor) Order : EM2016526
 Client : EMM CONSULTING PTK LTD
 Project : S180412

General Comments

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

Where moisture determination has been performed results are reported on a dry (eight) basis.

Where a reported less than x; result is higher than the LOR this may be due to primary sample extractions dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR this may be due to high

ey : Anonymous = Refers to samples (high are not specifically part of this (or) order but formed part of the wC 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 wC

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 WWTEN3+ 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% 740%; Result > 20 times LOR: 0% 720%.

Substrate: WATER

Laboratory sample ID	Client sample ID	Method/Compound	Laboratory Duplicate (DUP) Report						
			CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA250CA: Gross Alpha and Beta Activity (QC Lot: 32) 7) 33b									
CA20062+67046	Anonymous	EA240: Gross alpha	7777	0.04	Bq/L	<0.10	<0.10	0.00	No Limit
		EA240: Gross beta	7777	0.1	Bq/L	20.0	20.5	2.2+	0% 720%
		EA240: Gross beta activity 750,	7777	0.1	Bq/L	<0.21	<0.21	0.00	No Limit
EP20088607001	Anonymous	EA240: Gross alpha	7777	0.04	Bq/L	<0.04	<0.04	0.00	No Limit
		EA240: Gross beta	7777	0.1	Bq/L	0.5+	0.58	0.00	No Limit
		EA240: Gross beta activity 750,	7777	0.1	Bq/L	<0.10	<0.10	0.00	No Limit
ED03 P: Alkalinity - y PC Titrator (QC Lot: 32) 6117b									
EM201652+7002	Anonymous	ED039P: / ydrozide Al) alinity as CaCO3	DMOZ107001	1	mg/L	<1	<1	0.00	No Limit
		ED039P: Carbonate Al) alinity as CaCO3	3+1273276	1	mg/L	<1	<1	0.00	No Limit
		ED039P: Bicarbonate Al) alinity as CaCO3	9174273	1	mg/L	112	110	1.44	0% 720%
		ED039P: Total Al) alinity as CaCO3	7777	1	mg/L	112	110	1.44	0% 720%
EM2016530700+	Anonymous	ED039P: / ydrozide Al) alinity as CaCO3	DMOZ107001	1	mg/L	<1	<1	0.00	No Limit
		ED039P: Carbonate Al) alinity as CaCO3	3+1273276	1	mg/L	<1	<1	0.00	No Limit
		ED039P: Bicarbonate Al) alinity as CaCO3	9174273	1	mg/L	336	339	0.349	0% 720%
		ED039P: Total Al) alinity as CaCO3	7777	1	mg/L	336	339	0.349	0% 720%
ED061G: Sulfate (Tur- idimetric) as SO6 29- y DA (QC Lot: 32) 1432b									
EM20165017001	Anonymous	ED051G: Sulfate as SO5 7Turbidimetric	15+0+7987+	1	mg/L	120	121	1.05	0% 720%
EM20165267004	B/ 7M24D	ED051G: Sulfate as SO5 7Turbidimetric	15+0+7987+	1	mg/L	3310	3500	2.93	0% 720%
ED065G: Chloride - y Discrete Analyser (QC Lot: 32) 1433b									
EM20165017001	Anonymous	ED054G: Chloride	16+970076	1	mg/L	1500	1530	1.82	0% 720%
EM20165267004	B/ 7M24D	ED054G: Chloride	16+970076	1	mg/L	19800	1+000	0.209	0% 720%
ED0738: Dissolved Major Cations (QC Lot: 32) 1643b									
EM20165267002	UGM7M14S	ED083F: Calcium	955079072	1	mg/L	919	93+	2.+4	0% 720%
		ED083F: Magnesium	953878476	1	mg/L	1940	1+00	3.18	0% 720%



Sub/Matriz: WATER		Laboratory Duplicate (DUP) Report									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)		
ED0738: Dissolved Major Cations (QC Lot: 32) 1643b 9 continued											
EM20165267002	UGM7M14S	ED083F: Sodium	955072374	1	mg/L	14000	14400	3.83	0% 720%		
		ED083F: Potassium	955070879	1	mg/L	34	39	5.39	0% 740%		
EM20165307003	Anonymous	ED083F: Calcium	955079072	1	mg/L	20	20	0.00	0% 720%		
		ED083F: Magnesium	953878475	1	mg/L	59	5+	0.00	0% 720%		
		ED083F: Sodium	955072374	1	mg/L	404	408	0.1+	0% 720%		
		ED083F: Potassium	955070879	1	mg/L	8	8	0.00	No Limit		
EG0208: Dissolved Metals - y ICPMS (QC Lot: 32) 1641b											
EM20165267001	UGM7M5D	EG020AF: Cadmium	955076378	0.0001	mg/L	<0.0002	<0.0002	0.00	No Limit		
		EG020AF: Arsenic	955073+72	0.001	mg/L	<0.002	<0.002	0.00	No Limit		
		EG020AF: Chromium	955076973	0.001	mg/L	<0.002	<0.002	0.00	No Limit		
		EG020AF: Copper	95507407+	0.001	mg/L	<0.002	<0.002	0.00	No Limit		
		EG020AF: Lead	953878271	0.001	mg/L	<0.002	<0.002	0.00	No Limit		
		EG020AF: Ni)el	955070270	0.001	mg/L	<0.002	<0.002	0.00	No Limit		
		EG020AF: μinc	955076676	0.004	mg/L	<0.010	<0.010	0.00	No Limit		
EM20165307003	Anonymous	EG020AF: Cadmium	955076378	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit		
		EG020AF: Arsenic	955073+72	0.001	mg/L	0.062	0.061	0.00	0% 720%		
		EG020AF: Chromium	955076973	0.001	mg/L	0.003	0.003	0.00	No Limit		
		EG020AF: Copper	95507407+	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020AF: Lead	953878271	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020AF: Ni)el	955070270	0.001	mg/L	0.036	0.036	0.00	0% 720%		
		EG020AF: μinc	955076676	0.004	mg/L	0.055	0.055	0.00	No Limit		
EG020T: Total Metals - y ICPMS (QC Lot: 32) 354) b											
EM20165267002	UGM7M14S	EG020AT: Cadmium	955076378	0.0001	mg/L	<0.0002	<0.0002	0.00	No Limit		
		EG020AT: Arsenic	955073+72	0.001	mg/L	0.003	0.003	0.00	No Limit		
		EG020AT: Chromium	955076973	0.001	mg/L	0.02+	0.028	3.82	0% 740%		
		EG020AT: Copper	95507407+	0.001	mg/L	0.142	0.15+	2.91	0% 720%		
		EG020AT: Lead	953878271	0.001	mg/L	<0.002	<0.002	0.00	No Limit		
		EG020AT: Ni)el	955070270	0.001	mg/L	0.015	0.013	0.00	No Limit		
		EG020AT: μinc	955076676	0.004	mg/L	<0.010	0.011	0.00	No Limit		
EM20165+47001	Anonymous	EG020AT: Cadmium	955076378	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit		
		EG020AT: Arsenic	955073+72	0.001	mg/L	0.015	0.014	0.00	0% 740%		
		EG020AT: Chromium	955076973	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020AT: Copper	95507407+	0.001	mg/L	0.002	0.002	0.00	No Limit		
		EG020AT: Lead	953878271	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020AT: Ni)el	955070270	0.001	mg/L	0.028	0.028	0.00	0% 720%		
		EG020AT: μinc	955076676	0.004	mg/L	0.011	0.013	13.3	No Limit		
EG0358: Dissolved Mercury - y 8IMS (QC Lot: 32) 1640b											
EM20165267001	UGM7M5D	EG034F: Mercury	953878976	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit		
EM20165307003	Anonymous	EG034F: Mercury	953878976	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit		



Page : 5 of 9
 Wor) Order : EM2016526
 Client : EMM CONSULTING PTK LTD
 Project : S180412

SubMatrix: WATER									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG035T: Total Recovera- le Mercury - y 8IMS (QC Lot: 32) 276] b									
EM20165247024	Anonymous	EG034T: Mercury	953878976	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM20165267018	RB500	EG034T: Mercury	953878976	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG051G: 8errous Iron - y Discrete Analyser (QC Lot: 32) 1036b									
EM20165267001	UGM7M5D	EG041G: Ferrous Iron	7777	0.04	mg/L	2.1+	2.14	1.43	0% 720%
EM20165457005	Anonymous	EG041G: Ferrous Iron	7777	0.04	mg/L	<0.04	<0.04	0.00	No Limit
EK0J 5M: Sulfide as S29 (QC Lot: 32) 0] 11b									
EM20162417010	Anonymous	E, 0+4: Sulfide as S27	1+5867247+	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EK0J 5M: Sulfide as S29 (QC Lot: 32) 3273b									
EM20163697001	Anonymous	E, 0+4: Sulfide as S27	1+5867247+	0.1	mg/L	0.1	<0.1	0.00	No Limit
EP0J 0/0] 1: Total Petroleum Hydrocar- ons (QC Lot: 32) 1136b									
EM20163947001	Anonymous	EP0+0: C6 7 C8 Fraction	7777	20	Zg/L	<20	<20	0.00	No Limit
EP0J 0/0] 1: Total Recovera- le Hydrocar- ons 9NEPM 2013 8 ractions (QC Lot: 32) 1136b									
EM20163947001	Anonymous	EP0+0: C6 7 C10 Fraction	C6_C10	20	Zg/L	<20	<20	0.00	No Limit
EP0J 0: BTEXN (QC Lot: 32) 1136b									
EM20163947001	Anonymous	EP0+0: BenHene	917532	1	Zg/L	<1	<1	0.00	No Limit
		EP0+0: Toluene	10+7+7+3	2	Zg/L	<2	<2	0.00	No Limit
		EP0+0: EthylbenHene	10075175	2	Zg/L	<2	<2	0.00	No Limit
		EP0+0: meta7& para7Xylene	10+7+3+3	2	Zg/L	<2	<2	0.00	No Limit
			10675273						
		EP0+0: ortho7Xylene	8475976	2	Zg/L	<2	<2	0.00	No Limit
		EP0+0: Naphthalene	8172073	4	Zg/L	<4	<4	0.00	No Limit



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

The quality control term Method Blank (MB) 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 wC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS); refers to a certified reference material (CRM) or a non-interference free matrix spiked (with target analytes). The purpose of this wC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub Matrix: WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			Recovery Limits (%)	
				Result	Concentration	Spike Recovery (%)	LCS	Low	High	
EA250CA: Gross Alpha and Beta Activity (QCLot: 32) 7) 33b										
EA240: Gross alpha	7777	0.04	Bq/L	<0.04	194.1 Bq/L	88.4	84.2	104		
EA240: Gross beta	7777	0.1	Bq/L	<0.10	335.2 Bq/L	8+0	85.5	104		
EA240: Gross beta activity 750,	7777	0.1	Bq/L	<0.10	7777	7777	7777	7777		
ED03 P: Alkalinity - y PC Titrator (QCLot: 32) 6117b										
ED039P: Total Alkalinity as CaCO3	7777	7777	mg/L	7777	200 mg/L	83.5	+ + 0	112		
ED061G: Sulfate (Turbidimetric) SO6 29 - y DA (QCLot: 32) 1432b										
ED051G: Sulfate as SO4 Turbidimetric	15+0+7987+	1	mg/L	<1	24 mg/L	88.6	+4. +	119		
	16+ +970076	1	mg/L	<1	100 mg/L	102	+4. +	119		
ED065G: Chloride - y Discrete Analyser (QCLot: 32) 1433b										
ED054G: Chloride	16+ +970076	1	mg/L	<1	10 mg/L	86.4	+4.0	122		
				<1	1000 mg/L	113	+4.0	122		
ED0738: Dissolved Major Cations (QCLot: 32) 1643b										
ED083F: Calcium	955079072	1	mg/L	<1	4 mg/L	111	+ + 2	119		
ED083F: Magnesium	953876475	1	mg/L	<1	4 mg/L	109	+4.6	115		
ED083F: Sodium	955072374	1	mg/L	<1	40 mg/L	109	80.0	115		
ED083F: Potassium	955070879	1	mg/L	<1	40 mg/L	83. +	+6.9	111		
EG0208: Dissolved Metals - y ICPMS (QCLot: 32) 1641b										
EG020AF: Arsenic	955073+72	0.001	mg/L	<0.001	0.1 mg/L	103	+ + 4	10+		
EG020AF: Cadmium	955075378	0.0001	mg/L	<0.0001	0.1 mg/L	102	+3.4	10+		
EG020AF: Chromium	955075973	0.001	mg/L	<0.001	0.1 mg/L	88.8	+3.2	104		
EG020AF: Copper	95507407+	0.001	mg/L	<0.001	0.1 mg/L	100	+3.1	106		
EG020AF: Lead	953876271	0.001	mg/L	<0.001	0.1 mg/L	100	+5.6	109		
EG020AF: Nickel	955070270	0.001	mg/L	<0.001	0.1 mg/L	88.3	+5.3	10+		
EG020AF: Zinc	955076676	0.004	mg/L	<0.004	0.1 mg/L	105	+6.3	111		
EG020T: Total Metals - y ICPMS (QCLot: 32) 354) b										
EG020AT: Arsenic	955073+72	0.001	mg/L	<0.001	0.1 mg/L	88.2	+8.2	113		
EG020AT: Cadmium	955075378	0.0001	mg/L	<0.0001	0.1 mg/L	82.1	+6.5	112		
EG020AT: Chromium	955075973	0.001	mg/L	<0.001	0.1 mg/L	89.2	+6.8	110		
EG020AT: Copper	95507407+	0.001	mg/L	<0.001	0.1 mg/L	84.1	+6.8	108		
EG020AT: Lead	953876271	0.001	mg/L	<0.001	0.1 mg/L	85.5	+ + 3	110		
EG020AT: Nickel	955070270	0.001	mg/L	<0.001	0.1 mg/L	86.3	+9.8	111		
EG020AT: Zinc	955076676	0.004	mg/L	<0.004	0.1 mg/L	109	+6.9	115		
EG0358: Dissolved Mercury - y 8IMS (QCLot: 32) 1640b										



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 Wor) Order : EM2016526
 Client : EMM CONSULTING PTK LTD
 Project : S180412

Sub/Matriz: WATER			Method Blank (MB) Report		Laboratory Control Spike (LCS) Report				
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	LCS	Low	High
EG0358: Dissolved Mercury - y 8IMS (QCLot: 32) 1640b 9 continued									
EG034F: Mercury	953878976	0.0001	mg/L	<0.0001	0.01 mg/L	103		91.1	112
EG035T: Total Recoverable Mercury - y 8IMS (QCLot: 32) 276j b									
EG034T: Mercury	953878976	0.0001	mg/L	<0.0001	0.01 mg/L	88.2		92.6	114
EG051G: Ferrrous Iron - y Discrete Analyser (QCLot: 32) 1036b									
EG041G: Ferrrous Iron	7777	0.04	mg/L	<0.04	2 mg/L	112		94.+	112
EK0J 5M: Sulfide as S29 (QCLot: 32) 0) 11b									
E. 0+4: Sulfide as S27	1+5867247+	0.1	mg/L	<0.1	0.4 mg/L	105		+1.8	116
EK0J 5M: Sulfide as S29 (QCLot: 32) 3273b									
E. 0+4: Sulfide as S27	1+5867247+	0.1	mg/L	<0.1	0.4 mg/L	108		+1.8	116
EP0J 0/0) 1: Total Petroleum Hydrocarbons (QCLot: 32) 1136b									
EP0+0: C6 7C8 Fraction	7777	20	Zg/L	<20	360 Zg/L	110		64.4	128
EP0J 0/0) 1: Total Recoverable Hydrocarbons 9NEPM 2013 8ractions (QCLot: 32) 1136b									
EP0+0: C6 7C10 Fraction	C6_C10	20	Zg/L	<20	540 Zg/L	109		65.3	126
EP0J 0: BTEXN (QCLot: 32) 1136b									
EP0+0: Benzene	9175372	1	Zg/L	<1	20 Zg/L	8+.		68.+	125
EP0+0: Toluene	10+7+73	2	Zg/L	<2	20 Zg/L	10+		93.6	126
EP0+0: Ethylbenzene	10075175	2	Zg/L	<2	20 Zg/L	106		92.0	126
EP0+0: meta7 & paraXylene	10+73+73	2	Zg/L	<2	50 Zg/L	115		91.4	132
	10675273								
EP0+0: orthoXylene	8475976	2	Zg/L	<2	20 Zg/L	11+		96.4	132
EP0+0: Naphthalene	8172073	4	Zg/L	<4	4 Zg/L	84.1		90.4	129

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 wC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data quality Objectives xDwOs. Ideal recovery ranges stated may be (aimed in the event of sample matrix interference).

Sub/Matriz: WATER			Matrix Spike (MS) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)	MS	Low	High
ED061G: Sulfate (Tur- Idimetricbas SO6 29- y DA (QCLot: 32) 1432b								
EM20165017002	Anonymous	ED051G: Sulfate as SO5 7 Turbidimetric	15+0+7987+	100 mg/L	98.3		90.0	130
ED065G: Chloride - y Discrete Analyser (QCLot: 32) 1433b								
EM20165017002	Anonymous	ED054G: Chloride	16++970076	500 mg/L	# Not Determined		90.0	130
EG0208: Dissolved Metals - y ICPMS (QCLot: 32) 1641b								
EM20165267001	UGM7M5D	EG020A7F: Arsenic	955073+72	0.5 mg/L	10+		+4.0	131
		EG020A7F: Cadmium	95507378	0.1 mg/L	85.3		+1.0	133



Page : 9 of 9
 Wor) Order : EM2016526
 Client : EMM CONSULTING PTK LTD
 Project : S180412

Sub/Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low High
EG0208: Dissolved Metals - y ICPMS (QCLot: 32) 1641b 9continued						
EM20165267001	UGM7M5D	EG020A7F: Chromium	955075973	0.5 mg/L	86.8	91.0 134
		EG020A7F: Copper	95507407+	0.5 mg/L	84.8	96.0 130
		EG020A7F: Lead	953878271	0.5 mg/L	83.6	94.0 133
		EG020A7F: Ni)el	955070270	0.5 mg/L	116	93.0 131
		EG020A7F: jinc	955076676	0.5 mg/L	103	94.0 131
EG020T: Total Metals - y ICPMS (QCLot: 32) 354) b						
EM20165267002	UGM7M14S	EG020A7T: Arsenic	955073+72	2 mg/L	106	+2.0 11+
		EG020A7T: Cadmium	955075378	0.4 mg/L	8+6	94.0 128
		EG020A7T: Chromium	955075973	2 mg/L	8+9	+0.0 11+
		EG020A7T: Copper	95507407+	2 mg/L	85.+	+1.0 114
		EG020A7T: Lead	953878271	2 mg/L	88.6	+3.0 121
		EG020A7T: Ni)el	955070270	2 mg/L	85.3	+0.0 11+
		EG020A7T: jinc	955076676	2 mg/L	86.4	95.0 116
EG0358: Dissolved Mercury - y 8IMS (QCLot: 32) 1640b						
EM20165267002	UGM7M14S	EG034F: Mercury	953878976	0.01 mg/L	# 48.1	90.0 120
EG035T: Total Recovera- le Mercury - y 8IMS (QCLot: 32) 276) b						
EM20165247026	Anonymous	EG034T: Mercury	953878976	0.01 mg/L	105	90.0 130
EG051G: 8errous Iron - y Discrete Analyser (QCLot: 32) 1036b						
EM20165267004	B/ 7M24D	EG041G: Ferrous Iron	7777	2 mg/L	89.6	90.0 130
EK0J 5M: Sulfide as S29 (QCLot: 32) 0) 11b						
EM20162417020	Anonymous	E, 0+4: Sulfide as S27	1+5867247+	0.33 mg/L	123	90.0 130
EK0J 5M: Sulfide as S29 (QCLot: 32) 3273b						
EM20165267002	UGM7M14S	E, 0+4: Sulfide as S27	1+5867247+	0.33 mg/L	# 0.00	90.0 130
EP0J 0/0) 1: Total Petroleum Hydrocar- ons (QCLot: 32) 1136b						
EM20163947002	Anonymous	EP0+0: C6 7C8 Fraction	7777	2+0 Zg/L	99.2	53.0 124
EP0J 0/0) 1: Total Recovera- le Hydrocar- ons 9NEPM 2013 8ractions (QCLot: 32) 1136b						
EM20163947002	Anonymous	EP0+0: C6 7C10 Fraction	C6_C10	330 Zg/L	93.1	55.0 122
EP0J 0: BTEXN (QCLot: 32) 1136b						
EM20163947002	Anonymous	EP0+0: BenTene	9175372	20 Zg/L	+1.5	6+0 130
		EP0+0: Toluene	10+7+73	20 Zg/L	83.4	92.0 132



ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM2014624	Page	: 1 of 4
Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: PAUL GIBBONS	Telephone	: +61-3-8594 4600
Project	: S140512	Date Samples Received	: 22-Sep-2020
Site	: ----	Issue Date	: 01-Oct-2020
Sampler	: 7AITLHN BRODIE/ LUTE GRIKKIT. S	NoQaf samples received	: 20
Order number	: ----	NoQaf samples analysed	: 20

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

Brief method summaries and references are also provided to assist in traceabilityQ

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the (uality Control) CWRReportQ

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

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples
 Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED095C: Chloride by Discrete Analyser	EM2016901-002	Anonymous	Chloride	1688-00-6	Not Determined	----	MS recovery not determined, background level greater than or equal to 6x spike level.
EG035K: Dissolved Mercury by KIMS	EM2016926-002	UGM-M15S	Mercury	%34-4%6	54Q _	%0Q-120_	Recovery less than lower data quality objective
E7085M: Sulfide as S2-	EM2016926-002	UGM-M15S	Sulfide as S2-	18946-25-8	000 _	%0Q-130_	Recovery less than lower data quality objective

Outliers : Analysis Holding Time Compliance

Matrix: WATER

Method Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EP090/0z1: Total Petroleum Hydrocarbons						
Amber 8OC 8ial - Sulfuric Acid TS/	23-Sep-2020	19-Aug-2020	60	23-Sep-2020	19-Aug-2020	60
EP090/0z1: Total Recoverable Hydrocarbons - NEPM 2017 Fractions						
Amber 8OC 8ial - Sulfuric Acid TS/	23-Sep-2020	19-Aug-2020	60	23-Sep-2020	19-Aug-2020	60
EP090: BTEVN						
Amber 8OC 8ial - Sulfuric Acid TS/	23-Sep-2020	19-Aug-2020	60	23-Sep-2020	19-Aug-2020	60

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times/ this should be taken into consideration & then interpreting results. This report summarises extraction, preparation and analysis times and compares each with ALS recommended holding times referencing USEPA Sk 896/ AP. A/ AS and NEPMW based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and retests. 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 19 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 19 days. A recorded breach does not guarantee a breach for all FOC analytes and should be verified in case the reported breach is a false positive of Vinyl Chloride and Styrene are not key analytes of interest. concern.

Matrix: WATER

Method Container / Client Sample ID(s)	Sample Date			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue

Evaluation: * q . olding time breach X v k ithin holding time



Page : 3 of 4
 k or Y Order : EM2016926
 Client : EMM CONSULTING PTH LTD
 Project : S140512

Matrix: **WATER** Evaluation: * q . olding time breach X✓ q k ithin holding timeC

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Ef aluation	Date analysed	Due for analysis	Ef aluation	
EA130: Particle Sizing								
Clear Plastic Bottle - Natural (EA136)	PSDz02	-----	-----	-----	25-Sep-2020	13-Mar-2021	✓	
PSDz01/								
Clear Plastic Bottle - Natural (EA136)	PSDz02	-----	-----	-----	25-Sep-2020	19-Mar-2021	✓	
PSDz01/								
Clear Plastic Bottle - Natural (EA136)	PSDz02	-----	-----	-----	25-Sep-2020	15-Mar-2021	✓	
PSDz01/								
EA230: Gross Alpha and Beta Activity								
Clear Plastic Bottle - Natural (EA230)	B. -M14D/ (A100)	-----	-----	-----	29-Sep-2020	15-Mar-2021	✓	
UGM-M15S/ B. -M14S/								
EA230CA: Gross Alpha and Beta Activity								
Clear Plastic Bottle - Natural (EA230)	B. -M14D/ (A100)	-----	-----	-----	29-Sep-2020	15-Mar-2021	✓	
UGM-M15S/ B. -M14S/								
ED07zP: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED07z-P)	B. -M25D/	-----	-----	-----	26-Sep-2020	24-Sep-2020	✓	
UGM-M9D/ B. -M25S								
Clear Plastic Bottle - Natural (ED07z-P)	B. -M14D/ (A100)	-----	-----	-----	26-Sep-2020	30-Sep-2020	✓	
UGM-M15S/ B. -M14S/								
ED061G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Clear Plastic Bottle - Natural (ED061G)	B. -M25D/	-----	-----	-----	27-Sep-2020	13-Oct-2020	✓	
UGM-M9D/ B. -M25S								
Clear Plastic Bottle - Natural (ED061G)	B. -M14D/ (A100)	-----	-----	-----	27-Sep-2020	19-Oct-2020	✓	
UGM-M15S/ B. -M14S/								
ED063G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED063G)	B. -M25D/	-----	-----	-----	27-Sep-2020	13-Oct-2020	✓	
UGM-M9D/ B. -M25S								
Clear Plastic Bottle - Natural (ED063G)	B. -M14D/ (A100)	-----	-----	-----	27-Sep-2020	19-Oct-2020	✓	
UGM-M15S/ B. -M14S/								
ED057F: Dissolved Major Cations								
Clear Plastic Bottle - Nitric Acid; Filtered (ED057F)	B. -M25D/	-----	-----	-----	26-Sep-2020	13-Oct-2020	✓	
UGM-M9D/ B. -M25S								
Clear Plastic Bottle - Nitric Acid; Filtered (ED057F)	B. -M14D/ (A100)	-----	-----	-----	26-Sep-2020	19-Oct-2020	✓	
UGM-M15S/ B. -M14S/								



Page : 9 of 4
 k or Y Order : EM2016926
 Client : EMM CONSULTING PTH LTD
 Project : S140512

Matrix: WATER Evaluation: * q . olding time breach X✓ q k ithin holding timeC

Method		Sample Date			Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Ef aluation	Date analysed	Due for analysis	Ef aluation			
EG020F: Dissolved Metals by ICP-MS										
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)	B. -M25D/ UGM-M9D/ B. -M25S	13-Sep-2020	-----	----	27-Sep-2020	19-Mar-2021	✓			
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)	B. -M14D/ UGM-M15S/ B. -M14S/ (A100	14-Sep-2020	-----	----	27-Sep-2020	15-Mar-2021	✓			
EG020T: Total Metals by ICP-MS										
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)	RB100	13-Sep-2020	26-Sep-2020	19-Mar-2021	26-Sep-2020	19-Mar-2021	✓			
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)	UGM-M15S/ TB200/ RB900	14-Sep-2020	26-Sep-2020	15-Mar-2021	26-Sep-2020	15-Mar-2021	✓			
EG073F: Dissolved Mercury by FIMS										
Clear Plastic Bottle - Nitric Acid; Filtered (EG073F)	UGM-M9D/ B. -M25S	13-Sep-2020	-----	----	27-Sep-2020	13-Oct-2020	✓			
Clear Plastic Bottle - Nitric Acid; Filtered (EG073F)	B. -M14D/ UGM-M15S/ B. -M14S/ (A100	14-Sep-2020	-----	----	27-Sep-2020	19-Oct-2020	✓			
EG073T: Total Recoverable Mercury by FIMS										
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG073T)	RB100	13-Sep-2020	-----	----	27-Sep-2020	13-Oct-2020	✓			
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG073T)	UGM-M15S/ TB200/ RB900	14-Sep-2020	-----	----	27-Sep-2020	19-Oct-2020	✓			
EG031G: Ferrous Iron by Discrete Analyser										
Clear Plastic Bottle - HCl - Filtered (EG031G)	UGM-M9D/ B. -M25S	13-Sep-2020	-----	----	22-Sep-2020	22-Sep-2020	✓			
Clear Plastic Bottle - HCl - Filtered (EG031G)	UGM-M15S/ B. -M14S/ (A100	14-Sep-2020	-----	----	27-Sep-2020	23-Sep-2020	✓			
EK093M: Sulfide as S2-										
Clear Plastic Bottle - Zinc Acetate/NaOH (EK093)	UGM-M9D/ B. -M25S	13-Sep-2020	-----	----	22-Sep-2020	22-Sep-2020	✓			
Clear Plastic Bottle - Zinc Acetate/NaOH (EK093)	UGM-M15S/ B. -M14S/ (A100	14-Sep-2020	-----	----	27-Sep-2020	23-Sep-2020	✓			



Page : 5 of 4
 k or Y Order : EM2016926
 Client : EMM CONSULTING PTH LTD
 Project : S140512

Matrix: WATER Evaluation: * q . olding time breach X✓ q k ithin holding time

Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation		Analysis		
			Date extracted	Due for extraction	Date analysed	Due for analysis	Ef aluation
EP090/0z1: Total Petroleum Hydrocarbons							
Amber 80C 8ial - Sulfuric Acid (EP090)		71-Jul-2020	27-Sep-2020	19-Aug-2020	27-Sep-2020	19-Aug-2020	* x
TS/	TS Control						
EP090/0z1: Total Recoverable Hydrocarbons - NEPM 2017 Fractions							
Amber 80C 8ial - Sulfuric Acid (EP090)		71-Jul-2020	27-Sep-2020	19-Aug-2020	27-Sep-2020	19-Aug-2020	* x
TS/	TS Control						
EP090: BTEVN							
Amber 80C 8ial - Sulfuric Acid (EP090)		71-Jul-2020	27-Sep-2020	19-Aug-2020	27-Sep-2020	19-Aug-2020	* x
TS/	TS Control						



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

Evaluation: * q (quality Control frequency not within specification) ✓ q (quality Control frequency within specification)

Quality Control Methods	Sample Type	Method	Count			Rate (%)		Evaluation	Quality Control Specification
			QC	Regular	Actual	Expected			
Laboratory Duplicates (DUPW)									
Alkalinity by PC Titrator		ED03%P	2	20	10.00	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Chloride by Discrete Analyser		ED095G	2	20	10.00	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Dissolved Mercury by KIMS		EG035K	2	15	17.77	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Dissolved Metals by ICP-MS - Suite A		EG020A-K	2	20	10.00	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Kerrous Iron by Discrete Analyser		EG051G	2	10	20.00	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Gross Alpha and Beta Activity		EA250	2	1%	11.24	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Major Cations - Dissolved		ED043K	2	20	10.00	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Sulfate) Turbidimetric W&S SO9 2- by Discrete Analyser		ED091G	2	20	10.00	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Sulfide as S2-		E7 085	2	12	14.42	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Total Mercury by KIMS		EG035T	2	20	10.00	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Total Metals by ICP-MS - Suite A		EG020A-T	2	20	10.00	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
TR: Folate, BTE=		EP080	1	10	10.00	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Laboratory Control Samples (LCSW)									
Alkalinity by PC Titrator		ED03%P	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Chloride by Discrete Analyser		ED095G	2	20	10.00	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Dissolved Mercury by KIMS		EG035K	1	15	4.42	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Dissolved Metals by ICP-MS - Suite A		EG020A-K	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Kerrous Iron by Discrete Analyser		EG051G	1	10	10.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Gross Alpha and Beta Activity		EA250	2	1%	11.24	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Major Cations - Dissolved		ED043K	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Sulfate) Turbidimetric W&S SO9 2- by Discrete Analyser		ED091G	2	20	10.00	10.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Sulfide as S2-		E7 085	2	12	14.42	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Total Mercury by KIMS		EG035T	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Total Metals by ICP-MS - Suite A		EG020A-T	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
TR: Folate, BTE=		EP080	1	10	10.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Method Blank (MBW)									
Chloride by Discrete Analyser		ED095G	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Dissolved Mercury by KIMS		EG035K	1	15	4.42	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Dissolved Metals by ICP-MS - Suite A		EG020A-K	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Kerrous Iron by Discrete Analyser		EG051G	1	10	10.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Gross Alpha and Beta Activity		EA250	1	1%	3.99	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Major Cations - Dissolved		ED043K	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Sulfate) Turbidimetric W&S SO9 2- by Discrete Analyser		ED091G	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Sulfide as S2-		E7 085	2	12	14.42	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Total Mercury by KIMS		EG035T	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Total Metals by ICP-MS - Suite A		EG020A-T	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
TR: Folate, BTE=		EP080	1	10	10.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	



Page : % of 4
 k or Y Order : EM2016926
 Client : EMM CONSULTING PTH LTD
 Project : S140512

Matrix: **WATER** (Quality Control Frequency not within specification) ✓ (Quality Control Frequency within specification)

Analytical Methods	Method	QC	Count		Rate (%)		Evaluation	Quality Control Specification
			OC	Regular	Actual	Expected		
Method Blanks (MBW)-Continued								
TR. Foliatiles, BTE=	EP080	1	10	10.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Matrix Spikes (MSW)								
Chloride by Discrete Analyser	ED095G	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Dissolved Mercury by KIMS	EG035K	1	15	4.42	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Dissolved Metals by ICP-MS - Suite A	EG020A-K	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Mercurous Iron by Discrete Analyser	EG051G	1	10	10.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Sulfate (Turbidimetric) as SO ₄ 2- by Discrete Analyser	ED091G	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Sulfide as S ²⁻	E7085	2	12	14.42	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Total Mercury by KIMS	EG035T	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
Total Metals by ICP-MS - Suite A	EG020A-T	1	20	3.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	
TR. Foliatiles, BTE=	EP080	1	10	10.00	3.00	✓	NEPM 2013 B3 ; ALS (C Standard	



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognised procedures such as those published by the US EPA/ AP. A/ AS and NEPM/ Qh 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
Particle Sizing in k ater by Laser Diffraction Analysis	uEA159	k ATER	Particle Sizing Analysis of Particulates in k ater by Laser Diffraction Analysis according to AP. A Method 2560D
Gross Alpha and Beta Activity	EA250	k ATER	ASTM D2883-06: Determination of gross alpha and gross beta radioactivity in & ater samples by Liquid Scintillation Counting (LSC)
AlYalinity by PC Titrator	ED03%P	k ATER	In house: Referenced to AP. A 2320 B This procedure determines AlYalinity by automated measurement using a Titration on a settled supernatant aliquot of the sample using a 90 for indicating the total AlYalinity end-point. This method is compliant with NEPM Schedule B)3W
Sulfate)TurbidimetricWas SO9 2- by Discrete Analyser	ED091G	k ATER	In house: Referenced to AP. A 9500-SO9QDissolved sulfate is determined in a 0.95um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO9 suspension is measured by a photometer and the SO9-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B)3W
Chloride by Discrete Analyser	ED095G	k ATER	In house: Referenced to AP. A 9500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. The presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 980 nm AP. A seal method 2 01%1-L
Major Cations - Dissolved	ED043K	k ATER	In house: Referenced to AP. A 3120 and 3125XUSEPA Sk 896 - 6010 and 6020X. Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B)3W Sodium Adsorption Ratio is calculated from Ca/ Mg and Na & high determined by ALS in house method (k I-EN, ED043K). This method is compliant with NEPM Schedule B)3W . ardness parameters are calculated based on AP. A 2390 BQ. This method is compliant with NEPM Schedule B)3W
Dissolved Metals by ICP-MS - Suite A	EG020A-K	k ATER	In house: Referenced to AP. A 3125XUSEPA Sk 896 - 6020/ ALS (k I-EN, EG020Q. Samples are 0.95* m filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionise selected elements. Ions are then passed into a high vacuum mass spectrometer/ & high 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	k ATER	In house: Referenced to AP. A 3125XUSEPA Sk 896 - 6020/ ALS (k I-EN, EG020Q. The ICPMS technique utilizes a highly efficient argon plasma to ionise selected elements. Ions are then passed into a high vacuum mass spectrometer/ & high separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by KIMS	EG035K	k ATER	In house: Referenced to AS 3550/ AP. A 3112 . g - B)Klo&-injection)SnCl2) Cold Fapour generation WAASW. Samples are 0.95* m filtered prior to analysis. KIM-AAS is an automated flameless atomic absorption technique. The ionic bromate, bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl2 & high is then purged into a heated Vuartwell cell (quantification is by comparing absorbance against a calibration curve). This method is compliant with NEPM Schedule B)3W.



Analytical Methods	Method	Matrix	Method Descriptions
Total Mercury by KIMS	EG035T	k ATER	In house: Referenced to AS 3550/ AP. A 3112 . g - B)Klo&-injection)SnCl2)WCold Fapour generationWAASW KIM-AAS is an automated flameless atomic absorption techniVueQA bromate,bromide reagent is used to oxidise any organic mercury compounds in the unfiltered sampleQThe ionic mercury is reduced online to atomic mercury vapour by SnCl2 &hich is then purged into a heated VuartwcellQ(uantification is by comparing absorbance against a calibration curveQThis method is compliant &ith NEPM Schedule B)3)W
Kerrous Iron by Discrete Analyser	EG051G	k ATER	In house: Referenced to AP. A 3500 Ke-BQA colorimetric determination based on the reaction bet&een phenanthroline and ferrous iron at p. 3Q-3Q to form an orange-red complex that is measured against a five-point calibration curveQThis method is compliant &ith NEPM Schedule B)3)W
Sulfide as S2-	E7085	k ATER	In house: Referenced to AP. A 9500-S2- DQSulfide species present in &ater samples are immediately precipitated &hen collected in pretreated caustic,winc acetate preserved sample containersQThe sulphides are coloured using methylene blue indicatorQNon-detects may be screened by comparison against a standard at half-LOR/ other&ise samples are measured using UF-FIS detection at 669nmQThis method is compliant &ith NEPM Schedule B)3)W
Ionic Balance by PCT DA and Turbi SO9 DA	u EN055 - PG	k ATER	In house: Referenced to AP. A 1030KQThis method is compliant &ith NEPM Schedule B)3)W
TR. Folatiles,BTE=	EP080	k ATER	In house: Referenced to USEPA Sk 896 - 8260 k ater samples are directly purged prior to analysis by Capillary GC,MS and Vuantification is by comparison against an established 5 point calibration curveQAlternatively/ a sample is eVuillibrated in a headspace vial and a portion of the headspace determined by GCMS analysisQThis method is compliant &ith the (C reVuirements of NEPM Schedule B)3)W
Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	k ATER	In house: Referenced to USEPA Sk 896-3005QMethod 3005 is a Nitric,. ydrochloric acid digestion procedure used to prepare surface and ground &ater samples for analysis by ICPAES or ICPMSQThis method is compliant &ith NEPM Schedule B)3)W
Folatiles k ater Preparation	ORG16-k	k ATER	A 5 mL allVuot or 5 mL of a diluted sample is added to a 90 mL FOC vial for spargingQ

Fadi Soro

From: Angus Harding
Sent: Wednesday, 23 September 2020 9:20 AM
To: Samples Sydney
Subject: FW: [EXTERNAL] - COC for S190512
Attachments: COC S190512 20200921.xlsx

Hi Fadi,

See attached COC for EMM samples coming from Melbourne.

Send QA201 on to Envirolab for analysis.

Could the PSD_01/02 samples (not on hold) please be sent through on a separate report.

Some PSD_01/02 samples are on hold until further notice.

Cheers.

Kind Regards,

Angus Harding

Client Services Officer, Environmental
Sydney



T +61 2 8784 8555
E +61 2 8784 8500
D +61 2 8784 8503
angus.harding@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA



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From: Kaitlyn Brodie [mailto:kbrodie@emmconsulting.com.au]
Sent: Tuesday, 22 September 2020 6:25 PM
To: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>; Shane Colley <shane.colley@ALSGlobal.com>
Cc: Dan Condon <dcondon@emmconsulting.com.au>; Paul Gibbons <pgibbons@emmconsulting.com.au>
Subject: [EXTERNAL] - COC for S190512

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Good evening,

Attached is the COC for job number S190512. Could you please send QA201 on to Envirolab for analysis. Could the PSD_01/02 samples (not on hold) please be sent through on a separate report. Some PSD_01/02 samples are on hold until further notice.

5 eskys were delivered to ALS this afternoon (22/09/2020) and should arrive in Smithfield tomorrow.

Thank you and please let me know if I messed something up.

Kaitlyn


Kaitlyn Brodie

Hydrogeologist



EMM

GENERAL CONTRACTORS

T 02 9493 9500
M 0401 881 447
 Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065



EMM'S BUSINESS
CONTINUITY PLAN
FOR COVID-19

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Environmental

CERTIFICATE OF ANALYSIS

Work Order : ES20337MJ
Client : EGG CONSPLTIND i TY LTt
Contact : PAUL GIBBONS
Address : Ground Floor Suite 1 20 Chandos Street
 St Leonards NSW NSW 2065
Telephone : ----
Project : S190512 Bairnald T3 Ancillary
Order number : ----
C-O-C number : ----
Sampler : KAITLYN BRODIE, Luke G
Site : ----
Quote number : EN/112/18 - Primary work only
No. of samples received : 16
No. of samples analysed : 16

Page : 1 of 9
Laboratory : Environmental Division Sydney
Contact : Sepan Mahamad
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +61 2 8784 8555
Date Samples Received : 22-Sep-2020 19:00
Date Analysis Commenced : 23-Sep-2020
Issue Date : 09-Oct-2020 11:19



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Address of the person who signed the report : Col from Resorav , A, C Coh snf l ye Abbebbh el a o f bbiba u raw
, cf mē Re^ueu fi d Sf h sra Reversal Noapryf aol B

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Titus Vimalasiri	Metals Teamleader	Radionuclides, Fyshwick, ACT



Page : 2 of 9
Work Order : ES2033456
Client : EMM CONSULTING PTY LTD
Project : S190512 Balranald T3 Ancillary

General Comments

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

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

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

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

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

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

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

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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EG035: Poor matrix spike recovery was obtained for Mercury on sample ES2033456 # 2. Confirmed by re-analysis.
- EG020: Some samples were diluted and rerun due to matrix interference and LOR's have been raised accordingly. (High Total Dissolved Solids)
- EG020: Positive result for sample ES2033456 #014 and #016 has been confirmed by redigestion and reanalysis.
- EP080: Sample TRIP SPIKE contains volatile compounds spiked into the sample containers prior to dispatch from the laboratory. Result confirmed by re-analysis. TS is not ALS TS.
- LOR for Gross Alpha and Gross Beta raised due to high solid content.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER Matrix: WATER6		Client sample ID							
Compound	CAS Number	LOR	Unit	Client sampling date / time	PDG(IG) t	PDG(IG) S	- 4 IG(5t)	- 4 IG(5S)	- 4 IG(t)
					Result	Result	Result	Result	Result
EA2IM: Drobb Araf f l d - eaf Ayaf af									
Drobb geaf	----	0.10	Bq/L		2BM	3B5	<1.83	2BM	<1.85
Et 035I : Araf af g/ i C Trarf aor									
4/ drobble Araf af f b Cf CO3	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1
Cf rgol fae Araf af f b Cf CO3	3812-32-6	1	mg/L		<1	<1	<1	<1	<1
- iyf rgol fae Araf af f b Cf CO3	71-52-3	1	mg/L		7(0	2M7	77(	3) 3	733
Toaf mAf af f b Cf CO3	----	1	mg/L		7(0	2M7	77(	3) 3	733
Et 07(D: Scrf ae xCrgmth eary6fb SO7 21g/ t A									
Scrf ae f b SO7 1Tcrgmth eary	14808-79-8	1	mg/L		3) M0	73) 0	3) M0	72) 0	3) M0
Et 07MD: Cwarrde g/ t ibyreae Af f rthber									
Cwarrde	16887-00-6	1	mg/L		2(700	2M000	20300	2(000	20300
Et 093F: t rbborbed Gfjor Cf aol b									
Cf jwrch	7440-70-2	1	mg/L		M09	57U	79U	M03	790
Gf Q ebre'h	7439-95-4	1	mg/L		(770	(520	(390	(730	(730
Sodre'h	7440-23-5	1	mg/L		((000	(2700	(000	((500	(0) 00
i oaf bbrch	7440-09-7	1	mg/L		35	3M	35	33	3U
ED020F: t rbborbed Geaf af g/ ICI 1GS									
Arbel iy	7440-38-2	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Cf dh reh	7440-43-9	0.0001	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cwroh reh	7440-47-3	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Cosser	7440-50-8	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Nyikem	7440-02-0	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Lef d	7439-92-1	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Zif y	7440-66-6	0.005	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
ED020T: Toaf mGeaf af g/ ICI 1GS									
Arbel iy	7440-38-2	0.001	mg/L		1M1	<0.010	1M1	1M1	1M1
Cf dh reh	7440-43-9	0.0001	mg/L		1M1	<0.0010	1M1	1M1	1M1
Cwroh reh	7440-47-3	0.001	mg/L		1M1	<0.010	1M1	1M1	1M1
Cosser	7440-50-8	0.001	mg/L		1M1	<0.010	1M1	1M1	1M1
Nyikem	7440-02-0	0.001	mg/L		1M1	<0.010	1M1	1M1	1M1
Lef d	7439-92-1	0.001	mg/L		1M1	<0.010	1M1	1M1	1M1
Zif y	7440-66-6	0.005	mg/L		1M1	<0.052	1M1	1M1	1M1
ED03MF: t rbborbed Gerycr/ g/ FIGS									
Gerycr/	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
ED03MF: Toaf mReyo^erf gra Gerycr/ g/ FIGS									



Analytical Results

Sub-Matrix: WATER Matrix: WATER6		Client sample ID			
Compound	CAS Number	LOR	Unit	Client sampling date / time	Result
				- 4 1G() S	- 4 1G20t
				18-Sep-2020 09:50	21-Sep-2020 13:15
				ES20337MJ00U	ES20337MJ005
				Result	Result
				3B5	2B(
			Bq/L	<2.14	2B(
				<1	<1
			mg/L	<1	<1
			mg/L	<1	<1
			mg/L	723	750
			mg/L	723	750
				7770	39M0
			mg/L	7050	39M0
				23(00	2(200
			mg/L	2(700	27)00
				M02	M8M
			mg/L	(770	(750
			mg/L	((00	((200
			mg/L	3)	39
				<0.010	<0.010
			mg/L	<0.0010	<0.0010
			mg/L	<0.010	<0.010
			mg/L	<0.010	<0.010
			mg/L	<0.010	<0.010
			mg/L	<0.010	<0.010
			mg/L	<0.010	<0.010
			mg/L	<0.050	<0.050
				<0.0001	<0.0001
			mg/L	M03	2) M
			mg/L	<0.1	<0.1
			mg/L	573	U80
			meq/L	U)	U8U
			meq/L	3B3	7B)U
			%	59M	5(M
				53M	509
				3B(	0B)M



Analytical Results

Sub-Matrix: WATER		Client sample ID									
Matrix: WATER6		Client sampling date / time									
Compound	CAS Number	LOR	Unit	TS	T-7	T-M	R-U00	R-500			
				ES20337MJ0(1)	ES20337MJ0(2)	ES20337MJ0(3)	ES20337MJ0(7)	ES20337MJ0(M)	Result		
ED020T: Toaf mGeaf fb g/ lci 'IGS											
Arbel iy	7440-38-2	0.001	mg/L	1111	<0.001	<0.001	<0.001	<0.001	Result		
Cf dh rch	7440-43-9	0.0001	mg/L	1111	<0.0001	<0.0001	<0.0001	<0.0001	Result		
Cwroh rch	7440-47-3	0.001	mg/L	1111	<0.001	<0.001	<0.001	<0.001	Result		
Cosser	7440-50-8	0.001	mg/L	1111	<0.001	<0.001	0.001M	<0.001	Result		
Niykem	7440-02-0	0.001	mg/L	1111	<0.001	<0.001	<0.001	<0.001	Result		
Lef d	7439-92-1	0.001	mg/L	1111	<0.001	<0.001	<0.001	<0.001	Result		
Zit y	7440-66-6	0.005	mg/L	1111	<0.005	<0.005	0.001/2	<0.005	Result		
ED03M: Toaf mReyo^erf grb Gerycr/ g/ FIGS											
Gerycr/	7439-97-6	0.0001	mg/L	1111	<0.0001	<0.0001	<0.0001	<0.0001	Result		
Ei 0) 0: - TEXN											
- el zel e	71-43-2	1	µg/L	(3)	1111	1111	1111	1111	Result		
Tornel e	108-88-3	2	µg/L	(3)	1111	1111	1111	1111	Result		
Eaw rgel zel e	100-41-4	2	µg/L	(2)	1111	1111	1111	1111	Result		
h eaf 1& srf fx/ rel e	108-38-3 106-42-3	2	µg/L	27	1111	1111	1111	1111	Result		
oraw fx/ rel e	95-47-6	2	µg/L	(7)	1111	1111	1111	1111	Result		
^ Toaf ntX/ rel eb	----	2	µg/L	3)	1111	1111	1111	1111	Result		
^ Sch op- TEX	----	1	µg/L	5U	1111	1111	1111	1111	Result		
Nf swaaf rel e	91-20-3	5	µg/L	<5	1111	1111	1111	1111	Result		
Ei 0) 0S: Ti 4 X/G- TEX ScroQf eb											
(E't rywroeaaf l eif 7	17060-07-0	2	%	59B	1111	1111	1111	1111	Result		
Tornel eif)	2037-26-5	2	%	92BM	1111	1111	1111	1111	Result		
71- roh o'p'orogel zel e	460-00-4	2	%	90B	1111	1111	1111	1111	Result		



Page : 8 of 9
 Work Order : ES2033456
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

Analytical Results

Compound	CAS Number	Client sampling date / time		R-) 00	1111	1111	1111	1111	1111
		LOR	Unit						
Sub-Matrix: WATER									
Matrix: WATER6									
Client sample ID									
Client sampling date / time									
21-Sep-2020 14:20									
ES20337MJ0(U									
Result									

ED020T: Total Geofib g/ LCI FIGS									
Arbelly	7440-38-2	0.001	mg/L	<0.001	1111	1111	1111	1111	1111
Cf dh reh	7440-43-9	0.0001	mg/L	<0.0001	1111	1111	1111	1111	1111
Cwroh reh	7440-47-3	0.001	mg/L	<0.001	1111	1111	1111	1111	1111
Cosser	7440-50-8	0.001	mg/L	0B0U	1111	1111	1111	1111	1111
Niykem	7440-02-0	0.001	mg/L	<0.001	1111	1111	1111	1111	1111
Lef d	7439-92-1	0.001	mg/L	0B02	1111	1111	1111	1111	1111
Zit y	7440-66-6	0.005	mg/L	0B(U	1111	1111	1111	1111	1111
ED03M: Total Reyov' erf gB Gerycr/ g/ FIGS									
Gerycr/	7439-97-6	0.0001	mg/L	<0.0001	1111	1111	1111	1111	1111



Page : 9 of 9
Work Order : ES2033456
Client : EMM CONSULTING PTY LTD
Project : S190512 Balranald T3 Ancillary

Surrogate Control Limits

Sub-Matrix: WATER			
Compound	CAS Number	Recovery Limits (%)	
		Low	High
Ei 0) 0S: Ti 4. x/6- TEX ScrrroQf aeb (Bf r ywbroeawf l e f 7	17060-07-0	71	137
Tome l e f t)	2037-26-5	79	131
71- roh opporogel z e l e	460-00-4	70	128



Environmental

QUALITY CONTROL REPORT

Work Order : **ES20337MG**

Page : 1 of 7

Client : **EDD CONSULTING PTY LTDs**
 Contact : **PAUL GIBBONS**
 Address : **Ground Floor Suite 1 60 CWandos Street
 St Leonards NS- 6089**
 Tele2Wne : **ffff**
 Proect : **S1R0916 Ballranald THAncillary**
 Order number : **ffff**
 CpDc number : **ffff**
 Sam2ler : **/ AITLKN B+ODIEQLu4e G**
 Site : **ffff**
 wuote number : **EN(116(1k pPrimary) or4 only**
 No. of sam2les received : **18**
 No. of sam2les analysed : **18**

Laboratory : **Environmental Division Sydney**
 Contact : **Se2an h aWmad**
 Address : **677p6kR- ood2ar4 +oad SmitWfield NS- Australia 6185**

Tele2Wne : **j 81 6 k7k5 k999**
 Date Sam2les + eceived : **66p6e2p6060**
 Date Analysis Commenced : **6H6e2p6060**
 Issue Date : **0R0ct6p6060**



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

TW's re2ort su2ersedes any 2revious re2ort, sx) itWVW's reference. + esults a22ly to tW sam2le, sx as submitted. TW's document sW ill not be re2roducedQe; ce2t in full.

TW's wuality Control + e2ort contains tW follo ing information:

- Laboratory Du2licate , DUPx + e2ortW elative Percentage Difference , + PDx and Acce2tance Limits
- h etWd Blan4 , h Bx and Laboratory Control S2i4e , LCSx + e2ortW ecovery and Acce2tance Limits
- h attri; S2i4e , h Sx + e2ortW ecovery and Acce2tance Limits

Signatories

TW's document W's been electronically signed by tW autWorized signatories belo) . Electronic signing is carried out in com2liance) itW2rocedures s2ecified in 61 CF+ Part 11.

Signatories	Position	Accreditation Category
An4it JosW	Inorganic CVemist	Sydney InorganicsGSmitWfieldQNS-
Ed) andy Fad3ar	Organic Coordinator	Sydney OrganicsGSmitWfieldQNS-
Ivan Taylor	Analyst	Sydney InorganicsGSmitWfieldQNS-
Titus Vimalasiri	h etals Teamleader	+ adionuclidesCFysW ic4QACT



General Comments

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

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

- Where a reported less than (<) result is given, the LO+ QV% may be due to a primary sample or insufficient sample for analysis. - Where the LO+ of a reported result differs from standard LO+ QV% may be due to the following:

Anonymous = refers to samples where the client has not specifically identified the sample or order but formed part of the work 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.

LO+ = Limit of reporting

+ PD = + relative Percentage Difference

= Indicates failed work

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory sample. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the + relative Percent Deviation, + PDx of Laboratory Duplicates are specified in ALS Methodology. The level of retesting: + result < 10 times LO+; No Limit (result bet) between 10 and 60 times LO+; 0% p90 (result > 60 times LO+; 0% p60).

Subphatri: WATER

Laboratory Duplicate (DUP) Report									
Laboratory sample ID	Client sample ID	Method/Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA2MCA: 5 ro I Aphan nEd t en Al ayd 4QC Loc 3212G) b									
CA6008910001	Anonymous	EA690: Gross alpha	###	0.09	Bq(L)	<0.09	<0.09	0.00	No Limit
		EA690: Gross beta	###	0.1	Bq(L)	0.10	0.10	0.00	No Limit
		EA690: Gross beta activity p50/	###	0.1	Bq(L)	<0.10	<0.10	0.00	No Limit
ES60H598005	By ph 17S	EA690: Gross alpha	###	0.09	Bq(L)	1.19	1.19	15.7	No Limit
		EA690: Gross beta	###	0.1	Bq(L)	6.91	6.91	66.8	No Limit
		EA690: Gross beta activity p50/	###	0.1	Bq(L)	<1.19	<1.19	15.7	No Limit
ES03UP: AqnpBd f (PC Tarnor 4QC Loc 32u) n2b									
ES60H551001	Anonymous	ED0H7P: Ydro; ide Al4lality as CaCOH	Dh Op10001	1	mg(L)	<1	<1	0.00	No Limit
		ED0H7P: Carbonate Al4lality as CaCOH	Hk16p6p	1	mg(L)	1k	15	61.9	0% p90%
		ED0H7P: Bicarbonate Al4lality as CaCOH	71p6p	1	mg(L)	1R7	600	1.5H	0% p60%
		ED0H7P: Total Al4lality as CaCOH	###	1	mg(L)	615	615	0.00	0% p60%
ES60H5510018	Anonymous	ED0H7P: Ydro; ide Al4lality as CaCOH	Dh Op10001	1	mg(L)	<1	<1	0.00	No Limit
		ED0H7P: Carbonate Al4lality as CaCOH	Hk16p6p	1	mg(L)	1960	1990	1.5R	0% p60%
		ED0H7P: Bicarbonate Al4lality as CaCOH	71p6p	1	mg(L)	500	H00	16.H	0% p60%
		ED0H7P: Total Al4lality as CaCOH	###	1	mg(L)	9k60	9H0	k.95	0% p60%
ES03UP: AqnpBd f (PC Tarnor 4QC Loc 32u) n2b									
ES60H598009	By ph 1kD	ED0H7P: Ydro; ide Al4lality as CaCOH	Dh Op10001	1	mg(L)	<1	<1	0.00	No Limit
		ED0H7P: Carbonate Al4lality as CaCOH	Hk16p6p	1	mg(L)	<1	<1	0.00	No Limit
		ED0H7P: Bicarbonate Al4lality as CaCOH	71p6p	1	mg(L)	5H	5H	0.k5R	0% p60%
		ED0H7P: Total Al4lality as CaCOH	###	1	mg(L)	5H	5H	0.k5R	0% p60%
ES60H578005	Anonymous	ED0H7P: Ydro; ide Al4lality as CaCOH	Dh Op10001	1	mg(L)	<1	<1	0.00	No Limit
		ED0H7P: Carbonate Al4lality as CaCOH	Hk16p6p	1	mg(L)	<1	<1	0.00	No Limit
		ED0H7P: Bicarbonate Al4lality as CaCOH	71p6p	1	mg(L)	18H	19k	H68	0% p60%
		ED0H7P: Total Al4lality as CaCOH	###	1	mg(L)	18H	19k	H68	0% p60%



Page : Hof 7
 - or4 Order : ES60H598
 Client : Eh h CONSULTING PTK LTD
 Pro.ect : S1R0916 Baitranald THAncillary

Laboratory Duplicate (DUP) Report									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
Es 07n5 : S- pñre 4f- rf nd6 esv bnl SO7 29f (sA 4QC Loc 32u33G1b									
ES60H598p001	UGh th kD	ED051G: Sulfate as SO5 pTurbidimetric	15k0kp7Rk	1	mg/L	Hk90	H8HD	9.k5	0% p60%
ES60H598p010	wA600	ED051G: Sulfate as SO5 pTurbidimetric	15k0kp7Rk	1	mg/L	Hf60	H70	1.HH	0% p60%
Es 07M5 : Caprnde f (s v i ree ABnq l er 4QC Loc 32u33u0b									
ES60H598p001	UGh th kD	ED059G: CWoride	18kk7p00p	1	mg/L	61500	60700	H1R	0% p60%
ES60H598p010	wA600	ED059G: CWoride	18kk7p00p	1	mg/L	66600	65000	7.96	0% p60%
Es 013F: s v l oged Dnjor CnooBl 4QC Loc 32uGuM0b									
ES60H598p008	BYph 1kS	ED0RF: Calcium	7550p70p	1	mg/L	9R7	97H	5.15	0% p60%
		ED0RF: h agnesium	75HRF9p	1	mg/L	1H0	1H50	Hk0	0% p60%
		ED0RF: Sodium	7550p61p	1	mg/L	16900	16000	H86	0% p60%
		ED0RF: Potassium	7550p0p7	1	mg/L	68	6H	11.0	0% p60%
		ED0RF: Calcium	7550p70p	1	mg/L	89	8H	6.60	0% p60%
		ED0RF: h agnesium	75HRF9p	1	mg/L	H70	H76	0.966	0% p60%
		ED0RF: Sodium	7550p61p	1	mg/L	875	878	0.H1	0% p60%
		ED0RF: Potassium	7550p0p7	1	mg/L	958	998	1.71	0% p60%
E5 020F: s v l oged Deap f (ICPDS 4QC Loc 32uGuM0b									
ES60H598p008	BYph 1kS	EG060ApF: Cadmium	7550p51pR	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
		EG060ApF: Arsenic	7550pKp	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG060ApF: CWomium	7550p57pH	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG060ApF: Co22er	7550p00k	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG060ApF: Lead	75HRF6pI	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG060ApF: Nic4el	7550p06p	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG060ApF: Zinc	7550p88p	0.009	mg/L	<0.090	<0.090	0.00	No Limit
		EG060ApF: Cadmium	7550p51pR	0.0001	mg/L	0.0005	0.0005	0.00	No Limit
		EG060ApF: Arsenic	7550pKp	0.001	mg/L	0.01H	0.01H	0.00	0% p90%
		EG060ApF: CWomium	7550p57pH	0.001	mg/L	0.050	0.0HR	HH7	0% p60%
		EG060ApF: Co22er	7550p00k	0.001	mg/L	0.101	0.101	0.00	0% p60%
		EG060ApF: Lead	75HRF6pI	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG060ApF: Nic4el	7550p06p	0.001	mg/L	0.H59	0.H95	6.78	0% p60%
		EG060ApF: Zinc	7550p88p	0.009	mg/L	0.1F6	0.1k8	H10	0% p60%
E5 020T: TroampDeap f (ICPDS 4QC Loc 32uGuM0b									
ES60H598p01H	TB9	EG060ApT: Cadmium	7550p51pR	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG060ApT: Arsenic	7550pKp	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG060ApT: CWomium	7550p57pH	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG060ApT: Co22er	7550p00k	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG060ApT: Lead	75HRF6pI	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG060ApT: Nic4el	7550p06p	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG060ApT: Zinc	7550p88p	0.009	mg/L	<0.009	<0.009	0.00	No Limit
ES60H598p006	Anonymous	EG060ApT: Cadmium	7550p51pR	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG060ApT: Arsenic	7550pKp	0.001	mg/L	<0.001	<0.001	0.00	No Limit



Subph atri : WATER

Laboratory Duplicate (DUP) Report									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
E5 020T: ToompDeamp f (ICP&S 4QC Loc 32uGruub 9i oBoB-ed									
ES60H#616p006	Anonymous	EG060ApT: CWomium	7550p57pH	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG060ApT: Co22er	7550p90pk	0.001	mg/L	0.006	0.006	0.00	No Limit
		EG060ApT: Lead	75HRF6pI	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG060ApT: Nic4el	7550p06pD	0.001	mg/L	0.008	0.007	0.00	No Limit
		EG060ApT: Zinc	7550p88pB	0.009	mg/L	<0.009	<0.009	0.00	No Limit
E5 03MF: s J loyed Deri - r (f (FIDS 4QC Loc 32uGruM8b									
ES60H#616p006	Anonymous	EG0H9F: h ercury	75HRF7pB	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES60H#598p009	BYph 1kD	EG0H9F: h ercury	75HRF7pB	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
E5 03MF: ToompRei oyermp pæ Deri - r (f (FIDS 4QC Loc 32uGruW1b									
ES60H#679p001	Anonymous	EG0H9T: h ercury	75HRF7pB	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES60H#796p006	Anonymous	EG0H9T: h ercury	75HRF7pB	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
E5 0Mh6: Ferro- l IroBf (s J i reæ ABnq l er 4QC Loc 32u72G7b									
ES60H#161p001	Anonymous	EG091G: Ferrous Iron	ppp	0.09	mg/L	<0.09	<0.09	0.00	No Limit
ES60H#598p008	BYph 1kS	EG091G: Ferrous Iron	ppp	0.09	mg/L	6.Rk	6.RB	0.710	0% p60%
E5 0Mh6: Ferro- l IroBf (s J i reæ ABnq l er 4QC Loc 32uMh22b									
ES60H#598p007	BYph 60D	EG091G: Ferrous Iron	ppp	0.09	mg/L	9.1H	9.HI	H5R	0% p60%
ES60H#96R00H	Anonymous	EG091G: Ferrous Iron	ppp	0.09	mg/L	15H	159	0.RR6	0% p60%
EK0)MD: S- pæde nl S29 4QC Loc 32u72G7b									
ES60H#598p001	UGh rh kD	E/ 0k9: Sulfide as S6p	1k5R8p69pk	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES60H#598p010	wA600	E/ 0k9: Sulfide as S6p	1k5R8p69pk	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP0)0: t TEXN 4QC Loc 32)0u) 3b									
ES60H#688p001	Anonymous	EP0k0: Benzene	71p5H6	1	µg/L	<1	<1	0.00	No Limit
		EP0k0: Toluene	10kpkk.pH	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: EtWybenzene	100p51pB	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: metap& 2arapXylene	10kpkk.pH	6	µg/L	<6	<6	0.00	No Limit
			108p56pH	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: ortW6pXylene	R9p57pB	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: Na2W6tylene	R1p60pH	9	µg/L	<9	<9	0.00	No Limit
		EP0k0: Benzene	71p5H6	1	µg/L	<1	<1	0.00	No Limit
		EP0k0: Toluene	10kpkk.pH	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: EtWybenzene	100p51pB	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: metap& 2arapXylene	10kpkk.pH	6	µg/L	<6	<6	0.00	No Limit
			108p56pH	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: ortW6pXylene	R9p57pB	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: Na2W6tylene	R1p60pH	9	µg/L	<9	<9	0.00	No Limit



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

TV6 quality control term h etWd (Laboratory Blan4 refers to an analyte free matri; to) V6W all reagents are added in tV6 same volumes or 2ro2ortions as used in standard sam2le 2re2aration. TV6 2ur2ose of tV6 wC 2arameter is to monitor 2otential laboratory contamination. TV6 quality control term Laboratory Control S2i4e ,LCSx refers to a certified reference materialQ or a 4no) n interference free matri; s2i4ed) itW target analytes. TV6 2ur2ose of tV6 wC 2arameter is to monitor metWd 2recision and accuracy inde2endent of sam2le matri; . Dynamic + ecovery Limits are based on statistical evaluation of 2rocessed LCS.

Subph atri; : WATER

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			Recovery Limits (%)	
				Result	Concentration	Spike Concentration	LCS	Low	High	
EA210CA: 5 rol | Aphan nEd t em Ai oyq (4QCLOC 3212GI) b										
EA690: Gross al2V6	ppp	0.09	Bq(L)	<0.09	1791 Bq(L)	RR9	R9.6	109		
EA690: Gross beta	ppp	0.1	Bq(L)	<0.10	H56 Bq(L)	Rk.0	R5.5	109		
EA690: Gross beta activity p50/	ppp	0.1	Bq(L)	<0.10	ppp	ppp	ppp	ppp		
Es 03uP: AjknpBq f (PC Tarnor 4QCLOC 32u) m20b										
ED0H7P: Total Al4alinity as CaCOH	ppp	ppp	mg(L)	ppp	600 mg(L) 90 mg(L)	Rk.6 11k	k1.0 70.0	111 1H0		
Es 03uP: AjknpBq f (PC Tarnor 4QCLOC 32u) m2nb										
ED0H7P: Total Al4alinity as CaCOH	ppp	ppp	mg(L)	ppp	600 mg(L) 90 mg(L)	106 168	k1.0 70.0	111 1H0		
Es 07n5: S- f6n6 4f- rf v66 eovl bnl SO7 29f (sA 4QCLOC 32u33GIb										
ED051G: Sulfate as SO5 pTurbidimetric	15K0k pRk	1	mg(L)	<1 <1	69 mg(L) 900 mg(L)	100 105	k6.0 k6.0	166 166		
Es 07M5: Capnde f (s v i re6 ABnq l er 4QCLOC 32u33u0b										
ED059G: CWoride	18kk7 p0p6	1	mg(L)	<1 <1	10 mg(L) 1000 mg(L)	R5.9 109	k0.R k0.R	167 167		
Es 013F: s v l oyed Dnjor CnooBI 4QCLOC 32uGIM0b										
ED0RF: Calcium	7550 p0p6	1	mg(L)	<1	90 mg(L)	106	k0.0	115		
ED0RF: h agnesium	75HR9p6	1	mg(L)	<1	90 mg(L)	105	R0.0	118		
ED0RF: Sodium	7550 p0p6	1	mg(L)	<1	90 mg(L)	101	k6.0	160		
ED0RF: Potassium	7550 p0p7	1	mg(L)	<1	90 mg(L)	101	k9.0	11H		
E5 020F: s v l oyed Demp f (ICPD5 4QCLOC 32uGIM0b										
EG060ApF: Arsenic	7550 p0p6	0.001	mg(L)	<0.001	0.1 mg(L)	R1.0	k9.0	115		
EG060ApF: Cadmium	7550 p0p6	0.0001	mg(L)	<0.0001	0.1 mg(L)	R5.H	k5.0	110		
EG060ApF: CWomium	7550 p0p7H	0.001	mg(L)	<0.001	0.1 mg(L)	kR5	k9.0	111		
EG060ApF: Co22er	7550 p0p0k	0.001	mg(L)	<0.001	0.1 mg(L)	k7.H	k1.0	111		
EG060ApF: Lead	75HR9p6p1	0.001	mg(L)	<0.001	0.1 mg(L)	k8.0	kH0	111		
EG060ApF: Nic4el	7550 p0p6p0	0.001	mg(L)	<0.001	0.1 mg(L)	k8.7	k6.0	116		
EG060ApF: Zinc	7550 p0p8p6	0.009	mg(L)	<0.009	0.1 mg(L)	R0.0	k1.0	117		
E5 020T: ToompDemp f (ICPD5 4QCLOC 32uGIM0b										
EG060ApT: Arsenic	7550 p0p6	0.001	mg(L)	<0.001	0.1 mg(L)	R6.1	k6.0	115		
EG060ApT: Cadmium	7550 p0p6	0.0001	mg(L)	<0.0001	0.1 mg(L)	R1.k	k5.0	116		
EG060ApT: CWomium	7550 p0p7H	0.001	mg(L)	<0.001	0.1 mg(L)	101	k8.0	118		
EG060ApT: Co22er	7550 p0p0k	0.001	mg(L)	<0.001	0.1 mg(L)	R1.6	kH0	11k		
EG060ApT: Lead	75HR9p6p1	0.001	mg(L)	<0.001	0.1 mg(L)	R1.5	k9.0	119		



Subph atri : WATER	Method: Compound			Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	LCS	Low	High
E5 020T: ToarpDeomp f (ICPD S 4QCLOC 32uGruub 91 oBxB-ed									
EG060ApT: Nic4el	7550p6p0	0.001	mg/L	<0.001	0.1 mg/L	R1.9	k5.0	118	
EG060ApT: Zinc	7550p8p8	0.009	mg/L	<0.009	0.1 mg/L	R6.1	7R0	117	
E5 03MF: s v I oyed Deri - r (FIDS 4QCLOC 32uGuM8b									
EG0H9F: h ercury	75HrF7p8	0.0001	mg/L	<0.0001	0.01 mg/L	R1.6	kH0	109	
E5 03MF: ToompRei oyerrnf p Deri - r (FID S 4QCLOC 32uGuM1b									
EG0H9T: h ercury	75HrF7p8	0.0001	mg/L	<0.0001	0.01 mg/L	R1.R	77.0	111	
E5 0Mrb : Ferro- l I roBf (s v I iree ABng l er 4QCLOC 32u7) Q0b									
EG091G: Ferrous Iron	ppp	0.09	mg/L	<0.09	6 mg/L	105	kR0	117	
E5 0Mrb : Ferro- l I roBf (s v I iree ABng l er 4QCLOC 32uMh22b									
EG091G: Ferrous Iron	ppp	0.09	mg/L	<0.09	6 mg/L	105	kR0	117	
EK0) MD : S- p4de nl S29 4QCLOC 32u72G7b									
E/ 0k9: Sulfide as S8p	1k5R8p9pk	0.1	mg/L	<0.1	0.9 mg/L	R8.0	78.0	118	
EP0) 0: t TEXN 4QCLOC 32)0u) 3b									
EP0k0: Benzene	71p8p8	1	ug/L	<1	10 ug/L	RR0	70.0	166	
EP0k0: Toluene	10kpkqH	6	ug/L	<6	10 ug/L	105	8R0	16H	
EP0k0: EtWybenzene	100p81p8	6	ug/L	<6	10 ug/L	108	70.0	160	
EP0k0: metap& ZarapXylene	10kpkqH 108p86pH	6	ug/L	<6	10 ug/L	107	8R0	161	
EP0k0: ortWpXylene	R9p87p8	6	ug/L	<6	10 ug/L	108	76.0	166	
EP0k0: Na2W4ylene	R1p80pH	9	ug/L	<9	10 ug/L	106	70.0	160	

Matrix Spike (MS) Report

TVe quality control term h atri; S24e ,hSx refers to an intralaboratory s2lit sam2le s24ed) itW a re2representative set of target analytes. TVe 2ur2ose of tW s wC 2arameter is to monitor 2otential matri; effects on analyte recoveries. Static +ecoverly Limits as 2er laboratory Data wuality Ob&ectives ,DwOsx Ideal recovery ranges stated may be) aived in tW event of sam2le matri; interference.

Subph atri : WATER

Laboratory sample ID	Client sample ID	Method: Compound	Matrix Spike (MS) Report			
			CAS Number	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)
				MS	Low	High
Es 07n6 : S- f8re 4f- rf v46 ervi bnl SO7 29f (s A 4QCLOC 32u33G1b						
ES60H598p001	UGh ph kd	ED051G: Sulfate as SO5 p Turbidimetric	15k0kpfRk	10 mg/L	# Not Determined	1H0
Es 07M6 : Caprvde f (s v I iree ABng l er 4QCLOC 32u33u0b						
ES60H598p001	UGh ph kd	ED059G: CVbriide	18kk7p0p8	90 mg/L	# Not Determined	1H0
E5 020F: s v I oyed D eomp f (ICPD S 4QCLOC 32uGuMrb						
ES60H510p001	Anonymous	EG060ApF: Arsenic	7550p4kp8	1 mg/L	R1.7	1H0
		EG060ApF: Cadmium	7550p8pR	0.69 mg/L	R6.6	1H0



Subph atri : WATER

				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	SpikeRecovery(%)	MS	Recovery Limits (%)
E5 020F: s J loyed D eap f (ICP&S 4QCLOC 32uGulMh 9i oBoB- ed				Low	High		
ES60H510p001	Anonymous	EG060ApF: CWormium	7550p57H	1 mg/L	kk.1		70.0
		EG060ApF: Co2zer	7550p90k	1 mg/L	kR.1		70.0
		EG060ApF: Lead	75HRp6pl	1 mg/L	kHR		70.0
		EG060ApF: Nic4el	7550p6p0	1 mg/L	R0.8		70.0
		EG060ApF: Zinc	7550p8p8p	1 mg/L	R1.7		70.0
E5 020T: ToapD eap f (ICP&S 4QCLOC 32uGulMh							
ES60H516p00H	Anonymous	EG060ApT: Arsenic	7550p4kp6	1 mg/L	R4R		70.0
		EG060ApT: Cadmium	7550p5HR	0.69 mg/L	R6.5		70.0
		EG060ApT: CWormium	7550p57H	1 mg/L	100		70.0
		EG060ApT: Co2zer	7550p90k	1 mg/L	R6.R		70.0
		EG060ApT: Lead	75HRp6pl	1 mg/L	R0.R		70.0
		EG060ApT: Nic4el	7550p6p0	1 mg/L	R0.1		70.0
		EG060ApT: Zinc	7550p8p8p	1 mg/L	R1.k		70.0
E5 03MF: s J loyed D eri - r(f (FIDS 4QCLOC 32uGulMh							
ES60H50R006	Anonymous	EG0HF: h ercury	75HRp7p6	0.01 mg/L	71.9		70.0
E5 03MF: ToapRei oyerf p e D eri - r(f (FIDS 4QCLOC 32uGulMh							
ES60H598p06	UGh ph kS	EG0HT: h ercury	75HRp7p6	0.01 mg/L	# 96.9		70.0
E5 0Mh5 : Ferro - l IroBf (s J i ree ABnq l er 4QCLOC 32u7) G0b							
ES60H161p001	Anonymous	EG091G: Ferrous Iron	ppp	1 mg/L	Rk.9		70.0
E5 0Mh5 : Ferro - l IroBf (s J i ree ABnq l er 4QCLOC 32u7) G0b							
ES60H598p007	BYph 60D	EG091G: Ferrous Iron	ppp	1 mg/L	# Not Determined		70.0
EK0) MD : S - pde nl S29 4QCLOC 32u72G7b							
ES60H598p001	UGh ph kD	E/ 0k9: Sulfide as S6p	1k5R8p69k	0.111 mg/L	108		70.0
EP0) 0: t TEXN 4QCLOC 32) 0u) 3b							
ES60H588p001	Anonymous	EP0k0: Benzene	71p5H6	69 µg/L	R7.9		70.0
		EP0k0: Toluene	10kpkpH	69 µg/L	106		70.0
		EP0k0: EtWbenzene	100p51p	69 µg/L	105		70.0
		EP0k0: metap & 2arapylene	10kpkpH	69 µg/L	105		70.0
			108p66pH				
		EP0k0: ortWpXylene	R9p57p8	69 µg/L	10H		70.0
		EP0k0: Na2Wtylene	R1p60pH	69 µg/L	101		70.0

Work Order	: ES2033456	Page	: 1 of 18
Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: PAUL GIBBONS	Telephone	: +61 - 2724 2555
Project	: S19851 - Balranald TO Ancillary	Date Samples received	: -- R6epR 8- 8
Site	: FRRR	Issue Date	: 89/OctR 8-- 8
Sampler	: HAITLKN B3 ODIE/ Luke G	No. of samples received	: 16
Order number	: FRRR	No. of samples analysed	: 16

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

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

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) 3 report.

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

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- NO Quality Control Sample Frequency Outliers exist.



Page : - of 18
 Work Order : ES-800456
 Client : EMM CONSULTING PTK LTD
 Project : S19851- Balranald TO Ancillary

Outliers : Quality Control Samples
 Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED841G: Sulfate (Turbidimetric) as SO4 - Rby DA	ES-800456R881	UGMRM2D	Sulfate as SO4 - Turbidimetric	14282799	Not Determined	RRR	MS recovery not determined, background level greater than or equal to 4x spike level.
ED845G: Chloride by Discrete Analyser	ES-800456R881	UGMRM2D	Chloride	16227R87	Not Determined	RRR	MS recovery not determined, background level greater than or equal to 4x spike level.
EG805T: Total Recoverable Mercury by %MS	ES-800456R881	UGMRM2S	Mercury	740977	5- - 5 x	78.8R108x	Recovery less than lower data quality objective
EG851G: %Iron by Discrete Analyser	ES-800456R887	BFM-8D	Ferrous Iron	RRR	Not Determined	RRR	MS recovery not determined, background level greater than or equal to 4x spike level.

Outliers : Analysis Holding Time Compliance

Matrix: WATER

Method Container / Client Sample ID(s)	Extraction / Preparation		Analysis	
	Date extracted	Due for extraction	Date analysed	Due for analysis
EP080: BTEXN				
Amber VOC Vial - Sulfuric Acid TS	81R10cR8-8	14R1uR8-8	81R10cR8-8	14R1uR8-8
				48

Analysis Holding Time Compliance

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

This report summarizes extraction w preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 246/ APFA/ 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.

Folding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leachate date with the shortest analyte holding time for the e,ivalent soil method. These are: organics 14 days/ mercury - 2 days & other metals 128 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Folding 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.

Matrix: WATER

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

Method Container / Client Sample ID(s)	Sample Date		Analysis	
	Date extracted	Due for extraction	Date analysed	Due for analysis



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 WorkOrder : ES-800456
 Client : EMM CONSULTING PTK LTD
 Project : S19851- Balranald TO Ancillary

Matrix: **WATER** Evaluation: * = F olding time breach ; ✓ = Within holding time.

Method	Sample Date			Extraction / Preparation		Analysis	
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA250: Gross Alpha and Beta Activity							
UGM/RM2D/ Clear Plastic Bottle - Natural (EA250)	UGM/RM2S	17-Sep-2020	----	RRRR	06-Oct-2020	16/Mar/R 8-1	✓
BF RM17S/ BF RM12D/ QA-88	BF RM17S/ BF RM12S/	18-Sep-2020	----	RRRR	06-Oct-2020	17/Mar/R 8-1	✓
Clear Plastic Bottle - Natural (EA250)							
LPSPB84		20-Sep-2020	----	RRRR	06-Oct-2020	19/Mar/R 8-1	✓
BF RM- 8D/ Clear Plastic Bottle - Natural (EA250)	BF RM- 8S	21-Sep-2020	----	RRRR	06-Oct-2020	- 8/Mar/R 8-1	✓
EA250CA: Gross Alpha and Beta Activity							
UGM/RM2D/ Clear Plastic Bottle - Natural (EA250)	UGM/RM2S	17-Sep-2020	----	RRRR	06-Oct-2020	16/Mar/R 8-1	✓
BF RM17D/ BF RM12D/ QA-88	BF RM17S/ BF RM12S/	18-Sep-2020	----	RRRR	06-Oct-2020	17/Mar/R 8-1	✓
Clear Plastic Bottle - Natural (EA250)							
LPSPB84		20-Sep-2020	----	RRRR	06-Oct-2020	19/Mar/R 8-1	✓
BF RM- 8D/ Clear Plastic Bottle - Natural (EA250)	BF RM- 8S	21-Sep-2020	----	RRRR	06-Oct-2020	- 8/Mar/R 8-1	✓
ED037P: Alkalinity by PC Titrator							
UGM/RM2D/ Clear Plastic Bottle - Natural (ED037-P)	UGM/RM2S	17-Sep-2020	----	RRRR	26-Sep-2020	81FOct/R 8-8	✓
BF RM17D/ BF RM12D/ QA-88	BF RM17S/ BF RM12S/	18-Sep-2020	----	RRRR	26-Sep-2020	8- FOct/R 8-8	✓
Clear Plastic Bottle - Natural (ED037-P)							
LPSPB84		20-Sep-2020	----	RRRR	26-Sep-2020	84FOct/R 8-8	✓
BF RM- 8D/ Clear Plastic Bottle - Natural (ED037-P)	BF RM- 8S	21-Sep-2020	----	RRRR	26-Sep-2020	85FOct/R 8-8	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
UGM/RM2D/ Clear Plastic Bottle - Natural (ED041G)	UGM/RM2S	17-Sep-2020	----	RRRR	23-Sep-2020	15FOct/R 8-8	✓
BF RM17D/ BF RM12D/ QA-88	BF RM17S/ BF RM12S/	18-Sep-2020	----	RRRR	23-Sep-2020	16FOct/R 8-8	✓
Clear Plastic Bottle - Natural (ED041G)							
LPSPB84		20-Sep-2020	----	RRRR	23-Sep-2020	12FOct/R 8-8	✓
BF RM- 8D/ Clear Plastic Bottle - Natural (ED041G)	BF RM- 8S	21-Sep-2020	----	RRRR	23-Sep-2020	19FOct/R 8-8	✓



Matrix: **WATER** Evaluation: * = F olding time breach ; ✓ = Within holding time.

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
ED045G: Chloride by Discrete Analyser								
UGM/RM2D/ Clear Plastic Bottle - Natural (ED045G)	UGM/RM2S	----		RRRR	23-Sep-2020	15/Oct/8-8		✓
BF/RM17D/ BF/RM12D/ QA-88	BF/RM17S/ BF/RM12S/ QA-88	----		RRRR	23-Sep-2020	16/Oct/8-8		✓
Clear Plastic Bottle - Natural (ED045G)		----		RRRR	23-Sep-2020	12/Oct/8-8		✓
Clear Plastic Bottle - Natural (ED045G)	BF/RM-8D/ BF/RM-8S	----		RRRR	23-Sep-2020	19/Oct/8-8		✓
ED093F: Dissolved Major Cations								
UGM/RM2D/ Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)	UGM/RM2S	----		RRRR	25-Sep-2020	15/Oct/8-8		✓
BF/RM17D/ BF/RM12D/ QA-88	BF/RM17S/ BF/RM12S/ QA-88	----		RRRR	25-Sep-2020	16/Oct/8-8		✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)		----		RRRR	25-Sep-2020	12/Oct/8-8		✓
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)	BF/RM-8D/ BF/RM-8S	----		RRRR	25-Sep-2020	19/Oct/8-8		✓
EG020F: Dissolved Metals by ICP-MS								
UGM/RM2D/ Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)	UGM/RM2S	----		RRRR	25-Sep-2020	16/Mar/8-1		✓
BF/RM17D/ BF/RM12D/ QA-88	BF/RM17S/ BF/RM12S/ QA-88	----		RRRR	25-Sep-2020	17/Mar/8-1		✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)		----		RRRR	25-Sep-2020	19/Mar/8-1		✓
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)	BF/RM-8D/ BF/RM-8S	----		RRRR	25-Sep-2020	-8/Mar/8-1		✓
EG020T: Total Metals by ICP-MS								
UGM/RM2S/ Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)	UGM/RM2S	25-Sep-2020	16/Mar/8-1	✓	25-Sep-2020	16/Mar/8-1		✓
3B688/ Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)	3B688	25-Sep-2020	17/Mar/8-1	✓	25-Sep-2020	17/Mar/8-1		✓
TB4/ Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)	TB5/ 3B788	25-Sep-2020	19/Mar/8-1	✓	25-Sep-2020	19/Mar/8-1		✓
3B288/ Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)	3B288	25-Sep-2020	-8/Mar/8-1	✓	25-Sep-2020	-8/Mar/8-1		✓



Matrix: WATER Evaluation: * = F olding time breach ; ✓ = Within holding time.

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EG035F: Dissolved Mercury by FIMS								
UGM/RM2D/ Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)	UGM/RM2S	----		RRRR	25-Sep-2020	15FOctR8-8	✓	
BF RM17D/ BF RM12D/ QA-88 Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)	BF RM17S/ BF RM12S/	----		RRRR	25-Sep-2020	16FOctR8-8	✓	
LPSPB84 Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)		----		RRRR	25-Sep-2020	12FOctR8-8	✓	
BF RM-8D/ Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)	BF RM-8S	----		RRRR	25-Sep-2020	19FOctR8-8	✓	
EG035T: Total Recoverable Mercury by FIMS								
UGM/RM2S Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)		----		RRRR	25-Sep-2020	15FOctR8-8	✓	
3 B688 Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)		----		RRRR	25-Sep-2020	16FOctR8-8	✓	
TB4/ 3 B788 Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)	TB5/	----		RRRR	25-Sep-2020	12FOctR8-8	✓	
3 B288 Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)		----		RRRR	25-Sep-2020	19FOctR8-8	✓	
EG051G: Ferrous Iron by Discrete Analyser								
UGM/RM2D/ Clear Plastic Bottle - HCl - Filtered (EG051G)	UGM/RM2S	----		RRRR	24-Sep-2020	-4FsepR8-8	✓	
BF RM17D/ BF RM12D/ QA-88 Clear Plastic Bottle - HCl - Filtered (EG051G)	BF RM17S/ BF RM12S/	----		RRRR	24-Sep-2020	-5FsepR8-8	✓	
LPSPB84 Clear Plastic Bottle - HCl - Filtered (EG051G)		----		RRRR	24-Sep-2020	-7FsepR8-8	✓	
BF RM-8D/ Clear Plastic Bottle - HCl - Filtered (EG051G)	BF RM-8S	----		RRRR	24-Sep-2020	-2FsepR8-8	✓	
EK085M: Sulfide as S2-								
UGM/RM2D/ Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)	UGM/RM2S	----		RRRR	24-Sep-2020	-4FsepR8-8	✓	
BF RM17D/ BF RM12D/ QA-88 Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)	BF RM17S/ BF RM12S/	----		RRRR	24-Sep-2020	-5FsepR8-8	✓	
LPSPB84 Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)		----		RRRR	24-Sep-2020	-7FsepR8-8	✓	
BF RM-8D/ Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)	BF RM-8S	----		RRRR	24-Sep-2020	-2FsepR8-8	✓	



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 WorkOrder : ES-800456
 Client : EMM CONSULTING PTK LTD
 Project : S19851- Balranald TO Ancillary

Matrix: **WATER** Evaluation: * = F olding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Date analysed	Due for analysis
EP080: BTEXN Amber VOC Vial - Sulfuric Acid (EP080) TS	31-Jul-2020	01-Oct-2020	14AugR 8- 8	01-Oct-2020	14AugR 8- 8
					*





Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type	Method	Count			Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected			
Laboratory Duplicates (DUP)								
Alkalinity by PC Titrator	ED807R	4	48	10.00	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
Chloride by Discrete Analyser	ED845G	-	-8	10.00	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
Dissolved Mercury by %IMS	EG805%	-	-8	10.00	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
Dissolved Metals by ICP/MS RSuite A	EG8-8AR%	-	19	10.53	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
%Mercurous Iron by Discrete Analyser	EG851G	4	0-	12.50	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
Gross Alpha and Beta Activity	EA-58	-	17	11.76	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
Major Cations (Dissolved)	ED890%	-	19	10.53	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
Sulfate (Turbidimetric) as SO4 - Rby Discrete Analyser	ED841G	-	-8	10.00	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
Sulfide as S-R	EH825	-	-8	10.00	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
Total Mercury by %IMS	EG805T	-	-8	10.00	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
Total Metals by ICP/MS RSuite A	EG8-8AR	-	19	10.53	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
T3 F Volatiles/TEX	EP828	-	-8	10.00	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
Laboratory Control Samples (LCS)								
Alkalinity by PC Titrator	ED807R	4	48	10.00	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
Chloride by Discrete Analyser	ED845G	-	-8	10.00	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
Dissolved Mercury by %IMS	EG805%	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
Dissolved Metals by ICP/MS RSuite A	EG8-8AR%	1	19	5.26	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
%Mercurous Iron by Discrete Analyser	EG851G	-	0-	6.25	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
Gross Alpha and Beta Activity	EA-58	-	17	11.76	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
Major Cations (Dissolved)	ED890%	1	19	5.26	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
Sulfate (Turbidimetric) as SO4 - Rby Discrete Analyser	ED841G	-	-8	10.00	10.00	✓	NEPM - 810 B0 & ALS QC Standard	
Sulfide as S-R	EH825	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
Total Mercury by %IMS	EG805T	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
Total Metals by ICP/MS RSuite A	EG8-8AR	1	19	5.26	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
T3 F Volatiles/TEX	EP828	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
Method Blanks (MB)								
Chloride by Discrete Analyser	ED845G	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
Dissolved Mercury by %IMS	EG805%	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
Dissolved Metals by ICP/MS RSuite A	EG8-8AR%	1	19	5.26	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
%Mercurous Iron by Discrete Analyser	EG851G	-	0-	6.25	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
Gross Alpha and Beta Activity	EA-58	1	17	5.88	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
Major Cations (Dissolved)	ED890%	1	19	5.26	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
Sulfate (Turbidimetric) as SO4 - Rby Discrete Analyser	ED841G	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
Sulfide as S-R	EH825	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
Total Mercury by %IMS	EG805T	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard	
Total Metals by ICP/MS RSuite A	EG8-8AR	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard	



Page : 2 of 18
 Work Order : ES-800456
 Client : EMM CONSULTING PTK LTD
 Project : S19851- Balranald TO Ancillary

Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Analytical Methods	Method	Count		Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected		
Method Blanks (MB) Recontinued							
T3F Volatiles	EP828	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED845G	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard
Dissolved Mercury by %IMS	EG805%	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard
Dissolved Metals by ICP/MS RSuite A	EG8-8AR%	1	19	5.26	5.00	✓	NEPM - 810 B0 & ALS QC Standard
%Iron by Discrete Analyser	EG851G	-	0-	6.25	5.00	✓	NEPM - 810 B0 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 - Rby Discrete Analyser	ED841G	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard
Sulfide as S- R	EH825	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard
Total Mercury by %IMS	EG805T	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard
Total Metals by ICP/MS RSuite A	EG8-8AR	1	19	5.26	5.00	✓	NEPM - 810 B0 & ALS QC Standard
T3F Volatiles	EP828	1	-8	5.00	5.00	✓	NEPM - 810 B0 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA/ APFA/ 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
Gross Alpha and Beta Activity	EA-58	WATE3	ASTM D7-2006: Determination of gross alpha and gross beta radioactivity in water samples by Liquid Scintillation Counting (LSC).
Alkalinity by PC Titrator	ED807R	WATE3	In house: 3 referenced to APFA-0-8 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity endpoint. This method is compliant with NEPM Schedule B(0)
Sulfate (Turbidimetric) as SO ₄ - Rby Discrete Analyser	ED841G	WATE3	In house: 3 referenced to APFA 4588RSO4. Dissolved sulfate is determined in a 8.45µm filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO ₄ suspension is measured by a photometer and the SO ₄ R concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(0)
Chloride by Discrete Analyser	ED845G	WATE3	In house: 3 referenced to APFA 4588 Cl RG. The thiocyanate ion is liberated from mercuric thiocyanate through the reaction of mercury by the chloride ion to form non-coloured mercuric chloride. In the presence of ferric ions the liberated thiocyanate forms highly coloured ferric thiocyanate which is measured at 428 nm APFA seal method - 817R
Major Cations Dissolved	ED890%	WATE3	In house: 3 referenced to APFA 01-8 and 01-5; USEPA SW 246 R6818 and 68-8; Cations are determined by either ICPAES or ICPMS techniques. This method is compliant with NEPM Schedule B(0) Sodium Adsorption Ratio is calculated from Ca/ Mg and Na which determined by ALS in house method QWIEED890% This method is compliant with NEPM Schedule B(0) Fecundity parameters are calculated based on APFA - 048 B. This method is compliant with NEPM Schedule B(0)
Dissolved Metals by ICPMS RSuite A	EG8-8AR%	WATE3	In house: 3 referenced to APFA 01-5; USEPA SW246 R68-8/ ALS QWIEED8-8. Samples are 8.45µm filtered prior to analysis. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer/ which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Total Metals by ICPMS RSuite A	EG8-8AR	WATE3	In house: 3 referenced to APFA 01-5; USEPA SW246 R68-8/ ALS QWIEED8-8. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer/ which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by %IMS	EG805%	WATE3	In house: 3 referenced to AS 0558/ APFA 011- Fg RB (%oq R)jection (SnCl-)(Cold Vapour generation) AAS) Samples are 8.45µm filtered prior to analysis. %IMS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by SnCl- which is then purged into a heated, quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(0).
Total Mercury by %MS	EG805T	WATE3	In house: 3 referenced to AS 0558/ APFA 011- Fg RB (%oq R)jection (SnCl-)(Cold Vapour generation) AAS) %IMS 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 SnCl- which is then purged into a heated, quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(0).



Page : 18 of 18
 Work Order : ES-800456
 Client : EMM CONSULTING PTK LTD
 Project : S19851- Balranald TO Ancillary

Analytical Methods	Method	Matrix	Method Descriptions
%ferrous Iron by Discrete Analyser	EG851G	WATE3	In house: 3 eferenced to APFA 0588 %eRB. A colorimetric determination based on the reaction betq een phenanthroline and ferrous iron at pF 0. - 0.0 to form an orangeRed compleY that is measured against a fivepoint calibration curve. This method is compliant q ith NEPM Schedule B(0).
Sulfide as S- R	EH825	WATE3	In house: 3 eferenced to APFA 4588RS- RD. Sulfide species present in q ater samples are immediately precipitated q hen collected in pretreated causticinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. NonRtetects may be screened by comparison against a standard at halfR O3 / otherq ise samples are measured using UVRVIS detection at 664nm. This method is compliant q ith NEPM Schedule B(0)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN855 RPG	WATE3	In house: 3 eferenced to APFA 1808% This method is compliant q ith NEPM Schedule B(0)
T3F VolatilesBTEX	EP828	WATE3	In house: 3 eferenced to USEPA SW 246 R2- 68 Water samples are directly purged prior to analysis by Capillary GCMS and , uantification is by comparison against an established 5 point calibration curve. Alternatively/ a sample is e, uilibrated in a headspace vial and a portion of the headspace determined by GCMS analysis. This method is compliant q ith the QC re, uirements of NEPM Schedule B(0)
Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total 3ecoverable Metals	EN- 5	WATE3	In house: 3 eferenced to USEPA SW246R885. Method 0885 is a NitricF hydrochloric acid digestion procedure used to prepare surface and ground q ater samples for analysis by ICPAES or ICPMS. This method is compliant q ith NEPM Schedule B(0)
Volatiles Water Preparation	O3 G16RW	WATE3	A 5 mL ali, uot or 5 mL of a diluted sample is added to a 48 mL VOC vial for sparging.



CHAIN OF CUSTODY
ALS Laboratory Reference #

1. This report is valid only if the Chain of Custody is completed and returned to the laboratory with the sample.
2. This report is valid only if the sample is analysed within the specified time frame.
3. This report is valid only if the sample is analysed in the specified laboratory.
4. This report is valid only if the sample is analysed in the specified method.
5. This report is valid only if the sample is analysed in the specified instrument.

6. This report is valid only if the sample is analysed in the specified location.
7. This report is valid only if the sample is analysed in the specified time zone.
8. This report is valid only if the sample is analysed in the specified currency.
9. This report is valid only if the sample is analysed in the specified language.
10. This report is valid only if the sample is analysed in the specified units.

11. This report is valid only if the sample is analysed in the specified method.
12. This report is valid only if the sample is analysed in the specified instrument.
13. This report is valid only if the sample is analysed in the specified location.
14. This report is valid only if the sample is analysed in the specified time zone.
15. This report is valid only if the sample is analysed in the specified currency.

16. This report is valid only if the sample is analysed in the specified method.
17. This report is valid only if the sample is analysed in the specified instrument.
18. This report is valid only if the sample is analysed in the specified location.
19. This report is valid only if the sample is analysed in the specified time zone.
20. This report is valid only if the sample is analysed in the specified currency.

21. This report is valid only if the sample is analysed in the specified method.
22. This report is valid only if the sample is analysed in the specified instrument.
23. This report is valid only if the sample is analysed in the specified location.
24. This report is valid only if the sample is analysed in the specified time zone.
25. This report is valid only if the sample is analysed in the specified currency.

CLIENT: BMM CONSULTING

OFFICE: 20 Charles Street, Sydney
PROJECT: BMM Consultancy Services
PROJECT MANAGER: Paul Collins
ANALYST: Kelvin Givoni, Lisa Collins
DATE: 21/09/2020

PROJECT NO: 18099/2020
ANALYST: ALS (1) (V2) |

COUNTRY OF ORIGIN: AUSTRALIA

TOXICOLOGICAL REQUIREMENTS: O Standard (TV-Guide only)
SAMPLER TYPE: Grab
SAMPLER LOCATION: Major Road
SAMPLER DATE/TIME: 21/09/2020

RECEIVED BY: [Signature]
DATE/TIME: 23/9/2020

FOR LABORATORY USE ONLY (Print)

COB: ① 2 3 4 5 6 7
OR: ① 2 3 4 5 6 7
DATE/TIME: 23/9/2020

RECEIVED BY: [Signature]
DATE/TIME: 23/9/2020

ALS USE ONLY	SAMPLE DETAILS	DATE / TIME	MATRIX	CONTAINER INFORMATION	ANALYSIS REQUIRED (Indicate matrix, date, and method to be used in report only)	ADDITIONAL INFORMATION
LAB ID	SAMPLE ID			TYPE & PRESERVATIVE (Refer to code)	TOTAL SORTS	
	UGM-ARB0	17/09/2020 13:30	W		5	Major ions + toxic balance MT-1 & MT-2 (Green)
	UGM-ARB5	17/09/2020 13:50	W		5	Trace metals (Yellow)
	BH-M17D	18/09/2020 11:20	W		5	Passive iron (Maroon)
	BH-M17S	18/09/2020 10:40	W		5	Open hole metals (Field) (Red) EG20F W-2 (red)
	BH-M18D	18/09/2020 10:00	W		5	Total metals EG20F W-2T (red)
	BH-M18S	18/09/2020 9:50	W		5	Cover alpha beta GAD50 (LL Green)
	BH-M20D	21/09/2020 13:15	W		5	TRH, OTHER
	BH-M20S	21/09/2020 12:30	W		5	Lead partitioning EA150 (LL Green)
	LPSPB04	20/09/2020 14:15	W		5	HOLD
	QA200	18/09/2020 0:00	W		5	Duplicate - in-lab analysis
	QA201	17/09/2020 0:00	W		5	Triplicate - in-lab analysis. Please forward to Enviro data for analysis
	PSD 01	18/09/2020 7:50	W		1	Please report separately
	PSD 01	19/09/2020 8:50	W		1	Please report separately
	PSD 01	20/09/2020 10:00	W		1	Please report separately
	PSD 01	20/09/2020 7:10	W		1	Please report separately
	PSD 01	21/09/2020 8:50	W		1	Please report separately
	PSD 02	17/09/2020 8:00	W		1	Please report separately
	PSD 02	18/09/2020 8:55	W		1	Please report separately
	PSD 02	19/09/2020 10:05	W		1	Please report separately
	PSD 02	20/09/2020 7:15	W		1	Please report separately
	PSD 02	21/09/2020 8:55	W		1	Please report separately
	TS		W		2	
	TB4	20/09/2020 15:00	W		1	
	TB5	20/09/2020 15:00	W		1	
	RB900	18/09/2020 9:50	W		1	
	RB700	20/09/2020 14:30	W		1	
	RB800	21/09/2020 14:20	W		1	
TOTAL					75	11 14 11 11 0 11 2 2

Telephone : + 61-2-9791 8555



Environmental Division
Sydney
Work Order Reference
ES2033648

Subcon / Forward Lab / Split WO: ES2023456

Lab / Analysis: _____

Organised By / Date: _____

Relinquished By / Date: _____

Connote / Courier: _____

WO No: _____

Attached By PO / Internal Sheet: _____

Fadi Soro

From: Angus Harding
Sent: Wednesday, 23 September 2020 9:20 AM
To: Samples Sydney
Subject: FW: [EXTERNAL] - COC for S190512
Attachments: COC S190512 20200921.xlsx

Hi Fadi,

See attached COC for EMM samples coming from Melbourne.

Send QA201 on to Envirolab for analysis.

Could the PSD_01/02 samples (not on hold) please be sent through on a separate report.
Some PSD_01/02 samples are on hold until further notice.

Cheers.

Kind Regards,

Angus Harding

Client Services Officer, Environmental
Sydney



T +61 2 8784 8555
E +61 2 8784 8500
D +61 2 8784 8503
angus.harding@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA



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EnviroMail™ 128 – Revised PFAS Bottle Requirements



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www.alsglobal.com

From: Kaitlyn Brodie [mailto:kbrodie@emmconsulting.com.au]
Sent: Tuesday, 22 September 2020 6:25 PM
To: ALSEnviro Sydney <ALSEnviro.Sydney@ALSglobal.com>; Shane Colley <shane.colley@ALSglobal.com>
Cc: Dan Condon <dcondon@emmconsulting.com.au>; Paul Gibbons <pgibbons@emmconsulting.com.au>
Subject: [EXTERNAL] - COC for S190512

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Good evening,

Attached is the COC for job number S190512. Could you please send QA201 on to EnviroLab for analysis. Could the PSD_01/02 samples (not on hold) please be sent through on a separate report. Some PSD_01/02 samples are on hold until further notice.

5 eskys were delivered to ALS this afternoon (22/09/2020) and should arrive in Smithfield tomorrow.

Thank you and please let me know if I messed something up.

Kaitlyn

Kaitlyn Brodie

kbrodie@emmconsulting.com.au



EMM
Engineering, Management & Maintenance

T 02 9493 9500
M 0401 881 447

 Connect with us

SYDNEY | Ground Floor, 20 Chandos Street, St Leonards NSW 2055



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Environmental

CERTIFICATE OF ANALYSIS

Work Order	: ES2033648	Page	: 1 of 2
Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: PAUL GIBBONS	Contact	: Sepan Mahamad
Address	: Ground Floor Suite 1 20 Chandos Street St Leonards NSW NSW 2065	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61 2 8784 8555
Project	: S190512 Bairnald T3 Ancillary	Date Samples Received	: 22-Sep-2020 19:00
Order number	: ----	Date Analysis Commenced	: 29-Sep-2020
C-O-C number	: ----	Issue Date	: 01-Oct-2020 16:57
Sampler	: Kaitlyn Brodie & Luke G.		
Site	: ----		
Quote number	: EN/112/18 - Primary work only		
No. of samples received	: 10		
No. of samples analysed	: 2		

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories

Accreditation Category

Aleksandar Vujkovic

Laboratory Technician

Newcastle - Inorganics, Mayfield West, NSW



Page : 2 of 2
 Work Order : ES2033648
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

General Comments

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

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

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

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

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

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

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

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

~ = Indicates an estimated value.

- EA154: ALS does not hold NATA accreditation for Laser Particle Sizing.

Analytical Results

Sub-Matrix: WATER
 (Matrix: WATER)

Compound	Client sample ID		PSD_01	PSD_02	Result
	CAS Number	Unit			
			17-Sep-2020 07:50	17-Sep-2020 08:00	
	ES2033648-001		Result	ES2033648-006	Result
EA150: Particle Sizing					
+75µm		1	%	See Attached	See Attached



Environmental

QUALITY CONTROL REPORT

Work Order : **ES2033648** Page : 1 of 3

Client : **EMM CONSULTING PTY LTD** Laboratory : Environmental Division Sydney

Contact : **PAUL GIBBONS** Contact : Sepan Mahamad

Address : **Ground Floor Suite 1 20 Chandos Street**
St Leonards NSW NSW 2065 Address : 277-289 Woodpark Road Smithfield NSW Australia 2164

Telephone : **----** Telephone : +61 2 8784 8555

Project : **S190512 Balranald T3 Ancillary** Date Samples Received : 22-Sep-2020

Order number : **----** Date Analysis Commenced : 29-Sep-2020

C-O-C number : **----** Issue Date : 01-Oct-2020

Sampler : **Kaitlyn Brodie & Luke G.**

Site : **----**

Quote number : **EN/112/18 - Primary work only**

No. of samples received : **10**

No. of samples analysed : **2**

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories *Accreditation Category*

Aleksandar Vujkovic Laboratory Technician

Newcastle - Inorganics, Mayfield West, NSW



Page : 2 of 3
Work Order : ES2033648
Client : EMM CONSULTING PTY LTD
Project : S190512 Bairnald T3 Ancillary

General Comments

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

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

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

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

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

- **No Laboratory Duplicate (DUP) Results are required to be reported.**



Page : 3 of 3
Work Order : ES2033648
Client : EMM CONSULTING PTY LTD
Project : S190512 Bairnald T3 Ancillary

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.

- **No Method Blank (MB) or Laboratory Control Spike (LCS) Results are required to be reported.**

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.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**



ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2033648	Page	: 1 of 4
Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: PAUL GIBBONS	Telephone	: +61 2 8784 8555
Project	: S190512 Balranald T3 Ancillary	Date Samples Received	: 22-Sep-2020
Site	: ----	Issue Date	: 01-Oct-2020
Sampler	: Kaitlyn Brodie & Luke G.	No. of samples received	: 10
Order number	: ----	No. of samples analysed	: 2

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Page : 2 of 4
 Work Order : ES2033648
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

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

Method Container / Client Sample ID(s)	Sample Date		Extraction / Preparation		Analysis	
	Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA150: Particle Sizing Clear Plastic Bottle - Natural (EA154) PSD_01, PSD_02	17-Sep-2020	----	----	29-Sep-2020	16-Mar-2021	✓

Page : 3 of 4
Work Order : ES2033648
Client : EMM CONSULTING PTY LTD
Project : S190512 Balranald T3 Ancillary



Quality Control Parameter Frequency Compliance

- No Quality Control data available for this section.



Page : 4 of 4
Work Order : ES2033648
Client : EMM CONSULTING PTY LTD
Project : S190512 Balranald T3 Ancillary

Brief Method Summaries

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

<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Particle Sizing in Water by Laser Diffraction Analysis	* EA154	WATER	Particle Size Analysis of Particulates in Water by Laser Diffraction Analysis according to APHA Method 2560D

9



ALS Laboratory phone list

ALSOLOGY 21 Burton Road...
ALSOLOGY 21 Burton Road...
ALSOLOGY 21 Burton Road...
ALSOLOGY 21 Burton Road...
ALSOLOGY 21 Burton Road...

ALSOLOGY 21 Burton Road...
ALSOLOGY 21 Burton Road...
ALSOLOGY 21 Burton Road...
ALSOLOGY 21 Burton Road...
ALSOLOGY 21 Burton Road...

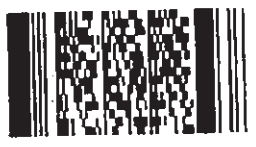
CLIENT: ERIN CONNATTO
OFFICE: 30 Chatterbox Road, Warragul
PROJECT: Bunnald to Anstey
PURCHASE ORDER:
PROJECT MANAGER: Paul Gibson
SAMPLER: Henry Meekins / Katrina Binks
COC (Created in ALS)? YES
Email Reports to: paul.gibson@als.com.au

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

Table with columns: LAB ID, SAMPLE ID, DATE/TIME, MATRIX, TYPE & PRESERVATIVE, TOTAL BOTTLES, ANALYSIS REQUIRED (including BODIES, pH, etc.), and Additional Information.

Envirotab Services
25 Research Drive
Croydon South VIC 3136
Ph: (03) 9753 2500
Job No: 22545
Date Received: 17/9/10
Time Received: 5:25pm
Received By: VS
Temp: Cool/Ambient
Cooling: Icepack
Security: Intact/Broken/None

Environmental Division
Melbourne
Work Order Reference
EM2014666



Telephone - 61-3-8549 8600

Continuation of table from previous block, rows 32-40.

41 Trip Spire Control.
Rehng by Milka 17/09
Received: 2/10/10
Temp: 25.37-15.20
Ice / Icebricks / NA

9

Scott Huett

From: Shane Colley
Sent: Thursday, 17 September 2020 3:25 PM
To: Samples Melbourne
Subject: FW: [EXTERNAL] - Please help
Attachments: EM2014666_COC.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: Client amendment

Hi guys

Can you check if we still have any of the bottles for EM2014666 – 32 + 33? Green, yellow sulphide, ferrous iron, metals and metals filtered (MG1818-20+25, MM184-86, MR 440-42). If so, can they be forwarded to Eurofins to be analysed at per the attached COC? Let me know. *EnviroLab*

Regards,

Shane Colley
Client Services Officer - Springvale
Environmental



T +61 3 8549 9600 D +61 3 8549 9613
shane.colley@alsglobal.com
2-4 Westall Rd
Springvale VIC 3171
AUSTRALIA



See how ALS is making sampling easier! [Register](#) your interest here.

Right Solutions · Right Partner
www.alsglobal.com

From: Kaitlyn Brodie <kbrodie@emmconsulting.com.au>
Sent: Thursday, 17 September 2020 3:18 PM
To: Shane Colley <shane.colley@ALSGlobal.com>
Cc: Dan Condon <dcondon@emmconsulting.com.au>
Subject: [EXTERNAL] - Please help

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Relinq by Milka 17/09



Hi Shane,

Just to clarify my earlier request...

In August I forgot to request samples QA101 and QA201 from 23/08/2020 to be forwarded to Enviro Lab for a full suite analysis. If the samples are still available could you please forward them to Enviro Lab now for a full analysis (COC attached). If there isn't enough sample to do a full suite, just the metals is fine.

Secondly, I have been sampling PSD_01 and PSD_02 for Particle Sizing in Water by Laser Diffraction (EA154) since 11/09/2020 and will continue to sample daily until approximately 11/10/2020. Is it possible to keep the results of PSD_01 and PSD_02 on a separate report?

Thanks for your help, let me know if you need any more details.

Kaitlyn

Kaitlyn Brodie

Hydrogeologist



T 02 9493 9500

M 0401 881 447

Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065



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This email and any files transmitted with it are confidential and are only to be read or used by the intended recipient as it may contain confidential information. Confidentiality or privilege is not waived or lost by erroneous transmission. If you have received this email in error, or are not the intended recipient, please notify the sender immediately and delete this email from your computer. You must not disclose, distribute, copy or use the information herein if you are not the intended recipient.

Relinq by Milika 17/09

CERTIFICATE OF ANALYSIS 22545

Client Details

Client	EMM
Attention	Paul Gibbons
Address	187 Coventry Street, South Melbourne, VIC, 3205

Sample Details

Your Reference	S190512
Number of Samples	2 WATER
Date samples received	17/09/2020
Date completed instructions received	17/09/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	24/09/2020
Date of Issue	24/09/2020
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Chris De Luca, Operations Manager

Authorised By

P. Adams

Pamela Adams, Laboratory Manager

HM in water - dissolved			
Our Reference		22545-1	22545-2
Your Reference	UNITS	QA101	QA201
Date Sampled		23/08/2020	23/08/2020
Type of sample		WATER	WATER
Date prepared	-	21/09/2020	21/09/2020
Date analysed	-	21/09/2020	21/09/2020
Arsenic-Dissolved	µg/L	<1	<1
Cadmium-Dissolved	µg/L	<0.2	<0.2
Chromium-Dissolved	µg/L	3	3
Copper-Dissolved	µg/L	130	120
Lead-Dissolved	µg/L	<1	<1
Nickel-Dissolved	µg/L	9	8
Zinc-Dissolved	µg/L	35	32
Mercury-Dissolved	µg/L	<0.05	<0.05

Miscellaneous Inorganics			
Our Reference		22545-1	22545-2
Your Reference	UNITS	QA101	QA201
Date Sampled		23/08/2020	23/08/2020
Type of sample		WATER	WATER
Date prepared	-	23/09/2020	23/09/2020
Date analysed	-	23/09/2020	23/09/2020
Sulphide	mg/L	<0.5	<0.5
Ferrous Iron	mg/L	<0.05	<0.05

Ion Balance			
Our Reference		22545-1	22545-2
Your Reference	UNITS	QA101	QA201
Date Sampled		23/08/2020	23/08/2020
Type of sample		WATER	WATER
Date prepared	-	21/09/2020	21/09/2020
Date analysed	-	21/09/2020	21/09/2020
Calcium - Dissolved	mg/L	650	620
Potassium - Dissolved	mg/L	34	34
Sodium - Dissolved	mg/L	13,000	13,000
Magnesium - Dissolved	mg/L	1,700	1,600
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	270	270
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5
Total Alkalinity as CaCO ₃	mg/L	270	270
Sulphate, SO ₄	mg/L	5,100	4,900
Chloride, Cl	mg/L	25,000	25,000
Hardness	mgCaCO ₃ /L	8,700	8,200
Ionic Balance	%	-4.1	-4.6

Method ID	Methodology Summary
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.
Inorg-051	Sulphide determined titrimetrically based on APHA latest edition 4500 S2- F. Note, the Sulphide is termed as Total Sulphide given any Sulphide contained in any sediment present may also included in the determination.
Inorg-076	A sample is determined colourimetrically by discrete analyser as referenced in APHA 3500 Fe-B (phenanthroline method). Water samples are filtered on receipt prior to analysis.
Inorg-087	Chloride by colourimetry using Discrete Analyser
Inorg-115	Sulphate by turbidity using Discrete Analyser
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.

Client Reference: S190512

QUALITY CONTROL: HM in water - dissolved					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			21/09/2020	[NT]	[NT]	[NT]	[NT]	21/09/2020	[NT]
Date analysed	-			21/09/2020	[NT]	[NT]	[NT]	[NT]	21/09/2020	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	107	[NT]
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	[NT]	[NT]	[NT]	[NT]	110	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05	[NT]	[NT]	[NT]	[NT]	100	[NT]

Client Reference: S190512

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			23/09/2020	[NT]	[NT]	[NT]	[NT]	23/09/2020	[NT]
Date analysed	-			23/09/2020	[NT]	[NT]	[NT]	[NT]	23/09/2020	[NT]
Sulphide	mg/L	0.5	Inorg-051	<0.5	[NT]	[NT]	[NT]	[NT]	82	[NT]
Ferrous Iron	mg/L	0.05	Inorg-076	<0.05	[NT]	[NT]	[NT]	[NT]	112	[NT]

QUALITY CONTROL: Ion Balance				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			21/09/2020	[NT]	[NT]	[NT]	[NT]	21/09/2020	[NT]
Date analysed	-			21/09/2020	[NT]	[NT]	[NT]	[NT]	21/09/2020	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	89	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	92	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	85	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	88	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	107	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	107	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-115	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Chloride, Cl	mg/L	1	Inorg-087	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Sulphide analysed by Envirolab Sydney, report number 251656.

Sulphide, Ferrous Iron, Alkalinity have exceeded the recommended technical holding times, Envirolab Group Form 347 "Recommended Preservation and Holding Times" can be provided on request (available on the Envirolab website)

METALS: The PQL has been raised for Cadmium due to the sample matrix requiring dilution.

67
19



CHAIN OF CUSTODY
ALS Laboratory, please tick →

CLIENT: ENH CONSULTING
OFFICE: 30 Charles Street, St Leonards
PROJECT: Barramundi 73 Sanitility
PURCHASE ORDER:
PROJECT MANAGER: Paul Gibbons
SAMPLER: Kaitlyn Brodie / Luke Griffiths
COC: Enabled to ALS? (YES)

TURNAROUND REQUIREMENTS:
 Standard TAT (LHM due date)
 Non Standard or urgent TAT (LHM due date)
 Non Standard or urgent TAT (LHM due date)
 Non Standard or urgent TAT (LHM due date)

CONTACT PH: 0477702413
SAMPLER MOBILE: 0481841847
ADD FORMAT: (for default)
EMAIL: paul.gibbons@enhconsulting.com.au; lucy.griffiths@enhconsulting.com.au

RECEIVED BY: Misha (ALS)
DATE/TIME: 22/09/2020
RECEIVED BY: Misha (ALS)
DATE/TIME: 22/09/2020

ANALYSIS REQUIRED INCLUDING BUT NOT LIMITED TO: (NB: Some Codes may be listed to attract specific prices)
 Whose Metals are required, specify Total (unfiltered bottle required) or Discharged (acid filtered bottle required).

SAMPLE ID	DATE / TIME	MATERIAL	CONTAINER INFORMATION		ANALYSIS REQUIRED INCLUDING BUT NOT LIMITED TO										Additional Information		
			TYPE & PRESERVATIVE (refer to codes)	TOTAL BOTTLES (refer to codes)	Major ions + toxic balance NT-1 & NT-2 (Green)	Bulked EXOS (Yellow)	Resonance from (field filtered) E0051 (Green)	Disolved metals (field filtered) E0205 (Red)	Total metals E0207 W-ZT (red)	Gross alpha beta E420 (TL Green)	TRM, GTXEN	Laser particle sizing E4154 (TL Green)	Comments on likely contaminants (level, dilution, or sample requiring specific OC analysis etc.)				
UGM-M4D	16/09/2020 14:55	W	5	4	1	1	1	1	1	1	1	1	1	1	1		
UGM-M15S	16/09/2020 10:20	W	6	5	1	1	1	1	1	1	1	1	1	1	1		
BH-M19D	16/09/2020 8:35	W	6	5	1	1	1	1	1	1	1	1	1	1	1		
BH-M19S	16/09/2020 8:45	W	5	4	1	1	1	1	1	1	1	1	1	1	1		
BH-M25D	15/09/2020 13:10	W	5	4	1	1	1	1	1	1	1	1	1	1	1		
BH-M25S	15/09/2020 12:30	W	5	4	1	1	1	1	1	1	1	1	1	1	1		
QA100	16/09/2020 0:00	W	6	5	1	1	1	1	1	1	1	1	1	1	1		
QA101	16/09/2020 0:00	W	6	5	1	1	1	1	1	1	1	1	1	1	1		
PSD-01	14/09/2020 11:20	W	1	1													
PSD 01	15/09/2020 11:30	W	1	1													
PSD 01	16/09/2020 7:00	W	1	1													
PSD 02	14/09/2020 11:25	W	1	1													
PSD 02	15/09/2020 11:35	W	1	1													
PSD 02	16/09/2020 7:05	W	3	3													
TS		W	1	1													
TB100	16/09/2020 14:30	W	1	1													
TB200	16/09/2020 14:30	W	1	1													
TB300	16/09/2020 14:30	W	1	1													
RB100	15/09/2020 15:30	W	1	1													
RB400	16/09/2020 10:55	W	1	1													
			TOTAL	62	6	6	6	6	6	6	6	6	6	6	6	6	

Received: 21/9
 C/notes 22/9 11:50
 Temp: 16.2°C
 Carrier
 ALS

EnviroLab Services
 25 Research Drive
 Croydon South VIC 3136
 Ph: (03) 9763 2500
 Job No: 22604

Date Received: 22/9/20
 Time Received: 4:00pm 8:30C
 Received By: KS
 Temp: Cool/Ambient
 Cooling: Ice/Repack
 Security: Intact/Broken/None

Water Container Codes: P = Unpreserved Plastic; M = Nalc Preserved Plastic; ORC = Nitro Preserved ORC; SH = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Amber Glass Preserved Plastic; C = Formaldehyde Preserved Plastic; F = Formaldehyde Preserved Plastic; S = Sulphuric Acid Preserved Plastic; H = HCl Preserved Plastic; HS = HCl Preserved Sulphate Plastic; SP = Sulphuric Acid Preserved Plastic; ST = Stems Sodium Thiosulphate Preserved Plastic; T = Toluene Preserved Plastic; V = VOA Vol Sulphur Preserved; VS = VOA Vol Sulphur Preserved; W = Water Preserved Plastic; WT = Water Preserved Plastic; Y = Yarn Preserved Plastic; Z = Zinc Preserved Plastic

CERTIFICATE OF ANALYSIS 22604

Client Details

Client	EMM
Attention	Paul Gibbons
Address	187 Coventry Street, South Melbourne, VIC, 3205

Sample Details

Your Reference	<u>S190512 Balranald T3 Ancillary</u>
Number of Samples	1 WATER
Date samples received	22/09/2020
Date completed instructions received	22/09/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	29/09/2020
Date of Issue	06/10/2020
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Chris De Luca, Operations Manager

Authorised By

P. Adams

Pamela Adams, Laboratory Manager

HM in water - dissolved		
Our Reference		22604-1
Your Reference	UNITS	QA101
Date Sampled		16/09/2020
Type of sample		WATER
Date prepared	-	23/09/2020
Date analysed	-	23/09/2020
Arsenic-Dissolved	µg/L	<1
Cadmium-Dissolved	µg/L	<0.2
Chromium-Dissolved	µg/L	2
Copper-Dissolved	µg/L	29
Lead-Dissolved	µg/L	<1
Nickel-Dissolved	µg/L	5
Zinc-Dissolved	µg/L	17
Mercury-Dissolved	µg/L	<0.05

Miscellaneous Inorganics		
Our Reference		22604-1
Your Reference	UNITS	QA101
Date Sampled		16/09/2020
Type of sample		WATER
Date prepared	-	23/09/2020
Date analysed	-	23/09/2020
Sulphide	mg/L	<0.5
Ferrous Iron	mg/L	<0.05

Ion Balance		
Our Reference		22604-1
Your Reference	UNITS	QA101
Date Sampled		16/09/2020
Type of sample		WATER
Date prepared	-	24/09/2020
Date analysed	-	24/09/2020
Calcium - Dissolved	mg/L	570
Potassium - Dissolved	mg/L	18
Sodium - Dissolved	mg/L	14,000
Magnesium - Dissolved	mg/L	1,500
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	310
Carbonate Alkalinity as CaCO ₃	mg/L	<5
Total Alkalinity as CaCO ₃	mg/L	310
Sulphate, SO ₄	mg/L	450
Chloride, Cl	mg/L	24,000
Hardness	mgCaCO ₃ /L	7,600
Ionic Balance	%	3.4

External testing		
Our Reference		22604-1
Your Reference	UNITS	QA101
Date Sampled		16/09/2020
Type of sample		WATER
Gross Alpha	Bq/L	5.16
Gross Beta (corrected for K40)	Bq/L	2.81
Gross Beta Activity -K40	Bq/L	<2.28

Method ID	Methodology Summary
Ext-011	Subcontracted to ALS.
Ext-058	Analysed by Western Radiation Services. NATA accreditation no. 14174
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.
Inorg-051	Sulphide determined titrimetrically based on APHA latest edition 4500 S2- F. Note, the Sulphide is termed as Total Sulphide given any Sulphide contained in any sediment present may also included in the determination.
Inorg-076	A sample is determined colourimetrically by discrete analyser as referenced in APHA 3500 Fe-B (phenanthroline method). Water samples are filtered on receipt prior to analysis.
Inorg-087	Chloride by colourimetry using Discrete Analyser
Inorg-115	Sulphate by turbidity using Discrete Analyser
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.

Client Reference: S190512 Balranald T3 Ancillary

QUALITY CONTROL: HM in water - dissolved							Duplicate		Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			23/09/2020	1	23/09/2020	23/09/2020		23/09/2020	[NT]
Date analysed	-			23/09/2020	1	23/09/2020	23/09/2020		23/09/2020	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	<1	[NT]		108	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	1	<0.2	[NT]		110	[NT]
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	2	[NT]		106	[NT]
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	29	[NT]		105	[NT]
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	<1	[NT]		107	[NT]
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	5	[NT]		105	[NT]
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	17	[NT]		107	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05	1	<0.05	<0.05	0	99	[NT]

Client Reference: S190512 Balranald T3 Ancillary

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			23/09/2020	[NT]	[NT]	[NT]	[NT]	23/09/2020	[NT]
Date analysed	-			23/09/2020	[NT]	[NT]	[NT]	[NT]	23/09/2020	[NT]
Sulphide	mg/L	0.5	Inorg-051	<0.5	[NT]	[NT]	[NT]	[NT]	97	[NT]
Ferrous Iron	mg/L	0.05	Inorg-076	<0.05	[NT]	[NT]	[NT]	[NT]	112	[NT]

Client Reference: S190512 Balranald T3 Ancillary

QUALITY CONTROL: Ion Balance				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			24/09/2020	[NT]	[NT]	[NT]	[NT]	24/09/2020	[NT]
Date analysed	-			24/09/2020	[NT]	[NT]	[NT]	[NT]	24/09/2020	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	99	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	99	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	90	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	96	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	106	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	106	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	106	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	106	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-115	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Chloride, Cl	mg/L	1	Inorg-087	<1	[NT]	[NT]	[NT]	[NT]	113	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Sulphide analysed by Envirolab Sydney, report number 251948.

Gross Alpha & Beta analysed by ALS, report number 850864.

METALS: The PQL has been raised for Cadmium due to the sample matrix requiring dilution.

CERTIFICATE OF ANALYSIS 22604

Client Details

Client	EMM
Attention	Paul Gibbons
Address	187 Coventry Street, South Melbourne, VIC, 3205

Sample Details

Your Reference	<u>S190512 Balranald T3 Ancillary</u>
Number of Samples	1 WATER
Date samples received	22/09/2020
Date completed instructions received	22/09/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	29/09/2020
Date of Issue	06/10/2020
Reissue Details	This report supersedes 22604_R00 due to changes in ESDAT chemcodes.
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Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Chris De Luca, Operations Manager

Authorised By

P. Adams

Pamela Adams, Laboratory Manager

HM in water - dissolved		
Our Reference		22604-1
Your Reference	UNITS	QA101
Date Sampled		16/09/2020
Type of sample		WATER
Date prepared	-	23/09/2020
Date analysed	-	23/09/2020
Arsenic-Dissolved	µg/L	<1
Cadmium-Dissolved	µg/L	<0.2
Chromium-Dissolved	µg/L	2
Copper-Dissolved	µg/L	29
Lead-Dissolved	µg/L	<1
Nickel-Dissolved	µg/L	5
Zinc-Dissolved	µg/L	17
Mercury-Dissolved	µg/L	<0.05

Miscellaneous Inorganics		
Our Reference		22604-1
Your Reference	UNITS	QA101
Date Sampled		16/09/2020
Type of sample		WATER
Date prepared	-	23/09/2020
Date analysed	-	23/09/2020
Sulphide	mg/L	<0.5
Ferrous Iron	mg/L	<0.05

Ion Balance		
Our Reference		22604-1
Your Reference	UNITS	QA101
Date Sampled		16/09/2020
Type of sample		WATER
Date prepared	-	24/09/2020
Date analysed	-	24/09/2020
Calcium - Dissolved	mg/L	570
Potassium - Dissolved	mg/L	18
Sodium - Dissolved	mg/L	14,000
Magnesium - Dissolved	mg/L	1,500
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	310
Carbonate Alkalinity as CaCO ₃	mg/L	<5
Total Alkalinity as CaCO ₃	mg/L	310
Sulphate, SO ₄	mg/L	450
Chloride, Cl	mg/L	24,000
Hardness	mgCaCO ₃ /L	7,600
Ionic Balance	%	3.4

External testing		
Our Reference		22604-1
Your Reference	UNITS	QA101
Date Sampled		16/09/2020
Type of sample		WATER
Gross Alpha	Bq/L	5.16
Gross Beta (corrected for K40)	Bq/L	2.81
Gross Beta Activity -K40	Bq/L	<2.28

Client Reference: S190512 Balranald T3 Ancillary

Method ID	Methodology Summary
Ext-011	Subcontracted to ALS.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.
Inorg-051	Sulphide determined titrimetrically based on APHA latest edition 4500 S2- F. Note, the Sulphide is termed as Total Sulphide given any Sulphide contained in any sediment present may also included in the determination.
Inorg-076	A sample is determined colourimetrically by discrete analyser as referenced in APHA 3500 Fe-B (phenanthroline method). Water samples are filtered on receipt prior to analysis.
Inorg-087	Chloride by colourimetry using Discrete Analyser
Inorg-115	Sulphate by turbidity using Discrete Analyser
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.

Client Reference: S190512 Balranald T3 Ancillary

QUALITY CONTROL: HM in water - dissolved						Duplicate		Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			23/09/2020	1	23/09/2020	23/09/2020		23/09/2020	[NT]
Date analysed	-			23/09/2020	1	23/09/2020	23/09/2020		23/09/2020	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	<1	[NT]		108	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	1	<0.2	[NT]		110	[NT]
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	2	[NT]		106	[NT]
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	29	[NT]		105	[NT]
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	<1	[NT]		107	[NT]
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	5	[NT]		105	[NT]
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	17	[NT]		107	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05	1	<0.05	<0.05	0	99	[NT]

Client Reference: S190512 Balranald T3 Ancillary

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			23/09/2020	[NT]	[NT]	[NT]	[NT]	23/09/2020	[NT]
Date analysed	-			23/09/2020	[NT]	[NT]	[NT]	[NT]	23/09/2020	[NT]
Sulphide	mg/L	0.5	Inorg-051	<0.5	[NT]	[NT]	[NT]	[NT]	97	[NT]
Ferrous Iron	mg/L	0.05	Inorg-076	<0.05	[NT]	[NT]	[NT]	[NT]	112	[NT]

Client Reference: S190512 Balranald T3 Ancillary

QUALITY CONTROL: Ion Balance					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			24/09/2020	[NT]	[NT]	[NT]	[NT]	24/09/2020	[NT]
Date analysed	-			24/09/2020	[NT]	[NT]	[NT]	[NT]	24/09/2020	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	99	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	99	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	90	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	96	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	106	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	106	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	106	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	106	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-115	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Chloride, Cl	mg/L	1	Inorg-087	<1	[NT]	[NT]	[NT]	[NT]	113	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Sulphide analysed by Envirolab Sydney, report number 251948.

Gross Alpha & Beta analysed by ALS, report number 850864.

METALS: The PQL has been raised for Cadmium due to the sample matrix requiring dilution.

INTERIM REPORT 252055

Client Details

Client	EMM Consulting Pty Ltd
Attention	Daniel Condon
Address	188 Normanby Rd, SOUTHBANK, VIC, 3006

Sample Details

Your Reference	<u>S100512, Balranald T3 Ancillary</u>
Number of Samples	1 water
Date samples received	24/09/2020
Date completed instructions received	24/09/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Report Details

Date results requested by	01/10/2020
Interim Report Date	01/10/2020
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

HM in water - dissolved		
Our Reference		252055-1
Your Reference	UNITS	QA201
Date Sampled		18/09/2020
Type of sample		water
Date prepared	-	28/09/2020
Date analysed	-	28/09/2020
Arsenic-Dissolved	µg/L	3
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	2
Copper-Dissolved	µg/L	<1
Lead-Dissolved	µg/L	<1
Mercury-Dissolved	µg/L	<0.05
Nickel-Dissolved	µg/L	8
Zinc-Dissolved	µg/L	6

Ion Balance		
Our Reference		252055-1
Your Reference	UNITS	QA201
Date Sampled		18/09/2020
Type of sample		water
Date prepared	-	24/09/2020
Date analysed	-	24/09/2020
Calcium - Dissolved	mg/L	580
Potassium - Dissolved	mg/L	27
Sodium - Dissolved	mg/L	13,000
Magnesium - Dissolved	mg/L	1,400
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	340
Carbonate Alkalinity as CaCO ₃	mg/L	<5
Total Alkalinity as CaCO ₃	mg/L	340
Sulphate, SO ₄	mg/L	4,000
Chloride, Cl	mg/L	21,000
Ionic Balance	%	1.0

Miscellaneous Inorganics		
Our Reference		252055-1
Your Reference	UNITS	QA201
Date Sampled		18/09/2020
Type of sample		water
Date prepared	-	25/09/2020
Date analysed	-	25/09/2020
Ferrous Iron	mg/L	2.8
Sulphide	mg/L	<0.5

Radioactivity Analysis report		
Our Reference		252055-1
Your Reference	UNITS	QA201
Date Sampled		18/09/2020
Type of sample		water
Date prepared	-	
Date analysed	-	
Radium-226	Bq/L	
Radium-228	Bq/L	

Client Reference: S100512, Balranald T3 Ancillary

Method ID	Methodology Summary
Ext-041	Analysed by Australian Government - Australian Radiation Protection and Nuclear Safety Agency. VIC. Radium 226 is determined by liquid scintillation counting. Radium 228 is measured by high resolution gamma-ray spectrometry.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.
Inorg-051	Sulphide determined titrimetrically based on APHA latest edition 4500 S2- F. Note, the Sulphide is termed as Total Sulphide given any Sulphide contained in any sediment present is also included in the determination.
Inorg-076	Ferrous Iron is determined colourimetrically by discrete analyser. Waters samples are filtered on receipt prior to analysis.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.

Client Reference: S100512, Balranald T3 Ancillary

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date prepared	-			28/09/2020	[NT]	[NT]	[NT]	[NT]	28/09/2020	[NT]
Date analysed	-			28/09/2020	[NT]	[NT]	[NT]	[NT]	28/09/2020	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	109	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]

Client Reference: S100512, Balranald T3 Ancillary

QUALITY CONTROL: Ion Balance					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			24/09/2020	[NT]	[NT]	[NT]	[NT]	24/09/2020	[NT]
Date analysed	-			24/09/2020	[NT]	[NT]	[NT]	[NT]	24/09/2020	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	99	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	86	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	87	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	96	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	103	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]

Client Reference: S100512, Balranald T3 Ancillary

QUALITY CONTROL: Miscellaneous Inorganics					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			25/09/2020	[NT]	[NT]	[NT]	[NT]	25/09/2020	[NT]
Date analysed	-			25/09/2020	[NT]	[NT]	[NT]	[NT]	25/09/2020	[NT]
Ferrous Iron	mg/L	0.05	Inorg-076	<0.05	[NT]	[NT]	[NT]	[NT]	83	[NT]
Sulphide	mg/L	0.5	Inorg-051	<0.5	[NT]	[NT]	[NT]	[NT]	98	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.



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CLIENT: EMM CONSULTING
 OFFICE: 20 Chandos Street, St Leonards
 PROJECT: S190512 PROJECT NO.: S190512
 PURCHASE ORDER: S190512 CONTACT PH: 0477 702 413
 PROJECT MANAGER: Paul Gibbons SAMPLER MOBILE: 0435 895 614
 SAMPLER: Daniel Condon EDD FORMAT (or default): Daniel Condon
 COC Enabled to ALS? (YES) DATE/TIME: 21/10/2020
 Email Reports to: paul.gibbons@emmconsulting.com.au; dcondon@emmconsulting.com.au; hcondon@emmconsulting.com.au
 Email Invoice to: accounts@emmconsulting.com.au; paul.gibbons@emmconsulting.com.au

TURNAROUND REQUIREMENTS:
 Standard YAT (List due date)
 Non Standard or urgent YAT (List due date)
 COC SEQUENCE NUMBER (Circle):
 OF: ① 2 3 4 5 6 7
 RECEIVED BY: *Mr. [Signature]* DATE/TIME: *21/10/2020*
 RECEIVED BY: *Shak [Signature]* DATE/TIME: *21/10/2020*

FOR LABORATORY USE ONLY (Circle)
 Culycol Seal Intact? Yes No N/A
 Free use / frozen ice packs present upon receipt? Yes No N/A
 Random Sample Temperature on Receipt: °C
 Other comment:
 REINQUISHED BY: DATE/TIME: RECEIVED BY: DATE/TIME:

CONTAINER INFORMATION
 ANALYSIS REQUIRED INCLUDING SUITES (Nil. Suite Codes must be listed to attract suite price)
 When Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required).
 Major ions + ionic balance NT-1 & NT-2 (Green)
 Sulphide EK085 (Yellow)
 Ferrous Iron (field filtered) EQ051 (Maroon)
 Dissolved metals (field filtered) EG020F W-2 (red)
 Total metals EG020T W-2T (red)
 Hold

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (below)	TOTAL BOTTLES	ANALYSIS REQUIRED INCLUDING SUITES (Nil. Suite Codes must be listed to attract suite price)	FOR LABORATORY USE ONLY (Circle)						
1	UGM-M8d	21/10/2020 10:00	W		5	Major ions + ionic balance NT-1 & NT-2 (Green)	Yes No N/A						
2	UGM-M8s	21/10/2020 10:30	W		5	Sulphide EK085 (Yellow)	Yes No N/A						
3	UGM-M12d	31/10/2020 13:30	W		5	Ferrous Iron (field filtered) EQ051 (Maroon)	Yes No N/A						
4	UGM-M12s	31/10/2020 13:15	W		5	Dissolved metals (field filtered) EG020F W-2 (red)	Yes No N/A						
5	BH-M19d	31/10/2020 12:00	W		5	Total metals EG020T W-2T (red)	Yes No N/A						
6	BH-M18s	31/10/2020 11:30	W		5	Hold	Yes No N/A						
7	BH-M19d	31/10/2020 9:00	W		5		Yes No N/A						
8	BH-M18s	31/10/2020 8:10	W		5		Yes No N/A						
9	BH-M20d	31/10/2020 9:10	W		5		Yes No N/A						
10	BH-M20s	31/10/2020 9:30	W		4		Yes No N/A						
11	RIN_201002	21/10/2020 14:00	W		1		Yes No N/A						
12	RIN_201003	31/10/2020 14:00	W		1		Yes No N/A						
13	TRIP BLANK_01	21/10/2020 14:00	W		1		Yes No N/A						
14	TRIP BLANK_02	31/10/2020 14:00	W		1		Yes No N/A						
TOTAL					53	9	10	10	10	14	0	0	0

HTI
 Environmental Division
 Sydney
 Work Order Reference
ES2035208
 Telephone: + 61-2-9794 8555

Notes:
 P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass; AP = Airtight Unpreserved Plastic
 V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulfate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airtight Unpreserved Vial S9 = Sulfuric Preserved Specimen bottle; HS = HCl Preserved Specimen bottle; SP = Sulfuric Preserved Plastic; F = Formallydehyde Preserved Glass
 Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Stabile Sothi; ASS = Plastic Bag for Acid Sulphate Sothi; B = Unpreserved Bag; LI = Liquid Iodine Preserved Bottle; STT = Stabile Sodium Thiosulfate Preserved Bottle



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **ES2035208** Page : 1 of 7
Client : **EMM CONSULTING PTY LTD** Laboratory : Environmental Division Sydney
Contact : **PAUL GIBBONS** Contact : Sepan Mahamad
Address : **Ground Floor Suite 1 20 Chandos Street**
St Leonards NSW NSW 2065 Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : **----** Telephone : +61 2 8784 8555
Project : **S190512** Date Samples Received : 08-Oct-2020 11:20
Order number : **S190512** Date Analysis Commenced : 09-Oct-2020
C-O-C number : **----** Issue Date : 14-Oct-2020 20:36
Sampler : **Daniel Condon**
Site : **----**
Quote number : **EN/222**
No. of samples received : **14**
No. of samples analysed : **14**



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



Page : 2 of 7
Work Order : ES2035208
Client : EMM CONSULTING PTY LTD
Project : S190512

General Comments

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

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

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

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

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

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

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

LOR = Limit of reporting

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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

● EG020: LOR's have been raised due to matrix interference. (High Total Dissolved Solids)

● EG020: It is recognised that total concentration is less than dissolved for some metal analytes. However, the difference is within experimental variation of the methods.

● Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Compound	CAS Number	LOR	Client sampling date / time		Client sample ID			
			Unit	Result	UGM-M8d	UGM-M8s	UGM-M12d	UGM-M12s	BH-M18d
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	403	262	396	338	439
Total Alkalinity as CaCO3	----	1	mg/L	403	262	396	338	439
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3570	4380	3560	4550	3480
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	18800	21500	19300	24200	17900
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	574	812	475	634	545
Magnesium	7439-95-4	1	mg/L	1500	1750	1280	1670	1420
Sodium	7440-23-5	1	mg/L	11500	13100	10200	14700	11200
Potassium	7440-09-7	1	mg/L	36	33	37	25	36
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Nickel	7440-02-0	0.001	mg/L	<0.010	0.031	<0.010	0.011	<0.010
Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chromium	7440-47-3	0.001	mg/L	<0.010	0.135	<0.010	0.014	<0.010
Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Nickel	7440-02-0	0.001	mg/L	<0.010	0.110	<0.010	0.018	<0.010
Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	7440-66-6	0.005	mg/L	<0.052	<0.052	<0.052	<0.052	<0.052
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG051G: Ferrous Iron by Discrete Analyser								



Analytical Results

Compound	CAS Number	LOR	Unit	Client sample ID				
				UGM-M8d	UGM-M8s	UGM-M12d	UGM-M12s	BH-M18d
				02-Oct-2020 10:00	02-Oct-2020 10:30	03-Oct-2020 13:30	03-Oct-2020 13:15	03-Oct-2020 12:00
				ES2035208-001	ES2035208-002	ES2035208-003	ES2035208-004	ES2035208-005
				Result	Result	Result	Result	Result
EG051G: Ferrous Iron by Discrete Analyser - Continued								
Ferrous Iron	----	0.05	mg/L	2.62	<0.05	<0.05	<0.05	7.24
EK085M: Sulfide as S2-								
Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	1.1	<0.1	<0.1
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	613	703	626	784	586
∅ Total Cations	----	0.01	meq/L	653	755	574	809	632
∅ Ionic Balance	----	0.01	%	3.20	3.59	4.40	1.57	3.78



Analytical Results

Compound	CAS Number	LOR	Client sampling date / time		Client sample ID				
			Unit	Result	BH-M18s	BH-M19d	BH-M19s	BH-M20d	BH-M20s
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	356	445	355	437	437	437
Total Alkalinity as CaCO3	----	1	mg/L	356	445	355	437	437	437
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3940	3400	4680	3570	3570	3570
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	20700	17500	23000	18800	18800	18800
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L	665	512	675	555	555	555
Magnesium	7439-95-4	1	mg/L	1430	1360	1670	1470	1470	1470
Sodium	7440-23-5	1	mg/L	13100	10800	14500	11600	11600	11600
Potassium	7440-09-7	1	mg/L	26	37	23	38	38	38
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nickel	7440-02-0	0.001	mg/L	0.012	<0.010	<0.010	0.030	<0.010	<0.010
Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	<0.050	0.062	<0.050	<0.050
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chromium	7440-47-3	0.001	mg/L	0.014	<0.010	<0.010	0.035	<0.010	0.011
Copper	7440-50-8	0.001	mg/L	<0.010	0.011	<0.010	0.252	<0.010	<0.010
Nickel	7440-02-0	0.001	mg/L	0.018	0.032	<0.010	0.053	<0.010	0.015
Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	7440-66-6	0.005	mg/L	<0.052	<0.052	<0.052	<0.050	<0.050	<0.050
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG051G: Ferrous Iron by Discrete Analyser									



Analytical Results

Compound	Sub-Matrix: WATER (Matrix: WATER)	Client sample ID									
		Client sampling date / time		BH-M18s	BH-M19d	BH-M19s	BH-M20d	BH-M20s			
		CAS Number	LOR	Unit	Result	Result	Result	Result	Result	Result	Result
			0.05	mg/L	2.40	2.71	<0.05	4.34	0.08		
EG051G: Ferrous Iron by Discrete Analyser - Continued		18496-25-8	0.1	mg/L	<0.1	1.3	<0.1	<0.1	0.4		
EK085M: Sulfide as S2-											
EN055: Ionic Balance											
∅ Total Anions			0.01	meq/L	673	573	753	613	----		
∅ Total Cations			0.01	meq/L	721	608	802	654	----		
∅ Ionic Balance			0.01	%	3.46	2.95	3.16	3.22	----		



Analytical Results

Compound	CAS Number	LOR	Unit	Client sample ID				
				Client sampling date / time	RIN_201002	RIN_201003	TRIP BLANK_01	TRIP BLANK_02
Sub-Matrix: WATER (Matrix: WATER)				02-Oct-2020 14:00	03-Oct-2020 14:00	02-Oct-2020 14:00	03-Oct-2020 14:00	
				ES2035208-011	ES2035208-012	ES2035208-013	ES2035208-014	
				Result	Result	Result	Result	
EG020T: Total Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	****
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	****
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	****
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	****
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	****
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	****
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	****
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	****



Environmental

QUALITY CONTROL REPORT

Work Order : **ES2035208**

Page : 1 of 7

Client : **EMM CONSULTING PTY LTD**
Contact : **PAUL GIBBONS**
Address : **Ground Floor, Suite 1 20 Chandos Street
St Leonards NSW NSW 2065**
Telephone : **----**
Project : **S190512**
Order number : **S190512**
C-O-C number : **----**
Sampler : **Daniel Condon**
Site : **----**
Quote number : **EN/222**
No. of samples received : **14**
No. of samples analysed : **14**

Laboratory : **Environmental Division Sydney**
Contact : **Sepan Mahamad**
Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**
Telephone : **+61 2 8784 8555**
Date Samples Received : **08-Oct-2020**
Date Analysis Commenced : **09-Oct-2020**
Issue Date : **14-Oct-2020**



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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Dian Dao	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



Page : 2 of 7
 Work Order : ES2035208
 Client : EMM CONSULTING PTY LTD
 Project : S190512

General Comments

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

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

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

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

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
ED037P: Alkalinity by PC Titrator (QC Lot: 3300396)									
ES2035035-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1160	1190	2.83	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	1160	1190	2.83	0% - 20%
ES2035123-009	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	<1	<1	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3300398)									
ES2035238-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	36	35	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	36	35	0.00	0% - 20%
ES2035270-004	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Total Alkalinity as CaCO3	---	1	mg/L	<1	<1	0.00	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3299188)									
ES2035065-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	33	33	0.00	0% - 20%
ES2035208-002	UGM-M8s	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	4380	4380	0.00	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3299189)									
ES2035150-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	232	233	0.00	0% - 20%
ES2035208-007	BH-M19d	ED045G: Chloride	16887-00-6	1	mg/L	17500	17300	1.17	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3301246)									



Laboratory Duplicate (DUP) Report									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED093F: Dissolved Major Cations (QC Lot: 3301246) - continued									
ES2035102-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	2	2	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	3	3	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	12	12	0.00	0% - 50%
		ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	0.00	No Limit
ES2034867-001	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	9	8	0.00	No Limit
		ED093F: Magnesium	7439-95-4	1	mg/L	12	11	0.00	0% - 50%
		ED093F: Sodium	7440-23-5	1	mg/L	10000	9560	5.01	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	87	85	2.03	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3301249)									
ES2035239-007	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	139	140	0.00	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	193	195	1.03	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	473	475	0.374	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	13	14	0.00	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3301247)									
ES2035167-009	Anonymous	EG020A-F: Cadmium	7440-43-9	0.001	mg/L	<0.0010	<0.0010	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.110	0.115	4.75	No Limit
ES2035239-007	Anonymous	EG020A-F: Cadmium	7440-43-9	0.001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.003	0.003	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3300475)									
ES2035208-001	UGM-M8d	EG020A-T: Cadmium	7440-43-9	0.001	mg/L	<0.0010	<0.0010	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.052	<0.052	0.00	No Limit
ES2035180-002	Anonymous	EG020A-T: Cadmium	7440-43-9	0.001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.001	mg/L	0.006	0.006	0.00	No Limit



Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report				Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)		
EG020T: Total Metals by ICP-MS (QC Lot: 3300475) - continued										
ES2035180-002	Anonymous	EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00		No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00		No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00		No Limit
EG020T: Total Metals by ICP-MS (QC Lot: 3300477)										
ES2035208-011	RIN_201002	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00		No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00		No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00		No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00		No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00		No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00		No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00		No Limit
EW2004458-003	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00		No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00		No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00		No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00		No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00		No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00		No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00		No Limit
EG035F: Dissolved Mercury by FIMS (QC Lot: 3301248)										
ES2035208-002	UGM-M8s	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00		No Limit
ES2035208-010	BH-M20s	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00		No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3303233)										
ES2035002-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00		No Limit
ES2035208-001	UGM-M8d	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00		No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3303234)										
ES2035208-011	RIN_201002	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00		No Limit
ES2035239-007	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00		No Limit
EG051G: Ferrous Iron by Discrete Analyser (QC Lot: 3299947)										
ES2034956-001	Anonymous	EG051G: Ferrous Iron	---	0.05	mg/L	1.98	1.94	2.05		0% - 20%
ES2035208-005	BH-M18d	EG051G: Ferrous Iron	---	0.05	mg/L	7.24	7.20	0.476		0% - 20%
EK085M: Sulfide as S2- (QC Lot: 3300004)										
ES2035208-001	UGM-M8d	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00		No Limit
ES2035208-010	BH-M20s	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	0.4	0.4	0.00		No Limit



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

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

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	LCS	Low	High
ED037P: Alkalinity by PC Titrator (QCLot: 3300396)									
ED037-P: Total Alkalinity as CaCO3	-----	-----	mg/L	-----	-----	200 mg/L	102	81.0	111
				-----	-----	50 mg/L	116	70.0	130
ED037P: Alkalinity by PC Titrator (QCLot: 3300398)									
ED037-P: Total Alkalinity as CaCO3	-----	-----	mg/L	-----	-----	200 mg/L	102	81.0	111
				-----	-----	50 mg/L	117	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3299188)									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	25 mg/L	103	82.0	122
				<1	<1	500 mg/L	102	82.0	122
ED045G: Chloride by Discrete Analyser (QCLot: 3299189)									
ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	10 mg/L	103	80.9	127
				<1	<1	1000 mg/L	106	80.9	127
ED093F: Dissolved Major Cations (QCLot: 3301246)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	50 mg/L	108	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	50 mg/L	101	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	<1	50 mg/L	99.1	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	50 mg/L	98.9	85.0	113
ED093F: Dissolved Major Cations (QCLot: 3301249)									
ED093F: Calcium	7440-70-2	1	mg/L	<1	<1	50 mg/L	105	80.0	114
ED093F: Magnesium	7439-95-4	1	mg/L	<1	<1	50 mg/L	102	90.0	116
ED093F: Sodium	7440-23-5	1	mg/L	<1	<1	50 mg/L	103	82.0	120
ED093F: Potassium	7440-09-7	1	mg/L	<1	<1	50 mg/L	97.0	85.0	113
EG020F: Dissolved Metals by ICP-MS (QCLot: 3301247)									
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.1 mg/L	85.3	85.0	114
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.1 mg/L	87.3	84.0	110
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.1 mg/L	89.9	85.0	111
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.1 mg/L	86.9	81.0	111
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.1 mg/L	88.4	83.0	111
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.1 mg/L	88.0	82.0	112
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.1 mg/L	86.1	81.0	117
EG020T: Total Metals by ICP-MS (QCLot: 3300475)									
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.1 mg/L	90.8	82.0	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.1 mg/L	90.8	84.0	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.1 mg/L	92.9	86.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.1 mg/L	90.9	83.0	118



Sub-Matrix: WATER				Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	LCS	Low	High
EG020T: Total Metals by ICP-MS (QCLot: 3300475) - continued									
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	87.4	85.0	85.0	115
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.3	84.0	84.0	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	89.1	79.0	79.0	117
EG020T: Total Metals by ICP-MS (QCLot: 3300477)									
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	96.9	82.0	82.0	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	92.0	84.0	84.0	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	89.0	86.0	86.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	92.7	83.0	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	90.2	85.0	85.0	115
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	95.7	84.0	84.0	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	94.8	79.0	79.0	117
EG035F: Dissolved Mercury by FIMS (QCLot: 3301248)									
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	98.1	83.0	83.0	105
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3303233)									
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	90.8	77.0	77.0	111
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3303234)									
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	92.5	77.0	77.0	111
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3299947)									
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	105	89.0	89.0	117
EK085M: Sulfide as S2- (QCLot: 3300004)									
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	94.0	76.0	76.0	116

Matrix Spike (MS) Report

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

Sub-Matrix: WATER				Matrix Spike (MS) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)	MS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3299188)								
ES2035065-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	79.2	70.0	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3299189)								
ES2035150-001	Anonymous	ED045G: Chloride	16887-00-6	50 mg/L	# Not Determined	70.0	70.0	130
EG020F: Dissolved Metals by ICP-MS (QCLot: 3301247)								
ES2035167-010	Anonymous	EG020A-F: Arsenic	7440-38-2	1 mg/L	90.8	70.0	70.0	130
		EG020A-F: Cadmium	7440-43-9	0.25 mg/L	89.2	70.0	70.0	130



Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low High
EG020F: Dissolved Metals by ICP-MS (QCLot: 3301247) - continued						
ES2035167-010	Anonymous	EG020A-F: Chromium	7440-47-3	1 mg/L	83.7	70.0 130
		EG020A-F: Copper	7440-50-8	1 mg/L	89.8	70.0 130
		EG020A-F: Lead	7439-92-1	1 mg/L	85.7	70.0 130
		EG020A-F: Nickel	7440-02-0	1 mg/L	91.4	70.0 130
		EG020A-F: Zinc	7440-66-6	1 mg/L	88.2	70.0 130
EG020T: Total Metals by ICP-MS (QCLot: 3300475)						
ES2035059-002	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	89.5	70.0 130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	93.4	70.0 130
		EG020A-T: Chromium	7440-47-3	1 mg/L	98.8	70.0 130
		EG020A-T: Copper	7440-50-8	1 mg/L	92.0	70.0 130
		EG020A-T: Lead	7439-92-1	1 mg/L	96.9	70.0 130
		EG020A-T: Nickel	7440-02-0	1 mg/L	93.3	70.0 130
		EG020A-T: Zinc	7440-66-6	1 mg/L	92.1	70.0 130
EG020T: Total Metals by ICP-MS (QCLot: 3300477)						
ES2035208-012	RIN_201003	EG020A-T: Arsenic	7440-38-2	1 mg/L	100	70.0 130
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	100	70.0 130
		EG020A-T: Chromium	7440-47-3	1 mg/L	88.4	70.0 130
		EG020A-T: Copper	7440-50-8	1 mg/L	97.9	70.0 130
		EG020A-T: Lead	7439-92-1	1 mg/L	106	70.0 130
		EG020A-T: Nickel	7440-02-0	1 mg/L	101	70.0 130
		EG020A-T: Zinc	7440-66-6	1 mg/L	99.7	70.0 130
EG035F: Dissolved Mercury by FIMS (QCLot: 3301248)						
ES2035208-001	UGM-M8d	EG035F: Mercury	7439-97-6	0.01 mg/L	70.1	70.0 130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3303233)						
ES2035086-001	Anonymous	EG035T: Mercury	7439-97-6	0.01 mg/L	92.0	70.0 130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3303234)						
ES2035208-012	RIN_201003	EG035T: Mercury	7439-97-6	0.01 mg/L	92.2	70.0 130
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3299947)						
ES2034956-001	Anonymous	EG051G: Ferrous Iron	----	1 mg/L	86.2	70.0 130
EK085M: Sulfide as S2- (QCLot: 3300004)						
ES2035208-001	UGM-M8d	EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	109	70.0 130



ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order : **EM2069208**

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Client : **ENN COSMULTISG PTY LTD**
Contact : **PAUL GIBBONS**
Project : **S190512**
Site : **----**
Sampler : **Daniel Condon**
Order number : **S190512**

Laboratory : **Environmental Division Sydney**
Telephone : **+61 2 8784 8555**
Date Samples Received : **08-Oct-2020**
Issue Date : **14-Oct-2020**
No. of samples received : **14**
No. of samples analysed : **14**

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- SO N method Blank value outliers occur.
- SO Duplicate outliers occur.
- SO Laboratory Control outliers occur.
- Matrix Spike outliers exist - please see following pages for full details.
- For all regular sample matrices, SO surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- SO Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- SO Quality Control Sample Frequency Outliers exist.



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 Work Order : ES2035208
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Outliers : Quality Control Samples
 Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WATER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (NM) Recoveries							
ED045G: Chloride by Discrete Analyser	ES2035150-001	Anonymous	Chloride	16887-00-6	Not Determined	----	NM recovery not determined, background level greater than or equal to 4x spike level.

Analysis Holding Time Compliance

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

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

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

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

Matrix: WATER

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

Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation		Evaluation	Analysis		
			Date extracted	Due for extraction		Date analysed	Due for analysis	
ED06j P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Satural (ED06j -P)	UGM-M8d,	UGM-M8s	----	----	----	05-Oct-2020	16-Oct-2020	✓
Clear Plastic Bottle - Satural (ED06j -P)	UGM-M12d, BH-M18d, BH-M19d, BH-M20d	UGM-M12s, BH-M18s, BH-M19s,	----	----	----	05-Oct-2020	17-Oct-2020	✓
ED04; G: Mulfate (Turbidimetric) as MD4 2- by DA								
Clear Plastic Bottle - Satural (ED04; G)	UGM-M8d,	UGM-M8s	----	----	----	05-Oct-2020	30-Oct-2020	✓
Clear Plastic Bottle - Satural (ED04; G)	UGM-M12d, BH-M18d, BH-M19d, BH-M20d	UGM-M12s, BH-M18s, BH-M19s,	----	----	----	05-Oct-2020	31-Oct-2020	✓
ED049G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Satural (ED049G)	UGM-M8d,	UGM-M8s	----	----	----	05-Oct-2020	30-Oct-2020	✓
Clear Plastic Bottle - Satural (ED049G)	UGM-M12d, BH-M18d, BH-M19d, BH-M20d	UGM-M12s, BH-M18s, BH-M19s,	----	----	----	05-Oct-2020	31-Oct-2020	✓



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

Method		Sample Date			Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation			
ED056F: Dissolved Na⁺br Cations										
Clear Plastic Bottle - Sitrlic Acid3Filtered (ED056F)	UGM-M8d, UGM-M8s	02-Oct-2020	----	----	; 0-Oct-2020	30-Oct-2020	✓			
Clear Plastic Bottle - Sitrlic Acid3Filtered (ED056F)	UGM-M12d, BH-M18d, BH-M19d, BH-M20d	06-Oct-2020	----	----	; 0-Oct-2020	31-Oct-2020	✓			
EG020F: Dissolved Metals by ICP-NM										
Clear Plastic Bottle - Sitrlic Acid3Filtered (EG020A-F)	UGM-M8d, UGM-M8s	02-Oct-2020	----	----	; 0-Oct-2020	31-Mar-2021	✓			
Clear Plastic Bottle - Sitrlic Acid3Filtered (EG020A-F)	UGM-M12d, BH-M18d, BH-M19d, BH-M20d	06-Oct-2020	----	----	; 0-Oct-2020	01-Apr-2021	✓			
EG020T: Total Metals by ICP-NM										
Clear Plastic Bottle - Sitrlic Acid3Unfiltered (EG020A-T)	UGM-M8d, UGM-M8s	02-Oct-2020	05-Oct-2020	31-Mar-2021	05-Oct-2020	31-Mar-2021	✓			
Clear Plastic Bottle - Sitrlic Acid3Unfiltered (EG020A-T)	UGM-M12d, BH-M18d, BH-M19d, BH-M20d	06-Oct-2020	05-Oct-2020	01-Apr-2021	05-Oct-2020	01-Apr-2021	✓			
Clear Plastic Bottle - Sitrlic Acid3Unspecified (EG020A-T)	RIN_201002, RIN_201003	02-Oct-2020	05-Oct-2020	31-Mar-2021	05-Oct-2020	31-Mar-2021	✓			
Clear Plastic Bottle - Sitrlic Acid3Unspecified (EG020A-T)	TRIP BLANK_01 TRIP BLANK_02	06-Oct-2020	05-Oct-2020	01-Apr-2021	05-Oct-2020	01-Apr-2021	✓			
EG069F: Dissolved Mercury by FIN M										
Clear Plastic Bottle - Sitrlic Acid3Filtered (EG069F)	UGM-M8d, UGM-M8s	02-Oct-2020	----	----	; 2-Oct-2020	30-Oct-2020	✓			
Clear Plastic Bottle - Sitrlic Acid3Filtered (EG069F)	UGM-M12d, BH-M18d, BH-M19d, BH-M20d	06-Oct-2020	----	----	; 2-Oct-2020	31-Oct-2020	✓			



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 Work Order : ES2035208
 Client : EMM CONSULTING PTY LTD
 Project : S190512

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

Method	Sample Date			Extraction / Preparation		Analysis	
	Container / Client Sample ID(s)	Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EG069T : Total Recoverable Mercury by FINM							
Clear Plastic Bottle - Sitrlic Acid3Unfiltered (EG069T)	UGM-M8d, UGM-M8s	02-Oct-2020	----	----	; 6-Oct-2020	30-Oct-2020	✓
Clear Plastic Bottle - Sitrlic Acid3Unfiltered (EG069T)	UGM-M12d, BH-M18d, BH-M19d, BH-M20d,	06-Oct-2020	----	----	; 6-Oct-2020	31-Oct-2020	✓
Clear Plastic Bottle - Sitrlic Acid3Unspecified (EG069T)	RIN_201002, TRIP BLANK_01	02-Oct-2020	----	----	; 6-Oct-2020	30-Oct-2020	✓
Clear Plastic Bottle - Sitrlic Acid3Unspecified (EG069T)	RIN_201003, TRIP BLANK_02	06-Oct-2020	----	----	; 6-Oct-2020	31-Oct-2020	✓
EG09; G: Ferrous Iron by Discrete Analyser							
Clear Plastic Bottle - HCl - Filtered (EG09; G)	UGM-M8d, UGM-M8s	02-Oct-2020	----	----	05-Oct-2020	09-Oct-2020	✓
Clear Plastic Bottle - HCl - Filtered (EG09; G)	UGM-M12d, BH-M18d, BH-M19d, BH-M20d,	06-Oct-2020	----	----	05-Oct-2020	10-Oct-2020	✓
E7 089N : Mulifide as M2-							
Clear Plastic Bottle - Kn Acetate/SaOH-FLOCCULATED (E7 089)	UGM-M8d, UGM-M8s	02-Oct-2020	----	----	05-Oct-2020	09-Oct-2020	✓
Clear Plastic Bottle - Kn Acetate/SaOH-FLOCCULATED (E7 089)	UGM-M12d, BH-M18d, BH-M19d, BH-M20d,	06-Oct-2020	----	----	05-Oct-2020	10-Oct-2020	✓



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type	Method	Count			Rate (%)		Evaluation
		QC	Regular	Actual	Expected		
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	4	40	0.00	0.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	0.00	0.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	2	17	0.00	0.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	2	19	0.96	0.00	✓	NEPM 2013 B3 & ALS QC Standard
Ferrous Iron by Discrete Analyser	EG051G	2	15	6.66	0.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	3	28	0.00	0.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	0.00	0.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	2	10	20.00	0.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	4	34	0.00	0.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	4	24	0.00	0.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	0.00	0.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	20	0.00	0.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	17	9.88	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	9.22	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Ferrous Iron by Discrete Analyser	EG051G	1	15	0.00	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	28	0.00	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	20	0.00	0.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	10	0.00	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	34	9.88	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	24	8.66	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Chloride by Discrete Analyser	ED045G	1	20	9.00	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	17	9.88	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	9.22	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Ferrous Iron by Discrete Analyser	EG051G	1	15	0.00	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Major Cations - Dissolved	ED093F	2	28	0.00	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	9.00	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	10	0.00	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	34	9.88	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	24	8.66	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	20	9.00	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Mercury by FIMS	EG035F	1	17	9.88	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Dissolved Metals by ICP-MS - Suite A	EG020A-F	1	19	9.22	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Ferrous Iron by Discrete Analyser	EG051G	1	15	0.00	9.00	✓	NEPM 2013 B3 & ALS QC Standard



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 Work Order : ES2035208
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Matrix: **WATER** Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Analytical Methods	Method	Count		Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected		
Matrix Spikes (MS) - Continued							
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	20	9.00	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfide as S2-	EK085	1	10	0.00	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS	EG035T	2	34	9.88	9.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-MS - Suite A	EG020A-T	2	24	8.66	9.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Alkalinity by PC Titrator	ED037-P	WATER	In house: Referenced to APHA 2320 B This procedure determines alkalinity by automated measurement (e.g. PC Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant with NEPM Schedule B(3)
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	WATER	In house: Referenced to APHA 4500-SO4. Dissolved sulfate is determined in a 0.45um filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading with a standard curve. This method is compliant with NEPM Schedule B(3)
Chloride by Discrete Analyser	ED045G	WATER	In house: Referenced to APHA 4500 Cl - G. The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride.in the presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate which is measured at 480 nm APHA seal method 2 017-1-1-L
Major Cations - Dissolved	ED093F	WATER	In house: Referenced to APHA 3120 and 3125; USEPA SW 846 - 6010 and 6020; Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant with NEPM Schedule B(3) Sodium Adsorption Ratio is calculated from Ca, Mg and Na which determined by ALS in house method QWI-ENVED093F. This method is compliant with NEPM Schedule B(3) Hardness parameters are calculated based on APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Dissolved Metals by ICP-MS - Suite A	EG020A-F	WATER	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-ENEG020. Samples are 0.45um 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	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-ENEG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by FIMS	EG035F	WATER	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl2)(Cold Vapour generation) AAS) Samples are 0.45um filtered prior to analysis. FIM-AAS is an automated flameless atomic absorption technique. A bromate/bromide reagent is used to oxidise any organic mercury compounds in the filtered sample. The ionic mercury is reduced online to atomic mercury vapour by 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 Schedule B(3).
Total Mercury by FIMS	EG035T	WATER	In house: Referenced to AS 3550, APHA 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 Schedule B(3).



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 Work Order : ES2035208
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Analytical Methods	Method	Matrix	Method Descriptions
Ferrous Iron by Discrete Analyser	EG051G	WATER	In house: Referenced to APHA 3500 Fe-B. A colorimetric determination based on the reaction between phenanthroline and ferrous iron at pH 3.2-3.3 to form an orange-red complex that is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B(3).
Sulfide as S2-	EK085	WATER	In house: Referenced to APHA 4500-S2-D. Sulfide species present in water samples are immediately precipitated when collected in pretreated caustic/zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR, otherwise samples are measured using UV-VIS detection at 664nm. This method is compliant with NEPM Schedule B(3)
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	WATER	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)
Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	WATER	In house: Referenced to 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 Schedule B(3)

Attached is a COC for 3 eskys posted this morning (15/10/2020) for job number S190512.

Please let me know if I need to make any changes.

Thanks

Kaitlyn

Kaitlyn Brodie

Hydrogeologist



T 02 9493 9500

M 0401 881 447

 Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065



Please consider the environment before printing my email.

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Environmental

CERTIFICATE OF ANALYSIS

Work Order	: EM2018304	Page	: 1 of 9
Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: PAUL GIBBONS	Contact	: Shane Colley
Address	: Ground Floor Suite 1 20 Chandos Street St Leonards NSW NSW 2065	Address	: 4 Westall Rd Springvale VIC Australia 3171
Telephone	: ----	Telephone	: +61-3-8549 9600
Project	: S190512	Date Samples Received	: 16-Oct-2020 10:20
Order number	: ----	Date Analysis Commenced	: 19-Oct-2020
C-O-C number	: ----	Issue Date	: 04-Nov-2020 13:18
Sampler	: BB, KB		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 19		
No. of samples analysed	: 19		



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	<i>Position</i>
Dilani Fernando	Senior Inorganic Chemist
Titus Vimalasiri	Metals Teamleader

<i>Accreditation Category</i>
Melbourne Inorganics, Springvale, VIC Radionuclides, Fyshwick, ACT



Page : 2 of 9
Work Order : EM2018304
Client : EMM CONSULTING PTY LTD
Project : S190512

General Comments

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

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

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

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

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

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

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

LOR = Limit of reporting

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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EK085: EM2018304-008 required dilution prior to analysis due to matrix interferences. LOR has been raised accordingly.
- EG035T: EM2018304 #2 Poor matrix spike recovery for total mercury due to sample matrix. Confirmed by re-extraction and re-analysis.
- EG020-T : EM2018304 #2 and #5 total metal required dilution prior analysis due to sample matrix. LORs have been adjusted accordingly.
- EG020-F : EM2018304 #1-15 dissolved metal required dilution prior analysis due to sample matrix. LORs have been adjusted accordingly.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- LOR for Gross Alpha and Gross Beta raised due to high solid content.
- ED045G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- EK085: EM2018304-002 Poor matrix spike recovery for sulphide due to sample matrix. Confirmed by re-extraction and re-analysis.
- EG035F: EM2018304-014 Poor matrix spike recovery for dissolved mercury due to sample matrix. Confirmed by re-preparation and re-analysis.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID							
Compound	CAS Number	LOR	Unit	Client sampling date / time	UGM-M8D	UGM-M8S	UGM-M12D	UGM-M12S	UGM-M15S
					Result	Result	Result	Result	Result
EA250: Gross Alpha and Beta Activity									
Gross beta	----	0.10	Bq/L		2.07	3.12	2.07	2.26	<2.18
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		418	253	401	336	218
Total Alkalinity as CaCO3	----	1	mg/L		418	253	401	336	218
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		3760	4780	3390	5130	5340
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		20800	24200	21700	25500	27700
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		514	746	500	584	774
Magnesium	7439-95-4	1	mg/L		1430	1730	1480	1620	1590
Sodium	7440-23-5	1	mg/L		10300	12000	10900	13200	13800
Potassium	7440-09-7	1	mg/L		57	53	59	39	42
EG020F: Dissolved Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		<0.002	<0.002	<0.002	<0.002	0.002
Cadmium	7440-43-9	0.0001	mg/L		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Chromium	7440-47-3	0.001	mg/L		<0.002	0.003	<0.002	0.002	<0.002
Copper	7440-50-8	0.001	mg/L		<0.002	0.003	<0.002	0.002	0.086
Nickel	7440-02-0	0.001	mg/L		<0.002	0.034	<0.002	0.003	0.014
Lead	7439-92-1	0.001	mg/L		<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	7440-66-6	0.005	mg/L		0.011	<0.010	<0.010	<0.010	0.010
EG020T: Total Metals by ICP-MS									
Arsenic	7440-38-2	0.001	mg/L		----	0.003	----	----	0.007
Cadmium	7440-43-9	0.0001	mg/L		----	<0.0002	----	----	<0.0002
Chromium	7440-47-3	0.001	mg/L		----	0.014	----	----	0.032
Copper	7440-50-8	0.001	mg/L		----	0.014	----	----	0.306
Nickel	7440-02-0	0.001	mg/L		----	0.033	----	----	0.020
Lead	7439-92-1	0.001	mg/L		----	<0.002	----	----	<0.002
Zinc	7440-66-6	0.005	mg/L		----	<0.010	----	----	0.015
EG035F: Dissolved Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG035T: Total Recoverable Mercury by FIMS									



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID							
Compound	CAS Number	LOR	Unit	Client sampling date / time	UGM-M8D	UGM-M8S	UGM-M12D	UGM-M12S	UGM-M15S
					13-Oct-2020 09:15	12-Oct-2020 09:30	14-Oct-2020 08:30	14-Oct-2020 07:50	14-Oct-2020 12:00
					EM2018304-001	EM2018304-002	EM2018304-003	EM2018304-004	EM2018304-005
					Result	Result	Result	Result	Result
EG035T: Total Recoverable Mercury by FIMS - Continued									
Mercury	7439-97-6	0.0001	mg/L		----	<0.0001	----	----	<0.0001
EG051G: Ferrous Iron by Discrete Analyser									
Ferrous Iron	----	0.05	mg/L		2.01	<0.05	1.42	<0.05	<0.05
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		673	787	691	833	897
∅ Total Cations	----	0.01	meq/L		593	703	622	738	771
∅ Ionic Balance	----	0.01	%		6.36	5.66	5.20	6.06	7.56
EA250CA: Gross Alpha and Beta Activity									
Gross alpha	----	0.05	Bq/L		<0.89	<1.00	<0.92	2.49	1.77
Gross beta activity - 40K	----	0.10	Bq/L		<1.78	<1.99	<1.84	<2.18	<2.18



Analytical Results

Compound	CAS Number	LOR	Client sampling date / time		Client sample ID			
			Unit	Result	BH-M17D	BH-M17S	BH-M18D	BH-M18S	BH-M19D
EA250: Gross Alpha and Beta Activity								
Gross beta	----	0.10	Bq/L	2.09	2.64	<1.70	2.72	2.27
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	433	372	467	354	442
Total Alkalinity as CaCO ₃	----	1	mg/L	433	372	467	354	442
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA								
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	3450	4240	3550	3790	6980
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	20500	21900	18600	23800	17500
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	512	622	474	620	476
Magnesium	7439-95-4	1	mg/L	1460	1490	1330	1440	1370
Sodium	7440-23-5	1	mg/L	10500	11500	9640	12200	10000
Potassium	7440-09-7	1	mg/L	57	51	55	41	57
EG020F: Dissolved Metals by ICP-MS								
Arsenic	7440-38-2	0.001	mg/L	<0.002	<0.002	<0.002	0.003	0.005
Cadmium	7440-43-9	0.0001	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Chromium	7440-47-3	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Copper	7440-50-8	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel	7440-02-0	0.001	mg/L	<0.002	0.012	<0.002	0.009	<0.002
Lead	7439-92-1	0.001	mg/L	<0.002	<0.002	<0.002	<0.002	<0.002
Zinc	7440-66-6	0.005	mg/L	<0.010	0.069	<0.010	<0.010	<0.010
EG035F: Dissolved Mercury by FIMS								
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG051G: Ferrous Iron by Discrete Analyser								
Ferrous Iron	----	0.05	mg/L	3.05	0.41	0.38	3.27	4.94
EK085M: Sulfide as S2-								
Sulfide as S ₂ -	18496-25-8	0.1	mg/L	<0.1	<0.1	4.7	<0.1	<0.1
EN055: Ionic Balance								
∅ Total Anions	----	0.01	meq/L	659	713	608	757	648
∅ Total Cations	----	0.01	meq/L	604	655	554	681	573
∅ Ionic Balance	----	0.01	%	4.34	4.26	4.66	5.30	6.13



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)	Client sample ID			
	BH-M17D	BH-M17S	BH-M18D	BH-M18S
Compound	Client sampling date / time	Client sampling date / time	Client sampling date / time	Client sampling date / time
CAS Number	LOR	Unit	Result	Result
	13-Oct-2020 15:00	13-Oct-2020 16:00	13-Oct-2020 13:45	13-Oct-2020 12:45
	EM2018304-006	EM2018304-007	EM2018304-008	EM2018304-009
	Result	Result	Result	Result
EA250CA: Gross Alpha and Beta Activity				
Gross alpha	---	0.05	Bq/L	1.21
Gross beta activity - 40K	---	0.10	Bq/L	<0.87
				<1.74
				<0.85
				2.40
				<2.00
				1.34
				<1.71
				EM2018304-010
				14-Oct-2020 10:50
				Result



Analytical Results

Compound	CAS Number	LOR	Client sample ID			
			Client sampling date / time	Unit	Result	Result
EA250: Gross Alpha and Beta Activity						
Gross beta	----	0.10	Bq/L	1.82	<2.04	2.82
ED037P: Alkalinity by PC Titrator						
Hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	423	190	418
Total Alkalinity as CaCO ₃	----	1	mg/L	423	190	418
ED041G: Sulfate (Turbidimetric) as SO₄ 2- by DA						
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	3880	4610	3700
ED045G: Chloride by Discrete Analyser						
Chloride	16887-00-6	1	mg/L	21300	24500	21700
ED093F: Dissolved Major Cations						
Calcium	7440-70-2	1	mg/L	496	760	485
Magnesium	7439-95-4	1	mg/L	1420	1410	1470
Sodium	7440-23-5	1	mg/L	10300	12700	10700
Potassium	7440-09-7	1	mg/L	58	48	58
EG020F: Dissolved Metals by ICP-MS						
Arsenic	7440-38-2	0.001	mg/L	<0.002	<0.002	<0.002
Cadmium	7440-43-9	0.0001	mg/L	<0.0002	<0.0002	<0.0002
Chromium	7440-47-3	0.001	mg/L	<0.002	<0.002	<0.002
Copper	7440-50-8	0.001	mg/L	0.010	<0.002	0.028
Nickel	7440-02-0	0.001	mg/L	0.006	<0.002	0.017
Lead	7439-92-1	0.001	mg/L	<0.002	<0.002	<0.002
Zinc	7440-66-6	0.005	mg/L	<0.010	<0.010	<0.010
EG035F: Dissolved Mercury by FIMS						
Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001
EG051G: Ferrous Iron by Discrete Analyser						
Ferrous Iron	----	0.05	mg/L	9.18	<0.05	5.59
EK085M: Sulfide as S2-						
Sulfide as S ₂ -	18496-25-8	0.1	mg/L	0.2	0.3	<0.1
EN055: Ionic Balance						
∅ Total Anions	----	0.01	meq/L	690	791	698
∅ Total Cations	----	0.01	meq/L	788	708	612
∅ Ionic Balance	----	0.01	%	7.72	5.56	6.52

Sub-Matrix: WATER
 (Matrix: WATER)

14-Oct-2020 10:20
 EM2018304-011
 Result

14-Oct-2020 13:30
 EM2018304-012
 Result

14-Oct-2020 13:50
 EM2018304-013
 Result

14-Oct-2020 09:05
 EM2018304-014
 Result

14-Oct-2020 09:25
 EM2018304-015
 Result

3.68

<1

<1

304

304

4940

25300

636

1730

14100

39

<0.002

<0.0002

<0.002

0.010

0.006

<0.002

<0.010

<0.0001

<0.05

<0.1

823

788

2.12

690

591

7.72

791

708

5.56

698

612

6.52

<0.0001

<0.05

<0.1

790

722

4.50



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)	Client sample ID		Client sampling date / time	LOR	Unit	Bq/L	Bq/L
	BH-M19S	BH-M20D						BH-M20S	BH-M21D	BH-M21S
Compound	EM2018304-011	EM2018304-012	EM2018304-013	EM2018304-014	EM2018304-015		
	14-Oct-2020 10:20	14-Oct-2020 13:30	14-Oct-2020 13:50	14-Oct-2020 09:05	14-Oct-2020 09:25		
	Result	Result	Result	Result	Result		
	4.48	<0.90	1.51	<0.91	1.44		
	<2.15	<1.81	<2.04	<1.82	2.61		
EA250CA: Gross Alpha and Beta Activity							
Gross alpha	---	0.05	0.10				
Gross beta activity - 40K	---	0.10					



Environmental

QUALITY CONTROL REPORT

Work Order : **EM206980S**

Page : 1 of 7

Client : **EMM CONGULTIND PTY LT5**
 Contact : **PAUL GIBBONS**
 Address : **Ground Floor Suite 1 20 Chandos Street
 St Leonards NSW NSW 2065**
 Telephone : **----**
 Project : **S190512**
 Order number : **----**
 C-O-C number : **----**
 Sampler : **BB, KB**
 Site : **----**
 Quote number : **EN/222**
 No. of samples received : **19**
 No. of samples analysed : **19**

Laboratory : **Environmental Division Melbourne**
 Contact : **Shane Colley**
 Address : **4 Westall Rd Springvale VIC Australia 3171**
 Telephone : **+61-3-8549 9600**
 Date Samples Received : **16-Oct-2020**
 Date Analysis Commenced : **19-Oct-2020**
 Issue Date : **04-Nov-2020**



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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Titus Vimalasiri	Metals Teamleader	Radionuclides, Fyshwick, ACT



General Comments

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

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

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

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

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

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
E A250CA: Drol I Aphan nBd t ean Ai oyvd 3QC Loc 88820147									
EB2027744-001	Anonymous	EA250: Gross alpha	----	0.05	Bq/L	<0.05	<0.05	0.00	No Limit
		EA250: Gross beta	----	0.1	Bq/L	<0.10	<0.10	0.00	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	<0.10	0.00	No Limit
EM2018304-009	BH-M18S	EA250: Gross alpha	----	0.05	Bq/L	2.40	2.04	16.4	No Limit
		EA250: Gross beta	----	0.1	Bq/L	2.72	3.50	25.0	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	<2.00	<2.00	0.00	No Limit
E508) P: AqtrpBdq b(PC Tarnor 3QC Loc 882066s7									
EM2018304-004	UGM-M12S	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	336	334	0.355	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	336	334	0.355	0% - 20%
EM2018280-010	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1630	1570	3.76	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1630	1570	3.76	0% - 20%
E508) P: AqtrpBdq b(PC Tarnor 3QC Loc 88206647									
EM2018304-014	BH-M21D	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	418	430	2.78	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	418	430	2.78	0% - 20%
E5056D: Gufnec 3Turbdvmeov 7nl GOS-2-b(5A 3QC Loc 886) 6S) 7									
EM2018304-009	BH-M18S	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3790	4430	15.7	0% - 20%
EM2018304-001	UGM-M8D	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3760	3900	3.79	0% - 20%
E5056S: Caprvde b(5 v i ree ABng l er 3QC Loc 886) 6S17									



Sub-Matrix: WATER									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
E5086D: Capnude b(5 v i ree ABnq| er 3QC Loc 886) 6S17 - i oBoBued									
EM2018304-009	BH-M18S	ED045G: Chloride	16887-00-6	1	mg/L	23800	23200	2.82	0% - 20%
EM2018304-001	UGM-M8D	ED045G: Chloride	16887-00-6	1	mg/L	20800	20700	0.402	0% - 20%
E5018F: 5 v I oged Mnjor CnooBl 3QC Loc 8869) 497									
EM2018266-002	Anonymous	ED093F: Calcium	7440-70-2	1	mg/L	17	17	0.00	0% - 50%
		ED093F: Magnesium	7439-95-4	1	mg/L	2	2	0.00	No Limit
		ED093F: Sodium	7440-23-5	1	mg/L	37	37	0.00	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	3	3	0.00	No Limit
EM2018304-005	UGM-M15S	ED093F: Calcium	7440-70-2	1	mg/L	774	760	1.87	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1590	1550	2.55	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	13800	13400	2.25	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	42	40	3.06	No Limit
ED020F: 5 v I oged Meantp b(ICP-MG 3QC Loc 8869) 447									
EM2018125-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.0002	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.135	0.138	2.38	0% - 20%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	0.005	0.004	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.032	0.033	0.00	0% - 20%
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.141	0.144	2.35	0% - 20%
EM2018236-014	Anonymous	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
ED020F: 5 v I oged Meantp b(ICP-MG 3QC Loc 8869) 417									
EM2018304-015	BH-M21S	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0002	<0.0002	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.002	<0.002	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.002	<0.002	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.028	0.026	4.46	0% - 50%
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.017	0.016	8.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.010	<0.010	0.00	No Limit
ED020T: ToopMeantp b(ICP-MG 3QC Loc 886)) 897									
EM2018237-145	Anonymous	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit



Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
ED020T: ToompMeap b(ICP-MG 3QC Loc 886) 897 - i oBoBued									
EM2018237-145	Anonymous	EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.003	99.9	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
EM2018304-016 RB1									
		EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit
ED08sF: 5 J I oyed Meri ur(b(FIMG 3QC Loc 8869) 4) 7									
EM2018219-001	Anonymous	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM2018304-002	UGM-M8S	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ED08sF: 5 J I oyed Meri ur(b(FIMG 3QC Loc 8869)) 07									
EM2018304-013	BH-M20S	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ED08sT: ToompRei oyernbø Meri ur(b(FIMG 3QC Loc 8864S927									
EM2018279-003	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM2018326-004	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ED0s6D: Ferroul IroB b(5 v i ree ABnq I er 3QC Loc 886S9067									
EM2018193-001	Anonymous	EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EM2018240-006	Anonymous	EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	0.11	74.4	No Limit
ED0s6D: Ferroul IroB b(5 v i ree ABnq I er 3QC Loc 886S9027									
EM2018304-006	BH-M17D	EG051G: Ferrous Iron	---	0.05	mg/L	3.05	3.04	0.00	0% - 20%
EM2018304-015	BH-M21S	EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	<0.05	0.00	No Limit
EK09sM: Guqfde nl Gz- 3QC Loc 8864S9) 7									
EM2018304-001	UGM-M8D	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EM2018304-010	BH-M19D	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.2	0.00	No Limit



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

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

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	LCS	Low	High
EA2s0CA: Drol I Aphn nEd t em Ai Oyq 3QCLoc 88820147									
EA250: Gross alpha	----	0.05	Bq/L	<0.05	1751 Bq/L	100	95.2	105	105
EA250: Gross beta	----	0.1	Bq/L	<0.10	3342 Bq/L	98.2	94.4	105	105
EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	----	----	----	----	----
E5 08) P: AqnpBq b(PC Tarnor 3QCLoc 882066s7									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	97.1	88.0	112	112
E5 08) P: AqnpBq b(PC Tarnor 3QCLoc 88206647									
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	104	88.0	112	112
E5 0S6D: Gupne 3Turbdvmeav 7nI GOS 2- b(5 A 3QCLoc 886) 6S) 7									
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	85.8	117	117
				<1	500 mg/L	103	80.0	120	120
E5 0S6D: Capnde b(5 v i ree ABqI er 3QCLoc 886) 6S) 7									
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.8	85.0	122	122
				<1	1000 mg/L	106	85.0	122	122
E5 018F: 5 v I oyed Mnjor CnooB) 3QCLoc 8869) 497									
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	103	88.2	117	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	93.5	85.6	114	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	102	90.0	114	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	100	86.7	111	111
ED020F: 5 v I oyed Meemp b(ICP-MG 3QCLoc 8869) 447									
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	88.5	108	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	99.9	83.5	108	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.5	83.2	105	105
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	83.1	106	106
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	102	84.6	107	107
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	100	84.3	108	108
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	86.3	111	111
ED020F: 5 v I oyed Meemp b(ICP-MG 3QCLoc 8869) 417									
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	97.4	88.5	108	108
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	103	83.5	108	108
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	99.2	83.2	105	105
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	94.5	83.1	106	106
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	100	84.6	107	107
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	93.8	84.3	108	108



Sub-Matrix: WATER				Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	LCS	Low	High
ED020F: 5 l o y e d M e a n p b (I C P - M G 3 Q C L o c 8 8 6 9) 4 1 7 - I o B o B u e d									
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	100	100	86.3	111
ED020T: T o a p M e a n p b (I C P - M G 3 Q C L o c 8 8 6) 8 9 7									
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	104	104	89.2	113
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	96.6	96.6	86.4	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	102	86.9	110
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.2	98.2	86.9	109
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.2	99.2	88.3	110
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	102	87.9	111
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	103	103	86.7	114
ED08sF: 5 l o y e d M e r i u r (b (F I M G 3 Q C L o c 8 8 6 9) 4) 7									
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	87.9	87.9	71.1	112
ED08sF: 5 l o y e d M e r i u r (b (F I M G 3 Q C L o c 8 8 6 9)) 0 7									
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	83.2	83.2	71.1	112
ED08sT: T o a p R e i o y e r n b p M e r i u r (b (F I M G 3 Q C L o c 8 8 6 4 S 9 2 7									
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	82.4	82.4	72.6	115
ED0s6D: F e r r o u l I r o B b (5 l i r e e A B n g l e r 3 Q C L o c 8 8 6 S 9 0 6 7									
EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	2 mg/L	96.0	96.0	75.8	112
ED0s6D: F e r r o u l I r o B b (5 l i r e e A B n g l e r 3 Q C L o c 8 8 6 S 9 0 2 7									
EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	2 mg/L	94.2	94.2	75.8	112
EK09sM: G u p f d e n l G 2 - 3 Q C L o c 8 8 6 4 S 9) 7									
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	106	106	81.9	116

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	Spike Recovery (%)	Recovery Limits (%)	
				MS	Low	High	
E50s6D: G u p f d e n l G 2 - 3 Q C L o c 8 8 6) 6 S) 7							
EM2018304-002	UGM-M8S	ED041C: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
E50s6D: C a p r n d e b (5 l i r e e A B n g l e r 3 Q C L o c 8 8 6) 6 S 1 7							
EM2018304-002	UGM-M8S	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	130
ED020F: 5 l o y e d M e a n p b (I C P - M G 3 Q C L o c 8 8 6 9) 4 4 7							
EM2018125-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	95.4	85.0	131



Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low High
ED020F: 5 V I o p y e d M e a n p b (I C P - M G 3 Q C L o c 8 8 6 9) 4 4 7 - i o B o B u e d						
EM2018125-001	Anonymous	EG020A-F: Cadmium	7440-43-9	0.05 mg/L	87.9	81.0 133
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	86.6	71.0 135
		EG020A-F: Copper	7440-50-8	0.2 mg/L	104	76.0 130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	88.9	75.0 133
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	98.1	73.0 131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	103	75.0 131
ED020F: 5 V I o p y e d M e a n p b (I C P - M G 3 Q C L o c 8 8 6 9) 4 1 7						
EM2018304-006	BH-M17D	EG020A-F: Arsenic	7440-38-2	0.4 mg/L	104	85.0 131
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	86.3	81.0 133
		EG020A-F: Chromium	7440-47-3	0.4 mg/L	94.2	71.0 135
		EG020A-F: Copper	7440-50-8	0.4 mg/L	92.6	76.0 130
		EG020A-F: Lead	7439-92-1	0.4 mg/L	88.5	75.0 133
		EG020A-F: Nickel	7440-02-0	0.4 mg/L	94.4	73.0 131
		EG020A-F: Zinc	7440-66-6	0.4 mg/L	94.4	75.0 131
ED020T: T o o p M e a n p b (I C P - M G 3 Q C L o c 8 8 6) 8 9 7						
EM2018237-145	Anonymous	EG020A-T: Arsenic	7440-38-2	1 mg/L	99.8	82.0 118
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	97.5	75.0 129
		EG020A-T: Chromium	7440-47-3	1 mg/L	101	80.0 118
		EG020A-T: Copper	7440-50-8	1 mg/L	96.1	81.0 115
		EG020A-T: Lead	7439-92-1	1 mg/L	93.7	83.0 121
		EG020A-T: Nickel	7440-02-0	1 mg/L	100	80.0 118
		EG020A-T: Zinc	7440-66-6	1 mg/L	99.0	74.0 116
ED08sF: 5 V I o p y e d M e r i u r (b (F I M G 3 Q C L o c 8 8 6 9) 4) 7						
EM2018219-002	Anonymous	EG035F: Mercury	7439-97-6	0.01 mg/L	91.9	70.0 120
ED08sF: 5 V I o p y e d M e r i u r (b (F I M G 3 Q C L o c 8 8 6 9)) 0 7						
EM2018304-014	BH-M21D	EG035F: Mercury	7439-97-6	0.01 mg/L	# 66.5	70.0 120
ED08sT: T o o p R e i o y e r n b p e M e r i u r (b (F I M G 3 Q C L o c 8 8 6 4 S 9 2 7						
EM2018304-002	UGM-M8S	EG035T: Mercury	7439-97-6	0.01 mg/L	# 65.1	70.0 130
ED0s6D: F e r r o u l i r o B b (5 V i r e e A B n q l e r 3 Q C L o c 8 8 6 S 9 0 6 7						
EM2018193-003	Anonymous	EG051G: Ferrous Iron	----	2 mg/L	91.9	70.0 130
ED0s6D: F e r r o u l i r o B b (5 V i r e e A B n q l e r 3 Q C L o c 8 8 6 S 9 0 2 7						
EM2018304-007	BH-M17S	EG051G: Ferrous Iron	----	2 mg/L	90.0	70.0 130
EK09sM: G u f v d e n l G 2 - 3 Q C L o c 8 8 6 4 S 9) 7						
EM2018304-002	UGM-M8S	EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	# 14.8	70.0 130

Work Order	: EM206980N	Page	: 1 of 19
Client	: EMM COSULTI (SP YI D TI g	Laboratory	: Environmental Division Melbourne
Contact	: PAUL GIBBONS	Telephone	: +61-3-8540 0699
Project	: S109512	Date Samples Received	: 16-Oct-2929
Site	: ----	Issue Date	: 94-Nov-2929
Sampler	: BBK/ B	No:of samples received	: 10
Order number	: ----	No:of samples analysed	: 10

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **SO Method Flank value outliers occur-**
- **SO duplicate outliers occur-**
- **SO Laboratory Control outliers occur-**
- **Matrix Spike outliers eBst , please see following pages or full details-**
- **For all regular sample matrices SO surrogate recovery outliers occur-**

Outliers : Analysis Holding Time Compliance

- **SO Analysis hold time Outliers eBst-**

Outliers : Frequency of Quality Control Samples

- **Quality Control Sample Frequency Outliers eBst , please see following pages or full details-**



Outliers : Quality Control Samples
 Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: WAI ER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Matrix Spike (MU) Recoveries ED941G: Sulfate Turbidimetric (as SO4 2- by DA	EM2918394--992	UGM-M8S	Sulfate as UON, Turbidimetric	14898-x0-8	Not Determined	----	MU recovery not determined if background level greater than or equal to NB spike level-
ED945G: Chloride by Discrete Analyser	EM2918394--992	UGM-M8S	Chloride	1688x-99-6	Not Determined	----	MU recovery not determined if background level greater than or equal to NB spike level-
EG935&: Dissolved Mercury by &IMS	EM2918394--914	B7-M21D	Mercury	x430-0x-6	66% 5	x9% 9 -129%	Recovery less than lower data (quality of jective
EG935T: Total Recoverable Mercury by &IMS	EM2918394--992	UGM-M8S	Mercury	x430-0x-6	65% 4	x9% 9 -139%	Recovery less than lower data (quality of jective
E/ 985M: Sulfide as S2-	EM2918394--992	UGM-M8S	Sulfide as U2,	18406-25-8	14% 8	x9% 9 -139%	Recovery less than lower data (quality of jective

Outliers : Frequency of Quality Control Samples

Matrix: WAI ER

Quality Control Sample Type	Count	Rate % (	Quality Control Specification
Method	Regular	Actual	Expected
Laboratory Duplicates (DUP)	3	34	19% 9
Dissolved Metals by ICP-MS - Suite A	3	8% 2	19% 9
			NEPM 2913 B3 V ALS . C Standard

Analysis Holding Time Compliance

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

This report summarises extraction preparation and analysis times and compares each, with ALS recommended holding times (referencing USEPA S) 846K AP7AK AS and NEPM (based on the sample container provided). Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reanalysis listing of breaches if any (is provided herein)

7 olding time for leachate methods (H 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 189 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

7 olding times for VOC in soils vary according to analytes of interest: vinyl Chloride and Styrene holding time is x days; others 14 days. A recorded breach does not guarantee a breach for all; OC 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.

Matrix: WAI ER

Evaluation: * F 7 olding time breach w/ F) within holding time

Method	Sample Date	Date extracted	Extraction / Preparation	Date analysed	Analysis
Container / Client Sample ID(s)		Due for extraction	Evaluation	Due for analysis	Evaluation



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Matrix: **WAI ER** Evaluation: * F 7 olding time breach w' F) ithin holding timet

Method	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Evaluation	Due for analysis
EA250: P ross Alpha and F eta Activity					
Clear Yeastic F ottle , Satural JEA2504					
UGM-M8S	62, Oct, 2020	''''	----	----	19-Apr-2921
B7 -M1xDK B7 -M18DK	68, Oct, 2020	''''	----	----	11-Apr-2921
Clear Yeastic F ottle , Satural JEA2504					
UGM-M12SK B7 -M10DK B7 -M29DK B7 -M21DK	6N Oct, 2020	''''	----	----	12-Apr-2921
EA250CA: P ross Alpha and F eta Activity					
Clear Yeastic F ottle , Satural JEA2504					
UGM-M8S	62, Oct, 2020	''''	----	----	19-Apr-2921
B7 -M1xDK B7 -M18DK	68, Oct, 2020	''''	----	----	11-Apr-2921
Clear Yeastic F ottle , Satural JEA2504					
UGM-M12SK B7 -M10DK B7 -M29DK B7 -M21DK	6N Oct, 2020	''''	----	----	12-Apr-2921
Eg08: Y- Alkalinity f y YC I itrator					
Clear Yeastic F ottle , Satural JEG08 , Y4					
UGM-M8S	62, Oct, 2020	''''	----	----	26-Oct-2929
B7 -M1xDK B7 -M18DK	68, Oct, 2020	''''	----	----	2x-Oct-2929
Clear Yeastic F ottle , Satural JEG08 , Y4					
UGM-M12DK UGM-M15SK B7 -M10SK B7 -M29SK B7 -M21S	6N Oct, 2020	''''	----	----	28-Oct-2929



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MatriX: **WAI ER** Evaluation: * F 7 olding time breach wv F) ithin holding timet

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
Eg0N6P : Uul.ate J urf idimetric4as UON2, f y gA								
UGM-M8S	Clear Yeastic F ottle , Satural J Eg 0N6P 4	62, Oct, 2020	''''	----	20, Oct, 2020	90-Nov-2929	✓	
UGM-M8DK B7-M1xSK B7-M18S	B7 -M1 xDK B7 -M18DK	68, Oct, 2020	''''	----	20, Oct, 2020	19-Nov-2929	✓	
UGM-M12DK UGM-M15SK B7-M10SK B7-M29SK B7-M21S	UGM-M12SK B7 -M10DK B7 -M29DK B7 -M21DK	6N Oct, 2020	''''	----	20, Oct, 2020	11-Nov-2929	✓	
Eg0N5P : Chloride f y g iscrete Analyser								
UGM-M8S	Clear Yeastic F ottle , Satural J Eg 0N5P 4	62, Oct, 2020	''''	----	20, Oct, 2020	90-Nov-2929	✓	
UGM-M8DK B7-M1xSK B7-M18S	B7 -M1 xDK B7 -M18DK	68, Oct, 2020	''''	----	20, Oct, 2020	19-Nov-2929	✓	
UGM-M12DK UGM-M15SK B7-M10SK B7-M29SK B7-M21S	UGM-M12SK B7 -M10DK B7 -M29DK B7 -M21DK	6N Oct, 2020	''''	----	20, Oct, 2020	11-Nov-2929	✓	
Eg018H: gissolved Major Cations								
UGM-M8S	Clear Yeastic F ottle , Sitruc Acid3Hiltered J Eg 018H4	62, Oct, 2020	''''	----	22, Oct, 2020	90-Nov-2929	✓	
UGM-M8DK B7-M1xSK B7-M18S	B7 -M1 xDK B7 -M18DK	68, Oct, 2020	''''	----	22, Oct, 2020	19-Nov-2929	✓	
UGM-M12DK UGM-M15SK B7-M10SK B7-M29SK B7-M21S	UGM-M12SK B7 -M10DK B7 -M29DK B7 -M21DK	6N Oct, 2020	''''	----	22, Oct, 2020	11-Nov-2929	✓	



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Matrîy: **WAI ER** Evaluation: * F 7 olding time breach wv F) ithin holding timet

Method	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Evaluation	Due for analysis
EP 020H: g dissolved Metals f y @Y, MU					
Clear Ylastic F ottle , Sitrîc Acid3Hltered)EP 020A, H4 UGM-M8S	62, Oct, 2020	''''	----	----	19-Apr-2921
Clear Ylastic F ottle , Sitrîc Acid3Hltered)EP 020A, H4 B7 -M1xDK B7 -M18DK	68, Oct, 2020	''''	----	----	11-Apr-2921
Clear Ylastic F ottle , Sitrîc Acid3Hltered)EP 020A, H4 UGM-M12DK UGM-M15SK B7 -M10SK B7 -M29SK B7 -M21S	6N Oct, 2020	''''	----	----	12-Apr-2921
EP 020I : I otal Metals f y @Y, MU					
Clear Ylastic F ottle , Sitrîc Acid3L n. ltered)EP 020A, I 4 UGM-M8S	62, Oct, 2020	20, Oct, 2020	19-Apr-2921	✓	19-Apr-2921
Clear Ylastic F ottle , Sitrîc Acid3L n. ltered)EP 020A, I 4 RB1	68, Oct, 2020	20, Oct, 2020	11-Apr-2921	✓	11-Apr-2921
Clear Ylastic F ottle , Sitrîc Acid3L n. ltered)EP 020A, I 4 UGM-M15SK TB1K	6N Oct, 2020	20, Oct, 2020	12-Apr-2921	✓	12-Apr-2921
EP 085H: g dissolved Mercury f y H@IU					
Clear Ylastic F ottle , Sitrîc Acid3Hltered)EP 085H4 UGM-M8S	62, Oct, 2020	''''	----	----	90-Nov-2929
Clear Ylastic F ottle , Sitrîc Acid3Hltered)EP 085H4 UGM-M8DK B7 -M1xSK B7 -M18S	68, Oct, 2020	''''	----	----	19-Nov-2929
Clear Ylastic F ottle , Sitrîc Acid3Hltered)EP 085H4 UGM-M12DK UGM-M15SK B7 -M10SK B7 -M29SK B7 -M21S	6N Oct, 2020	''''	----	----	11-Nov-2929
EP 085I : I otal Recoveraf le Mercury f y H@IU					
Clear Ylastic F ottle , Sitrîc Acid3L n. ltered)EP 085I 4 UGM-M8S	62, Oct, 2020	''''	----	----	61, Oct, 2020
Clear Ylastic F ottle , Sitrîc Acid3L n. ltered)EP 085I 4 RB1	68, Oct, 2020	''''	----	----	61, Oct, 2020
Clear Ylastic F ottle , Sitrîc Acid3L n. ltered)EP 085I 4 UGM-M15SK TB1K	6N Oct, 2020	''''	----	----	61, Oct, 2020



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Matrix: **WAI ER** Evaluation: * F 7 olding time breach wv F) ithin holding timet

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP 056P : Herrous Gon f y giscrete Analyser								
Clear Ylastic F ottle , q Cl , Hiltered JEP 056P4 UGM-M8S		''''	----	----	61, Oct, 2020	10-Oct-2929	✓	
Clear Ylastic F ottle , q Cl , Hiltered JEP 056P4 UGM-M8DK B7-M1xSK B7-M18S	B7 -M1xDK B7 -M18DK	''''	----	----	61, Oct, 2020	29-Oct-2929	✓	
Clear Ylastic F ottle , q Cl , Hiltered JEP 056P4 UGM-M12DK UGM-M15SK B7 -M10SK B7 -M29SK B7 -M21S	UGM-M12SK B7 -M10DK B7 -M29DK B7 -M21DK	''''	----	----	61, Oct, 2020	21-Oct-2929	✓	
E7 095M: Uul.ide as U2,								
Clear Ylastic F ottle , Kinc Acetate/SaOq JE7 0954 UGM-M8S		''''	----	----	61, Oct, 2020	10-Oct-2929	✓	
Clear Ylastic F ottle , Kinc Acetate/SaOq JE7 0954 UGM-M8DK B7 -M1xSK B7 -M18S	B7 -M1xDK B7 -M18DK	''''	----	----	61, Oct, 2020	29-Oct-2929	✓	
Clear Ylastic F ottle , Kinc Acetate/SaOq JE7 0954 UGM-M12DK UGM-M15SK B7 -M10SK B7 -M29SK B7 -M21S	UGM-M12SK B7 -M10DK B7 -M29DK B7 -M21DK	''''	----	----	61, Oct, 2020	21-Oct-2929	✓	



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory . C samples analysed , within the analytical lot(s) in , which the submitted sample(s) , asQ are(processed)Actual rate should be greater than or equal to the expected rateHA listing of breaches is provided in the Summary of OutliersH

Matrix: **WAIER**

Evaluation: * F . uality Control frequency not , ithin specification w F . uality Control frequency , ithin specification+

Analytical Methods	Method	Count			Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected			
Laboratory Duplicates (DUP)								
Alumini by PC Titrator	ED93x-P	3	28	60-; 6	60-00	✓	NEPM 2913 B3 V ALS . C Standard	
Chloride by Discrete Analyser	ED945G	2	29	60-00	60-00	✓	NEPM 2913 B3 V ALS . C Standard	
Dissolved Mercury by &IMS	EG935&	3	24	62-50	60-00	✓	NEPM 2913 B3 V ALS . C Standard	
Dissolved Metals by ICP-MS - Suite A	EG929A-&	3	34	9-92	60-00	✗	NEPM 2913 B3 V ALS . C Standard	
&errous Iron by Discrete Analyser	EG951G	4	39	68-88	60-00	✓	NEPM 2913 B3 V ALS . C Standard	
Gross Alpha and Beta Activity	EA259	2	1x	66-; Z	60-00	✓	NEPM 2913 B3 V ALS . C Standard	
Major Cations - Dissolved	ED903&	2	29	60-00	60-00	✓	NEPM 2913 B3 V ALS . C Standard	
Sulfate Turbidimetric(as SO4 2- by Discrete Analyser	ED941G	2	29	60-00	60-00	✓	NEPM 2913 B3 V ALS . C Standard	
Sulfide as S2-	E/ 985	2	15	68-88	60-00	✓	NEPM 2913 B3 V ALS . C Standard	
Total Mercury by &IMS	EG935T	2	12	6Z-Z;	60-00	✓	NEPM 2913 B3 V ALS . C Standard	
Total Metals by ICP-MS - Suite A	EG929A-T	2	10	60-58	60-00	✓	NEPM 2913 B3 V ALS . C Standard	
Laboratory Control Samples QCS								
Alumini by PC Titrator	ED93x-P	2	28	; -6N	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Chloride by Discrete Analyser	ED945G	2	29	60-00	60-00	✓	NEPM 2913 B3 V ALS . C Standard	
Dissolved Mercury by &IMS	EG935&	2	24	9-88	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Dissolved Metals by ICP-MS - Suite A	EG929A-&	2	34	5-99	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
&errous Iron by Discrete Analyser	EG951G	2	39	Z-Z;	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Gross Alpha and Beta Activity	EA259	2	1x	66-; Z	60-00	✓	NEPM 2913 B3 V ALS . C Standard	
Major Cations - Dissolved	ED903&	1	29	5-00	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Sulfate Turbidimetric(as SO4 2- by Discrete Analyser	ED941G	2	29	60-00	60-00	✓	NEPM 2913 B3 V ALS . C Standard	
Sulfide as S2-	E/ 985	1	15	Z-Z;	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Total Mercury by &IMS	EG935T	1	12	9-88	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Total Metals by ICP-MS - Suite A	EG929A-T	1	10	5-2Z	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Method Blank (MB)								
Chloride by Discrete Analyser	ED945G	1	29	5-00	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Dissolved Mercury by &IMS	EG935&	2	24	9-88	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Dissolved Metals by ICP-MS - Suite A	EG929A-&	2	34	5-99	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
&errous Iron by Discrete Analyser	EG951G	2	39	Z-Z;	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Gross Alpha and Beta Activity	EA259	1	1x	5-99	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Major Cations - Dissolved	ED903&	1	29	5-00	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Sulfate Turbidimetric(as SO4 2- by Discrete Analyser	ED941G	1	29	5-00	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Sulfide as S2-	E/ 985	1	15	Z-Z;	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Total Mercury by &IMS	EG935T	1	12	9-88	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Total Metals by ICP-MS - Suite A	EG929A-T	1	10	5-2Z	5-00	✓	NEPM 2913 B3 V ALS . C Standard	
Matrix Spikes (MS)								
Chloride by Discrete Analyser	ED945G	1	29	5-00	5-00	✓	NEPM 2913 B3 V ALS . C Standard	



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Matrix: **WAI ER** Evaluation: * F . uality Control frequency not , ithin specification w F . uality Control frequency , ithin specification

Analytical Methods	Method	Count		Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected		
Matrix Spikes QMSI - Continued							
Dissolved Mercury by &IMS	EG935&	2	24	9-88	5-00	✓	NEPM 2913 B3 V ALS . C Standard
Dissolved Metals by ICP-MS - Suite A	EG929A-&	2	34	5-99	5-00	✓	NEPM 2913 B3 V ALS . C Standard
Mercurous Iron by Discrete Analyser	EG951G	2	39	Z-Z;	5-00	✓	NEPM 2913 B3 V ALS . C Standard
Sulfate Turbidimetric(as SO4 2- by Discrete Analyser	ED941G	1	29	5-00	5-00	✓	NEPM 2913 B3 V ALS . C Standard
Sulfide as S2-	E/ 985	1	15	Z-Z;	5-00	✓	NEPM 2913 B3 V ALS . C Standard
Total Mercury by &IMS	EG935T	1	12	9-88	5-00	✓	NEPM 2913 B3 V ALS . C Standard
Total Metals by ICP-MS - Suite A	EG929A-T	1	10	5-ZZ	5-00	✓	NEPM 2913 B3 V ALS . C Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA KAP7 AKAS and NEPM H 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
Gross Alpha and Beta Activity	EA259	) ATER	ASTM Dx283-96: Determination of gross alpha and gross beta radioactivity in water samples by Liquid Scintillation Counting (LSC/H)
Alkalinity by PC Titrator	ED93x-P	) ATER	In house: Referenced to AP7 A 2329 B This procedure determines alkalinity by automated measurement (High pH Titrate) on a settled supernatant aliquot of the sample using pH 4.5 for indicating the total alkalinity end-point. This method is compliant, with NEPM Schedule B3.
Sulfate Turbidimetric (as SO4 2- by Discrete Analyser)	ED941G	) ATER	In house: Referenced to AP7 A 4599-SO4-H Dissolved sulfate is determined in a 945µm filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acetic acid medium, with barium chloride. Light absorbance of the BaSO4 suspension is measured by a photometer and the SO4-2 concentration is determined by comparison of the reading, with a standard curve. This method is compliant, with NEPM Schedule B3.
Chloride by Discrete Analyser	ED945G	) ATER	In house: Referenced to AP7 A 4599 Cl - GH The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form non-ionised mercuric chloride. The presence of ferric ions the liberated thiocyanate forms highly-coloured ferric thiocyanate, which is measured at 489 nm. AP7 A seal method 2 91x-1-L
Major Cations - Dissolved	ED903&	) ATER	In house: Referenced to AP7 A 3129 and 3125w (USEPA S) 846 - 6919 and 6929w. Cations are determined by either ICP-AES or ICP-MS techniques. This method is compliant, with NEPM Schedule B3. Sodium Adsorption Ratio is calculated from Ca/Mg and Na, which determined by ALS in house method.) I-EN-ED903&H This method is compliant, with NEPM Schedule B3. Hardness parameters are calculated based on AP7 A 2349 BH. This method is compliant, with NEPM Schedule B3.
Dissolved Metals by ICP-MS - Suite A	EG929A-&	) ATER	In house: Referenced to AP7 A 3125w (USEPA S) 846 - 6929KALS.) I-EN-EG929H Samples are 945µm 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	EG929A-T	) ATER	In house: Referenced to AP7 A 3125w (USEPA S) 846 - 6929KALS.) I-EN-EG929H The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Dissolved Mercury by &IMS	EG935&	) ATER	In house: Referenced to AS 3559KAP7 A 3112.7g - B. Cold, -injection (SnCl2) (Cold); apour generation (AAS) Samples are 945µm filtered prior to analysis. H&IM-AAS is an automated flameless atomic absorption technique. A bromate/promide reagent is used to oxidise any organic mercury compounds in the filtered 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 Schedule B3/H
Total Mercury by &IMS	EG935T) ATER	In house: Referenced to AS 3559KAP7 A 3112.7g - B. Cold, -injection (SnCl2) (Cold); apour generation (AAS) &IM-AAS is an automated flameless atomic absorption technique. A bromate/promide 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 Schedule B3/H



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Analytical Methods	Method	Matrix	Method Descriptions
Iron by Discrete Analyser	EG951G) ATER	In house: Referenced to AP7 A 3599 & e-BHA colorimetric determination based on the reaction between phenanthroline and ferrous iron at pH 3.12-3.18 to form an orange-red complex that is measured against a five-point calibration curve. This method is compliant with NEPM Schedule B3(H)
Sulfide as S2-	E/ 985	) ATER	In house: Referenced to AP7 A 4599-S2- DHSulfide species present in water samples are immediately precipitated, then collected in pretreated caustic zinc acetate preserved sample containers. The sulphides are coloured using methylene blue indicator. Non-detects may be screened by comparison against a standard at half-LOR. Other, these samples are measured using U ⁻ ; IS detection at 664nm. This method is compliant with NEPM Schedule B3
Ionic Balance by PCT DA and Turbi SO4 DA	* EN955 - PG	) ATER	In house: Referenced to AP7 A 1939. This method is compliant with NEPM Schedule B3
Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Recoverable Metals	EN25	) ATER	In house: Referenced to USEPA S) 846-3995. Method 3995 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 Schedule B3

Subcon Forward Lab / Split WO
 Lab / Analysis: *Carbon / gas analyser*
 Organised By / Date:
 Relinquished By / Date:
 Connote / Courier:
 WO No:
 Attached By PO / Internal Sheet:

Environmental Division
 Sydney
 Work Order Reference
ES2036844



Telephone : - 61-2-8784 8556

CLIENT: TIME COLETTING
 OFFICE: 31 CHANSE (RINK) LARVESTA
 PROJECT: **31W432**
 PERSONAL ORDER:
 PROJECT NUMBER: **31W432**
 ANALYST: **James D.**
 DATE: **25/10/20**

FUNCTIONAL REQUIREMENTS:
 (Checked by my laboratory for compliance) No. Blank or target (AT) (in the field)
 ANALYST REQUIRED INCLUDING BUT NOT LIMITED TO: (Check all that apply) Analytical Sampling QA/QC Other: _____
 WORK REQUIRED INCLUDING BUT NOT LIMITED TO: (Check all that apply) Sampling QA/QC Other: _____

LAB ID	SAMPLED	DATE / TIME	MATRIX	TYPE & PRESERVATIVE	TOTAL BOTTLES	ANALYSIS REQUIRED INCLUDING BUT NOT LIMITED TO: (Check all that apply)	WORK REQUIRED INCLUDING BUT NOT LIMITED TO: (Check all that apply)	REMARKS	ADDITIONAL INFORMATION			
1	UGM-MTD	15/10/2020 14:10	W		4	1	1					
2	UGM-MMS	15/10/2020 14:20	W		5	1	1					
3	UGM-MPD	17/10/2020 11:30	W		4	1	1					
4	UGM-MMS	17/10/2020 12:00	W		5	1	1					
5	UGM-MAD	15/10/2020 19:30	W		4	1	1					
6	BH-MTD	19/10/2020 11:45	W		4	1	1					
7	BH-M16S	19/10/2020 12:30	W		4	1	1					
8	BH-M22D	19/10/2020 12:00	W		5	1	1					
9	BH-M22S	19/10/2020 11:15	W		5	1	1					
10	BH-M23D	19/10/2020 9:50	W		4	1	1					
11	BH-M23S	19/10/2020 9:10	W		5	1	1					
12	BH-M24D	19/10/2020 10:20	W		4	1	1					
13	BH-M24S	19/10/2020 11:00	W		4	1	1					
14	BH-M25D	19/10/2020 8:10	W		4	1	1					
15	BH-M25S	19/10/2020 7:40	W		4	1	1					
16	LPSR604	17/10/2020 9:20	W		5	1	1					
	PSD_01	11/10/2020 14:45	W		1	1	1		Please report PSD samples in a separate			
	PSD_01	12/10/2020 12:50	W		1	1	1		Please report PSD samples in a separate			
	PSD_01	13/10/2020 18:45	W		1	1	1		Please report PSD samples in a separate			
	PSD_02	12/10/2020 12:55	W		1	1	1		Please report PSD samples in a separate			
	PSD_02	13/10/2020 18:45	W		1	1	1		Please report PSD samples in a separate			
17	QA1	16/10/2020 15:30	W		4	1	1		Duplicate			
	QC1	16/10/2020 16:30	W		4	1	1		Triplicate, please forward to Emerald			
18	QA2	17/10/2020 12:00	W		5	1	1		Duplicate			
	QC2	17/10/2020 12:00	W		6	1	1		Triplicate, please forward to Emerald			
19	TB3	18/10/2020	W		1	1	1		Duplicate			
20	TB4	18/10/2020	W		1	1	1		Triplicate, please forward to Emerald			
21	TB5	19/10/2020	W		1	1	1		Duplicate			
22	RB8	15/10/2020 0:00	W		1	1	1		Triplicate, please forward to Emerald			
23	RB4	16/10/2020 0:00	W		1	1	1		Duplicate			
24	RB5	17/10/2020 12:40	W		1	1	1		Triplicate, please forward to Emerald			
25	RB6	19/10/2020 12:05	W		1	1	1		Duplicate			
					TOTAL	160	20	20	15	3	0	5



Environmental

CERTIFICATE OF ANALYSIS

Work Order : ESM201833 Page : 1 of 11
Client : E4 4 CONSULTING PTY LTD Laboratory : Environmental Division Sydney
Contact : PAUL GIBBONS Contact : Sepan Mahamad
Address : Ground Floor Suite 1 20 Chandos Street
 St Leonards NSW NSW 2065 Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : ---- Telephone : +61 2 8784 8555
Project : S190512 Balranald T3 Ancillary Date Samples Received : 20-Oct-2020 19:15
Order number : ---- Date Analysis Commenced : 21-Oct-2020
C-O-C number : ---- Issue Date : 06-Nov-2020 09:38
Sampler : BILL BULL, KAITLYN BRODIE
Site : ----
Quote number : EN/112/20
No. of samples received : 25
No. of samples analysed : 25



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Titus Vimalasiri	Metals Teamleader	Radionuclides, Fyshwick, ACT



Page : 2 of 11
Work Order : ES2036844
Client : EMM CONSULTING PTY LTD
Project : S190512 Balranald T3 Ancillary

General Comments

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

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

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

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

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

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

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

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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EG020/ED093: LOR's have been raised due to matrix interference. (High Total Dissolved Solids)
- EG035: Poor matrix spike recovery was obtained for Mercury on sample ES2036844 # 4. Confirmed by re-analysis.
- LOR for Gross Alpha and Gross Beta raised due to high solid content.

- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID									
Compound	CAS Number	LOR	Unit	Client sampling date / time	UG4 -4 5D	UG4 -4 5S	UG4 -4 MD	UG4 -4 MS	UG4 -4 3D	Result	Result
ED207P: Alkalinity by PC Titrator											
6 hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L		<1	<1	<1	<1	<1	<1	<1
Non-carbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L		01B	090	099	M62	327	099	M62
Total Alkalinity as CaCO ₃	----	1	mg/L		01B	090	099	M62	327	099	M62
ED235G: Sulfate (Turbidimetric) as SO₄ M by DA											
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L		01B2	33M2	0732	3052	0722	0732	3052
ED238G: Chloride by Discrete Analyser											
Chloride	16887-00-6	1	mg/L		51222	M6122	57222	59322	51722	57222	59322
ED290F: Dissolved 4 major Cations											
Calcium	7440-70-2	1	mg/L		B7M	700	B92	7M9	B70	700	7M9
Magnesium	7439-95-4	1	mg/L		5332	51B2	5392	51M2	5382	5332	51M2
Sodium	7440-23-5	1	mg/L		52922	53M22	55322	5M622	55M22	52922	53M22
Potassium	7440-09-7	1	mg/L		0B	M6	07	05	07	0B	05
EG2M2F: Dissolved 4 metals by ICP-4 S											
Arsenic	7440-38-2	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	7440-43-9	0.0001	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chromium	7440-47-3	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Copper	7440-50-8	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nickel	7440-02-0	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lead	7439-92-1	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	7440-66-6	0.005	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
EG2M2T: Total 4 metals by ICP-4 S											
Arsenic	7440-38-2	0.001	mg/L		----	<0.010	----	<0.010	----	<0.010	----
Cadmium	7440-43-9	0.0001	mg/L		----	<0.0010	----	<0.0010	----	<0.0010	----
Chromium	7440-47-3	0.001	mg/L		----	<0.010	----	<0.010	----	<0.010	----
Copper	7440-50-8	0.001	mg/L		----	<0.010	----	<0.010	----	<0.010	----
Nickel	7440-02-0	0.001	mg/L		----	<0.010	----	<0.010	----	<0.010	----
Lead	7439-92-1	0.001	mg/L		----	<0.010	----	<0.010	----	<0.010	----
Zinc	7440-66-6	0.005	mg/L		----	<0.052	----	<0.052	----	<0.052	----
EG20BF: Dissolved 4 mercury by FI4 S											
4 mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG20BT: Total Recoverable 4 mercury by FI4 S											
4 mercury	7439-97-6	0.0001	mg/L		----	<0.0001	----	<0.0001	----	<0.0001	----
EG2B5G: Ferrous Iron by Discrete Analyser											



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID							
Compound	CAS Number	LOR	Unit	Client sampling date / time	UG4 -4 5D	UG4 -4 5S	UG4 -4 MD	UG4 -4 MS	UG4 -4 3D
					15-Oct-2020 14:10	15-Oct-2020 14:20	17-Oct-2020 11:30	17-Oct-2020 12:00	15-Oct-2020 15:30
					ESM#01833-225	ESM#01833-22M	ESM#01833-220	ESM#01833-223	ESM#01833-22B
					Result	Result	Result	Result	Result
EG2B5G: Ferrous Iron by Discrete Analyser - Continued									
Ferrous Iron	----	0.05	mg/L		5.19	2.58	MBB	<0.05	5.78
EK28B4 : Sulfide as SM									
Sulfide as SM	18496-25-8	0.1	mg/L		<0.1	<0.1	2.5	<0.1	<0.1
EN2BB: Ionic x alance									
∅ Total Anions	----	0.01	meq/L		B0B	8MM	B1B	13M	BB1
∅ Total Cations	----	0.01	meq/L		1MM	795	139	752	108
∅ Ionic x alance	----	0.01	%		7.B1	5.93	1.88	3.98	1.88



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID							
Compound	CAS Number	LOR	Unit	Client sampling date / time	x 6-4 51D	x 6-4 51S	x 6-4 MMD	x 6-4 MMS	x 6-4 MDD
					Result	Result	Result	Result	Result
EAME2: Gross Alpha and x eta Activity									
Gross beta	----	0.10	Bq/L		----		M33	<2.06	----
ED207P: Alkalinity by PC Titrator									
6 hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L		<1		<1	<1	<1
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L		<1		<1	<1	<1
x icarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L		3M6	008	3M6	025	3M6
Total Alkalinity as CaCO ₃	----	1	mg/L		3M6	008	3M6	025	3M6
ED235G: Sulfate (Turbidimetric) as SO₄ M by DA									
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L		0802	3M2	0792	3002	08M2
ED238G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		58E22	59922	58122	M8722	57922
ED290F: Dissolved 4 ajor Cations									
Calcium	7440-70-2	1	mg/L		125	771	B82	750	B15
4 agnesium	7439-95-4	1	mg/L		5B82	51E2	5B82	57M2	5382
Sodium	7440-23-5	1	mg/L		55922	50522	5M22	53122	55522
Potassium	7440-09-7	1	mg/L		09	01	30	M8	08
EG2M2F: Dissolved 4 etals by ICP-4 S									
Arsenic	7440-38-2	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Cadmium	7440-43-9	0.0001	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Chromium	7440-47-3	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Copper	7440-50-8	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Nickel	7440-02-0	0.001	mg/L		<0.010	2.2M2	<0.010	<0.010	<0.010
Lead	7439-92-1	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010
Zinc	7440-66-6	0.005	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
EG20BF: Dissolved 4 ercury by F14 S									
4 ercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EG2B5G: Ferrous Iron by Discrete Analyser									
Ferrous Iron	----	0.05	mg/L		5.73	2.MB	0.B0	7.01	M0B
EK28B4 : Sulfide as SM									
Sulfide as SM	18496-25-8	0.1	mg/L		<0.1	2.5	2.5	2.5	<0.1
EN2BB: Ionic x alance									
∅ Total Anions	----	0.01	meq/L		152	1B7	15M	790	B87
∅ Total Cations	----	0.01	meq/L		179	73B	195	850	103
∅ Ionic x alance	----	0.01	%		B.0M	1.M8	1.23	5.MB	0.83



Page : 6 of 11
 Work Order : ES2036844
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

Analytical Results

Compound	CAS Number	LOR	Unit	Client sample ID									
				Client sampling date / time	Client sample ID	Client sample ID	Client sample ID						
				19-Oct-2020 11:45	x 6 -4 51D	19-Oct-2020 12:30	x 6 -4 51S	16-Oct-2020 12:00	x 6 -4 MMD	16-Oct-2020 11:15	x 6 -4 MMS	16-Oct-2020 09:50	x 6 -4 MDD
				ESM01833-221	ESM01833-227	ESM01833-228	ESM01833-229	ESM01833-228	ESM01833-229	ESM01833-229	ESM01833-252		
				Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
EAME2CA: Gross Alpha and x eta Activity													
Gross alpha		0.05	Bq/L			<0.87					5.0B		
Gross beta activity - 32K		0.10	Bq/L			<1.74					<2.06		



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID										
Compound	CAS Number	LOR	Unit	Client sampling date / time	x 6-4 MMS	x 6-4 MBD	x 6-4 MBS	x 6-4 MBD	x 6-4 MBS	x 6-4 MBD	x 6-4 MBS	
					ESM201833-255	ESM201833-25M	ESM201833-250	ESM201833-253	ESM201833-250	ESM201833-253	ESM201833-25B	
					Result	Result	Result	Result	Result	Result	Result	
ED207P: Alkalinity by PC Titrator												
6 hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L		<1	<1	<1	<1	<1	<1	<1	
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L		<1	<1	<1	<1	<1	<1	<1	
Noncarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L		M18	3EM	088	323	088	323	05B	
Total Alkalinity as CaCO ₃	----	1	mg/L		M18	3EM	088	323	088	323	05B	
ED235G: Sulfate (Turbidimetric) as SO₄ M by DA												
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L		EM2	07M2	0932	0B22	0932	0B22	3B82	
ED238G: Chloride by Discrete Analyser												
Chloride	16887-00-6	1	mg/L		59822	58322	58122	51M22	58122	51M22	M022	
ED290F: Dissolved 4 major Cations												
Calcium	7440-70-2	1	mg/L		75B	105	12M	1M8	12M	1M8	189	
Magnesium	7439-95-4	1	mg/L		5B72	5132	53B2	5B22	53B2	5B22	5702	
Sodium	7440-23-5	1	mg/L		50022	5M222	50M22	55M22	50M22	55M22	5B022	
Potassium	7440-09-7	1	mg/L		M8	35	M8	33	M8	33	M8	
EG2M2F: Dissolved 4 metals by ICP-4 S												
Arsenic	7440-38-2	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Cadmium	7440-43-9	0.0001	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Chromium	7440-47-3	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Copper	7440-50-8	0.001	mg/L		2.23B	<0.010	<0.010	2.259	<0.010	<0.010	<0.010	
Nickel	7440-02-0	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	2.251	
Lead	7439-92-1	0.001	mg/L		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Zinc	7440-66-6	0.005	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
EG2M2T: Total 4 metals by ICP-4 S												
Arsenic	7440-38-2	0.001	mg/L		2.25M	-----	-----	-----	-----	-----	-----	
Cadmium	7440-43-9	0.0001	mg/L		<0.0010	-----	-----	-----	-----	-----	-----	
Chromium	7440-47-3	0.001	mg/L		2.205	-----	-----	-----	-----	-----	-----	
Copper	7440-50-8	0.001	mg/L		2.1M1	-----	-----	-----	-----	-----	-----	
Nickel	7440-02-0	0.001	mg/L		2.2MM	-----	-----	-----	-----	-----	-----	
Lead	7439-92-1	0.001	mg/L		<0.010	-----	-----	-----	-----	-----	-----	
Zinc	7440-66-6	0.005	mg/L		2.210	-----	-----	-----	-----	-----	-----	
EG20BF: Dissolved 4 mercury by FI4 S												
4 mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
EG20BT: Total Recoverable 4 mercury by FI4 S												
4 mercury	7439-97-6	0.0001	mg/L		<0.0001	-----	-----	-----	-----	-----	-----	
EG2B5G: Ferrous Iron by Discrete Analyser												



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID			
Compound	CAS Number	LOR	Unit	Client sampling date / time	
				16-Oct-2020 09:10	x 6-4 MMS
				19-Oct-2020 10:20	x 6-4 MBD
				19-Oct-2020 11:00	x 6-4 MBS
				16-Oct-2020 08:10	x 6-4 MBD
				16-Oct-2020 07:40	x 6-4 MBS
EG2B5G: Ferrous Iron by Discrete Analyser - Continued					
Ferrous Iron	----	0.05	mg/L	<0.05	2.MØ
				5.15	M5M
				59.7	M5M
				2.M	<0.1
	18496-25-8	0.1	mg/L	<0.1	<0.1
EK28B4 : Sulfide as SM					
Sulfide as SM				2.M	<0.1
EN2BB: Ionic x alance					
∅ Total Anions	----	0.01	meq/L	17M	153
∅ Total Cations	----	0.01	meq/L	733	7MØ
∅ Ionic x alance	----	0.01	%	B.2B	8.59
				7.7M	9.MM
				121	BØ8
				727	137
				8.59	5.11



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID				Client sampling date / time		Client sample ID	
Compound	CAS Number	LOR	Unit	LPSPx 23	QA5	QAM	Tx0	Tx3	
				Result	Result	Result	Result	Result	
EAM62: Gross Alpha and x eta Activity									
Gross beta	----	0.10	Bq/L	<1.77	----	----	----	----	
ED207P: Alkalinity by PC Titrator									
6 hydroxide Alkalinity as CaCO ₃	DMO-210-001	1	mg/L	<1	<1	<1	----	----	
Carbonate Alkalinity as CaCO ₃	3812-32-6	1	mg/L	<1	<1	<1	----	----	
xicarbonate Alkalinity as CaCO ₃	71-52-3	1	mg/L	337	091	MBM	----	----	
Total Alkalinity as CaCO ₃	----	1	mg/L	337	091	MBM	----	----	
ED235G: Sulfate (Turbidimetric) as SO₄ M by DA									
Sulfate as SO ₄ - Turbidimetric	14808-79-8	1	mg/L	0822	0732	3012	----	----	
ED23BG: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L	58722	58922	59822	----	----	
ED290F: Dissolved 4 ajor Cations									
Calcium	7440-70-2	1	mg/L	15B	100	7MM	----	----	
4 agnesium	7439-95-4	1	mg/L	5122	5B2	5B12	----	----	
Sodium	7440-23-5	1	mg/L	5M22	5M22	55722	----	----	
Potassium	7440-09-7	1	mg/L	33	3M	MØ	----	----	
EG2M2F: Dissolved 4 etals by ICP-4 S									
Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	<0.010	----	----	
Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	<0.0010	----	----	
Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	<0.010	----	----	
Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	<0.010	----	----	
Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	<0.010	----	----	
Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	<0.010	----	----	
Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	<0.050	----	----	
EG2M2T: Total 4 etals by ICP-4 S									
Arsenic	7440-38-2	0.001	mg/L	----	----	<0.010	<0.001	<0.001	
Cadmium	7440-43-9	0.0001	mg/L	----	----	<0.0010	<0.0001	<0.0001	
Chromium	7440-47-3	0.001	mg/L	----	----	<0.010	<0.001	<0.001	
Copper	7440-50-8	0.001	mg/L	----	----	<0.010	<0.001	<0.001	
Nickel	7440-02-0	0.001	mg/L	----	----	<0.010	<0.001	<0.001	
Lead	7439-92-1	0.001	mg/L	----	----	<0.010	<0.001	<0.001	
Zinc	7440-66-6	0.005	mg/L	----	----	<0.052	<0.005	<0.005	
EG20BF: Dissolved 4 ercury by F14 S									
4 ercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	----	----	
EG20BT: Total Recoverable 4 ercury by F14 S									



Page : 11 of 11
 Work Order : ES2036844
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

Analytical Results

Compound	CAS Number	LOR	Unit	Client sample ID				
				Client sampling date / time	Tx B	Rx 0	Rx 3	Rx B	Rx 1
				19-Oct-2020 00:00	15-Oct-2020 00:00	16-Oct-2020 00:00	19-Oct-2020 12:40	20-Oct-2020 12:05
				ESM201833-2M6	ESM201833-2M1	ESM201833-2M0	ESM201833-2M8	ESM201833-2M8
				Result	Result	Result	Result	Result
EG2M2T: Total 4 etals by ICP-4 S								
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
EG20BT: Total Recoverable 4 ercury by F14 S								
4 ercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001



Environmental

QUALITY CONTROL REPORT

Work Order : **EM20698SS**

Page : 1 of 7

Client : **EGG CONMULTIND PTY LT5**
 Contact : **PAUL GIBBONS**
 Address : **Ground Floor Suite 1 20 Chandos Street
 St Leonards NSW 2065**
 Telephone : **----**
 Project : **S190512 Balranald T3 Ancillary**
 Order number : **----**
 C-O-C number : **----**
 Sampler : **BILL BULL, KAITLYN BRODIE**
 Site : **----**
 Quote number : **EN/112/20**
 No. of samples received : **25**
 No. of samples analysed : **25**

Laboratory : **Environmental Division Sydney**
 Contact : **Sepan Mahamad**
 Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**
 Telephone : **+61 2 8784 8555**
 Date Samples Received : **20-Oct-2020**
 Date Analysis Commenced : **21-Oct-2020**
 Issue Date : **06-Nov-2020**



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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Titus Vimalasiri	Metals Teamleader	Radionuclides, Fyshwick, ACT



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 Work Order : ES2036844
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Bairnald T3 Ancillary

General Comments

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

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

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

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

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

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method/Compound	Laboratory Duplicate (DUP) Report						
			CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA250CA: Drol I Aphan nBd t ean Ai oyvd 3QC Loc 66620147									
EB2027381-001	Anonymous	EA250: Gross alpha	----	0.05	Bq/L	<1.07	<1.07	0.00	No Limit
		EA250: Gross beta	----	0.1	Bq/L	4.12	4.98	18.9	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	<2.14	<2.14	0.00	No Limit
ES2036844-008	BH-M22D	EA250: Gross alpha	----	0.05	Bq/L	<0.87	0.90	3.47	No Limit
		EA250: Gross beta	----	0.1	Bq/L	2.44	2.07	16.6	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	<1.74	<1.74	0.00	No Limit
E5064P: AqknpBdq) (PC Tvarnor 3QC Loc 662b0S97									
ES2036813-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	17	17	0.00	0% - 50%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	17	17	0.00	0% - 50%
ES2036840-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	18	15	15.5	0% - 50%
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	536	555	3.45	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	554	570	2.90	0% - 20%
E5064P: AqknpBdq) (PC Tvarnor 3QC Loc 662b0S47									
ES2036844-010	BH-M23D	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	426	428	0.415	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	426	428	0.415	0% - 20%
ES2036845-001	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	3	<1	101	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	3	<1	101	No Limit



Laboratory Duplicate (DUP) Report									
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
E50SbD: Mufjne 3Tur) vMvev 7n MOS2-) (5A 3QC Loc 66201897									
ES2036844-006	BH-M16D	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3830	3850	0.632	0% - 20%
ES2036681-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	1	0.00	No Limit
E50SbD: Mufjne 3Tur) vMvev 7n MOS2-) (5A 3QC Loc 66201817									
ES2036844-017	QA1	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	3740	3720	0.746	0% - 20%
E50SdD: Caprvde) (5 v i ree ABnq l er 3QC Loc 66201847									
ES2036844-006	BH-M16D	ED045G: Chloride	16887-00-6	1	mg/L	18500	18200	2.14	0% - 20%
ES2036681-001	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	3	3	0.00	No Limit
E50SdD: Caprvde) (5 v i ree ABnq l er 3QC Loc 66201887									
ES2036844-017	QA1	ED045G: Chloride	16887-00-6	1	mg/L	18900	18500	1.81	0% - 20%
E5016F: 5 v l oged Gnep) (ICP-GM 3QC Loc 662bSS27									
ES2036844-001	UGM-M1D	ED093F: Calcium	7440-70-2	1	mg/L	572	552	3.66	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1440	1380	3.97	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	10900	10400	4.43	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	35	34	0.00	0% - 20%
		ED093F: Calcium	7440-70-2	1	mg/L	715	713	0.354	0% - 20%
		ED093F: Magnesium	7439-95-4	1	mg/L	1570	1560	0.797	0% - 20%
		ED093F: Sodium	7440-23-5	1	mg/L	13300	13300	0.0717	0% - 20%
		ED093F: Potassium	7440-09-7	1	mg/L	29	31	7.69	0% - 20%
ED020F: 5 v l oged Gnep) (ICP-GM 3QC Loc 662bSSb7									
ES2036844-001	UGM-M1D	EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	0.00	No Limit
		EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.045	0.042	6.65	No Limit
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.050	<0.050	0.00	No Limit
ES2036844-011	BH-M23S								
ED020T: ToopGnep) (ICP-GM 3QC Loc 66296987									
ES2036844-002	UGM-M1S	EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0010	<0.0010	0.00	No Limit
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.010	<0.010	0.00	No Limit
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.010	<0.010	0.00	No Limit

Sub-Matrix: WATER



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 Work Order : ES2036844
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Bairanald T3 Ancillary

Sub-Matrix: WATER

Laboratory sample ID		Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED020T: ToampGeomp) (ICP-GM 3QC Loc 66296987 - i oBoBued										
ES2036844-002	UGM-M1S	EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.010	<0.010	0.00	No Limit	
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.052	<0.052	0.00	No Limit	
		EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit	
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit	
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit	
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit	
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit	
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit	
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	0.095	0.092	3.13	0% - 50%	
ED06sF: 5V I oyyed Geri ur() (FIGM 3QC Loc 662bSS67										
ES2036844-002	UGM-M1S	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit	
ES2036844-011	BH-M2S	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit	
ED06sT: ToampRei oyyern) pø Geri ur() (FIGM 3QC Loc 66216867										
ES2036844-002	UGM-M1S	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit	
ES2036844-025	RB6	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit	
ED06sD: Ferroul IroB) (5V i reø ABnq I er 3QC Loc 6622SSS7										
ES2036145-001	Anonymous	EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	<0.05	0.00	No Limit	
ES2036844-004	UGM-M2S	EG051G: Ferrous Iron	---	0.05	mg/L	<0.05	<0.05	0.00	No Limit	
ED06sD: Ferroul IroB) (5V i reø ABnq I er 3QC Loc 6622SSs7										
ES2036844-015	BH-M2S	EG051G: Ferrous Iron	---	0.05	mg/L	0.29	0.24	17.9	No Limit	
ES2036877-013	Anonymous	EG051G: Ferrous Iron	---	0.05	mg/L	1.09	1.19	8.70	0% - 20%	
EK08sG: Mupfde nl M2- 3QC Loc 66200917										
ES2036844-002	UGM-M1S	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit	
ES2036844-009	BH-M2S	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	0.1	<0.1	0.00	No Limit	
EK08sG: Mupfde nl M2- 3QC Loc 6622Sb47										
ES2036149-001	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit	
ES2036919-003	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit	



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

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

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			Recovery Limits (%)	
				Result	Concentration	Spike Concentration	LCS	Low	High	
EA250CA: Droi l Aphn nEd t em Ai oyq 3QCLoc 66620147										
EA250: Gross alpha	----	0.05	Bq/L	<0.05	1751 Bq/L	100	95.2	105		
EA250: Gross beta	----	0.1	Bq/L	<0.10	3342 Bq/L	98.2	94.4	105		
EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	----	----	----	----		
E5 064P: AqnpBq) (PC Tarnor 3QCLoc 662b0S97										
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	102	81.0	111		
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	106	70.0	130		
E5 064P: AqnpBq) (PC Tarnor 3QCLoc 662b0S47										
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	101	81.0	111		
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	50 mg/L	108	70.0	130		
E5 0SbD: Mjfnre 3Tur vhmenev 7nl MOS 2-) (5A 3QCLoc 66201897										
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	82.0	122		
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	500 mg/L	103	82.0	122		
E5 0SbD: Mjfnre 3Tur vhmenev 7nl MOS 2-) (5A 3QCLoc 66201817										
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	82.0	122		
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	500 mg/L	101	82.0	122		
E5 0SbD: Capnde) (5v i ree ABnq| er 3QCLoc 66201847										
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	98.2	80.9	127		
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	117	80.9	127		
E5 0SbD: Capnde) (5v i ree ABnq| er 3QCLoc 66201887										
ED045G: Chloride	16887-00-6	1	mg/L	<1	50 mg/L	94.2	80.9	127		
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	107	80.9	127		
E5 016F: 5v I oyed Gnjor CnooBI 3QCLoc 662bSS27										
ED093F: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	99.2	80.0	114		
ED093F: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	99.5	90.0	116		
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	99.3	82.0	120		
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.8	85.0	113		
ED020F: 5v I oyed Geamp) (ICP-GM 3QCLoc 662bSSb7										
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	90.4	85.0	114		
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	89.5	84.0	110		
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	87.0	85.0	111		
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	86.9	81.0	111		
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	88.2	83.0	111		
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	89.7	82.0	112		
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	86.9	81.0	117		



Sub-Matrix: WATER				Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	Spike Recovery (%)	LCS	Low	High
ED020T: ToapGeap) (ICP-GM 3QCLOC 66296987									
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	89.6	82.0	82.0	114
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	91.7	84.0	84.0	112
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	90.5	86.0	86.0	116
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	89.7	83.0	83.0	118
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	90.6	85.0	85.0	115
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	90.9	84.0	84.0	116
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	89.6	79.0	79.0	117
ED06sF: 5 l o yed Geri ur () (FIGM 3QCLOC 662bSS67									
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	102	83.0	83.0	105
ED06sT: ToapRei o yern) p Geri ur () (FIGM 3QCLOC 66216867									
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	99.2	77.0	77.0	111
ED0sBD: Ferroul IroB) (5 v i re e ABnq l er 3QCLOC 6622SSS7									
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	100	89.0	89.0	117
ED0sBD: Ferroul IroB) (5 v i re e ABnq l er 3QCLOC 6622SSs7									
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	101	89.0	89.0	117
EK08sG: Mupfde nI M2- 3QCLOC 66200917									
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	94.0	76.0	76.0	116
EK08sG: Mupfde nI M2- 3QCLOC 6622Sb47									
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	102	76.0	76.0	116

Matrix Spike (MS) Report

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

Sub-Matrix: WATER				Matrix Spike (MS) Report				
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)	MS	Low	High
E50SbD: Mupfde nI MOS 2-) (5 A 3QCLOC 66201897								
ES2036681-001	Anonymous	ED041C: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	105	70.0	70.0	130
E50SbD: Mupfde nI MOS 2-) (5 A 3QCLOC 66201817								
ES2036844-017	QA1	ED041C: Sulfate as SO4 - Turbidimetric	14808-79-8	10 mg/L	# Not Determined	70.0	70.0	130
E50SsD: Caprvde) (5 v i re e ABnq l er 3QCLOC 66201847								
ES2036681-001	Anonymous	ED045C: Chloride	16887-00-6	50 mg/L	91.3	70.0	70.0	130
E50SsD: Caprvde) (5 v i re e ABnq l er 3QCLOC 66201887								
ES2036844-017	QA1	ED045C: Chloride	16887-00-6	50 mg/L	# Not Determined	70.0	70.0	130



Sub-Matrix: WATER

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	SpikeRecovery(%) MS	Recovery Limits (%) Low High
ED020F: 5 V I oyred Geri p (ICP-GM 3QCLOC 662bSS67						
ES2036844-002	UGM-M1S	EG020A-F: Arsenic	7440-38-2	8.5 mg/L	80.9	70.0 130
		EG020A-F: Cadmium	7440-43-9	2.125 mg/L	79.2	70.0 130
		EG020A-F: Chromium	7440-47-3	8.5 mg/L	75.9	70.0 130
		EG020A-F: Copper	7440-50-8	8.5 mg/L	77.6	70.0 130
		EG020A-F: Lead	7439-92-1	8.5 mg/L	83.0	70.0 130
		EG020A-F: Nickel	7440-02-0	8.5 mg/L	77.3	70.0 130
		EG020A-F: Zinc	7440-66-6	8.5 mg/L	79.4	70.0 130
ED020T: ToompGerip (ICP-GM 3QCLOC 66296987						
ES2036844-004	UGM-M2S	EG020A-T: Arsenic	7440-38-2	10 mg/L	86.4	70.0 130
		EG020A-T: Cadmium	7440-43-9	2.5 mg/L	70.3	70.0 130
		EG020A-T: Chromium	7440-47-3	10 mg/L	83.8	70.0 130
		EG020A-T: Copper	7440-50-8	10 mg/L	76.3	70.0 130
		EG020A-T: Lead	7439-92-1	10 mg/L	82.9	70.0 130
		EG020A-T: Nickel	7440-02-0	10 mg/L	76.5	70.0 130
		EG020A-T: Zinc	7440-66-6	10 mg/L	74.8	70.0 130
ED06sF: 5 V I oyred Geri ur (FIGM 3QCLOC 662bSS67						
ES2036844-001	UGM-M1D	EG035F: Mercury	7439-97-6	0.01 mg/L	70.5	70.0 130
ED06sT: ToompRei oyern) p Geri ur (FIGM 3QCLOC 66216867						
ES2036844-004	UGM-M2S	EG035T: Mercury	7439-97-6	0.01 mg/L	# 61.5	70.0 130
ED0sbd: Ferroul IroB (5 V i ree ABng I er 3QCLOC 6622SSS7						
ES2036145-001	Anonymous	EG051G: Ferrous Iron	----	1 mg/L	91.3	70.0 130
ED0sbd: Ferroul IroB (5 V i ree ABng I er 3QCLOC 6622SSs7						
ES2036844-015	BH-M25S	EG051G: Ferrous Iron	----	1 mg/L	85.5	70.0 130
EK08sG: Mupfde nl M2- 3QCLOC 66200917						
ES2036844-002	UGM-M1S	EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	103	70.0 130
EK08sG: Mupfde nl M2- 3QCLOC 6622Sb47						
ES2036149-001	Anonymous	EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	97.0	70.0 130



Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order : **EM20698NN**

Page : 1 of 19

Client : **ESS COUM TI GP YI D TI g**
Contact : **PUGL I EDONSM**
Project : **Mij 941- Cairanalc T2 UmAilary**
Mfr : **dtbb**
Sampler : **ORLL OGLLK/ UETLHS ORNDIE**
Nrcer number : **dtbb**

Laboratory : **Environmental Division Mycney**
Telephone : **+61 - 3835 3444**
Date Samples Received : **- 9dNAd 9- 9**
Issue Date : **96dSovd 9- 9**
So. of samples received : **- 4**
So. of samples analysed : **- 4**

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **UO S** method blank value outliers occur-
- **UO g** duplicate outliers occur-
- **UO T** laboratory control outliers occur-
- **S** attribute outliers exist, please see following pages for full details-
- For all regular sample matrices **UO** surrogate recovery outliers occur-

Outliers : Analysis Holding Time Compliance

- **UO** Analysis hold time outliers exist-

Outliers : Frequency of Quality Control Samples

- **UO** Quality Control Sample Frequency Outliers exist-



Page : - of 19
 Work Nrcer : EM-926355
 Client : EYY CNSMGLTBI PTHLTD
 Projct : Mj 941- Calranalc T2 UnAllary

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Yatrix: WAI ER

Compound / Group Name	Laboratory Mample ID	Client Mample ID	Analyte	CUM Number	Data	Limits	Comment
SatriBpike JS MR Recoveries							
ED9511 : Mulfate (Turbidimetric) as MN5-dby DU	EM-926355d918	QU1	Mulfate as MON, Turbidimetric	15393d918	Sot Determinec	dttd	SM recovery not determined if ackround level greater than or equal to NB spike level-
ED9541 : Chlorice by DisArete Unalyser	EM-926355d918	QU1	Chloride	16338d918	Sot Determinec	dttd	SM recovery not determined if ackround level greater than or equal to NB spike level-
EI 924T : Total ReAverable Y erAury by %EM	EM-926355d995	GI Y dY -M	Sercury	852j d 8d	61.4.7	89.9d1297	Recovery less than lower data (quality of jective

Analysis Holding Time Compliance

BSamples are identified below as having been analysed or extracted outside of recommended holding times. This report summarizes extraction preparation and analysis times and compares each with ULM recommended holding times (referencing GMEPU MW 356K UP&UK UM and SEPY) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and returns. 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 leachate with the shortest analyte holding time for the relevant soil method. These are: organics 15 days; mercury - 3 days; other metals 139 days. Urecovery breach does not guarantee a breach for all nonvolatile parameters. Holding times for VOC in soils vary according to analytes of interest. Vinyl Chloride and Myrene holding time is 8 days; others 15 days. Urecovery breach does not guarantee a breach for all VNC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Myrene are not key analytes of interest.

Yatrix: WAI ER

Evaluation: * F & holding time breach; ✓ F Within holding time.

Method	Container / Client Sample ID(s)	Sample Date	Extraction / Preparation		Analysis	
			Date extracted	Due for extraction	Date analysed	Due for analysis
EAZ50: Pross Alpha and Feta Activity						
Clear Ylastic Fottle, Uatural JEA2504	O&dY -- DK	: 9, Oct, 2020	''''	dttd	28, Oct, 2020	15dJprd-9-1 ✓
Clear Ylastic Fottle, Uatural JEA2504	LPIMPO85	: 1, Oct, 2020	''''	dttd	28, Oct, 2020	14dJprd-9-1 ✓
EAZ50CA: Pross Alpha and Feta Activity						
Clear Ylastic Fottle, Uatural JEA2504	O&dY -- DK	: 9, Oct, 2020	''''	dttd	28, Oct, 2020	15dJprd-9-1 ✓
Clear Ylastic Fottle, Uatural JEA2504	LPIMPO85	: 1, Oct, 2020	''''	dttd	28, Oct, 2020	14dJprd-9-1 ✓



Y atrix: **WAI ER** Evaluation: * F & olcing time breaA; ✓ F Within holcing time.

Method	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Eg061Y - Alkalinity f y YC I litrator							
Clear Ylastic F ottle , Uatural)Eg061, Y4	GI Y dY 1MK QU1	5, Oct, 2020	****	****	2, , Oct, 2020	- j dNAd- 9- 9	✓
Clear Ylastic F ottle , Uatural)Eg061, Y4	O&dY -- MK O&dY - 2MK O&dY - 4MK	9, Oct, 2020	****	****	2, , Oct, 2020	29dNAd- 9- 9	✓
Clear Ylastic F ottle , Uatural)Eg061, Y4	GI Y dY - MK QU-	1, Oct, 2020	****	****	2, , Oct, 2020	21dNAd- 9- 9	✓
Clear Ylastic F ottle , Uatural)Eg061, Y4	O&dY 16MK O&dY - 5M	3, Oct, 2020	****	****	2, , Oct, 2020	9- dSovd- 9- 9	✓
Eg0N P - Mul.ate j urf idimetric-4as MON2, f y gA							
Clear Ylastic F ottle , Uatural)Eg0N, P 4	GI Y dY 1MK QU1	5, Oct, 2020	****	****	2, , Oct, 2020	1- dSovd- 9- 9	✓
Clear Ylastic F ottle , Uatural)Eg0N, P 4	O&dY -- MK O&dY - 2MK O&dY - 4MK	9, Oct, 2020	****	****	2, , Oct, 2020	12dSovd- 9- 9	✓
Clear Ylastic F ottle , Uatural)Eg0N, P 4	GI Y dY - MK QU-	1, Oct, 2020	****	****	2, , Oct, 2020	15dSovd- 9- 9	✓
Clear Ylastic F ottle , Uatural)Eg0N, P 4	O&dY 16MK O&dY - 5DK	3, Oct, 2020	****	****	2, , Oct, 2020	16dSovd- 9- 9	✓
Eg0N6P - Chloride f y g iscrete Analyser							
Clear Ylastic F ottle , Uatural)Eg0N6P 4	GI Y dY 1MK QU1	5, Oct, 2020	****	****	2, , Oct, 2020	1- dSovd- 9- 9	✓
Clear Ylastic F ottle , Uatural)Eg0N6P 4	O&dY -- DK O&dY - 2DK O&dY - 4DK	9, Oct, 2020	****	****	2, , Oct, 2020	12dSovd- 9- 9	✓
Clear Ylastic F ottle , Uatural)Eg0N6P 4	GI Y dY - DK LPMP095K	1, Oct, 2020	****	****	2, , Oct, 2020	15dSovd- 9- 9	✓
Clear Ylastic F ottle , Uatural)Eg0N6P 4	O&dY 16DK O&dY - 5DK	3, Oct, 2020	****	****	2, , Oct, 2020	16dSovd- 9- 9	✓



Y atrix: **WAI ER** Evaluation: * F & olcing time breaA; ✓ F Within holcing time.

Method	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
Eg036H: gissolved Sajor Cations							
Clear Ylastic F ottle , Uitrtric Acid7Hiltered)Eg036H4							
GI Y dY 1DK	; 5, Oct, 2020	''''	ctttt	ctttt	2;, Oct, 2020	1- dSovrd- 9- 9	✓
GI Y dY 5DK							
Clear Ylastic F ottle , Uitrtric Acid7Hiltered)Eg036H4							
O&dY -- DK	; 9, Oct, 2020	''''	ctttt	ctttt	2;, Oct, 2020	12dSovrd- 9- 9	✓
O&dY - 2DK							
O&dY - 4DK							
Clear Ylastic F ottle , Uitrtric Acid7Hiltered)Eg036H4							
GI Y dY - DK	; 1, Oct, 2020	''''	ctttt	ctttt	2;, Oct, 2020	15dSovrd- 9- 9	✓
LPMP085K							
Clear Ylastic F ottle , Uitrtric Acid7Hiltered)Eg036H4							
O&dY 16DK	; 3, Oct, 2020	''''	ctttt	ctttt	2;, Oct, 2020	16dSovrd- 9- 9	✓
O&dY - 5DK							
EP 020H: gissolved Setals f y @Y, S M							
Clear Ylastic F ottle , Uitrtric Acid7Hiltered)EP 020A, I 4							
GI Y dY 1DK	; 5, Oct, 2020	''''	ctttt	ctttt	2;, Oct, 2020	12dJprd- 9- 1	✓
GI Y dY 5DK							
Clear Ylastic F ottle , Uitrtric Acid7Hiltered)EP 020A, H4							
O&dY -- DK	; 9, Oct, 2020	''''	ctttt	ctttt	2;, Oct, 2020	15dJprd- 9- 1	✓
O&dY - 2DK							
O&dY - 4DK							
Clear Ylastic F ottle , Uitrtric Acid7Hiltered)EP 020A, H4							
GI Y dY - DK	; 1, Oct, 2020	''''	ctttt	ctttt	2;, Oct, 2020	14dJprd- 9- 1	✓
LPMP085K							
Clear Ylastic F ottle , Uitrtric Acid7Hiltered)EP 020A, H4							
O&dY 16DK	; 3, Oct, 2020	''''	ctttt	ctttt	2;, Oct, 2020	18dJprd- 9- 1	✓
O&dY - 5DK							
EP 020I : I otal Setals f y @Y, S M							
Clear Ylastic F ottle , Uatutral)EP 020A, I 4							
O&dY - 2M	; 9, Oct, 2020	26, Oct, 2020	15dJprd- 9- 1	✓	26, Oct, 2020	15dJprd- 9- 1	✓
Clear Ylastic F ottle , Uitrtric Acid7L n.iltered)EP 020A, I 4							
GI Y dY 1MK	; 5, Oct, 2020	26, Oct, 2020	1- dJprd- 9- 1	✓	26, Oct, 2020	1- dJprd- 9- 1	✓
RO2							
Clear Ylastic F ottle , Uitrtric Acid7L n.iltered)EP 020A, I 4							
RO5	; 9, Oct, 2020	26, Oct, 2020	12dJprd- 9- 1	✓	26, Oct, 2020	12dJprd- 9- 1	✓
Clear Ylastic F ottle , Uitrtric Acid7L n.iltered)EP 020A, I 4							
GI Y dY - MK	; 1, Oct, 2020	26, Oct, 2020	14dJprd- 9- 1	✓	26, Oct, 2020	14dJprd- 9- 1	✓
Clear Ylastic F ottle , Uitrtric Acid7L n.iltered)EP 020A, I 4							
TO2K	; 8, Oct, 2020	26, Oct, 2020	16dJprd- 9- 1	✓	26, Oct, 2020	16dJprd- 9- 1	✓
TO4K							
Clear Ylastic F ottle , Uitrtric Acid7L n.iltered)EP 020A, I 4							
RO4	; 3, Oct, 2020	26, Oct, 2020	18dJprd- 9- 1	✓	26, Oct, 2020	18dJprd- 9- 1	✓
Clear Ylastic F ottle , Uitrtric Acid7L n.iltered)EP 020A, I 4							
RO6	20, Oct, 2020	26, Oct, 2020	13dJprd- 9- 1	✓	26, Oct, 2020	13dJprd- 9- 1	✓



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 Work Nrcer : EM-926355
 Client : EYY CNSMGLTBSI PTHLTD
 Pro@At : Mj1,941- Oalranalc T2 UnAllary

Y atrix: **WAI ER** Evaluation: * F & olcing time breaAh ; ✓ F Within holcing time.

Method	Sample Date			Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation			
EP 065H: gissolved Sercury f y H&S M									
Clear Ylastic F ottle , Uitrac Acid7Hltered)EP 065H4	GI Y dY 1DK GI Y dY 5DK	; 5, Oct, 2020	****	cttd	22, Oct, 2020	cttd	1- dSovd- 9- 9	✓	
Clear Ylastic F ottle , Uitrac Acid7Hltered)EP 065H4	O&dY - - DK O&dY - 2DK O&dY - 4DK	; 9, Oct, 2020	****	cttd	22, Oct, 2020	cttd	12dSovd- 9- 9	✓	
Clear Ylastic F ottle , Uitrac Acid7Hltered)EP 065H4	GI Y dY - MK QU-	; 1, Oct, 2020	****	cttd	22, Oct, 2020	cttd	15dSovd- 9- 9	✓	
Clear Ylastic F ottle , Uitrac Acid7Hltered)EP 065H4	O&dY 16DK O&dY - 5DK	; 3, Oct, 2020	****	cttd	22, Oct, 2020	cttd	16dSovd- 9- 9	✓	
EP 065I : I otal Recoveraf le Sercury f y H&S M									
Clear Ylastic F ottle , Uatral)EP 065I 4	O&dY - 2M	; 9, Oct, 2020	****	cttd	21, Oct, 2020	cttd	12dSovd- 9- 9	✓	
Clear Ylastic F ottle , Uitrac Acid7L n. ltered)EP 065I 4	GI Y dY 1MK RO2	; 5, Oct, 2020	****	cttd	21, Oct, 2020	cttd	1- dSovd- 9- 9	✓	
Clear Ylastic F ottle , Uitrac Acid7L n. ltered)EP 065I 4	RO5	; 9, Oct, 2020	****	cttd	21, Oct, 2020	cttd	12dSovd- 9- 9	✓	
Clear Ylastic F ottle , Uitrac Acid7L n. ltered)EP 065I 4	GI Y dY - MK QU-	; 1, Oct, 2020	****	cttd	21, Oct, 2020	cttd	15dSovd- 9- 9	✓	
Clear Ylastic F ottle , Uitrac Acid7L n. ltered)EP 065I 4	TO2K TO4K	; 8, Oct, 2020	****	cttd	21, Oct, 2020	cttd	14dSovd- 9- 9	✓	
Clear Ylastic F ottle , Uitrac Acid7L n. ltered)EP 065I 4	RO4	; 3, Oct, 2020	****	cttd	21, Oct, 2020	cttd	16dSovd- 9- 9	✓	
Clear Ylastic F ottle , Uitrac Acid7L n. ltered)EP 065I 4	RO6	20, Oct, 2020	****	cttd	21, Oct, 2020	cttd	18dSovd- 9- 9	✓	
EP 05; P. Herrous Gon f y giscrete Analyser									
Clear Ylastic F ottle , q CI , Hltered)EP 05; P4	GI Y dY 1DK GI Y dY 5DK	; 5, Oct, 2020	****	cttd	22, Oct, 2020	cttd	- - dN/Ad- 9- 9	✓	
Clear Ylastic F ottle , q CI , Hltered)EP 05; P4	O&dY - - DK O&dY - 2DK O&dY - 4DK	; 9, Oct, 2020	****	cttd	22, Oct, 2020	cttd	- 2dN/Ad- 9- 9	✓	
Clear Ylastic F ottle , q CI , Hltered)EP 05; P4	GI Y dY - MK QU-	; 1, Oct, 2020	****	cttd	22, Oct, 2020	cttd	- 5dN/Ad- 9- 9	✓	
Clear Ylastic F ottle , q CI , Hltered)EP 05; P4	O&dY 16DK O&dY - 5DK	; 3, Oct, 2020	****	cttd	22, Oct, 2020	cttd	- 6dN/Ad- 9- 9	✓	



Page : 6 of 19
 Work Nrcer : EM-926355
 Client : EYY CNSMGLTBSI PTHLTD
 Pro@At : Mj.941- Oalranalc T2 UnAllary

Y atrix: **WAI ER** Evaluation: * F & olcing time breaAt ; ✓ F Within holcing time.

Method	Sample Date	Extraction / Preparation		Analysis		
		Date extracted	Due for extraction	Due for analysis	Evaluation	
EK085S : Mul. ide as M2, Clear Ylastic F ottle , Zinc Acetate/UaOq JEK0854 GI Y dY 1DK GI Y dY 5DK	; 5, Oct, 2020 ; 9, Oct, 2020	"" ""	cttt cttt	cttt cttt	-- dN/Ad- 9- 9 - 2dN/Ad- 9- 9	✓ ✓
Clear Ylastic F ottle , Zinc Acetate/UaOq JEK0854 O&dY -- DK O&dY - 2DK O&dY - 4DK	; 1, Oct, 2020 ; 3, Oct, 2020	"" ""	cttt cttt	cttt cttt	- 5dN/Ad- 9- 9 - 6dN/Ad- 9- 9	✓ ✓



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) pass(es) or fail(s). The actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Nutrients.

Yatrix: **WAI ER**

Evaluation: * F Quality Control frequency not within specification; ✓ Quality Control frequency within specification.

Quality Control Sample Type	Analytical Methods	Count			Rate (%)		Evaluation
		QC	Regular	Actual	Expected		
Laboratory Duplication (DGP)							
Alkalinity by PC Titrator	ED928P	5	59	0-00	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Chloride by Dis-Arete Analyser	ED954I	2	-3	0-1	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Dissolvec Y erAury by %BY M	EI 924%	-	-9	0-00	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Dissolvec Y etals by %Pdy MdMuite U	EI 9-9Ud%	-	-9	0-00	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
%errous Bon by Dis-Arete Analyser	EI 941I	5	59	0-00	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
I ross Upha anc Oeta UAtivity	EU-49	-	13	;	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Y aDr. Cations dDissolvec	ED9j 2%	-	13	;	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Mulfate (Turbicimetria) as MN5 - dby Dis-Arete Analyser	ED951I	2	-3	0-1	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Mulfice as M- d	E/ 934	5	-j	6-13	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Total Y erAury by %BY M	EI 924T	-	16	2-50	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Total Y etals by %Pdy MdMuite U	EI 9-9UdT	-	-9	0-00	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Laboratory Control Samples (LCM)							
Alkalinity by PC Titrator	ED928P	5	59	0-00	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Chloride by Dis-Arete Analyser	ED954I	5	-3	N-23	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Dissolvec Y erAury by %BY M	EI 924%	1	-9	5-00	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Dissolvec Y etals by %Pdy MdMuite U	EI 9-9Ud%	1	-9	5-00	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
%errous Bon by Dis-Arete Analyser	EI 941I	-	59	5-00	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
I ross Upha anc Oeta UAtivity	EU-49	-	13	;	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Y aDr. Cations dDissolvec	ED9j 2%	1	13	5-59	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Mulfate (Turbicimetria) as MN5 - dby Dis-Arete Analyser	ED951I	5	-3	N-23	0-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Mulfice as M- d	E/ 934	-	-j	9-30	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Total Y erAury by %BY M	EI 924T	1	16	9-25	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Total Y etals by %Pdy MdMuite U	EI 9-9UdT	1	-9	5-00	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Y ethoc Blanks (YO)							
Chloride by Dis-Arete Analyser	ED954I	-	-3	1-; N	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Dissolvec Y erAury by %BY M	EI 924%	1	-9	5-00	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Dissolvec Y etals by %Pdy MdMuite U	EI 9-9Ud%	1	-9	5-00	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
%errous Bon by Dis-Arete Analyser	EI 941I	-	59	5-00	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
I ross Upha anc Oeta UAtivity	EU-49	1	13	5-59	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Y aDr. Cations dDissolvec	ED9j 2%	1	13	5-59	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Mulfate (Turbicimetria) as MN5 - dby Dis-Arete Analyser	ED951I	-	-3	1-; N	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Mulfice as M- d	E/ 934	-	-j	9-30	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Total Y erAury by %BY M	EI 924T	1	16	9-25	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Total Y etals by %Pdy MdMuite U	EI 9-9UdT	1	-9	5-00	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc
Y etrix Mpikes (YM)							
Chloride by Dis-Arete Analyser	ED954I	-	-3	1-; N	5-00	✓	SEPY - 912 O2 z ULMQC Mtancarc



Page : 3 of 19
 Work Nrcer : EM-926355
 Client : EYY CNSMGLTBSI PTHLTD
 Pro@At : Mj 941- Oalranalc T2 UnAfflary

Y atrix: **WAI ER** Evaluation: * F Quality Control fre, uenAy not q ithin speAffiAation ; ✓ F Quality Control fre, uenAy q ithin speAffiAation.

Quality Control Mample Type	Method	Count		Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected		
Analytical Methods							
Y atrix Wpikes (YM) dContinuec							
Dissolvec YerAury by %BY M	EI 924%	1	-9	5-00	5-00	✓	SEPY -912 O2 z ULMQC Mtancarc
Dissolvec Y etals by %Pdy MdMuite U	EI 9-9Ud%	1	-9	5-00	5-00	✓	SEPY -912 O2 z ULMQC Mtancarc
%errous Bon by DisArete Unalyser	EI 9411	-	59	5-00	5-00	✓	SEPY -912 O2 z ULMQC Mtancarc
Mulfate (TurbicimetriA) as MN5 - dby DisArete Unalyser	ED9511	-	-3	1-; N	5-00	✓	SEPY -912 O2 z ULMQC Mtancarc
Mulfice as M- d	E/ 934	-	-J	9-30	5-00	✓	SEPY -912 O2 z ULMQC Mtancarc
Total YerAury by %BY M	EI 924T	1	16	9-25	5-00	✓	SEPY -912 O2 z ULMQC Mtancarc
Total Y etals by %Pdy MdMuite U	EI 9-9UdT	1	-9	5-00	5-00	✓	SEPY -912 O2 z ULMQC Mtancarc



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognised procedures such as those published by the GMEPUKUP&UKUMANC SEPY. The 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. Modifications from the original methods have been developed and are provided in the yellow descriptions.

Analytical Methods	Matrix	Method	Method Descriptions
Iross Ulpha anc Oeta UAivity	WUTER	EU-49	UMTY D8- 3206: Determination of gross alpha anc gross beta radioactivity in water samples by Li, uic MAntillation Counting (LMC).
Ulkalinity by PC Titrator	WUTER	ED928dP	house: ReferenAec to UP&U - 2- 9 O This procedure determines alkalinity by automatic measurement (e.g. PC Titrate) on a settlec supernatant ali, uot of the sample using p& 5.4 for indicating the total alkalinity endpoint. This method is compliant with SEPY Method Q(2)
Mulfate (TurbidimetriA) as MN5 - dby DisArete Unalyser	WUTER	ED9511	house: ReferenAec to UP&U 5499dWN5. Dissolvec sulfate is ceterminec in a 9.54um filterec sample. Mulfate ions are converted to a barium sulfate suspension in an acetate medium with barium chloride. Light absorbance of the solution is measured by a photometer and the absorbance is determined by comparison of the reacting with a standard curve. This method is compliant with SEPY Method Q(2)
Chlorice by DisArete Unalyser	WUTER	ED9541	house: ReferenAec to UP&U 5499 Cl dI. The thioyanate ion is liberated from mercuric thiocyanate through the reaction of mercuric ion with the chloride ion to form non-dissociated mercuric chloride in the presence of ferrous ions. The liberated thioyanate forms highly coloured ferric thiocyanate which is measured at 539 nm UP&U seal method - 918dtd.
Y aor Cations dDissolvec	WUTER	ED9j 2%	house: ReferenAec to UP&U 21- 9 anc 21- 4; GMEPU MW 356 d6919 anc 69- 9; Cations are determined by either PDCJEM or PDCMteAhi, ues. This method is compliant with SEPY Method Q(2) Mccium Ucsorption Ratio is calculated from Ca/K g anc Sa q h/ah ceterminec by ULMIn house method QWBESME9j 2% This method is compliant with SEPY Method Q(2) & arcness parameters are as follows based on UP&U - 259 O. This method is compliant with SEPY Method Q(2)
Dissolvec Y etals by PDC M dMuite U	WUTER	EI 9- 9Ud%	house: ReferenAec to UP&U 21- 4; GMEPU MW356 d69- 9KJLM QWBESMEI 9- 9. Samples are 9.54um filtered prior to analysis. The PDCMteAhi, ue utilizees a highly efficient argon plasma to ionise selected elements. Ions are then passed into a high vacuum mass spectrometer which separates the analytes based on their cation/mass to charge ratios prior to their measurement by a discrete ion detector.
Total Y etals by PDC M dMuite U	WUTER	EI 9- 9Ud%	house: ReferenAec to UP&U 21- 4; GMEPU MW356 d69- 9KJLM QWBESMEI 9- 9. The PDCMteAhi, ue utilizees a highly efficient argon plasma to ionise selected elements. Ions are then passed into a high vacuum mass spectrometer which separates the analytes based on their cation/mass to charge ratios prior to their measurement by a discrete ion detector.
Dissolvec Y erAury by PDC M	WUTER	EI 924%	house: ReferenAec to UM2449KUP&U 211- &g dO (%oq dn@Ation (MnCl-)(Colc Vapour generation) UUM) Samples are 9.54um filtered prior to analysis. PDCMteAhi, ue utilizees an automatic flameless atomic absorption technique, ue. U bromate/bromine reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionised mercury is reduced to atomic mercury vapour by MnCl- which is then passed into a heated, uart= Aell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with SEPY Method Q(2).
Total Y erAury by PDC M	WUTER	EI 924T	house: ReferenAec to UM2449KUP&U 211- &g dO (%oq dn@Ation (MnCl-)(Colc Vapour generation) UUM) PDCMteAhi, ue utilizees an automatic flameless atomic absorption technique, ue. U bromate/bromine reagent is used to oxidise any organic mercury compounds in the unfiltered sample. The ionised mercury is reduced to atomic mercury vapour by MnCl- which is then passed into a heated, uart= Aell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with SEPY Method Q(2).



Page : 19 of 19
 Work Nrcer : EM-926355
 Client : EYY CNSMGLTBI PTHLTD
 Projct : Mj 941- Calranalc T2 UnAillary

Analytical Methods	Method	Matrix	Method Descriptions
%ferrous Iron by Discrete Analyser	EI 941I	WUTER	house: ReferenAec to UP&U 2499 %edO. U AolorimetriAcetermination basec on the reaAition betq een phenanthroline anc ferrous iron at p& 2.- 2. to form an orangeAec Aomplex that is measurec against a fivepoint Aalibration Aurve. This method is Aompliant q ith SEPY Mhewecule Q(2).
Mulfice as M- d	E/ 934	WUTER	house: ReferenAec to UP&U 5499dM- dD. Mulfice speAes present in q ater samples are immedieately preAipitatec q hen AolleAec in pretreatec AaustiAminA aAetate preservec sample Aontainers. The sulphices are Aolourec using methylene blue inciAator. Sonc:eteAis may be sAreenec by Aomparison against a stancarc at halfd.NRkotherg use samples are measurec using GVdVM ceteAition at 665nm. This method is Aompliant q ith SEPY Mhewecule Q(2)
BniACalanAe by PCT DU anc Turbi MN5 DU	* ES944 dPI	WUTER	house: ReferenAec to UP&U 1929% This method is Aompliant q ith SEPY Mhewecule Q(2)
Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total ReAoverable Y etals	ES- 4	WUTER	house: ReferenAec to GMEPU MW35662994. Y ethoc 2994 is a SitrifA&ycroAloriA aAic cigestion proAecure usec to prepare surfae anc ground q ater samples for analysis by ECPUEMor ECPYM. This method is Aompliant q ith SEPY Mhewecule Q(2)

Subcom / Forward Lab / Split WO
 Lab / Analysis: *Norco / PSD*
 Organised By / Date:
 Requiring By / Date:
 Comnote / Court:
 WO No:
 Attached By PO / Internal Sheet:

ES 203 6844

Environmental Division
 Sydney
 Work Order Reference
ES2036846



Telephone : + 61-2-8784 8555

LAB ID	SAMPLE ID	DATE/TIME	MATRIX (S&G)	COMMENTS/INFORMATION	ANALYSIS REQUIRED (listing BUT IN THE Case Cells under analytical pass)	ADDITIONAL INFORMATION
	UGM-M1D	16/10/2020 14:10	W	TYPE & PRESERVATIVE (none)	1	None
	UGM-M1S	16/10/2020 14:20	W	TOTAL BUTTLER	1	None
	UGM-M2D	17/10/2020 11:30	W	TYPE & PRESERVATIVE (none)	1	None
	UGM-M2S	17/10/2020 12:00	W	TOTAL BUTTLER	1	None
	UGM-M4D	18/10/2020 15:30	W	TYPE & PRESERVATIVE (none)	1	None
	BH-M1D	18/10/2020 11:45	W	TOTAL BUTTLER	1	None
	BH-M1S	18/10/2020 12:30	W	TYPE & PRESERVATIVE (none)	1	None
	BH-M2D	16/10/2020 12:00	W	TOTAL BUTTLER	1	None
	BH-M2S	16/10/2020 11:15	W	TYPE & PRESERVATIVE (none)	1	None
	BH-M3D	16/10/2020 9:50	W	TOTAL BUTTLER	1	None
	BH-M3S	16/10/2020 9:10	W	TYPE & PRESERVATIVE (none)	1	None
	BH-M4D	19/10/2020 10:20	W	TOTAL BUTTLER	1	None
	BH-M4S	19/10/2020 11:00	W	TYPE & PRESERVATIVE (none)	1	None
	BH-M5D	16/10/2020 8:10	W	TOTAL BUTTLER	1	None
	BH-M5S	16/10/2020 7:40	W	TYPE & PRESERVATIVE (none)	1	None
	PSD-P04	17/10/2020 9:20	W	TOTAL BUTTLER	1	None
	PSD_01	11/10/2020 14:45	W	TYPE & PRESERVATIVE (none)	1	Please report PSD samples in a separate
	PSD_01	12/10/2020 12:50	W	TOTAL BUTTLER	1	Please report PSD samples in a separate
	PSD_01	13/10/2020 16:45	W	TYPE & PRESERVATIVE (none)	1	Please report PSD samples in a separate
	PSD_02	12/10/2020 12:55	W	TOTAL BUTTLER	1	Please report PSD samples in a separate
	PSD_02	13/10/2020 16:45	W	TYPE & PRESERVATIVE (none)	1	Please report PSD samples in a separate
	O-A1	15/10/2020 15:30	W	TOTAL BUTTLER	4	Duplicate
	O-C1	15/10/2020 15:30	W	TYPE & PRESERVATIVE (none)	4	Duplicate
	O-A2	17/10/2020 12:00	W	TOTAL BUTTLER	4	Duplicate
	O-C2	17/10/2020 12:00	W	TYPE & PRESERVATIVE (none)	4	Duplicate
	TB3	18/10/2020	W	TOTAL BUTTLER	1	Duplicate
	TB4	18/10/2020	W	TYPE & PRESERVATIVE (none)	1	Duplicate
	TB5	18/10/2020	W	TOTAL BUTTLER	1	Duplicate
	RB3	18/10/2020 0:00	W	TYPE & PRESERVATIVE (none)	1	Duplicate
	RB4	18/10/2020 0:00	W	TOTAL BUTTLER	1	Duplicate
	RB5	17/10/2020 12:40	W	TYPE & PRESERVATIVE (none)	1	Duplicate
	RB6	18/10/2020 12:05	W	TOTAL BUTTLER	1	Duplicate
				TOTAL	160	

CLIENT: BUNUBI CONSULTING
 PROJECT: Sydney Airport
 ANALYSIS: ...
 DATE: ...
 TIME: ...



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **ES2036846** **Page** : 1 of 9
Client : **EMM CONSULTING PTY LTD** **Laboratory** : Environmental Division Sydney
Contact : **PAUL GIBBONS** **Contact** : **Sepan Mahamad**
Address : **Ground Floor Suite 1 20 Chandos Street** **Address** : **277-289 Woodpark Road Smithfield NSW Australia 2164**
St Leonards NSW NSW 2065
Telephone : **----** **Telephone** : **+61 2 8784 8555**
Project : **S190512 Balranald T3 Ancillary** **Date Samples Received** : **08-Oct-2020 14:00**
Order number : **----** **Date Analysis Commenced** : **26-Oct-2020**
C-O-C number : **----** **Issue Date** : **30-Oct-2020 14:56**
Sampler : **BILL BULL, KAITLYN BRODIE**
Site : **----**
Quote number : **EN/222**
No. of samples received : **33**
No. of samples analysed : **33**



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories	Position
Aleksandar Vujkovic	Laboratory Technician
Ankit Joshi	Inorganic Chemist
Ashesh Patel	Senior Chemist

Accreditation Category
Newcastle - Inorganics, Mayfield West, NSW
Sydney Inorganics, Smithfield, NSW
Sydney Inorganics, Smithfield, NSW



Page : 2 of 9
Work Order : ES2036846
Client : EMM CONSULTING PTY LTD
Project : S190512 Balranald T3 Ancillary

General Comments

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

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

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

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

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

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

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

LOR = Limit of reporting

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

∅ = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- EA154: ALS does not hold NATA accreditation for Laser Particle Sizing.



Analytical Results

Sub-Matrix: WATER (Matrix: WATER)		Client sample ID			
Compound	CAS Number	LOR	Client sampling date / time	Unit	
			22-Sep-2020 08:30	ES2036846-010	PSD_01
			23-Sep-2020 08:30	ES2036846-011	PSD_01
			24-Sep-2020 08:30	ES2036846-012	PSD_01
			25-Sep-2020 11:30	ES2036846-013	PSD_01
			26-Sep-2020 11:30	ES2036846-014	PSD_01
EA025: Total Suspended Solids dried at 104 ± 2°C Suspended Solids (SS)					
	----	5	mg/L	<5	Result
				15	Result
				<5	Result
				<5	Result
EA150: Particle Sizing ø +75µm					
	----	1	%	<5	Result

See Attached

See Attached

See Attached

See Attached

See Attached

See Attached

See Attached

See Attached



Analytical Results

Compound	CAS Number	Client sample ID		PSD_01	PSD_01	PSD_01	PSD_01	PSD_01
		Client sampling date / time	Unit					
Sub-Matrix: WATER (Matrix: WATER)								
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	---	5	mg/L	27-Sep-2020 11:30	ES2036846-015	28-Sep-2020 11:30	29-Sep-2020 11:30	30-Sep-2020 11:30
EA150: Particle Sizing								
Ø +75µm	---	1	%	27-Sep-2020 11:30	ES2036846-015	28-Sep-2020 11:30	29-Sep-2020 11:30	30-Sep-2020 11:30
					Result	Result	Result	Result
					<5	<5	<5	<5
					See Attached	See Attached	See Attached	See Attached
								01-Oct-2020 11:30
								ES2036846-019
					Result	Result	Result	Result
					<5	<5	<5	<5



Page : 7 of 9
 Work Order : ES2036846
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

Analytical Results

Compound	CAS Number	Client sample ID		PSD_02	PSD_02	PSD_02	PSD_02	PSD_02
		Client sampling date / time	Unit					
Sub-Matrix: WATER (Matrix: WATER)								
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	---	5	mg/L	23-Sep-2020 16:45	24-Sep-2020 08:30	25-Sep-2020 11:30	26-Sep-2020 11:30	27-Sep-2020 11:30
EA150: Particle Sizing								
ø +75µm	---	1	%	ES2036846-034	ES2036846-035	ES2036846-036	ES2036846-037	ES2036846-038
				Result	Result	Result	Result	Result
				<5	7	14	15	<5
				See Attached	See Attached	See Attached	See Attached	See Attached



Page : 8 of 9
 Work Order : ES2036846
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

Analytical Results

Compound	CAS Number	LOR	Unit	Client sample ID									
				Client sampling date / time	PSD_02	PSD_02	PSD_02	PSD_02					
				28-Sep-2020 11:30	ES2036846-039	29-Sep-2020 11:30	ES2036846-040	30-Sep-2020 11:30	ES2036846-041	01-Oct-2020 11:30	ES2036846-042	02-Oct-2020 11:30	ES2036846-043
				Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
				11	12	10	28	6					
EA025: Total Suspended Solids dried at 104 ± 2°C													
Suspended Solids (SS)	----	5	mg/L										
EA150: Particle Sizing													
Ø +75µm	----	1	%										

See Attached

See Attached

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See Attached



Page : 9 of 9
 Work Order : ES2036846
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

Analytical Results

Compound	CAS Number	Client sample ID			PSD_02	PSD_02	PSD_02	PSD_02
		Client sampling date / time	LOR	Unit				
Sub-Matrix: WATER (Matrix: WATER)								
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	---	5	mg/L	03-Oct-2020 11:30	ES2036846-044	04-Oct-2020 11:30	05-Oct-2020 11:30	
EA150: Particle Sizing								
ø +75µm	---	1	%					
					Result	Result	Result	
					7	24	24	
					See Attached	See Attached	See Attached	



Environmental

QUALITY CONTROL REPORT

Work Order : **ES2036846**

Page : 1 of 3

Client : **EMM CONSULTING PTY LTD**
 Contact : **PAUL GIBBONS**
 Address : **Ground Floor, Suite 1 20 Chandos Street
 St Leonards NSW 2065**
 Telephone : **----**
 Project : **S190512 Balranald T3 Ancillary**
 Order number : **----**
 C-O-C number : **----**
 Sampler : **BILL BULL, KAITLYN BRODIE**
 Site : **----**
 Quote number : **EN/222**
 No. of samples received : **33**
 No. of samples analysed : **33**

Laboratory : **Environmental Division Sydney**
 Contact : **Sepan Mahamad**
 Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**
 Telephone : **+61 2 8784 8555**
 Date Samples Received : **08-Oct-2020**
 Date Analysis Commenced : **26-Oct-2020**
 Issue Date : **30-Oct-2020**



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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Aleksandar Vujkovic	Laboratory Technician	Newcastle - Inorganics, Mayfield West, NSW
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Ashesh Patel	Senior Chemist	Sydney Inorganics, Smithfield, NSW



Page : 2 of 3
 Work Order : ES2036846
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Bairnald T3 Ancillary

General Comments

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

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

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

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

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

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3328253)									
ES2036846-010	PSD_01	EA025H: Suspended Solids (SS)	---	5	mg/L	<5	21	123	No Limit
ES2036846-019	PSD_01	EA025H: Suspended Solids (SS)	---	5	mg/L	<5	<5	0.00	No Limit
EA025: Total Suspended Solids dried at 104 ± 2°C (QC Lot: 3331029)									
ES2036846-001	PSD_01	EA025H: Suspended Solids (SS)	---	5	mg/L	<5	12	78.8	No Limit
ES2036846-041	PSD_02	EA025H: Suspended Solids (SS)	---	5	mg/L	10	23	75.6	No Limit



Page : 3 of 3
 Work Order : ES2036846
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Bairnald T3 Ancillary

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

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

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
				Result	Concentration	Spike Recovery (%)	LCS	Low	High
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3328253)									
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	106	106	83.0	129
				<5	1000 mg/L	103	103	82.0	110
EA025: Total Suspended Solids dried at 104 ± 2°C (QCLot: 3331029)									
EA025H: Suspended Solids (SS)	----	5	mg/L	<5	150 mg/L	99.3	99.3	83.0	129
				<5	1000 mg/L	98.0	98.0	82.0	110

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.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**



ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES2036846	Page	: 1 of 7
Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: PAUL GIBBONS	Telephone	: +61 2 8784 8555
Project	: S190512 Balranald T3 Ancillary	Date Samples Received	: 08-Oct-2020
Site	: ----	Issue Date	: 30-Oct-2020
Sampler	: BILL BULL, KAITLYN BRODIE	No. of samples received	: 33
Order number	: ----	No. of samples analysed	: 33

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



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 Work Order : ES2036846
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

Outliers : Analysis Holding Time Compliance

Matrix: WATER

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA025: Total Suspended Solids dried at 104 ± 2°C							
Clear Plastic Bottle - Natural PSD_01		-----	-----	-----	26-Oct-2020	08-Oct-2020	18
Clear Plastic Bottle - Natural PSD_02		-----	-----	-----	27-Oct-2020	08-Oct-2020	19
Clear Plastic Bottle - Natural PSD_01		-----	-----	-----	26-Oct-2020	09-Oct-2020	17
Clear Plastic Bottle - Natural PSD_02		-----	-----	-----	27-Oct-2020	09-Oct-2020	18
Clear Plastic Bottle - Natural PSD_01		-----	-----	-----	26-Oct-2020	10-Oct-2020	16
Clear Plastic Bottle - Natural PSD_02		-----	-----	-----	27-Oct-2020	10-Oct-2020	17
Clear Plastic Bottle - Natural PSD_01		-----	-----	-----	26-Oct-2020	11-Oct-2020	15
Clear Plastic Bottle - Natural PSD_02		-----	-----	-----	27-Oct-2020	11-Oct-2020	16
Clear Plastic Bottle - Natural PSD_01, PSD_02	PSD_02	-----	-----	-----	27-Oct-2020	12-Oct-2020	15
Clear Plastic Bottle - Natural PSD_01		-----	-----	-----	27-Oct-2020	18-Oct-2020	9
Clear Plastic Bottle - Natural PSD_01, PSD_02	PSD_02	-----	-----	-----	27-Oct-2020	19-Oct-2020	8
Clear Plastic Bottle - Natural PSD_01, PSD_02	PSD_02	-----	-----	-----	27-Oct-2020	20-Oct-2020	7
Clear Plastic Bottle - Natural PSD_01, PSD_02	PSD_02	-----	-----	-----	26-Oct-2020	29-Sep-2020	27
Clear Plastic Bottle - Natural PSD_01, PSD_02	PSD_02	-----	-----	-----	26-Oct-2020	30-Sep-2020	26
Clear Plastic Bottle - Natural PSD_01, PSD_02	PSD_02	-----	-----	-----	26-Oct-2020	01-Oct-2020	25
Clear Plastic Bottle - Natural PSD_01, PSD_02	PSD_02	-----	-----	-----	26-Oct-2020	02-Oct-2020	24
Clear Plastic Bottle - Natural PSD_01, PSD_02	PSD_02	-----	-----	-----	26-Oct-2020	03-Oct-2020	23
Clear Plastic Bottle - Natural PSD_01		-----	-----	-----	27-Oct-2020	03-Oct-2020	24
Clear Plastic Bottle - Natural PSD_02		-----	-----	-----	26-Oct-2020	04-Oct-2020	22



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 Work Order : ES2036846
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

Matrix: **WATER**

Method	Extraction / Preparation			Analysis	
	Date extracted	Due for extraction	Days overdue	Date analysed	Days overdue
EA025: Total Suspended Solids dried at 10.4 ± 2°C - Analysis Holding Time Compliance					
Clear Plastic Bottle - Natural PSD_02	*****	*****	*****	27-Oct-2020	23
Clear Plastic Bottle - Natural PSD_01	*****	*****	*****	26-Oct-2020	21
Clear Plastic Bottle - Natural PSD_02	*****	*****	*****	27-Oct-2020	22
Clear Plastic Bottle - Natural PSD_01	*****	*****	*****	26-Oct-2020	20
Clear Plastic Bottle - Natural PSD_02	*****	*****	*****	27-Oct-2020	21
Clear Plastic Bottle - Natural PSD_01	*****	*****	*****	26-Oct-2020	19
Clear Plastic Bottle - Natural PSD_02	*****	*****	*****	27-Oct-2020	20

Analysis Holding Time Compliance

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

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

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

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

Matrix: **WATER**

Method	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Date analysed	Due for analysis
EA025: Total Suspended Solids dried at 10.4 ± 2°C					
Clear Plastic Bottle - Natural (EA025H) PSD_01	01-Oct-2020	*****	*****	26-Oct-2020	08-Oct-2020
Clear Plastic Bottle - Natural (EA025H) PSD_02	01-Oct-2020	*****	*****	27-Oct-2020	08-Oct-2020
Clear Plastic Bottle - Natural (EA025H) PSD_01	02-Oct-2020	*****	*****	26-Oct-2020	09-Oct-2020
Clear Plastic Bottle - Natural (EA025H) PSD_02	02-Oct-2020	*****	*****	27-Oct-2020	09-Oct-2020
Clear Plastic Bottle - Natural (EA025H) PSD_01	03-Oct-2020	*****	*****	26-Oct-2020	10-Oct-2020
Clear Plastic Bottle - Natural (EA025H) PSD_02	03-Oct-2020	*****	*****	27-Oct-2020	10-Oct-2020
Clear Plastic Bottle - Natural (EA025H) PSD_01	04-Oct-2020	*****	*****	26-Oct-2020	11-Oct-2020

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



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 Work Order : ES2036846
 Client : EMM CONSULTING PTY LTD
 Project : S190512 Balranald T3 Ancillary

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

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA025: Total Suspended Solids dried at 10.4 ± 2°C - Continued								
PSD_02		04-Oct-2020	-----	-----	27-Oct-2020	11-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_02							
PSD_01		05-Oct-2020	-----	-----	27-Oct-2020	12-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		11-Oct-2020	-----	-----	27-Oct-2020	18-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		12-Oct-2020	-----	-----	27-Oct-2020	19-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		13-Oct-2020	-----	-----	27-Oct-2020	20-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		22-Sep-2020	-----	-----	26-Oct-2020	29-Sep-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		23-Sep-2020	-----	-----	26-Oct-2020	30-Sep-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		24-Sep-2020	-----	-----	26-Oct-2020	01-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		25-Sep-2020	-----	-----	26-Oct-2020	02-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		26-Sep-2020	-----	-----	26-Oct-2020	03-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		26-Sep-2020	-----	-----	27-Oct-2020	03-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		27-Sep-2020	-----	-----	26-Oct-2020	04-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		27-Sep-2020	-----	-----	27-Oct-2020	04-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		28-Sep-2020	-----	-----	26-Oct-2020	05-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		28-Sep-2020	-----	-----	27-Oct-2020	05-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		29-Sep-2020	-----	-----	26-Oct-2020	06-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		29-Sep-2020	-----	-----	27-Oct-2020	06-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		30-Sep-2020	-----	-----	26-Oct-2020	07-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							
PSD_01		30-Sep-2020	-----	-----	27-Oct-2020	07-Oct-2020	✗	
Clear Plastic Bottle - Natural (EA025H)	PSD_01							



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

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA150: Particle Sizing								
Clear Plastic Bottle - Natural (EA154)	PSD_02	01-Oct-2020	-----	-----	26-Oct-2020	30-Mar-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	02-Oct-2020	-----	-----	26-Oct-2020	31-Mar-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	03-Oct-2020	-----	-----	26-Oct-2020	01-Apr-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	04-Oct-2020	-----	-----	26-Oct-2020	02-Apr-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	05-Oct-2020	-----	-----	26-Oct-2020	03-Apr-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	11-Oct-2020	-----	-----	26-Oct-2020	09-Apr-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	12-Oct-2020	-----	-----	26-Oct-2020	10-Apr-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	13-Oct-2020	-----	-----	26-Oct-2020	11-Apr-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	22-Sep-2020	-----	-----	26-Oct-2020	21-Mar-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	23-Sep-2020	-----	-----	26-Oct-2020	22-Mar-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	24-Sep-2020	-----	-----	26-Oct-2020	23-Mar-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	25-Sep-2020	-----	-----	26-Oct-2020	24-Mar-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	26-Sep-2020	-----	-----	26-Oct-2020	25-Mar-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	27-Sep-2020	-----	-----	26-Oct-2020	26-Mar-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	28-Sep-2020	-----	-----	26-Oct-2020	27-Mar-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	29-Sep-2020	-----	-----	26-Oct-2020	28-Mar-2021	✓	
Clear Plastic Bottle - Natural (EA154)	PSD_02	30-Sep-2020	-----	-----	26-Oct-2020	29-Mar-2021	✓	



Quality Control Parameter Frequency Compliance

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

Matrix: **WATER**

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

Quality Control Sample Type	Method	Count		Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected		
Analytical Methods							
Laboratory Duplicates (DUP)							
Suspended Solids (High Level)	EA025H	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Suspended Solids (High Level)	EA025H	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Suspended Solids (High Level)	EA025H	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



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Work Order : ES2036846
Client : EMM CONSULTING PTY LTD
Project : S190512 Balranald T3 Ancillary

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Suspended Solids (High Level)	EA025H	WATER	In house: Referenced to APHA 2540D. A gravimetric procedure employed to determine the amount of 'non-filterable' residue in a aqueous sample. The prescribed GFC (1.2um) filter is rinsed with deionised water, oven dried and weighed prior to analysis. A well-mixed sample is filtered through a glass fibre filter (1.2um). The residue on the filter paper is dried at 104+/-2C . This method is compliant with NEPM Schedule B(3)
Particle Sizing in Water by Laser Diffraction Analysis	* EA154	WATER	Particle Size Analysis of Particulates in Water by Laser Diffraction Analysis according to APHA Method 2560D

CERTIFICATE OF ANALYSIS 253949

Client Details

Client	EMM Consulting Pty Ltd
Attention	P Gibbons
Address	188 Normanby Rd, SOUTHBANK, VIC, 3006

Sample Details

Your Reference	S190512
Number of Samples	2 Water
Date samples received	21/10/2020
Date completed instructions received	21/10/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

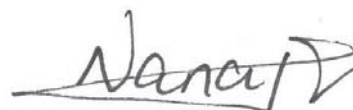
Report Details

Date results requested by	28/10/2020
Date of Issue	28/10/2020
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Diego Bigolin, Team Leader, Inorganics
 Jaimie Loa-Kum-Cheung, Metals Supervisor
 Priya Samarawickrama, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

Ion Balance			
Our Reference		253949-1	253949-2
Your Reference	UNITS	QC1	QC2
Date Sampled		15/10/2020	17/10/2020
Type of sample		Water	Water
Date prepared	-	22/10/2020	22/10/2020
Date analysed	-	22/10/2020	22/10/2020
Calcium - Dissolved	mg/L	600	700
Potassium - Dissolved	mg/L	46	38
Sodium - Dissolved	mg/L	14,000	14,000
Magnesium - Dissolved	mg/L	1,600	1,700
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	380	270
Carbonate Alkalinity as CaCO ₃	mg/L	<5	<5
Total Alkalinity as CaCO ₃	mg/L	380	270
Sulphate, SO ₄	mg/L	3,600	4,400
Chloride, Cl	mg/L	18,000	20,000
Ionic Balance	%	12	10

HM in water - dissolved			
Our Reference		253949-1	253949-2
Your Reference	UNITS	QC1	QC2
Date Sampled		15/10/2020	17/10/2020
Type of sample		Water	Water
Date prepared	-	23/10/2020	23/10/2020
Date analysed	-	23/10/2020	23/10/2020
Arsenic-Dissolved	µg/L	<1	2
Cadmium-Dissolved	µg/L	<0.1	<0.1
Chromium-Dissolved	µg/L	<1	4
Copper-Dissolved	µg/L	<1	1
Lead-Dissolved	µg/L	<1	<1
Mercury-Dissolved	µg/L	<0.05	<0.05
Nickel-Dissolved	µg/L	<1	5
Zinc-Dissolved	µg/L	73	3

HM in water - total		
Our Reference		253949-2
Your Reference	UNITS	QC2
Date Sampled		17/10/2020
Type of sample		Water
Date prepared	-	23/10/2020
Date analysed	-	23/10/2020
Arsenic-Total	µg/L	3
Cadmium-Total	µg/L	0.1
Chromium-Total	µg/L	6
Copper-Total	µg/L	5
Lead-Total	µg/L	<1
Mercury-Total	µg/L	<0.05
Nickel-Total	µg/L	8
Zinc-Total	µg/L	9

Miscellaneous Inorganics			
Our Reference		253949-1	253949-2
Your Reference	UNITS	QC1	QC2
Date Sampled		15/10/2020	17/10/2020
Type of sample		Water	Water
Date prepared	-	22/10/2020	22/10/2020
Date analysed	-	22/10/2020	22/10/2020
Ferrous Iron	mg/L	1.7	<0.05
Sulphide	mg/L	<0.5	<0.5

Method ID	Methodology Summary
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.
Inorg-051	Sulphide determined titrimetrically based on APHA latest edition 4500 S2- F. Note, the Sulphide is termed as Total Sulphide given any Sulphide contained in any sediment present is also included in the determination.
Inorg-076	Ferrous Iron is determined colourimetrically by discrete analyser. Waters samples are filtered on receipt prior to analysis.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.

Client Reference: S190512

QUALITY CONTROL: Ion Balance					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			22/10/2020	[NT]	[NT]	[NT]	[NT]	22/10/2020	[NT]
Date analysed	-			22/10/2020	[NT]	[NT]	[NT]	[NT]	22/10/2020	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	106	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	97	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	111	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	110	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	100	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	109	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	95	[NT]

Client Reference: S190512

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date prepared	-			23/10/2020	[NT]	[NT]	[NT]	[NT]	23/10/2020	[NT]
Date analysed	-			23/10/2020	[NT]	[NT]	[NT]	[NT]	23/10/2020	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	91	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	87	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	103	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	93	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]

Client Reference: S190512

QUALITY CONTROL: HM in water - total					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			23/10/2020	[NT]	[NT]	[NT]	[NT]	23/10/2020	[NT]
Date analysed	-			23/10/2020	[NT]	[NT]	[NT]	[NT]	23/10/2020	[NT]
Arsenic-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	90	[NT]
Cadmium-Total	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	86	[NT]
Chromium-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	94	[NT]
Copper-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Lead-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]
Mercury-Total	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	98	[NT]
Nickel-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	92	[NT]
Zinc-Total	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]

Client Reference: S190512

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			22/10/2020	[NT]	[NT]	[NT]	[NT]	22/10/2020	[NT]
Date analysed	-			22/10/2020	[NT]	[NT]	[NT]	[NT]	22/10/2020	[NT]
Ferrous Iron	mg/L	0.05	Inorg-076	<0.05	[NT]	[NT]	[NT]	[NT]	86	[NT]
Sulphide	mg/L	0.5	Inorg-051	<0.5	[NT]	[NT]	[NT]	[NT]	81	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Dissolved Metals: no filtered, preserved sample was received for 253949-1, therefore the unpreserved sample was filtered through 0.45µm filter at the lab. Note: there is a possibility some elements may be underestimated.



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CLIENT: CHRYSTAL CONSULTING
 OFFICE: 2000 Lakeside Drive, Suite 200, Irvine, CA 92614
 PROJECT: UNIVERSITY OF CALIFORNIA
 PROJECT NO.: 151883
 PURCHASE ORDER: 151883
 PROJECT MANAGER: PAUL GIBSON
 SAMPLE: 151883-01 (151883-01)
 DATE: 15/12/2015
 ANALYST: J. GIBSON

FOR LABORATORY USE ONLY (Print)
 ANALYST: J. GIBSON
 DATE/TIME: 15/12/2015 11:30
 RECEIVED BY: J. GIBSON

ALS USE ONLY	SAMPLE DETAILS	MATRIX	DATE / TIME	MATRIX	CONTAINER INFORMATION	ANALYSIS REQUIRED	RECEIVED BY	DATE/TIME	RECEIVED BY	DATE/TIME	ANALYSIS INFORMATION	ANALYSIS INFORMATION						
1	UCOM-MTD	W	15/12/2015 11:15	W	6	1	1	1	1	1	1	1						
2	UCOM-M1S	W	15/12/2015 11:30	W	5	1	1	1	1	1	1	1						
3	UCOM-M2D	W	15/12/2015 11:15	W	4	1	1	1	1	1	1	1						
4	UCOM-M2S	W	15/12/2015 11:30	W	5	1	1	1	1	1	1	1						
5	UCOM-M4D	W	15/12/2015 14:15	W	4	1	1	1	1	1	1	1						
6	UCOM-M1S	W	15/12/2015 11:30	W	6	1	1	1	1	1	1	1						
7	BH-M16D	W	15/12/2015 16:45	W	4	1	1	1	1	1	1	1						
8	BH-M16S	W	15/12/2015 16:45	W	4	1	1	1	1	1	1	1						
9	BH-M18D	W	15/12/2015 8:00	W	5	1	1	1	1	1	1	1						
10	BH-M16S	W	15/12/2015 7:15	W	5	1	1	1	1	1	1	1						
11	BH-M20D	W	15/12/2015 15:00	W	5	1	1	1	1	1	1	1						
12	BH-M20S	W	15/12/2015 14:30	W	5	1	1	1	1	1	1	1						
13	BH-M20D	W	15/12/2015 8:30	W	5	1	1	1	1	1	1	1						
14	BH-M20S	W	15/12/2015 10:20	W	5	1	1	1	1	1	1	1						
15	BH-M20D	W	15/12/2015 8:10	W	5	1	1	1	1	1	1	1						
16	BH-M20S	W	15/12/2015 9:45	W	4	1	1	1	1	1	1	1						
17	BH-M20D	W	15/12/2015 10:10	W	4	1	1	1	1	1	1	1						
18	BH-M20S	W	15/12/2015 11:00	W	4	1	1	1	1	1	1	1						
19	BH-M20D	W	15/12/2015 7:45	W	5	1	1	1	1	1	1	1						
20	BH-M20S	W	15/12/2015 7:15	W	5	1	1	1	1	1	1	1						
21	LPS-16B4	W	15/12/2015 8:00	W	5	1	1	1	1	1	1	1						
22	QAZ	W	15/12/2015 7:15	W	5	1	1	1	1	1	1	1						
23	QAZ	W	15/12/2015 7:15	W	5	1	1	1	1	1	1	1						
24	TB4	W	15/12/2015 15:30	W	1	1	1	1	1	1	1	1						
25	TB5	W	15/12/2015 15:30	W	1	1	1	1	1	1	1	1						
26	FR3	W	15/12/2015 16:30	W	1	1	1	1	1	1	1	1						
27	RB4	W	15/12/2015 14:30	W	1	1	1	1	1	1	1	1						
28	RB5	W	15/12/2015 8:45	W	1	1	1	1	1	1	1	1						
TOTAL											114	23	23	23	11	10	1	0

31 Trip spike control
 15/12/2015 10:35
 15/12/2015 7:00

Environmental Division
 Melbourne
 Work Order Reference
EM2020793



Telephone + 61-3-9549 9600

Forwarded to
 Secondary Lab
 Date 24/11/15

Received: 24/11/15
 Carrier: TOLL
 C/note: 302094
 Temp: 16.9°C
 Seal: (NAT)
 ICC / ICBRICKS





Environmental

CERTIFICATE OF ANALYSIS

Work Order : E2 03037MJ
Client : E2 2 CONSLTINP DTY LTI
Contact : PAUL GIBBONS
Address : Ground Floor Suite 1 W0 Chandos Street
St Leonards NS6 NS6 W054
Telephone :
Project : S19041W
Order number :
C-O-C number :
Sampler : BILL BULL, KAITLQN BRODIE
Site :
/ ote number : ENWWW
No. of samples received : 30
No. of samples analysed : 30

Page : 1 of 12
Laboratory : Environmental Division Melbourne
Contact : Shane Colley
Address : 2 6 estall Rd Springvale VIC Australia 3171
Telephone : +51-3-8429 9500
Date Samples Received : W2-Nov-W0W0 10:24
Date Analysis Commenced : W4-Nov-W0W0
Issue Date : 02-Dec-W0W0 11:21



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

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

This Certificate of Analysis contains the follo ing information:

- General Comments
• Analytical Results
• Surrogate Control Limits

Additioal f tarpp l rtoa herttaean rd rstw rehorm btf ue rogad ta rse rofobtac wehrl re l ml Qsp eanw. y gl ftn Coarrof Rehorril y Ayc Cop hftl aQe Awewwpe ean rd l wtkwn b trs
y gl ftn Re. teb l ad Sl p hfe ReQethnNorrtqd rtoa^

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance) ith procedures specified in W0 CFR Part 11.

Table with 2 columns: Signatories, Position. Rows include Arenie Vijayaratham (Non-Metals Team Leader), Dilani Fernando (Senior Inorganic Chemist), Eric Chau (Metals Team Leader), NiYY Stepnie) sY (Senior Inorganic Instrument Chemist), Titus Vimalasiri (Metals Teamleader), Hing Lin (Senior Organic Chemist).

Accreditation Category

Table with 1 column: Accreditation Category. Rows include Melbourne Inorganics, Springvale, VIC; Melbourne Inorganics, Springvale, VIC; Melbourne Inorganics, Springvale, VIC; Melbourne Inorganics, Springvale, VIC; Radionuclides, Fysh) icY, ACT; Melbourne Organics, Springvale, VIC.



Page : W0f 12
 6 of 7 Order : EMM0793
 Client : EMM CONSULTING PTQLTD
 Project : S19041W

General Comments

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

- 6 here moisture determination has been performed, results are reported on a dry weight basis.
- 6 here a reported result is higher than the LOR, this may be due to primary sample extraction/digestion dilution and/or insufficient sample for analysis.
- 6 here the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced) or matrix interference.
- 6 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.

6 here 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

B - This result is computed from individual analyte detections at or above the level of reporting

~ - ALS is not NATA accredited for these tests.

_ - Indicates an estimated value.

- ED037-P: EMM0793 #WX 3. Alkalinity has been confirmed via re-preparation and re-analysis.
- EP080: 6 here reported, Total Hydrogen is the sum of the reported concentrations of mXp-Hylene and o-Hylene at or above the LOR.
- EG0V0-F : EMM0793 #1-V0 dissolved metal re-urid dilution prior analysis due to sample matrix. LORs have been adjusted accordingly.
- EG0V0-T : EMM0793 #W #2, #5, #14 and #19 total metal re-urid dilution prior analysis due to sample matrix. LORs have been adjusted accordingly.
- EG0V0-T : EMM0793 #V0-V0 results for total metal have been confirmed by re-digestion and re-analysis.
- EP080: Sample TRIP SPIKE contains volatile compounds spiked into the sample containers prior to dispatch from the laboratory. BTEHN compounds spiked at 10 ug/L. Ionic balances are calculated using: major anions - chloride, alkalinity and sulfate and major cations - calcium, magnesium, potassium and sodium.
- LOR for Gross Alpha and Gross Beta raised due to high solid content.
- ED024G: The presence of thiocyanate can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.
- EK084: EMM0793-00WP00 matrix spike recovery for sulphide due to sample matrix. Confirmed by re-extraction and re-analysis.
- EK084: EMM0793-00WP00 matrix spike recovery for mercury due to sample matrix. Confirmed by re-extraction and re-analysis.
- EG034F: EMM0793 #Wand WP00 matrix spike recovery for mercury due to sample matrix. Confirmed by re-extraction and re-analysis.
- Sodium Adsorption Ratio here reported: 6 here results for Na, Ca or Mg are =LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that =LOR zero concentration and a conservative approach for Ca X Mg relative to the assumption that =LOR is equivalent to the LOR concentration.



Analytical Results

Sub-Matrix: WATER		Sal mpe ID		GP 2 H2 4i	GP 2 H2 4S	GP 2 H2 0i	GP 2 H2 0S	GP 2 H2 -i
Matrix: WATER		Sal mping date / til e		14-Nov-2010 1W14	14-Nov-2010 1W30	15-Nov-2010 11:14	15-Nov-2010 11:30	14-Nov-2010 12:14
Col mound	CAS Nul ber	LOR	Unit	Result	Result	Result	Result	Result
Ei 3UD: Afkl ftatn u, DC Ttrl rbr								
5, droxide Afkl ftatn I wCl COU	DMO-W0-001	1	mg/L	=1	=1	=1	=1	=1
Cl ruoal re Afkl ftatn I wCl COU	381W3W5	1	mg/L	=1	=1	=1	=1	=1
6 tQ ruoal re Afkl ftatn I wCl COU	71-4W3	1	mg/L	-04	-40	-0M	U88	-44
Tor f Afkl ftatn I wCl COU	----	1	mg/L	-04	-40	-0M	U88	-44
Ei 3-4P: Sgrfne fgrutdtp eritQ I wSO- 0Hu, i A								
Sgrfne I wSO- Hfgrutdtp eritQ	12808-79-8	1	mg/L	-093	) 433	- - U8	) 003	-0-3
Ei 3-)P: Csforde u, i twQere Aal f, wer								
Csforde	15887-00-5	1	mg/L	47L83	0UD33	49L83	4M63	49033
Ei 3MF: i twof. ed 2 I jor Cl rtoaw								
Cl rQgp	7220-70-W	1	mg/L	800	7M6	) M7	7) -	) 78
2 I caewgtp	7239-94-2	1	mg/L	4843	4M-3	48-3	4933	4833
Sodtgp	7220-W8-4	1	mg/L	44033	4) - 33	44833	40733	44033
Dorl wtgtp	7220-09-7	1	mg/L	) 3	-4	- M	- U	- 9
EP303F: i twof. ed 2 eri fvu, ICDH2 S								
ArweatQ	7220-38-W	0.001	mg/L	=0.00W	3937	=0.00W	3930	=0.00W
Cl dp tgp	7220-23-9	0.0001	mg/L	=0.000W	=0.000W	=0.000W	=0.000W	=0.000W
Csrop tgp	7220-27-3	0.001	mg/L	=0.00W	=0.00W	=0.00W	3938	=0.00W
Cohher	7220-40-8	0.001	mg/L	=0.00W	3930	=0.00W	=0.00W	=0.00W
NtQref	7220-0W0	0.001	mg/L	=0.00W	393U	=0.00W	394)	=0.00W
Lel d	7239-9W1	0.001	mg/L	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W
ZtaQ	7220-55-5	0.004	mg/L	=0.010	=0.010	3948	394U	3948
EP303T: Tor f 2 eri fvu, ICDH2 S								
ArweatQ	7220-38-W	0.001	mg/L	HHH	393M	HHH	3930	HHH
Cl dp tgp	7220-23-9	0.0001	mg/L	HHH	=0.000W	HHH	=0.000W	HHH
Csrop tgp	7220-27-3	0.001	mg/L	HHH	393-	HHH	393-	HHH
Cohher	7220-40-8	0.001	mg/L	HHH	3937	HHH	3938	HHH
NtQref	7220-0W0	0.001	mg/L	HHH	394)	HHH	3908	HHH
Lel d	7239-9W1	0.001	mg/L	HHH	3930	HHH	=0.00W	HHH
ZtaQ	7220-55-5	0.004	mg/L	HHH	3903	HHH	39UB	HHH
EP3UJ F: i twof. ed 2 erQgr, u, F12 S								
2 erQgr,	7239-97-5	0.0001	mg/L	=0.0001	=0.0001	=0.0001	=0.0001	=0.0001
EP3UJ T: Tor f ReQb. erl lufe 2 erQgr, u, F12 S								
2 erQgr,	7239-97-5	0.0001	mg/L	HHH	=0.0001	HHH	=0.0001	HHH
EP3) 4P: Ferrogwiroa u, i twQere Aal f, wer								



Analytical Results

Sub-Matrix: WATER Matrix: WATER(	Sal mtr ID		GP 2 H 4i	GP 2 H 4S	GP 2 H 0i	GP 2 H 0S	GP 2 H - i
Col mound	CAS Num ber	LOR	Sal mtrng date / til e	Unit	Result	Result	Result
EP3) 4P : Ferrogwiroa u, i twQere Aal f, wer HCoartaged	----	0.04	14-Nov-0000 1W14	14-Nov-0000 1W30	15-Nov-0000 11:14	15-Nov-0000 11:30	14-Nov-0000 12:14
Ferrogwiroa	18295-W-8	0.1	E2 03037MJ#34	E2 03037MJ#30	E2 03037MJ#30	E2 03037MJ#3-	E2 03037MJ#3)
EK39) 2 : Sgfrtde l wS0H	----	0.01	Result	Result	Result	Result	Result
Sgfrtde l wS0H	18295-W-8	0.1	474	389	079	=0.04	488
EN3)) : loatQ6 l fi aQe	----	0.01	=0.1	=0.1	=0.1	=0.1	=0.1
~ Tor f Aatoaw	----	0.01	) 98	78M	847	878	843
~ Tor f Cl rtoaw	----	0.01	8) 0	973	873	7UM	8- M
~ loatQ6 l fi aQe	----	0.01	) 7U7	84M	- 48	- 4 8	U9M



Analytical Results

Sub-Matrix: WATER		Sal mping date / til e		Sal mping date / til e		Sal mping date / til e		Sal mping date / til e		Sal mping date / til e		Sal mping date / til e	
Matrix: WATER		CAS Nul ber	LOR	Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result
EA0) 3: ProwwAfnsI ad 6 erI AQt. In													
ProvwuerI	----	0.10	B<w	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
Ei 3UD: Afkl fIatn u, DC Ttrl ndr													
5, droxtde Afkl fIatn I wCl COU	DMO-W0-001	1	mgw	=1	=1	=1	=1	=1	=1	=1	=1	=1	=1
Cl ruoal re Afkl fIatn I wCl COU	381W3W5	1	mgw	=1	=1	=1	=1	=1	=1	=1	=1	=1	=1
6 tQ ruoal re Afkl fIatn I wCl COU	71-4W3	1	mgw	0LB	U7-	U7-	U7-	U7-	U7-	U7-	U7-	U7-	U7-
TorI f Afkl fIatn I wCl COU	----	1	mgw	0LB	U7-	U7-	U7-	U7-	U7-	U7-	U7-	U7-	U7-
Ei 3-4P: Sgrfne Tgrutdp erIQ I wSO- 0Hu, i A													
Sgrfne I wSO- HTgrutdp erIQ	12808-79-8	1	mgw	)NB3	--03	-7-3	LN73	LN73	LN73	LN73	LN73	LN73	LN73
Ei 3-) P: Csforde u, i twQere Aal f, wer													
Csforde	15887-00-5	1	mgw	0UT33	49)33	4M63	47833	47833	47833	47833	47833	47833	47833
Ei 3MF: i twof. ed 2 I jor Cl rtoaw													
Cl rQgp	7220-70-W	1	mgw	78U	)84	7-0	)43	)43	)43	)43	)43	)43	)43
2 I caewgtp	7239-94-2	1	mgw	47MB	4833	4703	4)33	4)33	4)33	4)33	4)33	4)33	4)33
Sodtgp	7220-V8-4	1	mgw	4)333	44033	40)33	43733	43733	43733	43733	43733	43733	43733
DorI wgtgp	7220-09-7	1	mgw	U7	-9	-8	-9	-9	-9	-9	-9	-9	-9
EP303F: i twof. ed 2 erI fwu, ICDI2 S													
ArweatQ	7220-38-W	0.001	mgw	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W
Cl dp tgp	7220-23-9	0.0001	mgw	=0.000W	=0.000W	=0.000W	=0.000W	=0.000W	=0.000W	=0.000W	=0.000W	=0.000W	=0.000W
Csrop tgp	7220-27-3	0.001	mgw	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W
Cohher	7220-40-8	0.001	mgw	3*3)	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W
NtQref	7220-0W0	0.001	mgw	3*37	3*33)	3*30	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W
Lel d	7239-9W1	0.001	mgw	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W
ZtaQ	7220-55-5	0.004	mgw	=0.010	=0.010	3*44	3*40	3*40	3*40	3*40	3*40	3*40	3*40
EP303T: TorI f 2 erI fwu, ICDI2 S													
ArweatQ	7220-38-W	0.001	mgw	3*33-	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
Cl dp tgp	7220-23-9	0.0001	mgw	=0.000W	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
Csrop tgp	7220-27-3	0.001	mgw	3*308	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
Cohher	7220-40-8	0.001	mgw	3*48-	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
NtQref	7220-0W0	0.001	mgw	3*40	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
Lel d	7239-9W1	0.001	mgw	=0.00W	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
ZtaQ	7220-55-5	0.004	mgw	=0.010	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
EP3UJF: i twof. ed 2 erQgr, u, F12 S													
2 erQgr,	7239-97-5	0.0001	mgw	=0.0001	=0.0001	=0.0001	=0.0001	=0.0001	=0.0001	=0.0001	=0.0001	=0.0001	=0.0001
EP3UJ T: TorI f ReQb. erI ufe 2 erQgr, u, F12 S													



Analytical Results

Sub-Matrix: WATER	Sal mtr ID	GP 2 H 4) S	6 5 H 48i	6 5 H 48S	6 5 H 4M	6 5 H 4MS
Matrix: WATER	Sal mtr date / til e	14-Nov-2020 07:10	13-Nov-2020 15:24	13-Nov-2020 14:24	12-Nov-2020 08:00	12-Nov-2020 07:14
Col mound	CAS Nul ber	E2 03037MJ#38	E2 03037MJ#37	E2 03037MJ#39	E2 03037MJ#3M	E2 03037MJ#43
	LOR	Unit	Result	Result	Result	Result
EP3U) T: Torf ReQp. erl ufe 2 erQgr, u, F12 S HCoataged						
2 erQgr,	7239-97-5	0.0001	mg/L	HHH	HHH	HHH
EP3) 4P: Ferrogwiroa u, i twQere Aal f, wer						
Ferrogwiroa	----	0.04	mg/L	4MM	) 73	=0.04
EK39) 2: Sgfrtle l wS0H						
Sgfrtle l wS0H	18295-W-8	0.1	mg/L	=0.1	3U	3M
EN3) : loatQ6 l fl aQe						
~ Torf Aatoaw	----	0.01	me<L	80U	) 99	770
~ Torf Cl rtoaw	----	0.01	me<L	8-9	848	949
~ loatQ6 l fl aQe	----	0.01	;	4MB	070	07M
EA0) 3CA: ProwwAfnsl l ad 6erl AQ. tn						
ProwwAfnsl	----	0.04	B<L	HHH	479	- 80
Prowwuer l Qt. tn H-3K	----	0.10	B<L	HHH	=W09	=W54



Analytical Results

Sub-Matrix: WATER	Sal mtr ID	6 5 H2 03i	6 5 H2 03S	6 5 H2 00i	6 5 H2 00S	6 5 H2 00i
Matrix: WATER(	Sal mtrng date / til e	12-Nov-2020 14:00	12-Nov-2020 12:30	12-Nov-2020 09:30	12-Nov-2020 10:10	15-Nov-2020 09:10
Col mound	CAS Nul ber	LOR	Unit	Result	Result	Result
EA0) 3: ProwwAfns l ad 6 erl AQt. tn						
Prowwuerl	----	0.10	B<w	=Ww3	=W42	HHH
Ei 3UD: Afkl ftatn u, DC Ttrl ndr						
5, droxtde Afkl ftatn l wCl COU	DMO-W0-001	1	mgw	=1	=1	=1
Cl ruoal re Afkl ftatn l wCl COU	381W3W5	1	mgw	=1	=1	=1
6 tQ ruoal re Afkl ftatn l wCl COU	71-4W3	1	mgw	-) U	U0	- 83
Torl f Afkl ftatn l wCl COU	----	1	mgw	-) U	U0	- 83
Ei 3-4P: Sgrfnre Tgrutdtp erntQ l wSO- 0Hu, i A						
Sgrfnre l wSO- HTgrutdtp erntQ	12808-79-8	1	mgw	-- 73	) LB3	- U43
Ei 3-) P: Csforde u, i twQere Aal f, wer						
Csforde	15887-00-5	1	mgw	4M-33	04733	49433
Ei 3MF: i twnof. ed 2 l jor Cl rtoaw						
Cl rQgp	7220-70-W	1	mgw	) - 3	7U	) - M
2 l caewgtp	7239-94-2	1	mgw	48U3	48) 3	4) 93
Sodtgp	7220-V8-4	1	mgw	44833	4- 433	44433
Dorl wgtgp	7220-09-7	1	mgw	) 3	- 3	) 4
EP303F: i twnof. ed 2 erl fwu, ICDI2 S						
ArweatQ	7220-38-W	0.001	mgw	=0.00W	=0.00W	3*330
Cl dp tgp	7220-23-9	0.0001	mgw	=0.000W	=0.000W	=0.000W
Csrop tgp	7220-27-3	0.001	mgw	=0.00W	=0.00W	=0.00W
Cohher	7220-40-8	0.001	mgw	3*338	=0.00W	=0.00W
NtQref	7220-0W0	0.001	mgw	=0.00W	3*339	=0.00W
Lel d	7239-9W1	0.001	mgw	=0.00W	=0.00W	=0.00W
ZtaQ	7220-55-5	0.004	mgw	3*344	=0.010	=0.010
EP303T: Torl f 2 erl fwu, ICDI2 S						
ArweatQ	7220-38-W	0.001	mgw	HHH	HHH	HHH
Cl dp tgp	7220-23-9	0.0001	mgw	HHH	HHH	HHH
Csrop tgp	7220-27-3	0.001	mgw	HHH	HHH	HHH
Cohher	7220-40-8	0.001	mgw	HHH	HHH	HHH
NtQref	7220-0W0	0.001	mgw	HHH	HHH	HHH
Lel d	7239-9W1	0.001	mgw	HHH	HHH	HHH
ZtaQ	7220-55-5	0.004	mgw	HHH	HHH	HHH
EP3UJF: i twnof. ed 2 erQgr, u, F12 S						
2 erQgr,	7239-97-5	0.0001	mgw	=0.0001	=0.0001	=0.0001
EP3UJ T: Torl f ReQb. erl ufe 2 erQgr, u, F12 S						



Analytical Results

Sub-Matrix: WATER Matrix: WATER(	CAS Nul ber	LOR	Sal mng date / til e	Sal mng ID	6 5 H2 03S	6 5 H2 00i	6 5 H2 00S	6 5 H2 00i
Col mound			12-Nov-2020 14:00	E2 03037MJ#44	12-Nov-2020 12:30	12-Nov-2020 09:30	12-Nov-2020 10:10	15-Nov-2020 09:10
			Unit	Result	Result	Result	Result	Result
EP3U) T: Torf ReQp. erl ufe 2 erQgr, u, F12 S HCoataged								
2 erQgr,	7239-97-5	0.0001	mg/L	HHH	HHH	HHH	HHH	=0.0001
EP3) 4P: Ferrogwiroa u, i twQere Aal f, wer								
Ferrogwiroa	----	0.04	mg/L	43)	344	U08	876	01)
EK39) 2: Sgfitde l wS0H								
Sgfitde l wS0H	18295-W-8	0.1	mg/L	30	30	=0.1	34	34
EN3) : loatQ6 l fi aQe								
~ Torf Aatoaw	----	0.01	me<L	8-M	709	843	7UU	834
~ Torf CI rtoaw	----	0.01	me<L	887	797	8-0	77U	8U3
~ loatQ6 l fi aQe	----	0.01	;	4U	U99	0)	087	0^3
EA0) 3CA: ProwwAfnsl l ad 6eirl AQ. tn								
ProwwAfnsl	----	0.04	B<L	=1.1W	4MU	=1.07	4UD	HHH
Prowwuer l Qt. tn H-3K	----	0.10	B<L	=W08	=W44	=W12	=W42	HHH



Analytical Results

Sub-Matrix: WATER		Sal nr ID		6 5 H 0 U S		6 5 H 0 - i		6 5 H 0 - S		6 5 H 0 i		6 5 H 0 S	
Matrix: WATER		Sal nrng date / til e		E2 03037MJ#48		E2 03037MJ#47		E2 03037MJ#49		E2 03037MJ#4M		E2 03037MJ#03	
Col mound	CAS Nul ber	LOR	Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
Ei 3UJD: Afkl ftatn u, DC Ttrl ndr													
5, droxide Afkl ftatn I wCl COU	DMO-W0-001	1	mg/L	=1	=1	=1	=1	=1	=1	=1	=1	=1	=1
Cl ruoal re Afkl ftatn I wCl COU	381W3W5	1	mg/L	=1	=1	=1	=1	=1	=1	=1	=1	=1	=1
6 tQ ruoal re Afkl ftatn I wCl COU	71-4W3	1	mg/L	0MU	-) 0	-) 0	-) 0	-) 0	-) 0	-) 0	-) 0	-) 0	U0)
Torf f Afkl ftatn I wCl COU	----	1	mg/L	0MU	-) 0	-) 0	-) 0	-) 0	-) 0	-) 0	-) 0	-) 0	U0)
Ei 3-4P: Sgrfrre fTgrutdtp eritQ I wSO- 0Hu, i A													
Sgrfrre I wSO- fTgrutdtp eritQ	12808-79-8	1	mg/L	8LMB	-) UB	-) UB	-) UB	-) UB	-) UB	-) UB	-) UB	-) UB	) 743
Ei 3-) P: Csforde u, i twQere Aal f, wer													
Csforde	15887-00-5	1	mg/L	0) LB3	49933	49933	49933	4M-33	4M-33	47- 33	47- 33	47- 33	0UM63
Ei 3MJF: i twof. ed 2 I jor Cl rtoaw													
Cl rQgp	7220-70-W	1	mg/L	77U	) 9-	) 9-	) 9-	847	847	) 73	) 73	) 73	887
2 I caewgtp	7239-94-2	1	mg/L	0393	4873	4873	4873	4803	4803	4) 83	4) 83	4) 83	49UB
Sodtgp	7220-W8-4	1	mg/L	4) MB3	44733	44733	44733	4U) 33	4U) 33	43) 33	43) 33	43) 33	4) 333
Dorf wtgtp	7220-09-7	1	mg/L	- 0	) 0	) 0	) 0	UU	UU	) 0	) 0	) 0	U0
EP303F: i twof. ed 2 eri fvu, ICDI# S													
ArweatQ	7220-38-W	0.001	mg/L	=0.00W	=0.00W	=0.00W	=0.00W	3#3-	3#3-	3#3-	3#3-	3#3-	=0.00W
Cl dp tgp	7220-23-9	0.0001	mg/L	=0.000W	=0.000W	=0.000W	=0.000W	=0.000W	=0.000W	=0.000W	=0.000W	=0.000W	=0.000W
Csrop tgp	7220-27-3	0.001	mg/L	3#3U	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W
Cohher	7220-40-8	0.001	mg/L	3#3) -	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	3#83	3#83	3#83	=0.00W
NtQref	7220-0W0	0.001	mg/L	3#07	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	3#3-	3#3-	3#3-	3#43
Lel d	7239-9W1	0.001	mg/L	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W	=0.00W
ZtaQ	7220-55-5	0.004	mg/L	3#3- 3	3#0)	3#0)	3#0)	=0.010	=0.010	3#47	3#47	3#47	3#49
EP303T: Torf f 2 eri fvu, ICDI# S													
ArweatQ	7220-38-W	0.001	mg/L	HHH	HHH	HHH	HHH	HHH	HHH	3#3)	3#3)	3#3)	HHH
Cl dp tgp	7220-23-9	0.0001	mg/L	HHH	HHH	HHH	HHH	HHH	HHH	=0.000W	=0.000W	=0.000W	HHH
Csrop tgp	7220-27-3	0.001	mg/L	HHH	HHH	HHH	HHH	HHH	HHH	=0.00W	=0.00W	=0.00W	HHH
Cohher	7220-40-8	0.001	mg/L	HHH	HHH	HHH	HHH	HHH	HHH	3#0MI	3#0MI	3#0MI	HHH
NtQref	7220-0W0	0.001	mg/L	HHH	HHH	HHH	HHH	HHH	HHH	3#3U	3#3U	3#3U	HHH
Lel d	7239-9W1	0.001	mg/L	HHH	HHH	HHH	HHH	HHH	HHH	=0.00W	=0.00W	=0.00W	HHH
ZtaQ	7220-55-5	0.004	mg/L	HHH	HHH	HHH	HHH	HHH	HHH	=0.010	=0.010	=0.010	HHH
EP3UJ F: i twof. ed 2 erQgr, u, F12 S													
2 erQgr,	7239-97-5	0.0001	mg/L	=0.0001	=0.0001	=0.0001	=0.0001	=0.0001	=0.0001	=0.0001	=0.0001	=0.0001	=0.0001
EP3UJ T: Torf f ReQb. erl lufe 2 erQgr, u, F12 S													
2 erQgr,	7239-97-5	0.0001	mg/L	HHH	HHH	HHH	HHH	HHH	HHH	=0.0001	=0.0001	=0.0001	HHH
EP3) 4P: Ferrogrwiroa u, i twQere Aal f, wer													



Analytical Results

Col mound	CAS Num ber	LOR	Sal mping date / til e	Sal mpe ID	6 5 H2 0 U S	6 5 H2 0 - i	6 5 H2 0 - S	6 5 H2 0) i	6 5 H2 0) S
		Unit			15-Nov-2024 E2 03037MJ#48	13-Nov-2024 E2 03037MJ#47	13-Nov-2024 E2 03037MJ#49	15-Nov-2024 E2 03037MJ#4M	15-Nov-2024 E2 03037MJ#03
					Result	Result	Result	Result	Result
EP3) 4P : Ferrogwiroa u, i twQere Aal f, wer HCoartaged									
Ferrogwiroa	----	0.04	mg/L		=0.04	4^9	47^U	0^38	3^8
EK39) 2 : Sgfrtde l wS0H									
Sgfrtde l wS0H	18295-W-8	0.1	mg/L		3^4	=0.1	=0.1	=0.1	3^4
EN3)) : loatQ6 l fi a Qe									
~ Tor f Aatoaw	----	0.01	me<L		9) 0	8U	8) )	) 9)	933
~ Tor f CI rtoaw	----	0.01	me<L		M80	877	7) 0	84)	9U7
~ loatQ6 l fi a Qe	----	0.01	;		0^9-	U^0M	8^9M	0^A.8	0^UB



Analytical Results

Sub-Matrix: WATER		Sal mtr ID		Y A0		T6 U		T6 -		T6)	
Matrix: WATER(		Sal mtrng date / til e		12-Nov-2020 07:14		15-Nov-2020 14:40		15-Nov-2020 14:40		15-Nov-2020 14:40	
Col mnd	CAS Nul ber	LOR	Unit	Result	E2 03037MJ#00	Result	E2 03037MJ#00	Result	E2 03037MJ#00	Result	E2 03037MJ#00
EA0) 3: P rowwAfns l ad 6 erl AQt. tn											
Provwuer	----	0.10	B<w	=W19	U03	HHH	HHH	HHH	HHH	HHH	HHH
Ei 3UD: Afkl ftatn u, DC Ttrl ndr											
5, droxtde Afkl ftatn l wCl COU	DMO-W0-001	1	mgw	=1	=1	HHH	HHH	HHH	HHH	HHH	HHH
Cl ruoal re Afkl ftatn l wCl COU	381W3W5	1	mgw	=1	=1	HHH	HHH	HHH	HHH	HHH	HHH
6 tQ ruoal re Afkl ftatn l wCl COU	71-4W3	1	mgw	- 8)	U-4	HHH	HHH	HHH	HHH	HHH	HHH
Torl f Afkl ftatn l wCl COU	----	1	mgw	- 8)	U-4	HHH	HHH	HHH	HHH	HHH	HHH
Ei 3-4P: Sgrfne Tgrutdp erntQ l wSO- 0Hu, i A											
Sgrfne l wSO- HTgrutdp erntQ	12808-79-8	1	mgw	-) U3	) M63	HHH	HHH	HHH	HHH	HHH	HHH
Ei 3-) P: Csforde u, i twQere Aal f, wer											
Csforde	15887-00-5	1	mgw	4M833	0UJ 33	HHH	HHH	HHH	HHH	HHH	HHH
Ei 3MJF: i twof. ed 2 l jor Cl rtoaw											
Cl rQgp	7220-70-W	1	mgw	) M0	8) 4	HHH	HHH	HHH	HHH	HHH	HHH
2 l caewgtp	7239-94-2	1	mgw	4893	4983	HHH	HHH	HHH	HHH	HHH	HHH
Sodtgp	7220-V8-4	1	mgw	44733	4- M63	HHH	HHH	HHH	HHH	HHH	HHH
Dorl wgtgp	7220-09-7	1	mgw	)	U0	HHH	HHH	HHH	HHH	HHH	HHH
EP303F: i twof. ed 2 erl fwu, ICDI2 S											
ArweatQ	7220-38-W	0.001	mgw	=0.00W	=0.00W	HHH	HHH	HHH	HHH	HHH	HHH
Cl dp tgp	7220-23-9	0.0001	mgw	=0.000W	=0.000W	HHH	HHH	HHH	HHH	HHH	HHH
Csrop tgp	7220-27-3	0.001	mgw	=0.00W	=0.00W	HHH	HHH	HHH	HHH	HHH	HHH
Cohher	7220-40-8	0.001	mgw	=0.00W	3\$U0	HHH	HHH	HHH	HHH	HHH	HHH
NtQref	7220-0W0	0.001	mgw	=0.00W	3\$37	HHH	HHH	HHH	HHH	HHH	HHH
Lel d	7239-9W1	0.001	mgw	=0.00W	=0.00W	HHH	HHH	HHH	HHH	HHH	HHH
ZtaQ	7220-55-5	0.004	mgw	=0.010	3\$0M	HHH	HHH	HHH	HHH	HHH	HHH
EP303T: Torl f 2 erl fwu, ICDI2 S											
ArweatQ	7220-38-W	0.001	mgw	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
Cl dp tgp	7220-23-9	0.0001	mgw	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
Csrop tgp	7220-27-3	0.001	mgw	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
Cohher	7220-40-8	0.001	mgw	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
NtQref	7220-0W0	0.001	mgw	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
Lel d	7239-9W1	0.001	mgw	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
ZtaQ	7220-55-5	0.004	mgw	HHH	HHH	HHH	HHH	HHH	HHH	HHH	HHH
EP3UJF: i twof. ed 2 erQgr, u, F12 S											
2 erQgr,	7239-97-5	0.0001	mgw	=0.0001	=0.0001	HHH	HHH	HHH	HHH	HHH	HHH
EP3UJ T: Torl f ReQb. erl ufe 2 erQgr, u, F12 S											



Analytical Results

Sub-Matrix: WATER	Sal mtr ID	LDS63-	Y A0	T6 U	T6 -	T6)
Matrix: WATER(	Sal mtr date / til e					
Col mound	CAS Nul ber	LOR	Unit	Result	Result	Result
EP3U) T: Torf ReQp. erl lufe 2 erQgr, u, F12 S HCcoatedg	7239-97-5	0.0001	mg/L	HHH	=0.0001	=0.0001
2 erQgr,						
EP3) 4P: Ferrogwiroa u, i twQere Aal f, wer		0.04	mg/L	HHH	HHH	HHH
Ferrogwiroa						
EK39) 2: Sgfitde l wS0H	18295-W-8	0.1	mg/L	HHH	HHH	HHH
Sgfitde l wS0H						
EN3) : loatQ6 l fi aQe						
~ Torf Aatoaw		0.01	me<L	HHH	HHH	HHH
~ Torf CI rtoaw		0.01	me<L	HHH	HHH	HHH
~ loatQ6 l fi aQe		0.01	;	HHH	HHH	HHH
EA0) 3CA: ProwwAfnsl l ad 6 erl AQ. tn						
ProwwAfnsl		0.04	B<L	HHH	HHH	HHH
Prowwuer l Qt. tn H-3K		0.10	B<L	HHH	HHH	HHH



Analytical Results

Sub-Matrix: WATER
 Matrix: WATER

Col bound	CAS Nul ber	Sal mping date / til e		R6U	R6 -	Trth whtke 09430303	R64	R60
		LOR	Unit						12-Nov-10 07:44	14-Nov-10 12:30	13-Nov-10 10:34	12-Nov-10 07:44
EP303T: Torf 2 erl fvu, ICDH S								
ArweatQ	7220-38-W	0.001	mg/L	=0.001	HHH	HHH	=0.001	=0.001
Cl dp tgp	7220-23-9	0.0001	mg/L	=0.0001	HHH	HHH	=0.0001	=0.0001
Csrop tgp	7220-27-3	0.001	mg/L	=0.001	HHH	HHH	=0.001	=0.001
Cohher	7220-40-8	0.001	mg/L	3*30	HHH	HHH	=0.001	=0.001
Ntckef	7220-0W0	0.001	mg/L	=0.001	HHH	HHH	=0.001	=0.001
Lel d	7239-9W1	0.001	mg/L	=0.001	HHH	HHH	=0.001	=0.001
ZlaQ	7220-55-5	0.004	mg/L	=0.004	HHH	HHH	=0.004	=0.004
EP3UJ T: Torf ReQp. erl ufe 2 erQgr, u, FI2 S								
2 erQgr,	7239-97-5	0.0001	mg/L	=0.0001	HHH	HHH	=0.0001	=0.0001
ED393874: Torf Derrofeqg 5, droQ ruoaw								
C8 HCMFH Qtoa	----	V0	%g/L	HHH	HHH	473	HHH	HHH
ED393874: Torf ReQ. erl ufe 5, droQ ruoawHNE2 034UFl Qtoa								
C8 HC43 Fl Qtoa	C5jC10	V0	%g/L	HHH	HHH	473	HHH	HHH
^ C8 HC43 Fl Qtoa p tagw6TEX	C5jC10-BTEH	V0	%g/L	HHH	HHH	73	HHH	HHH
ED393: 6 TEXN								
6 eazeae	71-23-W	1	%g/L	HHH	HHH	04	HHH	HHH
Tofgeae	108-88-3	W	%g/L	HHH	HHH	4M	HHH	HHH
Ers, fueazeae	100-21-2	W	%g/L	HHH	HHH	4M	HHH	HHH
p erl H& hl rl H, feae	108-38-3 105-2W3	W	%g/L	HHH	HHH	03	HHH	HHH
orrsofK, feae	94-27-5	W	%g/L	HHH	HHH	00	HHH	HHH
^ Torf f X, feae	----	W	%g/L	HHH	HHH	- 0	HHH	HHH
^ Sgp orf6 TEX	----	1	%g/L	HHH	HHH	434	HHH	HHH
NI hrs l feae	91-V0-3	4	%g/L	HHH	HHH	04	HHH	HHH
ED393S: TD5 V(v6 TEX Sgrrocl rew								
4*0H tC&foers l aeH -	17050-07-0	W	;	HHH	HHH	M*7	HHH	HHH
TofgeaeH 9	V037-V6-4	W	;	HHH	HHH	M*7	HHH	HHH
- H&rop orfgorouezeae	250-00-2	W	;	HHH	HHH	443	HHH	HHH



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6 of Y Order : EMM0793
Client : EMM CONSULTING PTQLTD
Project : S19041W

Surrogate Control Limits

Sub-Matrix: WATER		Recovery Limits (%)	
Col number	CAS Number	Low	High
ED393S: TD5 116 TEX Sgrrocl rew			
470H 105foroersl aeH -	17050-07-0	73	110
TofgeaeH 9	1037-116-4	70	111
- 16 rop orfgorouaeae	250-00-2	71	110



Environmental

QUALITY CONTROL REPORT

Work Order : **EM2020793**

Page : 1 of 10

Client : **EMM CONSULTING PTY LTD**
Contact : **PAUL GIBBONS**
Address : **Ground Floor Suite 1 20 Chandos Street
St Leonards NSW NSW 2065**
Telephone : **----**
Project : **S190512**
Order number : **----**
C-O-C number : **----**
Sampler : **BILL BULL, KAITLYN BRODIE**
Site : **----**
Quote number : **EN/222**
No. of samples received : **30**
No. of samples analysed : **30**

Laboratory : **Environmental Division Melbourne**
Contact : **Shane Colley**
Address : **4 Westall Rd Springvale VIC Australia 3171**
Telephone : **+61-3-8549 9600**
Date Samples Received : **24-Nov-2020**
Date Analysis Commenced : **25-Nov-2020**
Issue Date : **04-Dec-2020**



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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	Position	Accreditation Category
Arenie Vijayaratham	Non-Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Eric Chau	Metals Team Leader	Melbourne Inorganics, Springvale, VIC
Nikki Stepniewski	Senior Inorganic Instrument Chemist	Melbourne Inorganics, Springvale, VIC
Titus Vimlasiri	Metals Teamleader	Radionuclides, Fyshwick, ACT
Xing Lin	Senior Organic Chemist	Melbourne Organics, Springvale, VIC



General Comments

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

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

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

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

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

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method/Compound	CSM Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA250CA: Gross Alpha and Beta Activity (QC Lot: 3391214)									
CA2007887-001	Anonymous	EA250: Gross alpha	----	0.05	Bq/L	<0.05	<0.05	0.00	No Limit
		EA250: Gross beta	----	0.1	Bq/L	<0.10	<0.10	0.00	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	<0.10	0.00	No Limit
EM2020793-011	BH-M20D	EA250: Gross alpha	----	0.05	Bq/L	<1.12	<1.12	0.00	No Limit
		EA250: Gross beta	----	0.1	Bq/L	<2.23	<2.23	0.00	No Limit
		EA250: Gross beta activity - 40K	----	0.1	Bq/L	<2.23	<2.23	0.00	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 3382503)									
EM2020791-012	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	1160	1160	0.139	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	1160	1160	0.139	0% - 20%
EM2020791-009	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	955	960	0.566	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	955	960	0.566	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 3382505)									
EM2020793-016	BH-M23S	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	293	294	0.00	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	293	294	0.00	0% - 20%
EM2020816-002	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.00	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	15	17	8.14	0% - 50%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	15	17	8.14	0% - 50%



Sub-Matrix: WATER										
Laboratory sample ID	Sample ID	Method	h et/or: ACompoun:	CSM Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3382140)										
EM2020788-003	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric		14808-79-8	1	mg/L	88	88	0.00	0% - 20%
EM2020791-010	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric		14808-79-8	1	mg/L	743	743	0.00	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 3382143)										
EM2020793-007	BH-M16D	ED041G: Sulfate as SO4 - Turbidimetric		14808-79-8	1	mg/L	4420	4440	0.513	0% - 20%
EM2020793-016	BH-M23S	ED041G: Sulfate as SO4 - Turbidimetric		14808-79-8	1	mg/L	6390	6620	3.47	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3382141)										
EM2020791-001	Anonymous	ED045G: Chloride		16887-00-6	1	mg/L	553	543	1.89	0% - 20%
EM2020791-010	Anonymous	ED045G: Chloride		16887-00-6	1	mg/L	5720	5660	1.10	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 3382144)										
EM2020793-008	BH-M16S	ED045G: Chloride		16887-00-6	1	mg/L	19900	18800	5.65	0% - 20%
EM2020793-016	BH-M23S	ED045G: Chloride		16887-00-6	1	mg/L	25300	25300	0.164	0% - 20%
ED093F: Dissolved Major Cations (QC Lot: 3383791)										
EM2020765-002	Anonymous	ED093F: Calcium		7440-70-2	1	mg/L	183	183	0.00	0% - 20%
		ED093F: Magnesium		7439-95-4	1	mg/L	425	423	0.461	0% - 20%
		ED093F: Sodium		7440-23-5	1	mg/L	1680	1680	0.230	0% - 20%
		ED093F: Potassium		7440-09-7	1	mg/L	9	9	0.00	No Limit
EM2020765-012	Anonymous	ED093F: Calcium		7440-70-2	1	mg/L	133	127	5.09	0% - 20%
		ED093F: Magnesium		7439-95-4	1	mg/L	430	411	4.43	0% - 20%
		ED093F: Sodium		7440-23-5	1	mg/L	2210	2110	4.94	0% - 20%
		ED093F: Potassium		7440-09-7	1	mg/L	10	11	0.00	0% - 50%
ED093F: Dissolved Major Cations (QC Lot: 3383794)										
EM2020793-018	BH-M24S	ED093F: Calcium		7440-70-2	1	mg/L	617	613	0.704	0% - 20%
		ED093F: Magnesium		7439-95-4	1	mg/L	1620	1620	0.416	0% - 20%
		ED093F: Sodium		7440-23-5	1	mg/L	13500	13400	0.520	0% - 20%
		ED093F: Potassium		7440-09-7	1	mg/L	33	33	0.00	0% - 50%
EM2020793-010	BH-M19S	ED093F: Calcium		7440-70-2	1	mg/L	641	641	0.00	0% - 20%
		ED093F: Magnesium		7439-95-4	1	mg/L	1830	1830	0.106	0% - 20%
		ED093F: Sodium		7440-23-5	1	mg/L	14600	14700	0.426	0% - 20%
		ED093F: Potassium		7440-09-7	1	mg/L	31	31	0.00	0% - 50%
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3383790)										
EM2020765-001	Anonymous	EG020A-F: Cadmium		7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
		EG020A-F: Arsenic		7440-39-2	0.001	mg/L	0.046	0.045	2.36	0% - 20%
		EG020A-F: Chromium		7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit
		EG020A-F: Copper		7440-50-8	0.001	mg/L	0.020	0.019	6.64	0% - 20%
		EG020A-F: Lead		7439-92-1	0.001	mg/L	0.008	0.008	0.00	No Limit
		EG020A-F: Nickel		7440-02-0	0.001	mg/L	0.105	0.101	4.06	0% - 20%
		EG020A-F: Zinc		7440-66-6	0.005	mg/L	0.148	0.143	3.78	0% - 20%
EM2020765-012	Anonymous	EG020A-F: Cadmium		7440-43-9	0.0001	mg/L	0.0021	0.0022	6.21	0% - 20%
		EG020A-F: Arsenic		7440-39-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit



Sub-Matrix: WATER		Laboratory Duplicate (DUP) Report									
Laboratory sample ID	Sample ID	h et/or: ACompound:	CSM Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)		
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3383790) - continued											
EM2020765-012	Anonymous										
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.00	No Limit		
		EG020A-F: Copper	7440-50-8	0.001	mg/L	0.030	0.031	4.05	0% - 20%		
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	0.298	0.307	2.97	0% - 20%		
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.139	0.146	5.35	0% - 20%		
EG020F: Dissolved Metals by ICP-MS (QC Lot: 3383793)											
EM2020793-009	BH-M19D										
		EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0002	<0.0002	0.00	No Limit		
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.006	0.006	0.00	No Limit		
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.002	<0.002	0.00	No Limit		
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.002	<0.002	0.00	No Limit		
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit		
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.002	<0.002	0.00	No Limit		
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	0.012	<0.010	22.3	No Limit		
EM2020793-018	BH-M24S										
		EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0002	<0.0002	0.00	No Limit		
		EG020A-F: Arsenic	7440-38-2	0.001	mg/L	0.004	0.004	0.00	No Limit		
		EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.002	<0.002	0.00	No Limit		
		EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.002	<0.002	0.00	No Limit		
		EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.002	<0.002	0.00	No Limit		
		EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.002	<0.002	0.00	No Limit		
		EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.010	<0.010	0.00	No Limit		
EG020T: Total Metals by ICP-MS (QC Lot: 3385309)											
EM2020793-025	TB5										
		EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit		
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-T: Copper	7440-50-8	0.001	mg/L	0.005	0.005	0.00	No Limit		
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.00	No Limit		
EM2020490-081	Anonymous										
		EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit		
		EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.00	No Limit		
		EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.018	108	No Limit		
EG035F: Dissolved Mercury by FIMS (QC Lot: 3383792)											
EM2020793-001	UGM-M1D										
		EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit		
EM2020793-010	BH-M19S										
		EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit		
EG035F: Dissolved Mercury by FIMS (QC Lot: 3383795)											



Page : 5 of 10
 Work Order : EM2020793
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Sub-Matrix: WATER									
Laboratory sample ID	Sample ID	h et/or: A compound:	CSM Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EG035F: Dissolved Mercury by FIMS (QC Lot: 3383795) - continued									
EM2020793-021	LPSPB04	EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3384258)									
EM2020706-001	Anonymous	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EM2020793-023	TB3	EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
EG051G: Ferrous Iron by Discrete Analyser (QC Lot: 3382237)									
EM2020576-007	Anonymous	EG051G: Ferrous Iron	----	0.05	mg/L	8.35	8.29	0.718	0% - 20%
EM2020793-008	BH-M16S	EG051G: Ferrous Iron	----	0.05	mg/L	0.10	0.09	0.00	No Limit
EG051G: Ferrous Iron by Discrete Analyser (QC Lot: 3382238)									
EM2020793-019	BH-M25D	EG051G: Ferrous Iron	----	0.05	mg/L	2.06	2.04	1.02	0% - 20%
EK085M: Sulfide as S2- (QC Lot: 3384289)									
EM2020793-001	UGM-M1D	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.1	0.00	No Limit
EM2020793-010	BH-M19S	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	0.1	0.2	0.00	No Limit
EK085M: Sulfide as S2- (QC Lot: 3384290)									
EM2020793-021	LPSPB04	EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP080/074: Total Petroleum Hydrocarbons (QC Lot: 3383788)									
EM2018560-003	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	<20	<20	0.00	No Limit
EM2018560-014	Anonymous	EP080: C6 - C9 Fraction	----	20	µg/L	30	30	0.00	No Limit
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3383788)									
EM2018560-003	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	<20	<20	0.00	No Limit
EM2018560-014	Anonymous	EP080: C6 - C10 Fraction	C6_C10	20	µg/L	80	80	0.00	No Limit
EP080: BTEXN (QC Lot: 3383788)									
EM2018560-003	Anonymous	EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	<2	<2	0.00	No Limit
			106-42-3						
		EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	<5	<5	0.00	No Limit
		EP080: Benzene	71-43-2	1	µg/L	<1	<1	0.00	No Limit
		EP080: Toluene	108-88-3	2	µg/L	<2	<2	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	2	µg/L	<2	<2	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3	2	µg/L	2	2	0.00	No Limit
			106-42-3						
EM2018560-014	Anonymous	EP080: ortho-Xylene	95-47-6	2	µg/L	<2	<2	0.00	No Limit
		EP080: Naphthalene	91-20-3	5	µg/L	16	17	6.69	No Limit



h etdo: Blank (h B) an: Laboratory Control Mpike (LCM) 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**

h etdo: AComoun:	CSM Number	LOR	Unit	h etdo: Blank (h B) Report		Laboratory Control Mpike (LCM) Report		
				Result	Concentration	Mpike Recovery (%)	Recovery Limits (%)	Low	Higd
EA250CA: Gross Alpha and Beta Activity (QCLot: 3381214)								
EA250: Gross alpha	----	0.05	Bq/L	<0.05	1751 Bq/L	101	95.2	105
EA250: Gross beta	----	0.1	Bq/L	<0.10	3342 Bq/L	101	94.4	105
EA250: Gross beta activity - 40K	----	0.1	Bq/L	<0.10	----	----	----	----
ED037P: Alkalinity by PC Titrator (QCLot: 3382503)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	111	85.0	116
ED037P: Alkalinity by PC Titrator (QCLot: 3382505)								
ED037-P: Total Alkalinity as CaCO3	----	----	mg/L	----	200 mg/L	106	85.0	116
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3382140)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	101	85.8	117
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3382143)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	500 mg/L	112	80.0	120
ED045G: Chloride by Discrete Analyser (QCLot: 3382141)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	97.2	85.0	115
ED045G: Chloride by Discrete Analyser (QCLot: 3382144)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	1000 mg/L	98.4	85.0	122
ED093F: Dissolved Major Cations (QCLot: 3383794)								
ED093F: Calcium	7440-70-2	1	mg/L	<1	5 mg/L	110	88.2	117
ED093F: Magnesium	7439-95-4	1	mg/L	<1	5 mg/L	106	85.6	114
ED093F: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	106	90.0	114
ED093F: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	88.0	82.8	115
EG020F: Dissolved Metals by ICP-MS (QCLot: 3383790)								
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	103	89.0	111
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	106	83.5	111
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	102	83.2	109



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 Work Order : EM2020793
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Sub-Matrix: WATER		h etdo: Blank (h B) Report		Laboratory Control (Mpike (LCM) Report			
h etdo: ACompound:	CSMNumber	LOR	Unit	Result	Mpike Concentration	Mpike Recovery (%) LCM	Recovery Limits (%) Low High
EG020F: Dissolved Metals by ICP-MS (QCLot: 3383790) - continued							
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.9	83.1 107
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	101	84.6 108
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	84.3 110
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	110	86.3 112
EG020F: Dissolved Metals by ICP-MS (QCLot: 3383793)							
EG020A-F: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	99.1	89.0 111
EG020A-F: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	104	83.5 111
EG020A-F: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	98.5	83.2 109
EG020A-F: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.0	83.1 107
EG020A-F: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.4	84.6 108
EG020A-F: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	84.3 110
EG020A-F: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	86.3 112
EG020T: Total Metals by ICP-MS (QCLot: 3385309)							
EG020A-T: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	110	89.2 115
EG020A-T: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	102	86.4 115
EG020A-T: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	105	86.9 112
EG020A-T: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	105	86.9 111
EG020A-T: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	106	88.3 112
EG020A-T: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	106	87.9 113
EG020A-T: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	108	86.7 117
EG035F: Dissolved Mercury by FIMS (QCLot: 3383792)							
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	87.8	71.6 116
EG035F: Dissolved Mercury by FIMS (QCLot: 3383795)							
EG035F: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	86.4	71.6 116
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3384258)							
EG035T: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	94.3	73.4 119
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3382237)							
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	97.0	75.8 112
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3382238)							
EG051G: Ferrous Iron	----	0.05	mg/L	<0.05	2 mg/L	96.4	75.8 112
EK085M: Sulfide as S2- (QCLot: 3384288)							
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	104	81.9 116
EK085M: Sulfide as S2- (QCLot: 3384290)							
EK085: Sulfide as S2-	18496-25-8	0.1	mg/L	<0.1	0.5 mg/L	103	81.9 116
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3383788)							
EP080: C6 - C9 Fraction	----	20	µg/L	<20	360 µg/L	105	65.5 129
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3383788)							



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 Work Order : EM2020793
 Client : EMM CONSULTING PTY LTD
 Project : S190512

Sub-Matrix: **WATER**

<i>h etdo: ACompound:</i>		CSMNumber	LOR	Unit	<i>h etdo: Blank (h B) Report</i>		Laboratory Control Mpik (LCM) Report				
					Result	Concentration	Mpik Recovery (%)	LCM	Low	High	
EP080/074: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3383788) - continued											
EP080: C6 - C10 Fraction		C6_C10	20	µg/L	<20	450 µg/L	103		64.3	126	
EP080: BTEXN (QCLot: 3383788)											
EP080: Benzene		71-43-2	1	µg/L	<1	20 µg/L	111		69.8	124	
EP080: Toluene		108-88-3	2	µg/L	<2	20 µg/L	107		73.6	126	
EP080: Ethylbenzene		100-41-4	2	µg/L	<2	20 µg/L	108		72.0	126	
EP080: meta- & para-Xylene		108-38-3 106-42-3	2	µg/L	<2	40 µg/L	105		71.5	132	
EP080: ortho-Xylene		95-47-6	2	µg/L	<2	20 µg/L	108		76.5	132	
EP080: Naphthalene		91-20-3	5	µg/L	<5	5 µg/L	90.6		70.5	127	

h atrix Mpik (h M) 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	Mample ID	<i>h etdo: ACompound:</i>	CSMNumber	Mpik Concentration	h M	Recovery Limits (%)	
						Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3382140)							
EM2020791-001	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	106	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 3382143)							
EM2020793-008	BH-M16S	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	# Not Determined	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 3382141)							
EM2020791-002	Anonymous	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	142
ED045G: Chloride by Discrete Analyser (QCLot: 3382144)							
EM2020793-009	BH-M19D	ED045G: Chloride	16887-00-6	400 mg/L	# Not Determined	70.0	142
EG020F: Dissolved Metals by ICP-MS (QCLot: 3383790)							
EM2020765-001	Anonymous	EG020A-F: Arsenic	7440-38-2	0.2 mg/L	89.2	76.6	124
		EG020A-F: Cadmium	7440-43-9	0.05 mg/L	85.2	74.6	118
		EG020A-F: Chromium	7440-47-3	0.2 mg/L	79.9	71.0	135
		EG020A-F: Copper	7440-50-8	0.2 mg/L	80.7	76.0	130
		EG020A-F: Lead	7439-92-1	0.2 mg/L	81.2	75.0	133
		EG020A-F: Nickel	7440-02-0	0.2 mg/L	80.0	73.0	131
		EG020A-F: Zinc	7440-66-6	0.2 mg/L	78.2	75.0	131



Sub-Matrix: WATER

Laboratory sample ID	Sample ID	h std.: ACompound:	CSM Number	h atrix: Mpike (h M) Report		
				Mpike Concentration	MpikeRecovery(%) h M	Recovery Limits (%) Low High
EG020F: Dissolved Metals by ICP-MS (QCLot: 3383793) - continued						
EM2020793-009	BH-M19D					
		EG020A-F: Arsenic	7440-38-2	0.4 mg/L	106	76.6 124
		EG020A-F: Cadmium	7440-43-9	0.1 mg/L	94.0	74.6 118
		EG020A-F: Chromium	7440-47-3	0.4 mg/L	92.5	71.0 135
		EG020A-F: Copper	7440-50-8	0.4 mg/L	95.7	76.0 130
		EG020A-F: Lead	7439-92-1	0.4 mg/L	92.7	75.0 133
		EG020A-F: Nickel	7440-02-0	0.4 mg/L	97.5	73.0 131
		EG020A-F: Zinc	7440-66-6	0.4 mg/L	95.6	75.0 131
EG020T: Total Metals by ICP-MS (QCLot: 3385309)						
EM2020490-081	Anonymous					
		EG020A-T: Arsenic	7440-38-2	1 mg/L	102	82.0 123
		EG020A-T: Cadmium	7440-43-9	0.25 mg/L	98.9	81.8 123
		EG020A-T: Chromium	7440-47-3	1 mg/L	100	78.9 119
		EG020A-T: Copper	7440-50-8	1 mg/L	100.0	80.4 118
		EG020A-T: Lead	7439-92-1	1 mg/L	104	80.5 121
		EG020A-T: Nickel	7440-02-0	1 mg/L	102	80.0 118
		EG020A-T: Zinc	7440-66-6	1 mg/L	99.7	74.0 120
EG035F: Dissolved Mercury by FIMS (QCLot: 3383792)						
EM2020793-002	UGM-M1S					
		EG035F: Mercury	7439-97-6	0.01 mg/L	# 58.7	70.0 120
EG035F: Dissolved Mercury by FIMS (QCLot: 3383795)						
EM2020793-022	QA2					
		EG035F: Mercury	7439-97-6	0.01 mg/L	# 62.1	70.0 120
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3384258)						
EM2020706-002	Anonymous					
		EG035T: Mercury	7439-97-6	0.01 mg/L	91.1	70.0 130
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3382237)						
EM2020775-001	Anonymous					
		EG051G: Ferrous Iron	----	2 mg/L	93.3	70.0 130
EG051G: Ferrous Iron by Discrete Analyser (QCLot: 3382238)						
EM2020793-020	BH-M25S					
		EG051G: Ferrous Iron	----	2 mg/L	96.7	70.0 130
EK085M: Sulfide as S2- (QCLot: 3384289)						
EM2020793-002	UGM-M1S					
		EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	# 69.5	70.0 130
EK085M: Sulfide as S2- (QCLot: 3384290)						
EM2020793-022	QA2					
		EK085: Sulfide as S2-	18496-25-8	0.33 mg/L	# 20.9	70.0 130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3383788)						
EM2018560-004	Anonymous					
		EP080: C6 - C9 Fraction	----	280 µg/L	70.2	43.0 125
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3383788)						
EM2018560-004	Anonymous					
		EP080: C6 - C10 Fraction	C6_C10	330 µg/L	68.2	44.0 122
EP080: BTEXN (QCLot: 3383788)						
EM2018560-004	Anonymous					
		EP080: Benzene	71-43-2	20 µg/L	90.9	68.0 130

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 Project : S190512



Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	h std: ACompound:	CSM Number	h atrix Mpike (h M) Report		
				Mpike Concentration	MpikeRecovery(%) h M	Recovery Limits (%) Low High
EP080: BTEXN (QCLot: 3363788) - continued						
EM2018560-004	Anonymous	EP080: Toluene	108-88-3	20 µg/L	88.3	72.0 132



ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM2020793	Page	: 1 of 18
Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Selbourne
Contact	: PcAL UG I BON	Telephone	: +61-2-745j j 699
Pro@dct	: Nlj 9418	Date Namples 3 edeiverR	: 85-Oov-8989
Nite	: ----	@sue Date	: 95-Ded-8989
Nampler	: I GL I ALLHkcGL/ O I 3BDæ	Ookof samples redeiverR	: 29
BrRber number	: ----	Ookof samples analyseR	: 29

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

rief methoR summaries anR referendes are also proviReR to assist in tradeabilityK

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flaggeR in the . uality Control Q C(3 epork

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

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Quality Control Samples
 Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

S atriY: WATER

CompoundR Uroup C@me	Laboratory N@mple	Client N@mple	Analyte	C@N Cumber	Data	Limits	Comment
Matrix Spike (MS) Recoveries							
ED951U: Nulfate Turbidimetric(as NB5 8- by Dc	ES8989M 2--997	I x-S 16N	Sulfate as SO4 - Turbidimetric	15797-M -7	Oot DetermineR	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED954U: Chlorid@ by Disdrete c nalyser	ES8989M 1--998	c nonymous	Chloride	1677M99-6	Oot DetermineR	----	MS recovery not determined, background level greater than or equal to 4x spike level.
ED954U: Chlorid@ by Disdrete c nalyser	ES8989M 2--99j	I x-S 1j D	Chloride	1677M99-6	Oot DetermineR	----	MS recovery not determined, background level greater than or equal to 4x spike level.
EU924F: DissolveR S erdury by F@N	ES8989M 2--998	AUS-S 1N	Mercury	M52j -j M6	47M% %	M@Q-189%	Recovery less than lower data quality objective
EU924F: DissolveR S erdury by F@N	ES8989M 2--988	. c8	Mercury	M52j -j M6	68M% %	M@Q-189%	Recovery less than lower data quality objective
EK974S: Nulfid@ as NB-	ES8989M 2--998	AUS-S 1N	Sulfide as S2-	175j 6-84-7	6j M% %	M@Q-129%	Recovery less than lower data quality objective
EK974S: Nulfid@ as NB-	ES8989M 2--988	. c8	Sulfide as S2-	175j 6-84-7	89M% %	M@Q-129%	Recovery less than lower data quality objective

Outliers : Analysis Holding Time Compliance

S atriY: WATER

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EG051G: Ferrous Iron by Discrete Analyser						
Clear Plastic Bottle - HCl - Filtered						
I x-S 16DH	----	----	----	84-Oov-8989	89-Oov-8989	5
I x-S 85DH	----	----	----	84-Oov-8989	81-Oov-8989	4
Clear Plastic Bottle - HCl - Filtered						
I x-S 1j DH	----	----	----	84-Oov-8989	88-Oov-8989	3
I x-S 89DH	----	----	----	84-Oov-8989	82-Oov-8989	2
I x-S 88DH	----	----	----	84-Oov-8989	84-Oov-8989	2
. c8						
Clear Plastic Bottle - HCl - Filtered						
AUS-S 1DH	----	----	----	84-Oov-8989	88-Oov-8989	3
AUS-S 5DH	----	----	----	84-Oov-8989	84-Oov-8989	2
LPNPI 95						
Clear Plastic Bottle - HCl - Filtered						
AUS-S 8DH	----	----	----	84-Oov-8989	88-Oov-8989	3
I x-S 82DH	----	----	----	84-Oov-8989	82-Oov-8989	2
I x-S 84DH	----	----	----	84-Oov-8989	84-Oov-8989	2



Sample: WATER

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EK085M: Sulfide as S2-							
Clear Plastic Bottle - Zinc Acetate/NaOH	I x -S 16DH I x -S 85DH				84-Oov-8989	89-Oov-8989	5
Clear Plastic Bottle - Zinc Acetate/NaOH	I x -S 1j DH I x -S 89DH I x -S 88DH . c 8				84-Oov-8989	81-Oov-8989	4
Clear Plastic Bottle - Zinc Acetate/NaOH	AUS -S 1DH AUS -S 5DH LPNPI 95				84-Oov-8989	88-Oov-8989	3
Clear Plastic Bottle - Zinc Acetate/NaOH	AUS -S 8DH I x -S 82DH I x -S 84DH				84-Oov-8989	82-Oov-8989	2
EP080/071: Total Petroleum Hydrocarbons							
Amber VOC Vial - Sulfuric Acid	Trip sp1V@ - 87M 98989	84-Oov-8989	11-Oov-8989	14	84-Oov-8989	11-Oov-8989	14
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions							
Amber VOC Vial - Sulfuric Acid	Trip sp1V@ - 87M 98989	84-Oov-8989	11-Oov-8989	14	84-Oov-8989	11-Oov-8989	14
EP080: BTEXN							
Amber VOC Vial - Sulfuric Acid	Trip sp1V@ - 87M 98989	84-Oov-8989	11-Oov-8989	14	84-Oov-8989	11-Oov-8989	14

Analysis Holding Time Compliance

6 samples are identified below as having been analysed or extracted outside of recommended holding times. This should be taken into consideration when interpreting results. This report summarizes extraction and analysis times and compares each with the recommended holding times (referencing ANEPc N) 756H cPxcH cN anR OEPS (baseR on the sample container provider's Dates reported represent first rate of extraction or analysis and reductions in subsequence listings of breaches if any is provided herein. x holding time for leadhate methods @K TCLP(vary according to the analyte reported assessment compares the leadhate rate with the shortest analyte holding time for the e, uivalent soil methoR. These are: organids 15 PaysMercury 87 Rays & other metals 179 RaysKc redorRbreath Does not guarantee a breath for all non-volatile parameters. x holding times for VOC in soils vary according to analytes of interest ; inyl ChloriRe anR Ntyrene holRing time is MRaysw others 15 RaysK c redorRbreath Does not guarantee a breath for all ; BC analytes anR should be verified in case the reported breath is a false positive or ; inyl ChloriRe anR Ntyrene are not very analytes of interest. Monday

Sample: WATER

Evaluation: * = x olRing time breach w(=) ithin holRing time

Method		Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue



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) orWBrtRer : ES 8989M 2
 Client : ESS CBONAL T(OU PT/ LTD
 ProQedt : N1j 9418

S atriy: WATER Evaluation: * = x olRing time breadh wv =) ithin hoilfing timek

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Ef aluation	Date analysed	Due for analysis	Ef aluation	
EA250: Gross Alpha and Beta Activity								
Clear Plastic Bottle - Natural (EA250)								
I x -S 1j DH		-----	-----	-----	30-Nov-2020	12-Say-8981	✓	
I x -S 89DH								
I x -S 88DH								
. c 8								
Clear Plastic Bottle - Natural (EA250)								
AUS -S 14NH	LPNPI 95	-----	-----	-----	30-Nov-2020	15-Say-8981	✓	
EA250CA: Gross Alpha and Beta Activity								
Clear Plastic Bottle - Natural (EA250)								
I x -S 1j DH		-----	-----	-----	30-Nov-2020	12-Say-8981	✓	
I x -S 89DH								
I x -S 88DH								
. c 8								
Clear Plastic Bottle - Natural (EA250)								
AUS -S 14NH	LPNPI 95	-----	-----	-----	30-Nov-2020	15-Say-8981	✓	
ED037P: Alkalinity by PC Titrator								
Clear Plastic Bottle - Natural (ED037-P)								
I x -S 16DH		-----	-----	-----	25-Nov-2020	8MOov-8989	✓	
I x -S 85DH								
Clear Plastic Bottle - Natural (ED037-P)								
I x -S 1j DH		-----	-----	-----	25-Nov-2020	87-Oov-8989	✓	
I x -S 89DH								
I x -S 88DH								
. c 8								
Clear Plastic Bottle - Natural (ED037-P)								
AUS -S 1DH	AUS -S 1NH	-----	-----	-----	25-Nov-2020	8j -Oov-8989	✓	
AUS -S 6DH	AUS -S 14NH							
LPNPI 95								
Clear Plastic Bottle - Natural (ED037-P)								
AUS -S 8DH	AUS -S 8NH	-----	-----	-----	25-Nov-2020	29-Oov-8989	✓	
I x -S 82DH	I x -S 82NH							
I x -S 84DH	I x -S 84N							



S atriY: WATER Evaluation: * = x olRng time breadh wv =) ithin holRng timek

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Ef aluation	Date analysed	Due for analysis	Ef aluation	
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Clear Plastic Bottle - Natural (ED041G)								
I x -S 16DH I x -S 85DH	I x -S 16NH I x -S 85NH	-----	-----	-----	25-Nov-2020	11-Ded-8989	✓	
Clear Plastic Bottle - Natural (ED041G)								
I x -S 1j DH I x -S 89DH I x -S 88DH . c 8	I x -S 1j NH I x -S 89NH I x -S 88NH	-----	-----	-----	25-Nov-2020	18-Ded-8989	✓	
Clear Plastic Bottle - Natural (ED041G)								
AUS -S 1DH AUS -S 5DH LPNPI 95	AUS -S 1NH AUS -S 14NH	-----	-----	-----	25-Nov-2020	12-Ded-8989	✓	
Clear Plastic Bottle - Natural (ED041G)								
AUS -S 8DH I x -S 82DH I x -S 84DH	AUS -S 8NH I x -S 82NH I x -S 84NH	-----	-----	-----	25-Nov-2020	15-Ded-8989	✓	
ED045G: Chloride by Discrete Analyser								
Clear Plastic Bottle - Natural (ED045G)								
I x -S 16DH I x -S 85DH	I x -S 16NH I x -S 85NH	-----	-----	-----	25-Nov-2020	11-Ded-8989	✓	
Clear Plastic Bottle - Natural (ED045G)								
I x -S 1j DH I x -S 89DH I x -S 88DH . c 8	I x -S 1j NH I x -S 89NH I x -S 88NH	-----	-----	-----	25-Nov-2020	18-Ded-8989	✓	
Clear Plastic Bottle - Natural (ED045G)								
AUS -S 1DH AUS -S 5DH LPNPI 95	AUS -S 1NH AUS -S 14NH	-----	-----	-----	25-Nov-2020	12-Ded-8989	✓	
Clear Plastic Bottle - Natural (ED045G)								
AUS -S 8DH I x -S 82DH I x -S 84DH	AUS -S 8NH I x -S 82NH I x -S 84NH	-----	-----	-----	25-Nov-2020	15-Ded-8989	✓	



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) orWBrtRer : ES 8989M 2
 Client : ESS CBONAL T@U PT/ LTD
 Pro@ct : N1j,9418

S atrnY: WATER Evaluation: * = x olRng time breadh wv =) ithin holRng timek

Method		Sample Date			Extraction / Preparation			Analysis		
Container / Client Sample ID(s)		Date extracted	Due for extraction	Ef aluation	Date analysed	Due for analysis	Ef aluation			
ED093F: Dissolved Major Cations										
ED093F: Dissolved Major Cations; Filtered (ED093F)	I x -S 16NH I x -S 85NH	13-Nov-2020	-----	-----	26-Nov-2020	11-Ded-8989	✓			
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)	I x -S 1j DH I x -S 89NH I x -S 88NH	14-Nov-2020	-----	-----	26-Nov-2020	18-Ded-8989	✓			
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)	AUS -S 1NH AUS -S 14NH	15-Nov-2020	-----	-----	26-Nov-2020	12-Ded-8989	✓			
Clear Plastic Bottle - Nitric Acid; Filtered (ED093F)	AUS -S 8NH I x -S 82NH I x -S 84NH	16-Nov-2020	-----	-----	26-Nov-2020	15-Ded-8989	✓			
EG020F: Dissolved Metals by ICP-MS										
EG020F: Dissolved Metals by ICP-MS	I x -S 16NH I x -S 85NH	13-Nov-2020	-----	-----	25-Nov-2020	18-Say-8981	✓			
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)	I x -S 1j NH I x -S 89NH I x -S 88NH	14-Nov-2020	-----	-----	25-Nov-2020	12-Say-8981	✓			
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)	AUS -S 1NH AUS -S 14NH	15-Nov-2020	-----	-----	25-Nov-2020	15-Say-8981	✓			
Clear Plastic Bottle - Nitric Acid; Filtered (EG020A-F)	AUS -S 8NH I x -S 82NH I x -S 84NH	16-Nov-2020	-----	-----	25-Nov-2020	14-Say-8981	✓			



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) orWBriRer : ES 8989M 2
 Client : ESS CBONAL T@U PT/ LTD
 Pro@ct : N1j,9418

S atrnY: WATER Evaluation: * = x olRing time breadh wv =) ithin holRing timek

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Ef aluation	Date analysed	Due for analysis	Ef aluation	
EG020T : Total Metals by ICP-MS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)	3 | 1	26-Nov-2020	18-S ay-8981	✓	26-Nov-2020	18-Say-8981	✓	
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)	3 | 2H	26-Nov-2020	12-S ay-8981	✓	26-Nov-2020	12-Say-8981	✓	
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)	AUS -S 1NH 3 | 5	26-Nov-2020	15-S ay-8981	✓	26-Nov-2020	15-Say-8981	✓	
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020A-T)	I x -S 82DH TI 2H TI 4	26-Nov-2020	14-S ay-8981	✓	26-Nov-2020	14-Say-8981	✓	
EG035F : Dissolved Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)	I x -S 16NH I x -S 85NH	13-Nov-2020	-----	----	25-Nov-2020	11-Ded-8989	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)	I x -S 1j NH I x -S 89NH I x -S 88NH . c 8	14-Nov-2020	-----	----	25-Nov-2020	18-Ded-8989	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)	AUS -S 1NH AUS -S 14NH LPNPI 95	15-Nov-2020	-----	----	25-Nov-2020	12-Ded-8989	✓	
Clear Plastic Bottle - Nitric Acid; Filtered (EG035F)	AUS -S 8DH I x -S 82DH I x -S 84DH	16-Nov-2020	-----	----	25-Nov-2020	15-Ded-8989	✓	
EG035T : Total Recoverable Mercury by FIMS								
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)	3 | 1	13-Nov-2020	-----	----	26-Nov-2020	11-Ded-8989	✓	
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)	3 | 2H	14-Nov-2020	-----	----	26-Nov-2020	18-Ded-8989	✓	
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)	AUS -S 1NH 3 | 5	15-Nov-2020	-----	----	26-Nov-2020	12-Ded-8989	✓	
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035T)	I x -S 82DH TI 2H TI 5H	16-Nov-2020	-----	----	26-Nov-2020	15-Ded-8989	✓	



S atriy: WATER Evaluation: * = x olRng time breadh wv =) ithin hoilRng time

Method		Sample Date			Extraction / Preparation		Analysis	
Container / Client Sample ID(s)		Date extracted	Due for extraction	Ef aluation	Date analysed	Due for analysis	Ef aluation	
EG051G: Ferrous Iron by Discrete Analyser								
Clear Plastic Bottle - HCl - Filtered (EG051G)								
I x-S 16DH	I x-S 16NH	-----	-----	-----	25-Nov-2020	89-Oov-8989	-----	*
I x-S 85DH	I x-S 85N	-----	-----	-----	25-Nov-2020	81-Oov-8989	-----	*
Clear Plastic Bottle - HCl - Filtered (EG051G)								
I x-S 1j DH	I x-S 1j NH	-----	-----	-----	25-Nov-2020	88-Oov-8989	-----	*
I x-S 89DH	I x-S 89NH	-----	-----	-----	25-Nov-2020	89-Oov-8989	-----	*
I x-S 88DH	I x-S 88NH	-----	-----	-----	25-Nov-2020	82-Oov-8989	-----	*
. c 8								
Clear Plastic Bottle - HCl - Filtered (EG051G)								
AUS-S 1DH	AUS-S 1NH	-----	-----	-----	25-Nov-2020	89-Oov-8989	-----	*
AUS-S 5DH	AUS-S 14NH	-----	-----	-----	25-Nov-2020	81-Oov-8989	-----	*
LPNPI 95								
Clear Plastic Bottle - HCl - Filtered (EG051G)								
AUS-S 8DH	AUS-S 8NH	-----	-----	-----	25-Nov-2020	88-Oov-8989	-----	*
I x-S 82DH	I x-S 82NH	-----	-----	-----	25-Nov-2020	89-Oov-8989	-----	*
I x-S 84DH	I x-S 84N	-----	-----	-----	25-Nov-2020	81-Oov-8989	-----	*
EK085M: Sulfide as S2-								
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)								
I x-S 16DH	I x-S 16NH	-----	-----	-----	25-Nov-2020	89-Oov-8989	-----	*
I x-S 85DH	I x-S 85N	-----	-----	-----	25-Nov-2020	81-Oov-8989	-----	*
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)								
I x-S 1j DH	I x-S 1j NH	-----	-----	-----	25-Nov-2020	88-Oov-8989	-----	*
I x-S 89DH	I x-S 89NH	-----	-----	-----	25-Nov-2020	89-Oov-8989	-----	*
I x-S 88DH	I x-S 88NH	-----	-----	-----	25-Nov-2020	82-Oov-8989	-----	*
. c 8								
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)								
AUS-S 1DH	AUS-S 1NH	-----	-----	-----	25-Nov-2020	89-Oov-8989	-----	*
AUS-S 5DH	AUS-S 14NH	-----	-----	-----	25-Nov-2020	81-Oov-8989	-----	*
LPNPI 95								
Clear Plastic Bottle - Zinc Acetate/NaOH (EK085)								
AUS-S 8DH	AUS-S 8NH	-----	-----	-----	25-Nov-2020	88-Oov-8989	-----	*
I x-S 82DH	I x-S 82NH	-----	-----	-----	25-Nov-2020	89-Oov-8989	-----	*
I x-S 84DH	I x-S 84N	-----	-----	-----	25-Nov-2020	82-Oov-8989	-----	*
EP080/071: Total Petroleum Hydrocarbons								
Amber VOC Vial - Sulfuric Acid (EP080)								
Trip spiVè - 87M 98989		25-Nov-2020	11-Oov-8989	-----	25-Nov-2020	11-Oov-8989	-----	*
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Amber VOC Vial - Sulfuric Acid (EP080)								
Trip spiVè - 87M 98989		25-Nov-2020	11-Oov-8989	-----	25-Nov-2020	11-Oov-8989	-----	*
EP080: BTEXN								
Amber VOC Vial - Sulfuric Acid (EP080)								
Trip spiVè - 87M 98989		25-Nov-2020	11-Oov-8989	-----	25-Nov-2020	11-Oov-8989	-----	*



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory compliance samples in which the submitted sample (as a percentage of total samples) is greater than or equal to the specified rate of compliance listing of breaches is provided in the Summary of Breaches

Sample: **WATER** Evaluation: * = quality Control frequency not within specification ** = quality Control frequency within specification

Analytical Methods	Method	Count			Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected			
Laboratory Duplicate DAP								
Compliance by PC Titrator	ED92MP	5	59	10.00	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Chloride by Discrete analyser	ED954U	5	2M	10.81	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Dissolve Residuals by FSN	EU924F	2	86	11.54	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Dissolve Residuals by P-S-N - Nuite c	EU989c-F	5	86	15.38	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Ferrous Ion by Discrete analyser	EU941U	2	85	12.50	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Uross c lpha anRI eta cdtivity	Ec849	8	1M	11.76	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
S@r Cations - DissolveR	ED9j 2F	5	2M	10.81	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Nulfate Turbidity (as NB 5 8- by Discrete analyser	ED951U	5	59	10.00	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Nulfite as NB-	Ek 974	2	88	13.64	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Total S erduy by FSN	EU924T	8	89	10.00	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Total S etals by P-S-N - Nuite c	EU989c-T	8	89	10.00	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
T3 x ; olatilesV TEX	EP979	8	17	11.11	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Laboratory Control Samples QC								
Compliance by PC Titrator	ED92MP	8	59	5.00	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Chloride by Discrete analyser	ED954U	5	2M	10.81	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Dissolve Residuals by FSN	EU924F	8	86	7.69	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Dissolve Residuals by P-S-N - Nuite c	EU989c-F	8	86	7.69	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Ferrous Ion by Discrete analyser	EU941U	8	85	8.33	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Uross c lpha anRI eta cdtivity	Ec849	8	1M	11.76	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
S@r Cations - DissolveR	ED9j 2F	8	2M	5.41	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Nulfate Turbidity (as NB 5 8- by Discrete analyser	ED951U	5	59	10.00	10.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Nulfite as NB-	Ek 974	8	88	9.09	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Total S erduy by FSN	EU924T	1	89	5.00	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Total S etals by P-S-N - Nuite c	EU989c-T	1	89	5.00	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
T3 x ; olatilesV TEX	EP979	1	17	5.56	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
SethoR lanV@ S I (
Chloride by Discrete analyser	ED954U	8	2M	5.41	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Dissolve Residuals by FSN	EU924F	8	86	7.69	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Dissolve Residuals by P-S-N - Nuite c	EU989c-F	8	86	7.69	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Ferrous Ion by Discrete analyser	EU941U	8	85	8.33	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Uross c lpha anRI eta cdtivity	Ec849	1	1M	5.88	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
S@r Cations - DissolveR	ED9j 2F	8	2M	5.41	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Nulfate Turbidity (as NB 5 8- by Discrete analyser	ED951U	8	59	5.00	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Nulfite as NB-	Ek 974	8	88	9.09	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Total S erduy by FSN	EU924T	1	89	5.00	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	
Total S etals by P-S-N - Nuite c	EU989c-T	1	89	5.00	5.00	✓	OEPS 8912 I 2 & cLN . C NtanParr	



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) orWB rRer : ES 8989M 2
 Client : ESS CBONAL T@U PT/ LTD
 Pro@ct : N1j 9418

Quality Control Sample Type : Quality Control Sample Type
 Analytical Methods : Quality Control Specification

Sample Type	Analytical Methods	Method	Count		Rate (%)		Evaluation	Quality Control Specification
			QC	Regular	Actual	Expected		
Satriy NpiVes GN	SethoR lanV8 GL (- Continuer T3x ; olatilesV TEX	EP979	1	17	5.56	5.00	✓	OEPS 8912 I 2 & cLN . C NtanRarR
		ED954U	8	2M	5.41	5.00	✓	OEPS 8912 I 2 & cLN . C NtanRarR
		EU924F	8	86	7.69	5.00	✓	OEPS 8912 I 2 & cLN . C NtanRarR
		EU989c-F	8	86	7.69	5.00	✓	OEPS 8912 I 2 & cLN . C NtanRarR
		EU941U	8	85	8.33	5.00	✓	OEPS 8912 I 2 & cLN . C NtanRarR
		ED951U	8	59	5.00	5.00	✓	OEPS 8912 I 2 & cLN . C NtanRarR
		Ek 974	8	88	9.09	5.00	✓	OEPS 8912 I 2 & cLN . C NtanRarR
		EU924T	1	89	5.00	5.00	✓	OEPS 8912 I 2 & cLN . C NtanRarR
		EU989c-T	1	89	5.00	5.00	✓	OEPS 8912 I 2 & cLN . C NtanRarR
		EP979	1	17	5.56	5.00	✓	OEPS 8912 I 2 & cLN . C NtanRarR

Sample Type : Satriy NpiVes GN

Analytical Methods : Satriy NpiVes GN

Method : Satriy NpiVes GN

QC : Satriy NpiVes GN

Regular : Satriy NpiVes GN

Actual : Satriy NpiVes GN

Expected : Satriy NpiVes GN

Evaluation : Satriy NpiVes GN

Quality Control Specification : Satriy NpiVes GN



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 ANEPc HcPx cHc N anROEPS K@ house. Reproduced 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 the methods have been developed are provided in the Summary Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Gross alpha activity	Ec849	) c TE3	Determination of gross alpha activity in water samples by Li, uid Nidtitillation Counting (NC/K
Conductivity by PC Titrator	ED92MP	) c TE3	This procedure determines conductivity by automatic measurement of the conductivity of a sample using a titration cell. This method is compliant with OEPS Method 1.
Nitrate Turbidity (as NB5-8- by Discrete analyser)	ED951U	) c TE3	This procedure is for the determination of nitrate in a 964µm filtered sample. Nitrate ions are converted to a barium sulfate suspension in an acidified mercuric chloride solution. The absorbance of the solution is measured by a photometer. The method is compliant with OEPS Method 1.
Chloride by Discrete analyser	ED954U	) c TE3	The thiocyanate ion is liberated from mercuric thiocyanate through the reaction of mercuric ion with thiocyanate. The presence of ferrid ions liberates thiocyanate forms highly coloured ferrid thiocyanate which is measured at 579 nm. This method is compliant with OEPS Method 1.
Sulfate Cations - Dissolver	ED9j 2F	) c TE3	This procedure is for the determination of sulfate in a 964µm filtered sample. Sulfate ions are converted to a barium sulfate suspension in an acidified mercuric chloride solution. The absorbance of the solution is measured by a photometer. The method is compliant with OEPS Method 1.
Dissolved Solids by P-S-N - Nuite c	EU989c-F	) c TE3	This procedure is for the determination of dissolved solids in a 964µm filtered sample. The sample is filtered through a 0.45µm filter and the residue is dried at 105°C. The weight of the residue is measured. This method is compliant with OEPS Method 1.
Total Solids by P-S-N - Nuite c	EU989c-T	) c TE3	This procedure is for the determination of total solids in a 964µm filtered sample. The sample is filtered through a 0.45µm filter and the residue is dried at 105°C. The weight of the residue is measured. This method is compliant with OEPS Method 1.
Dissolved Solids by FSN	EU924F	) c TE3	This procedure is for the determination of dissolved solids in a 964µm filtered sample. The sample is filtered through a 0.45µm filter and the residue is dried at 105°C. The weight of the residue is measured. This method is compliant with OEPS Method 1.
Total Solids by FSN	EU924T	) c TE3	This procedure is for the determination of total solids in a 964µm filtered sample. The sample is filtered through a 0.45µm filter and the residue is dried at 105°C. The weight of the residue is measured. This method is compliant with OEPS Method 1.



Analytical Methods	Method	Matrix	Method Descriptions
Ferrous Co by Discrete c analyser	EU941U	) c TE3	house: 3 eferendeR to c Px c 2499 Fe-I K c dolorimetrid Retermination baseR on the reaction betq een phenanthroline anR ferrous iron at px 216-212 to form an orange-reR compleY that is measureR against a five-point dalibration curveK This methoR is compliant q ith OEPS N d h e R u l e I Q (K
NulfiRe as NB-	Ek 974	) c TE3	house: 3 eferendeR to c Px c 5499-N8- DK NulfiRe species present in q ater samples are immerRately predipitateR q hen dollectedeR in pretreatereR daustidV ind adetate preserveR sample dontainersK The sulphidRe are doloureR using methylene blue inR datorK Oon- Retedts may be sdreeneR by domparison against a stanRarR at half-LB 3 Hotherq ise samples are measureR using A ; - ; Q Retedtion at 665nmK This methoR is compliant q ith OEPS N d h e R u l e I Q (
Qnid I alande by PCT Dc anR Turbi NB5 Dc	* EO944 - PU	) c TE3	house: 3 eferendeR to c Px c 1929FK This methoR is compliant q ith OEPS N d h e R u l e I Q (
T3x ; olatilesV TEX	EP979	) c TE3	house: 3 eferendeR to ANEPc N) 756 - 7869) ater samples are R redtly purgeR prior to analysis by Capillary UC V S N anR , uantifidation is by domparison against an establisheR 4 point dalibration durveK c lternativelyH a sample is e, uilibraterR in a heatRspade vial anR a portion of the heatRspade RetermineR by UCS N analysisK This methoR is compliant q ith the . C re, uirements of OEPS N d h e R u l e I Q (
Preparation Methods	Method	Matrix	Method Descriptions
Digestion for Total Sedoverable S etals	EO84	) c TE3	house: 3 eferendeR to ANEPc N) 756-2994K S ethoR 2994 is a CitridV y Rodchlorid adIR Rgestion prodeR ure useR to prepare surfade anR gounR q ater samples for analysis by Q P c EN or Q P S NK This methoR is compliant q ith OEPS N d h e R u l e I Q (
; olatiles) ater Preparation	B3 U16-)	) c TE3	c 4 mL ali, uot or 4 mL of a fluteR sample is a R R e R to a 59 mL ; BC vial for purgingK



CHAIN OF CUSTODY
ALS Laboratory, please tick a

DADELAIDE 21 Burnside Road Prospect SA 5096
Ph: 08 8329 0880 E: info@als.com.au
DURISMANE 2 Hyde Street Sturtford QLD 4053
Ph: 07 3243 7222 E: samples@als.com.au
GLADSTONE 48 Callendrah Drive Chirn QLD 4660
Ph: 07 7471 5600 E: jladstone@als.com.au

MACKEY 78 Harbour Road Mackay QLD 4740
Ph: 07 4944 0177 E: mackey@als.com.au
MELBOURNE 2-4 Westall Road Springvale VIC 3171
Ph: 03 8549 8600 E: samples.melbourne@als.com.au
MURDOCH 1299 Spynrey Road Murdoch NSW 2850
Ph: 02 6372 6735 E: murdoch@als.com.au

NEWCASTLE 7/565 Millland Road Mayfield West NSW 2304
Ph: 02 4014 2500 E: samples.newcastle@als.com.au
NOWRA 4/13 Greary Place North Nowra NSW 2541
Ph: 02 4423 2063 E: nowra@als.com.au
PERTH 10 Hod Way Malaga WA 6060
Ph: 08 9505 7655 E: samples.perth@als.com.au

WOLLONGONG 1/19-21 Ralph Black Dr. North Wollongong NSW 2500
Ph: 02 4225 3125 E: wollongong@als.com.au

CLIENT: EMM CONSULTING

OFFICE: 88 Ground Floor, 188 Normanby Road, Southbank 3006

PROJECT: Bairnsdale T3 Amalfity

PURCHASE ORDER: PROJECT NO.: S190512

PROJECT MANAGER: Paul Gibbons

SAMPLER: Iluka

COC: Emitted to ALS? (YES)

RELINQUISHED BY: Kaitlyn Brodie

DATE/TIME: 17/11/2020

RECEIVED BY: [Signature]

DATE/TIME:

TURNAROUND REQUIREMENTS: Standard TAT (List due date):
(Standard TAT may be longer for some tests e.g., Ultra - Non Standard or urgent TAT (List due date):
(Trace Organisms)

FOR LABORATORY USE ONLY (Circle)

Cubby Seal Intact? Yes No N/A

Free ice / frozen ice blocks present upon receipt? Yes No N/A

Random Sample Temperature on Receipt: °C

Other comment:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)	CONTAINER INFORMATION	ANALYSIS REQUIRED including SUITES (NB: Suite Codes must be listed to attract suite price) Where Metals are required, specify Total, (unfiltered bottle required) or Dissolved (field filtered bottle required).	ADDITIONAL INFORMATION
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE codes below
1	HMC composite 7	1/11/2020 to 5/11/2020	S	(refer to codes below)
2	Tail composite 7	1/11/2020 to 5/11/2020	S	
3	Trommel oversize composite 7	1/11/2020 to 5/11/2020	S	
TOTAL				

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP = Airflight Unpreserved Plastic
V = VOA Vial (HCl Preserved); VB = VOA Vial Sulfuric Preserved; AV = Airflight Unpreserved Vial SG - Sulfuric Preserved Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Sulfuric Preserved Speciation Bottle; F = Formaldehyde Preserved Glass
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; T = Lugol's Iodine Preserved Bottle; STT = Sterile Sodium Thiosulfate Preserved Bottle.

**Environmental Division
Melbourne
Work Order Reference
EM2020837**

Barcode: [Barcode]

Telephone : +61-3-8549 9600

Received: 24/11/2020 Carrier: [Signature]

C/note: 30 209 4009 74

Temp: 16 °F Seal: Y

Ice / Icebricks (N/A)



Gemma Smeaton

From: Benjamin Comensoli
Sent: Tuesday, 24 November 2020 12:36 PM
To: COC Melbourne
Subject: FW: [EXTERNAL] - RE: ALS Samples
Attachments: COC S190512 20201116.xlsx; COC S190512 20201117_Solids.xlsx

From: Bill Bull <bbull@emmconsulting.com.au>
Sent: Tuesday, 24 November 2020 12:27 PM
To: Benjamin Comensoli <benjamin.comensoli@ALSGlobal.com>
Cc: Kaitlyn Brodie <kbrodie@emmconsulting.com.au>
Subject: [EXTERNAL] - RE: ALS Samples

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Hi Ben,

If I remember correctly, there should have been four eskies delivered. I believe these are the relevant COCs, but let me know if they don't align with the samples inside.

Thanks,

Bill Bull | Environmental Engineer
T 08 8232 2253 | M 0435 060 396

From: Benjamin Comensoli <benjamin.comensoli@ALSGlobal.com>
Sent: Tuesday, 24 November 2020 11:51 AM
To: Bill Bull <bbull@emmconsulting.com.au>
Subject: ALS Samples

CAUTION: This email originated outside of the Organisation.

Hey Bill,

Can you please provide the COC and analysis details for the samples received at ALS Springvale today

Cheers,

Regards,
Ben Comensoli
Client Services Officer, Environmental
Melbourne



Environmental

CERTIFICATE OF ANALYSIS

Work Order : EM2020837 **Page** : 1 of 2
Client : EMM CONSULTING PTY LTD **Laboratory** : Environmental Division Melbourne
Contact : PAUL GIBBONS **Contact** : Shane Colley
Address : 187 Coventry Street **Address** : 4 Westall Rd Springvale VIC Australia 3171
Melbourne 3205
Telephone : ---- **Telephone** : +61-3-8549 9600
Project : S190512 **Date Samples Received** : 24-Nov-2020 10:45
Order number : ---- **Date Analysis Commenced** : 02-Dec-2020
C-O-C number : ---- **Issue Date** : 03-Dec-2020 13:52
Sampler : Iluka
Site : ----
Quote number : EN/222
No. of samples received : 3
No. of samples analysed : 3



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

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

Signatories

Accreditation Category

Ben Feigendrejers

Senior Acid Sulfate Soil Chemist

Brisbane Acid Sulphate Soils, Stafford, QLD



General Comments

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

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

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

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

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

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

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

LOR = Limit of reporting

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

ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.

Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Col mound	CAS Num ber	Sal mpng date / til e		Sal mp ID	HMC composite 7	Tail composite 7	Trommel oversize composite 7	Result
		LOR	Unit					
	----	0.5	kg H2SO4/t		14.3	-3.4	-588	-----
EA009: Net Acid Production Potential								
Net Acid Production Potential								
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit		2.5	3.2	11.0	-----
NAG (pH 4.5)	----	0.1	kg H2SO4/t		14.4	3.0	<0.1	-----
NAG (pH 7.0)	----	0.1	kg H2SO4/t		18.0	5.4	<0.1	-----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t		6.2	19.9	592	-----
ANC as CaCO3	----	0.1	% CaCO3		0.6	2.0	60.3	-----
Fizz Rating	----	0	Fizz Unit		1	1	5	-----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%		0.67	0.54	0.13	-----



Environmental

QUALITY CONTROL REPORT

Work Order : **EM2020837**

Page : 1 of 3

Client : **EMM CONSULTING PTY LTD**
 Contact : **PAUL GIBBONS**
 Address : **187 Coventry Street
 Melbourne 3205**
 Telephone : ----
 Project : **S190512**
 Order number : ----
 C-O-C number : ----
 Sampler : **Iluka**
 Site : ----
 Quote number : **EN/222**
 No. of samples received : **3**
 No. of samples analysed : **3**

Laboratory : **Environmental Division Melbourne**
 Contact : **Shane Colley**
 Address : **4 Westall Rd Springvale VIC Australia 3171**

Telephone : **+61-3-8549 9600**
 Date Samples Received : **24-Nov-2020**
 Date Analysis Commenced : **02-Dec-2020**
 Issue Date : **03-Dec-2020**



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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories

Position

Accreditation Category

Ben Felgendreieris

Senior Acid Sulfate Soil Chemist

Brisbane Acid Sulphate Soils, Stafford, QLD



Page : 2 of 3
 Work Order : EM2020837
 Client : EMM CONSULTING PTY LTD
 Project : S190512

General Comments

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

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

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

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

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

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: SOIL

Laboratory sample ID	Sample ID	h etdo: ACompound:	CSM Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA011: Net Acid Generation (QC Lot: 3391390)									
EM2020837-001	HMC composite 7	EA011: NAG (pH 4.5)	---	0.1	kg H2SO4/t	14.4	14.3	0.995	0% - 20%
		EA011: NAG (pH 7.0)	---	0.1	kg H2SO4/t	18.0	17.7	2.06	0% - 20%
		EA011: pH (OX)	---	0.1	pH Unit	2.5	2.5	0.00	0% - 20%
EM2020865-008	Anonymous	EA011: NAG (pH 4.5)	---	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: NAG (pH 7.0)	---	0.1	kg H2SO4/t	<0.1	<0.1	0.00	No Limit
		EA011: pH (OX)	---	0.1	pH Unit	8.7	8.8	0.00	0% - 20%
EA013: Acid Neutralising Capacity (QC Lot: 3391389)									
EB2030562-091	Anonymous	EA013: ANC as H2SO4	---	0.5	kg H2SO4 equiv./t	53.5	52.4	2.04	0% - 20%
EM2020865-003	Anonymous	EA013: ANC as H2SO4	---	0.5	kg H2SO4 equiv./t	18.7	19.4	3.71	0% - 20%
ED042T: Total Sulfur by LECO (QC Lot: 3395618)									
EB2031554-001	Anonymous	ED042T: Sulfur - Total as S (LECO)	---	0.01	%	0.01	<0.01	0.00	No Limit
EM2020865-005	Anonymous	ED042T: Sulfur - Total as S (LECO)	---	0.01	%	0.49	0.49	0.00	0% - 20%



h etdo: Blank (h B) an: Laboratory Control Mpike (LCM) Report

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

Sub-Matrix: SOIL

h etdo: ACompound:	CSM Number	LOR	Unit	h etdo: Blank (h B) Report		Laboratory Control Mpike (LCM) Report			
				Result	Concentration	Mpike Recovery (%)	LCM	Low	High
EA011: Net Acid Generation (QCLot: 3391390)									
EA011: NAG (pH 7.0)			kg H2SO4/t		26.74 kg H2SO4/t	94.7		70.0	130
EA013: Acid Neutralising Capacity (QCLot: 3391389)									
EA013: ANC as H2SO4			kg H2SO4 equiv./t		9.9 kg H2SO4 equiv./t	93.3		82.0	120
ED042T: Total Sulfur by LECO (QCLot: 3395618)									
ED042T: Sulfur - Total as S (LECO)		0.01	%	<0.01	0.16 %	98.5		70.0	130

h atrix Mpike (h M) 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 (DOOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**



ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: EM2020837	Page	: 1 of 4
Client	: EMM CONSULTING PTY LTD	Laboratory	: Environmental Division Melbourne
Contact	: PAUL GIBBONS	Telephone	: +61-3-8549 9600
Project	: S190512	Date Samples Received	: 24-Nov-2020
Site	: ----	Issue Date	: 03-Dec-2020
Sampler	: Iluka	No. of samples received	: 3
Order number	: ----	No. of samples analysed	: 3

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED042T: Total Sulfur by LECO						
Miscellaneous Plastic Container						
HMC composite 7,	02-Dec-2020	12-Nov-2020	20	----	----	----
Trommel oversize composite 7						

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA011: Net Acid Generation							
Miscellaneous Plastic Container (EA011)							
HMC composite 7,	05-Nov-2020	02-Dec-2020	05-Nov-2021	✓	02-Dec-2020	31-May-2021	✓
Trommel oversize composite 7							
EA013: Acid Neutralising Capacity							
Miscellaneous Plastic Container (EA013)							
HMC composite 7,	05-Nov-2020	02-Dec-2020	05-Nov-2021	✓	03-Dec-2020	31-May-2021	✓
Trommel oversize composite 7							
ED042T: Total Sulfur by LECO							
Miscellaneous Plastic Container (ED042T)							
HMC composite 7,	05-Nov-2020	02-Dec-2020	12-Nov-2020	*	02-Dec-2020	31-May-2021	✓
Trommel oversize composite 7							



Quality Control Parameter Frequency Compliance

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

Matrix: **SOIL**

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

Quality Control Sample Type Analytical Methods	Method	Count		Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected		
Laboratory Duplicates (DUP)							
Acid Neutralising Capacity (ANC)	EA013	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Net Acid Generation	EA011	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acid Neutralising Capacity (ANC)	EA013	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Net Acid Generation	EA011	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Sulfur - Total as S (LECO)	ED042T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
Net Acid Production Potential	EA009	SOIL	In house: Referenced to Coastech Research (Canada)(Mod.). NAPP = Acid Production Potential (APP or MAP-Maximum Acid Potential) minus Neutralising Capacity (ANC). NAPP may be +ve, zero or -ve.
Net Acid Generation	EA011	SOIL	In house: Referenced to Miller (1998) Titrimetric procedure determines net acidity in a soil following peroxide oxidation. Titrations to both pH 4.5 and pH 7 are reported.
Acid Neutralising Capacity (ANC)	EA013	SOIL	In house: Referenced to USEPA 600/2-78-054, I. Miller (2000). A fizz test is done to semiquantitatively estimate the likely reactivity. The soil is then reacted with an known excess quantity of an appropriate acid. Titration determines the acid remaining, and the ANC can be calculated from comparison with a blank titration.
Sulfur - Total as S (LECO)	ED042T	SOIL	In house: Dried and pulverised sample is combusted in a high temperature furnace in the presence of strong oxidants / catalysts. The evolved S (as SO ₂) is measured by infra-red detector
Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
Dry and Pulverise (up to 100g)	GEO30	SOIL	#



CHAIN OF CUSTODY
ALS Laboratory, Please Refer →

LABORATORY: 21 Erina Road, Erina, NSW 2206
Ph: 02 4321 1800 E: info@als.com.au
DUNEDIN: 133 Spring Road, Nelson, NZ 7010
Ph: 06 491 8800 E: samp@nz.als.com.au

LABORATORY: 24 Waterloo Road, Singapore, SINGAPORE
Ph: 06 659 8800 E: samp@sg.als.com.au
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LABORATORY: 5388 National Road, Hamilton, NZ 3204
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DUNEDIN: 133 Spring Road, Nelson, NZ 7010
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LABORATORY: 27-28 Woodward Road, Sydney, NSW 1500
Ph: 02 9212 3255 E: samp@au.als.com.au
DUNEDIN: 133 Spring Road, Nelson, NZ 7010
Ph: 06 491 8800 E: samp@nz.als.com.au

LABORATORY: 110-111 Sappi Street, On Veranda, Sydney, NSW 2050
Ph: 02 4229 3128 E: samp@sy.als.com.au

CLIENT: ERM CONSULTING
OFFICE: 20 Chardon Street, St Leonards
PROJECT: Barawal 19 Ancillary
PROJECT NO.: 819012
ALIS QUOTE NO:
COUNTRY OF ORIGIN:
CONTACT PH.: 047702415
SAMPLE MOBILE: 040181447
END FORMAT (for default):
REUNISHED BY: Keahyn Brodie
DATE/TIME:
REUNISHED BY: Keahyn Brodie
DATE/TIME:

PURCHASE ORDER:
PROJECT MANAGER: Paul Gibson
SAMPLES: Keahyn Brodie / Bill Bell
CO C: Keahyn Brodie / Bill Bell
CO C Email: keahyn_brodie@ermconsulting.com.au
Email: paul.gibson@ermconsulting.com.au
Additional Information:

TURN/ROUND REQUIREMENTS:
 Standard TAT (last due date)
 Special TAT (last due date)
COC SEQUENCE NUMBER (draft):
OFF: 1 2 3 4 5 6 7
RECEIVED BY: Keahyn Brodie
DATE/TIME: 24/11/2020 14:00
RECEIVED BY: Keahyn Brodie
DATE/TIME:

FOR LABORATORY USE ONLY (Grade):
Change Sheet (later)? Yes No N/A
Final Co. known (no index present upon receipt)? Yes No N/A
Random Sample Temperature on Receipt: °C
Other comment:

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes)	TOTAL BOTTLES	ANALYSIS REQUIRED INCLUDING SUITES (NB: Suite Codes must be used to abbreviate suite)	Additional Information
1	UGM-M8D	18/11/2020 8:30	W		5	Major ions + ionic balance NT-1 & NT-2 (Green)	Environmental Division Sydney Work Order Reference ES20416996 Telephone: + 61-2-8784 8655
2	UGM-M8S	18/11/2020 8:10	W		6	Sulphide EK086 (Yellow)	
3	UGM-M12D	18/11/2020 12:10	W		5	Ferrous Iron (field filtered) EG051 (Maroon)	
4	UGM-M12S	18/11/2020 12:30	W		5	Dissolved metals (field filtered) EG020F W-2 (red)	
5	BH-M17D	17/11/2020 12:40	W		5	Total metals EG020T W-2T (red)	
6	BH-M17S	17/11/2020 13:30	W		6	Gross alpha beta EA250 (1L Green)	
7	BH-M18D	17/11/2020 10:40	W		5	TRH, BTXEN	
8	BH-M18S	17/11/2020 9:45	W		6		
9	BH-M21D	18/11/2020 10:50	W		5		
10	BH-M21S	18/11/2020 11:20	W		5		
11	QA1	18/11/2020 8:30	W		5		
12	QC1	18/11/2020 8:30	W		1		
13	TriB Blank 1	18/11/2020 0:00	W		1		
14	TriB Blank 2	18/11/2020 0:00	W		1		
15	RBS	17/11/2020 11:00	W		1		
TOTAL					68	12 12 12 12 7 12 1 0	

**QC1 / ENVIRONMENTAL
EA250 / ALS Canberra**
Subcontract Forward Lab / Split WO
Organised By / Date:
Relinquished By / Date:
Connote / Courier:
WO No: **ES 20416996**
Attached By PO / Internal Sheet:

Water Contaminant Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; CHC = Nitric Preserved CHC; SH = Sodium Hydroxide Preserved; ST = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AR = Amber Glass Preserved Plastic; AD = Amber Glass Preserved Plastic; V = VOA Volatilisable Preserved; VS = VOA Volatile Preserved; AV = Volatilisable Preserved; AVS = Volatilisable Preserved; S = Sulphur Preserved Plastic; HS = HCl Preserved Specimen bottle; SP = Sulphur Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Strontium Bottle; ASS = High Bag for Acid Sulphide Solids; B = Unpreserved Bag; L = Liquid; LD = Liquid Preserved Bottle; ST = Strontium Bottle; TH = Thioflavin Preserved Bottle;

Fadi Soro

From: Angus Harding
Sent: Tuesday, 24 November 2020 10:04 AM
To: Samples Sydney
Subject: FW: [EXTERNAL] - Esky delivery for S190512
Attachments: COC S190512 20201124.xlsx

Hi Fadi,

See attached COC for EMM samples coming from Wollongong.

Cheers.

Kind Regards,

Angus Harding

Client Services Officer, Environmental
Sydney



T +61 2 8784 8555
F +61 2 8784 8500
D +61 2 8784 8503
angus.harding@alsglobal.com
277-289 Woodpark Road
Smithfield NSW 2164 AUSTRALIA



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From: Kaitlyn Brodie [mailto:kbrodie@emmcconsulting.com.au]
Sent: Tuesday, 24 November 2020 9:22 AM
To: ALSEnviro Sydney <ALSEnviro.Sydney@ALSGlobal.com>
Subject: [EXTERNAL] - Esky delivery for S190512

CAUTION: This email originated from outside of ALS. Do not click links or open attachments unless you recognize the sender and are sure content is relevant to you.

Good morning Sydney Team,

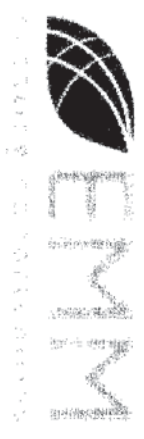
I just dropped some eskys at ALS Wollongong so they should be arriving in Sydney shortly.

COC is attached. Please let me know if I missed anything.

Thanks

Kaitlyn

Kaitlyn Brodie
Hydrogeologist



T 02 9493 9500
M 0401 881 447
[in](#) Connect with us

SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065

**EMMI'S BUSINESS
CONTINUITY PLAN
FOR COVID-19**

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Environmental

CERTIFICATE OF ANALYSIS

Work Order : ES2037MJM
Client : EGG CONSPLTIND i TYLTt
Contact : PAUL GIBBONS
Address : Ground Moor Suite 1 60 Chandos Street
 St Leonards NS5 NS5 607-
TelePhone : 0996685000
ProjeCt : S180- 16 Blairnald THAncillary
Order number : 0996685000
CpDQC number : 0996685000
SamFler : / aityn Brodie KBill Bull
Site : 0996685000
Quote number : ENK16160 Primary worR
No. of samFles received : 1-
No. of samFles analysed : 1-

Page : 1 of 8
Laboratory : Environmental Division Sydney
Contact : SeFan 2 ahamad
Address : 6996685000 FarR4 oad Smithfield NS5 Australia 617+
TelePhone : j 71 6 k9k+ k- - -
Date SamFles 4 received : 6-pNovp6060 18:00
Date Analysis Commenced : 6- pNovp6060
Issue Date : 09pDecp6060 1- :- 1



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

This reFort suFersedes any Previous reFort(s) with this reference. 4 results aFFly to the samFle(s) as submitted, unless the samFling was conducted by ALS. This document shall not be reFroduced, exceFt in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical 4 results
- Surrogate Control Limits

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Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with Procedures sFecified in 61 CW4 Part 11.

Signatories	Position	Accreditation Category
AnRt Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NS5
Edwandy Væd3ar	Organic Coordinator	Sydney Organics, Smithfield, NS5
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NS5
Titus Vimalasiri	2 etals Teamleader	4 adionuclides, WyshwicR ACT



Page : 6 of 8
5 or ROrder : ES60+1787
Client : E2 2 CONSULTING PTMLTD
Project : S180-16 Balranald TH Ancillary

General Comments

The analytical Procedures used by ALS have been developed from established internationally recognised Procedures such as those Published by the USEPA, APYA, AS and NEP2. In house developed Procedures are fully validated and are often at the client request.

5 here moisture determination has been Performed, results are reported on a dry weight basis.

5 here a reported less than (<) result is higher than the LO4, this may be due to Primary sample extract dilution and/or insufficient sample for analysis.

5 here the LO4 of a reported result differs from standard LO4, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

5 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.

5 here 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.
LO4 = Limit of Reporting

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

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

• EP0K0: 5 here reported, Total Xylenes is the sum of the reported concentrations of m&pXylene and oXylene at or above the LO4.

• EG0H- : Poor matrix spike recovery was obtained for 2 mercury on sample ES60+1787. Confirmed by reanalysis.

• EG060: LO4 have been raised due to matrix interference. (High Total Dissolved Solids)

• EG060: Positive result for samples ES60+1787 p16, 01H has been confirmed by reanalysis.

• EP0K0: Sample T4 IP SPI/ E contains volatile compounds stored into the sample containers prior to dispatch from the laboratory. BTEXN compounds stored at 60 ug/kg.

• LO4 for Gross Alpha and Gross Beta raised due to high solid content.

• Sodium Adsorption Ratio (where reported): 5 here results for Na, Ca or 2 g are <LO4, a concentration at half the reported LO4 is incorporated into the SA4 calculation. This represents a conservative approach for Na relative to the assumption that <LO4 = zero concentration and a conservative approach for Ca & 2 g relative to the assumption that <LO4 is equivalent to the LO4 concentration.



Analytical Results

Subp2 atrix: WATER		Sal nrp ID		PDG(IG) t		PDG(IG) S		PDG(IG) 72t		PDG(IG) 72S		- 4 IG7(t	
52 atrix: WATERx		Sal nrpng date / til e		ES2037MLJMD007		ES2037MLJMD002		ES2037MLJMD008		ES2037MLJMD003		ES2037MLJMD006	
Col mound	CAS Null ber	LOR	Unit	4 result	4 result	4 result	4 result	4 result	4 result	4 result	4 result	4 result	4 result
EA260: Drobb Atrwf f l d - eaf Ayat'ar													
Drobb geaf	ppp	0.10	BqK	<6.6+	<6.- 6	<6.68	<6.9+	<6.18	<6.18	<6.18	<6.18	<6.18	<6.18
Et 08(i : Atrwf nr g/ i C Trarf aor													
4/ dro9rde Atrwf nr f b Cf CO8	D2 Op610p001	1	mgK	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cf rgol f ae Atrwf nr f b Cf CO8	Hk16p6p7	1	mgK	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
- i yf rgol f ae Atrwf nr f b Cf CO8	91p-6pH	1	mgK	388	268	30U	888	320	888	320	888	320	888
Toaf m Atrwf nr f b Cf CO8	ppp	1	mgK	388	268	30U	888	320	888	320	888	320	888
Et 037D: Scrf ae 5Tcrgmlh earyxf b SO3 21g/ t A													
Scrf ae f b SO3 1Tcrgmlh eary	1+k0k-p8pk	1	mgK	86) 0	3230	8670	32M0	8670	32M0	8670	32M0	8670	32M0
Et 036D: Cwarrde g/ t i byreæ Al f nrber													
Cwarrde	17kk9p0p7	1	mgK	7) 00	27000	7U600	28M00	7) 00	28M00	7) 00	28M00	7) 00	28M00
Et 0U8F: t rbbornted Gfjor Cf aol b													
Cf ytrch	9++0p0p0p6	1	mgK	63)	) 03	62(	M80	687	M80	687	M80	687	M80
Gf Q ebreh	9++H8p8- p-	1	mgK	7300	7M00	7370	7M00	7860	7M00	7860	7M00	7860	7M00
Sodreh	9++0p0pHp	1	mgK	77000	72600	77800	73200	70M00	73200	70M00	73200	70M00	73200
i oaf bbrch	9++0p0p8p8	1	mgK	32	8U	38	2U	32	2U	32	2U	32	2U
ED020F: t rbbornted Geaf rb g/ ICI 1GS													
Arbel iy	9++0p0pKp6	0.001	mgK	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cf dh reh	9++0p+H8	0.0001	mgK	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cwroh reh	9++0p+9pH	0.001	mgK	<0.010	0B72	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cosser	9++0p 0pK	0.001	mgK	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nytkem	9++0p0p6p0	0.001	mgK	<0.010	0B72	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Lef d	9++H8p86pl	0.001	mgK	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Zit y	9++0p7p7p7	0.00-	mgK	<0.0- 0	<0.0- 0	<0.0- 0	<0.0- 0	<0.0- 0	<0.0- 0	<0.0- 0	<0.0- 0	<0.0- 0	<0.0- 0
ED020T: Toaf m Geaf rb g/ ICI 1GS													
Arbel iy	9++0p0pKp6	0.001	mgK	1111	<0.010	1111	1111	1111	1111	1111	1111	1111	1111
Cf dh reh	9++0p+H8	0.0001	mgK	1111	<0.0010	1111	1111	1111	1111	1111	1111	1111	1111
Cwroh reh	9++0p+9pH	0.001	mgK	1111	0B66	1111	1111	1111	1111	1111	1111	1111	1111
Cosser	9++0p 0pK	0.001	mgK	1111	0B7M	1111	1111	1111	1111	1111	1111	1111	1111
Nytkem	9++0p0p6p0	0.001	mgK	1111	0B87	1111	1111	1111	1111	1111	1111	1111	1111
Lef d	9++H8p86pl	0.001	mgK	1111	<0.010	1111	1111	1111	1111	1111	1111	1111	1111
Zit y	9++0p7p7p7	0.00-	mgK	1111	<0.0- 6	1111	1111	1111	1111	1111	1111	1111	1111
ED086F: t rbbornted Gerycr/ g/ FIGS													
Gerycr/	9++H8p89p7	0.0001	mgK	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
ED086T: Toaf m Reyo^erf gra Gerycr/ g/ FIGS													



Page : + of 8
 5 of ROrder : ES60+1787
 Client : E2.2 CONSULTING PTMLTD
 Project : S180-16 Balranald TH Ancillary

Analytical Results

Subp atriX: WATER	Sal m p ID	PDG (t)	PDG (S)	PDG (72t)	PDG (72S)	- 4 (7t)	
5 atriX: WATERx	Sal m p date / til e	PDG (t)	PDG (S)	PDG (72t)	PDG (72S)	- 4 (7t)	
Col mound	CAS Nil ber	LOR	Unit	ES2037MLJM007	ES2037MLJM008	ES2037MLJM003	
ED086T: Toaf mReyo^erf gra Gerycr/ g/ FIGS 1Col at ced	9+H8p9p	0.0001	mg/L	1k pNov p060 0k:HD	1k pNov p060 16:10	1k pNov p060 16:HD	
Gerycr/				4 esult	4 esult	4 esult	19pNov p060 16:+0
ED067D: Ferrocb lrol g/ t rbyreæ Al f riber							ES2037MLJM006
Ferrocb lrol	ppp	0.0-	mg/L	2B2	7B6	<0.0-	4 esult
EK0) 6G: Scripte f b S21							
Scripte f b S21	1k+87p- pk	0.1	mg/L	<0.1	<0.1	<0.1	<0.1
EN066: lol ry - f rfi ye							
ø Toaf mAl nol b	ppp	0.01	meq/L	M73	M7	(M7	M72
ø Toaf mCf aol b	ppp	0.01	meq/L	M22	M66	() 2	M00
ø lol ry - f rfi ye	ppp	0.01	%	0B0	0B7	7BM	0BJU
EA260CA: Drobb Answ f l d - eaf Ayarar							
Drobb f rawf	ppp	0.0-	Bq/L	<1.16	<1.1+	7B(	<1.10
Drobb geaf f yarar 130K	ppp	0.10	Bq/L	<6.6+	<6.68	<6.9+	<6.18



Analytical Results

Subst atriX: WATER		Sal nmpg date / til e		- 4 1G7(S		- 4 1G7) t		- 4 1G7) S		- 4 1G27t		- 4 1G27S	
52 atriX: WATERx		Sal nmpg date / til e		19pNovp060 1HHD		19pNovp060 10:+0		19pNovp060 08:+-		1kpNovp060 10:- 0		1kpNovp060 11:60	
Col mound	CAS Nul ber	LOR	Unit	ES2037MJM00M	ES2037MJM00(	ES2037MJM00(	ES2037MJM00(	ES2037MJM00)	ES2037MJM00U	ES2037MJM00U	ES2037MJM070	4 result	4 result
EA260: Drobb Atrwf f l d - eaf AyatA r													
Drobb geaf	ppp	0.10	BqK	2B(	<6.19	<6.- 1	<6.6k	<6.- H					
Et 08(i : Atrf m r g/ i C Trarf aor													
4/ dro9rde Atrf m r f b Cf CO8	D2 Op610p01	1	mgK	<1	<1	<1	<1	<1					<1
Cf rgol f ae Atrf m r f b Cf CO8	Hk16p6p7	1	mgK	<1	<1	<1	<1	<1					<1
- i yf rgol f ae Atrf m r f b Cf CO8	91p-6pH	1	mgK	8U6	36(	82(	33)	87M					87M
Toaf m Atrf m r f b Cf CO8	ppp	1	mgK	8U6	36(	82(	33)	87M					87M
Et 037D: Scrf ae 5Tcrgmlh earyxf b SO3 21g/ t A													
Scrf ae f b SO3 1Tcrgmlh eary	1+k0k-p8pk	1	mgK	8(M	8320	8(M	8330	3070					3070
Et 036D: Cwarrde g/ t i byreæ Al f rthber													
Cwarrde	17kk9p0p7	1	mgK	7UJ00	7) 000	20700	7U200	27200					27200
Et 0U8F: t rbbornted Gfjor Cf aol b													
Cf ytrch	9++0p0p0p6	1	mgK	M60	626	M(	67)	M82					M82
Gf Q ebreh	9++H8p8- p-	1	mgK	78U0	7820	7370	7370	73) 0					73) 0
Sodre h	9++0p0pH	1	mgK	77) 00	70300	72U00	77700	78000					78000
i oaf bbrch	9++0p0p8p8	1	mgK	8M	37	80	38	80					80
ED020F: t rbbornted Geaf rb g/ lCi 1GS													
Arbel iy	9++0p0pKp6	0.001	mgK	<0.010	<0.010	<0.010	<0.010	<0.010					<0.010
Cf dh reh	9++0p+H8	0.0001	mgK	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010					<0.0010
Cwroh reh	9++0p+9pH	0.001	mgK	<0.010	<0.010	<0.010	<0.010	<0.010					<0.010
Cosser	9++0p 0pk	0.001	mgK	<0.010	<0.010	<0.010	<0.010	<0.010					<0.010
Nyikem	9++0p0p6p0	0.001	mgK	0B78	<0.010	<0.010	<0.010	0B3)					<0.010
Lef d	9++H8p86pl	0.001	mgK	<0.010	<0.010	<0.010	<0.010	<0.010					<0.010
Zit y	9++0p7p7p7	0.00-	mgK	0B66	<0.0- 0	<0.0- 0	<0.0- 0	<0.0- 0					<0.0- 0
ED020T: Toaf mGeaf rb g/ lCi 1GS													
Arbel iy	9++0p0pKp6	0.001	mgK	<0.010	1111	<0.010	1111	<0.010					<0.010
Cf dh reh	9++0p+H8	0.0001	mgK	<0.0010	1111	<0.0010	1111	<0.0010					<0.0010
Cwroh reh	9++0p+9pH	0.001	mgK	<0.010	1111	<0.010	1111	0B7U					<0.010
Cosser	9++0p 0pk	0.001	mgK	0B80	<0.010	<0.010	<0.010	<0.010					<0.010
Nyikem	9++0p0p6p0	0.001	mgK	0B73	<0.010	<0.010	0B77	0B(0					<0.010
Lef d	9++H8p86pl	0.001	mgK	<0.010	1111	<0.010	1111	<0.010					<0.010
Zit y	9++0p7p7p7	0.00-	mgK	0B(2	1111	<0.0- 6	1111	<0.0- 6					<0.0- 6
ED086F: t rbbornted Gerycr/ g/ FIGS													
Gerycr/	9++H8p89p7	0.0001	mgK	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001					<0.0001
ED086T: Toaf mReyo^erf gra Gerycr/ g/ FIGS													



Page : 7 of 8
 5 orROrder : ES60+1787
 Client : E2.2 CONSULTING PTMLTD
 Project : S180-16 Balranald THAncillary

Analytical Results

Subp atrix: WATER	Sal mpe ID	- 4 1G7(S)	- 4 1G7) t	- 4 1G7) S	- 4 1G27t	- 4 1G27S
52 atrix: WATERx	Sal mping date / til e	19pNovp060 1HHD	19pNovp060 10:+0	19pNovp060 08:+-	1kpNovp060 10:- 0	1kpNovp060 11:60
Col mound	CAS Nul ber	ES2037MLJMD0M	ES2037MLJMD0(	ES2037MLJMD0)	ES2037MLJMD0U	ES2037MLJMD070
	LOR	4 esult	4 esult	4 esult	4 esult	4 esult
ED086T: Toaf mReyo^erf gra Gerycr/ g/ FIGS 1Col at ced						
Gerycr/	9+H8p9p7	0.0001	1111	<0.0001	1111	<0.0001
ED067D: Ferrocb lrol g/ t rbyreæ AI f rñber						
Ferrocb lrol	ppp	0.0-	3B8	7B(	UB(	<0.0-
EK0) 6G: Scripte f b S21						
Scripte f b S21	1k+87p6- pk	0.1	0B2	<0.1	<0.1	<0.1
EN066: lol ry - f rñl ye						
∅ Toaf mAl nol b	ppp	0.01	6))	M63	M22	M)
∅ Toaf nCf aol b	ppp	0.01	6))	(77	M2M	(20
∅ lol ry - f rñl ye	ppp	0.01	0B7	3B0	0B0	2B0
EA260CA: Drobb Answf fl d - eaf Ayarñal						
Drobb f rñwf	ppp	0.0-	<1.0k	7B(	<1.1+	2B2
Drobb geaf f yarñal 130K	ppp	0.10	<6.19	<6.- 1	<6.6k	<6.- H



Analytical Results

Subp2 atrix: WATER	Sal mē ID	, A7	Trrs - rfi k 7	Trrs - rfi k 2	R- 6	Trrs Ssite
52 atrix: WATERx	Sal mēng date / til e					
Col mound	CAS Nul ber	LOR	Unit	ES2037MJM077	ES2037MJM078	ES2037MJM073
ED086T: Toaf mReyo^erf grø Gerycr/ g/ FIGS 1Col at ced						
Gerycr/	9+H8p9p7	0.0001	mg/L	<0.0001	<0.0001	1111
ED067D: Ferrocb lrol g/ t rbyreæ AI f rñber						
Ferrocb lrol	ppp	0.0-	mg/L	1111	1111	1111
EK0) 6G: Scipmle f b S21						
Scipmle f b S21	1k+87p6- pk	0.1	mg/L	1111	1111	1111
EN066: lol ry - f rñl ye						
∅ Toaf mAl nol b	ppp	0.01	meq/L	1111	1111	1111
∅ Toaf mCf aol b	ppp	0.01	meq/L	1111	1111	1111
∅ lol ry - f rñl ye	ppp	0.01	%	1111	1111	1111
Ei 0) 0: - TEXN						
- el zel e	91pt+H6	1	µg/L	1111	1111	73
Tonnel e	10kpkkptH	6	µg/L	1111	1111	73
Eaw rgei zel e	100pt+1p-	6	µg/L	1111	1111	73
h eaf 1& sf rf 1X/ rñl e	10kpkkptH 107pt+6pH	6	µg/L	1111	1111	73
orawo 1X/ rñl e	8- pt+9p7	6	µg/L	1111	1111	76
^ Toaf mX/ rñl eb	ppp	6	µg/L	1111	1111	2U
^ Sch op- TEX	ppp	1	µg/L	1111	1111	(7
Nf swawf rñl e	81pt0pH	-	µg/L	1111	1111	7)
EA260CA: Drobb Atawf f l d - eef Ayarñæ						
Drobb f rawf	ppp	0.0-	Bq/L	1111	1111	1111
Drobb geaf f yarñæ 130K	ppp	0.10	Bq/L	1111	1111	1111
Ei 0) 0S: Ti 4.5X- TEX ScrooQf æb						
7æTt i yworoæwf l eT 3	19070p09p	6	%	1111	1111	ULB
Tonnel eT)	60H8p67p	6	%	1111	1111	700
3T- roh oporoogel zel e	+70p0p-	6	%	1111	1111	706



Page : 8 of 8
5 of ROrder : ES60+1787
Client : E2 2 CONSULTING PTMLTD
Project : S180-16 Ballranald THAncillary

Surrogate Control Limits

Subp atri x: WATER			
Col moun d	CAS Nul ber	Recovery Limits (%)	
		Low	High
Ei 0) OS: Ti 4 5/x- TEX ScrrroQf aeb			
7 2ft rrvvroeeaf l e ft 3	19070p9p	91	1H9
Tome l e ft)	60H9p7p	98	1H1
31- roh opno roge l z e l e	+70p00p+	90	16K



Environmental

QUALITY CONTROL REPORT

Work Order : **ES2037MGM**

Page : 1 of 7

Client : **EDD CONSULTING PTY LTD**
 Contact : **PAUL GIBBONS**
 Address : **Ground Floor Suite 1 60 Wandos Street
 St Leonards NS- 6089**
 Telephone : **0000**
 Project : **S1R0916 Blairnald TH Ancillary**
 Order number : **0000**
 CPOC number : **0000**
 Sampler : **/ aityn Brodie KBill Bull**
 Site : **0000**
 Quote number : **ENK16160 Primary work**
 No. of samples received : **19**
 No. of samples analysed : **19**

Laboratory : **Environmental Division Sydney**
 Contact : **Se2an h aVmad**
 Address : **6776kR - ood2ar4 +oad SmitWfield NS- Australia 6185**
 Telephone : **j 81 6 k7k5 k999**
 Date Samples received : **65pNovp6060**
 Date Analysis Commenced : **69pNovp6060**
 Issue Date : **07pDecp6060**



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

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

This Quality Control report contains the following information:

- Laboratory Duplicate (DUP) + error; + relative Percentage Difference (+PD) and Acceptance Limits
- Method Blank (h B) and Laboratory Control Sample (LCS) + error; + recovery and Acceptance Limits
- Matrix Sample (h S) + error; + recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorised signatories below. Electronic signing is carried out in compliance with procedures specified in 61 CF+ Part 11.

Signatories	Position	Accreditation Category
ArMit zosW	Inorganic Chemist	Sydney Inorganics, SmitWfield, NS-
Edwandy Fad3ar	Organic Coordinator	Sydney Organics, SmitWfield, NS-
Ivan Taylor	Analyst	Sydney Inorganics, SmitWfield, NS-
Titus J imalasiiri	Metals Teamleader	+adionuclides, FysWirc4, ACT



General Comments

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

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

- Where a reported less than (<) result is given, this may be due to a primary sample dilution and/or insufficient sample for analysis. - Where the LO+ of a reported result differs from standard LO+ , this may be due to the

/ ey : Anonymous = + refers to samples where not specifically part of the 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.

LO+ = Limit of reporting

+ PD = + relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the + relative Percent Deviation (+PD) of Laboratory Duplicates are specified in ALS Method Q-1 ENIKK and are dependent on the magnitude of results in comparison to the level of reporting: + result < 10 times LO+ : No Limit; + result between 10 and 60 times LO+ : 0% p90%; + result > 60 times LO+ : 0% p60%.

Substratix: WATER

Laboratory sample ID	Sample ID	Method/Compound	CSM Number	LOR	Unit	Laboratory Duplicate (DUP) Report			Recovery Limits (%)
						Original Result	Duplicate Result	RPD (%)	
EA210CA: 5 ropp A tan B E d c ei B A v i X j y 4 QC Loi:) G 27 Mb									
ES60518R8p007	BY ph 1KD	EA690: Gross alpha	ppp	0.09	Bq/K	<1.0k	<1.0k	0.00	No Limit
		EA690: Gross beta	ppp	0.1	Bq/K	<6.17	<6.17	0.00	No Limit
		EA690: Gross beta activity p50/	ppp	0.1	Bq/K	<6.17	<6.17	0.00	No Limit
ES0) uP: A ik B y j 4 f 4 PC T y r B or QC Loi:) m) ul Mb									
ES605189k017	Anonymous	ED0H7P: Yttrium as CaCO3	Dh Op010p01	1	mg/K	<1	<1	0.00	No Limit
		ED0H7P: Carbonate Al4allinity as CaCO3	Hk16p6p6	1	mg/K	<1	<1	0.00	No Limit
		ED0H7P: Bicarbonate Al4allinity as CaCO3	71p6p6H	1	mg/K	<1	1	0.00	No Limit
		ED0H7P: Total Al4allinity as CaCO3	ppp	1	mg/K	<1	1	0.00	No Limit
ES605189k015	Anonymous	ED0H7P: Yttrium as CaCO3	Dh Op010p01	1	mg/K	<1	<1	0.00	No Limit
		ED0H7P: Carbonate Al4allinity as CaCO3	Hk16p6p6	1	mg/K	<1	<1	0.00	No Limit
		ED0H7P: Bicarbonate Al4allinity as CaCO3	71p6p6H	1	mg/K	66R	66R	1.HR	0% p60%
		ED0H7P: Total Al4allinity as CaCO3	ppp	1	mg/K	66R	66R	1.HR	0% p60%
ES 0375 : S- k B i e T- r f y j 6 e i r y b B p SO3 29 f 4 s A QC Loi:) G 071 b									
ES60518R8p001	UGh ph KD	ED051G: Sulfate as SO5 pTurbidimetric	15k0k7p7k	1	mg/K	H970	H970	0.657	0% p60%
ES60518R8p010	BY ph 61S	ED051G: Sulfate as SO5 pTurbidimetric	15k0k7p7k	1	mg/K	5010	5060	0.1Hk	0% p60%
ES 0315 : C n b o r y d e f 4 s y v r e i e A t B k p e r QC Loi:) G 073 b									
ES60518R8p001	UGh ph KD	ED059G: Chloride	18kk7p00p6	1	mg/K	1kk00	1R000	1.05	0% p60%
ES60518R8p010	BY ph 61S	ED059G: Chloride	18kk7p00p6	1	mg/K	61600	60k00	6.69	0% p60%
ES 09 F : s y p p o i e d D B o r C B y o t p QC Loi:) G 3 2 b									
ES60518R8p001	UGh ph KD	ED0RFF: Calcium	7550p70p6	1	mg/K	95k	9HR	1.9H	0% p60%
		ED0RFF: Magnesium	75HR9p6	1	mg/K	1500	1HK0	1.9k	0% p60%
		ED0RFF: Sodium	7550p61p6	1	mg/K	11000	10700	6.17	0% p60%
		ED0RFF: Potassium	7550p0p7	1	mg/K	56	56	0.00	0% p60%
ES60566R001	Anonymous	ED0RFF: Calcium	7550p70p6	1	mg/K	1HR	1HK	0.k66	0% p60%



Laboratory sample ID		h etio: ACompoun:	CSM Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
Subph atrix: WATER									
Es 0G F: s yppoif ed D B or CB yot p 1QC Loi:)) G B 2b 9vot iy - ed									
ES60566R001	Anonymous	ED0RFF: h agnesium	75HRF0p	1	mgK	169	169	0.00	0% p60%
		ED0RFF: Sodium	7550p6H	1	mgK	955	966	5.6k	0% p60%
		ED0RFF: Potassium	7550p0R7	1	mgK	7	7	0.00	No Limit
Es 020F: s yppoif ed D eiBp f 4 ICP S 1QC Loi:)) G B 7b									
ES60518R001	UGh th kD	EG060ApF: Cadmium	7550p5HR	0.0001	mgK	<0.0010	<0.0010	0.00	No Limit
		EG060ApF: Arsenic	7550pHkF6	0.001	mgK	<0.010	<0.010	0.00	No Limit
		EG060ApF: CWormium	7550p57pH	0.001	mgK	<0.010	<0.010	0.00	No Limit
		EG060ApF: Co22er	7550p00k	0.001	mgK	<0.010	<0.010	0.00	No Limit
		EG060ApF: Lead	75HRF0p	0.001	mgK	<0.010	<0.010	0.00	No Limit
		EG060ApF: Nic4el	7550p06p	0.001	mgK	<0.010	<0.010	0.00	No Limit
		EG060ApF: Zinc	7550p88p	0.009	mgK	<0.090	<0.090	0.00	No Limit
		EG060ApF: Cadmium	7550p5HR	0.0001	mgK	<0.0001	<0.0001	0.00	No Limit
		EG060ApF: Arsenic	7550pHkF6	0.001	mgK	0.011	0.010	0.00	0% p90%
		EG060ApF: CWormium	7550p57pH	0.001	mgK	<0.001	<0.001	0.00	No Limit
		EG060ApF: Co22er	7550p00k	0.001	mgK	<0.001	<0.001	0.00	No Limit
		EG060ApF: Lead	75HRF0p	0.001	mgK	<0.001	<0.001	0.00	No Limit
		EG060ApF: Nic4el	7550p06p	0.001	mgK	0.019	0.015	0.00	0% p90%
		EG060ApF: Zinc	7550p88p	0.009	mgK	0.1k5	0.1k1	1.1k	0% p60%
Es 020T: ToiBhRevol (erB le Derv- r4 f 4 ICP S 1QC Loi:)) G B 2b									
ES60518R006	UGh th kS	EG060ApT: Cadmium	7550p5HR	0.0001	mgK	<0.0010	<0.0010	0.00	No Limit
		EG060ApT: Arsenic	7550pHkF6	0.001	mgK	<0.010	<0.010	0.00	No Limit
		EG060ApT: CWormium	7550p57pH	0.001	mgK	0.099	0.095	1.kH	No Limit
		EG060ApT: Co22er	7550p00k	0.001	mgK	0.018	0.019	0.00	No Limit
		EG060ApT: Lead	75HRF0p	0.001	mgK	<0.010	<0.010	0.00	No Limit
		EG060ApT: Nic4el	7550p06p	0.001	mgK	0.0H1	0.06k	11.H	No Limit
		EG060ApT: Zinc	7550p88p	0.009	mgK	<0.096	<0.096	0.00	No Limit
		EG060ApT: Cadmium	7550p5HR	0.0001	mgK	0.0057	0.005R	5.5R	0% p60%
		EG060ApT: Arsenic	7550pHkF6	0.001	mgK	0.06R	0.065	17.8	0% p60%
		EG060ApT: CWormium	7550p57pH	0.001	mgK	0.001	0.001	0.00	No Limit
		EG060ApT: Co22er	7550p00k	0.001	mgK	0.007	0.007	0.00	No Limit
		EG060ApT: Lead	75HRF0p	0.001	mgK	0.18H	0.1H9	1k.k	0% p60%
		EG060ApT: Nic4el	7550p06p	0.001	mgK	0.009	0.009	0.00	No Limit
		EG060ApT: Zinc	7550p88p	0.009	mgK	0.1F8	0.1F0	H69	0% p60%
Es 0J F: s yppoif ed D erv- r4 f 4 FIDS 1QC Loi:)) G B 0b									
ES60518R006	UGh th kS	EG0H9F: h ercury	75HRF7p	0.0001	mgK	<0.0001	<0.0001	0.00	No Limit
ES60566R001	Anonymous	EG0H9F: h ercury	75HRF7p	0.0001	mgK	<0.0001	<0.0001	0.00	No Limit
Es 0J T: ToiBhRevol (erB le Derv- r4 f 4 FIDS 1QC Loi:)) G u07b									
Eh 6060R001	Anonymous	EG0H9T: h ercury	75HRF7p	0.0001	mgK	<0.0001	<0.0001	0.00	No Limit
Eh 6060R0011	Anonymous	EG0H9T: h ercury	75HRF7p	0.0001	mgK	<0.0001	<0.0001	0.00	No Limit



Page : 5 of 7
 - or4 Order : ES60518R8
 Client : Eh h CONSULTING PTV LTD
 Pro&ct : S1R0916 Baitranald THAncillary

Laboratory Duplicate (DUP) Report									
Laboratory sample ID	Sample ID	h etio: ACompou:	CSM Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
E5 01 T: ToiBhRevo(erB le Deriv- r4 f 4 FID S 1QC Loi:) G u02b									
ES60518R8p008	BYph 17S	EG0H9T: h ercury	75HR7R7pB	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
ES605650R006	Anonymous	EG0H9T: h ercury	75HR7R7pB	0.0001	mg/L	<0.0001	<0.0001	0.00	No Limit
E5 01 75: Ferro- p Irot f 4 s s ypreite At B4per 1QC Loi:) GM G0b									
ES60518R8p001	UGh th kD	EG091G: Ferrous Iron	PPP	0.09	mg/L	6.66	6.1H	5.98	0% p60%
ES60518R8p010	BYph 61S	EG091G: Ferrous Iron	PPP	0.09	mg/L	<0.09	<0.09	0.00	No Limit
EK0m D: S- l9de Ep S29 1QC Loi:) m231 mb									
ES605160k001	Anonymous	E/ 0k9: Sulfide as S6p	1k5R8p69jk	0.1	mg/L	<0.1	<0.1	0.00	No Limit
ES60518R8p005	UGh th 16S	E/ 0k9: Sulfide as S6p	1k5R8p69jk	0.1	mg/L	<0.1	<0.1	0.00	No Limit
EP0m0: c TEXN 1QC Loi:) mM G0b									
EB60HDR76p001	Anonymous	EP0k0: BenMene	71p5H6	1	µg/L	<1	<1	0.00	No Limit
		EP0k0: Toluene	10kpkkph	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: EtWylbenMene	100p51p5	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: metap& ZarapXylene	10kpkkph	6	µg/L	<6	<6	0.00	No Limit
			108p56pH						
		EP0k0: ortW0pxylene	R9p57pB	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: Na2VWAlene	R1p60pH	9	µg/L	<9	<9	0.00	No Limit
		EP0k0: BenMene	71p5H6	1	µg/L	<1	<1	0.00	No Limit
		EP0k0: Toluene	10kpkkph	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: EtWylbenMene	100p51p5	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: metap& ZarapXylene	10kpkkph	6	µg/L	<6	<6	0.00	No Limit
			108p56pH						
EB60HDR76p01H	Anonymous	EP0k0: ortW0pxylene	R9p57pB	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: Na2VWAlene	R1p60pH	9	µg/L	<9	<9	0.00	No Limit
		EP0k0: BenMene	71p5H6	1	µg/L	<1	<1	0.00	No Limit
		EP0k0: Toluene	10kpkkph	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: EtWylbenMene	100p51p5	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: metap& ZarapXylene	10kpkkph	6	µg/L	<6	<6	0.00	No Limit
			108p56pH						
		EP0k0: ortW0pxylene	R9p57pB	6	µg/L	<6	<6	0.00	No Limit
		EP0k0: Na2VWAlene	R1p60pH	9	µg/L	<9	<9	0.00	No Limit



h etdo: Blank (h B) an: Laboratory Control Mpik (LCM) Report

TVe quality control term h etWd K Laboratory Blan4 refers to an analyte free matrix to wWw all reagents are added in tW same volumes or 2ro2ortions as used in standard sam2le 2re2aration. TVe 2ur2ose of tW QC 2arameter is to monitor 2otentia laboratory contamination. TVe quality control term Laboratory Control S2i4e (LCS) refers to a certified reference material, or a 4nown interference free matrix s2i4ed witW target analytes. TVe 2ur2ose of tW QC 2arameter is to monitor metWd 2recision and accuracy inde2endent of sam2le matrix. Dynamic + ecovery Limits are based on statistical evaluation of 2ro2essed LCS.

Subph atrix: **WATER**

h etdo: AComoun:	CSM Number	LOR	Unit	h etdo: Blank (h B) Report		Laboratory Control Mpik (LCM) Report		
				Result	Concentration	Mpike Recovery (%)	Recovery Limits (%)	Low	Higd
EA210CA: 5 ropp AlanBE d ce lB Av iX y4 1QCLOi:)) G27Mb								
EA690: Gross al2V	ppp	0.09	BqK	<0.09	1791 BqK	101	R9.6	109
EA690: Gross beta	ppp	0.1	BqK	<0.10	H56 BqK	101	R5.5	109
EA690: Gross beta activity p50/	ppp	0.1	BqK	<0.10	ppp	ppp	ppp	ppp
Es0 uP: AlkE y4 f 4 PC Ty rBor 1QCLOi:)) m ul Mb								
ED0H7P: Total Alkalinity as CaCOH	ppp	ppp	mgK	ppp	600 mgK 90 mgK	106 119	k1.0 70.0	111 1H0
Es0375 : S- lBE 1I- rf y4e eirywbBp SO3 29f 4 sA 1QCLOi:)) G707I b								
ED051G: Sulfate as SO5 pTurbidimetric	15k0k pRK	1	mgK	<1	69 mgK 900 mgK	115 108	k6.0 k6.0	166 166
Es0315 : Cnbyde f 4 s yvreie At Bper 1QCLOi:)) G7073b								
ED059G: CWoride	18kk7 p0pB	1	mgK	<1	90 mgK 1000 mgK	Rk.R R9.7	k0.R k0.R	167 167
Es0G F: s yppofed D B or CB yot p 1QCLOi:)) G3G 2b								
ED0RF: Calcium	7550 p0pB	1	mgK	<1	90 mgK	10H	k0.0	115
ED0RF: h agnesium	751HR p9pB	1	mgK	<1	90 mgK	Rk.9	R0.0	118
ED0RF: Sodium	7550 p0pB	1	mgK	<1	90 mgK	R8.7	k6.0	160
ED0RF: Potassium	7550 p0pB	1	mgK	<1	90 mgK	R9.0	k9.0	11H
E5 020F: s yppofed D e lBp f 4 ICPD S 1QCLOi:)) G3G 7b								
EG060ApF: Arsenic	7550 p0pB	0.001	mgK	<0.001	0.1 mgK	kk.H	k9.0	115
EG060ApF: Cadmium	7550 p0pB	0.0001	mgK	<0.0001	0.1 mgK	R6.k	k5.0	110
EG060ApF: CWormium	7550 p0pB	0.001	mgK	<0.001	0.1 mgK	R5.0	k9.0	111
EG060ApF: Co22er	7550 p0pB	0.001	mgK	<0.001	0.1 mgK	kk.k	k1.0	111
EG060ApF: Lead	751HR p6p1	0.001	mgK	<0.001	0.1 mgK	R6.9	kH0	111
EG060ApF: Nic4el	7550 p0pB	0.001	mgK	<0.001	0.1 mgK	k7.1	k6.0	116
EG060ApF: Zinc	7550 p0pB	0.009	mgK	<0.009	0.1 mgK	kk.5	k1.0	117
E5 020T: ToiEnDe lBp f 4 ICPD S 1QCLOi:)) G3M2Mb								
EG060ApT: Arsenic	7550 p0pB	0.001	mgK	<0.001	0.1 mgK	R5.9	k6.0	115
EG060ApT: Cadmium	7550 p0pB	0.0001	mgK	<0.0001	0.1 mgK	R9.8	k5.0	116
EG060ApT: CWormium	7550 p0pB	0.001	mgK	<0.001	0.1 mgK	R7.R	k8.0	118
EG060ApT: Co22er	7550 p0pB	0.001	mgK	<0.001	0.1 mgK	RH.k	kH0	11k
EG060ApT: Lead	751HR p6p1	0.001	mgK	<0.001	0.1 mgK	R9.0	k9.0	119
EG060ApT: Nic4el	7550 p0pB	0.001	mgK	<0.001	0.1 mgK	R6.6	k5.0	118
EG060ApT: Zinc	7550 p0pB	0.009	mgK	<0.009	0.1 mgK	RH.8	7R0	117
E50 | F: s yppofed D erv- r4 f 4 FIDS 1QCLOi:)) G3G 0b								



Subph atrix: WATER

h etdo: ACompoun:	CSMNumber	LOR	Unit	h etdo: Blank (h B) Report		Laboratory Control (L C M) Report			
				Result	Concentration	Mpike Recovery (%)	Mpike Concentration	Low	High
E50 | F: s yppofied Derv- r4 f 4 FIDS 1QCLoi:)) C3G 0b 9vot i y - ed									
EG0H9F: h ercury	75H4R7jB	0.0001	mgK	<0.0001	0.01 mgK	R8:R	kH0	109	
E50 | T: ToiBhRevo(erE fE Derv- r4 f 4 FIDS 1QCLoi:)) G u07b									
EG0H9T: h ercury	75H4R7jB	0.0001	mgK	<0.0001	0.01 mgK	R8:1	77.0	111	
E50 | T: ToiBhRevo(erE fE Derv- r4 f 4 FIDS 1QCLoi:)) G u02b									
EG0H9T: h ercury	75H4R7jB	0.0001	mgK	<0.0001	0.01 mgK	R9:H	77.0	111	
E50 | 75 : Ferro- p Irot f 4 s yvveie At B4per 1QCLoi:)) GM 00b									
EG091G: Ferrois Iron	mp	0.09	mgK	<0.09	6 mgK	101	kR0	117	
EK0m D: S- iB4ie Bp S29 1QCLoi:)) n23I nB									
E/ 0k9: Sulfide as S8p	1k5R8p9jk	0.1	mgK	<0.1	0.9 mgK	100	78.0	118	
EP0n0: c TEXN 1QCLoi:)) nM 00b									
EP0k0: BenMene	71pH6	1	ugK	<1	10 ugK	k5:R	70.0	166	
EP0k0: Toluene	10kpkqH	6	ugK	<6	10 ugK	kk:1	8R0	16H	
EP0k0: EtWibeniMene	100p71p	6	ugK	<6	10 ugK	R6:8	70.0	160	
EP0k0: metap& ZarapXylene	10kpkqH 108p6p	6	ugK	<6	10 ugK	R6:1	8R0	161	
EP0k0: ortWpXylene	R9p7jB	6	ugK	<6	10 ugK	RH6	76.0	166	
EP0k0: Na2W0ylene	R1p0qH	9	ugK	<9	10 ugK	kk:5	70.0	160	

h atrix Mpike (h M) Report

TVe quality control term h atrix S24e (h S) refers to an intralaboratory s2lit sam2le s24ed witW a rezrepresentative set of target analytes. TVe 2ur2ose of TVs QC 2arameter is to monitor 2otential matrix effects on analyte recoveries. Static +ecoverly Limits as 2er laboratory Data Quality Ob2actives (DQOs). Ideal recovery ranges stated may be waived in TVe event of sam2le matrix interference.

Subph atrix: WATER

Laboratory sample ID	Msample ID	h etdo: ACompoun:	h atrix Mpike (h M) Report			
			Mpike Concentration	MpikeRecovery(%)	h M	Recovery Limits (%)
			CSMNumber	Low	High	
Es 0375 : S- iB4ie T1- rf y4y6 eirywbBp SO3 29 f 4 s A 1QCLoi:)) G7071 b						
ES60518R8p001	UGh ph kD	ED051G: Sulfate as SO5 p Turbidimetric	15k0k7Rjk	10 mgK	# Not Determined	1H0
Es 0315 : Cntrbye f 4 s yvveie At B4per 1QCLoi:)) G7073b						
ES60518R8p001	UGh ph kD	ED059G: CWbriide	18kk7p0pB	90 mgK	# Not Determined	1H0
E5 020F: s yppofied D eiBp f 4 ICP9S 1QCLoi:)) C3G 7b						
ES60518R8p006	UGh ph kS	EG060ApF: Arsenic	7550pHkpb	10 mgK	R0:1	1H0
		EG060ApF: Cadmium	7550pBHR	6.9 mgK	k1:6	1H0
		EG060ApF: CWormium	7550p7H1	10 mgK	7R7	1H0
		EG060ApF: Co22er	7550p90pk	10 mgK	kH5	1H0
		EG060ApF: Lead	75H4R6pl	10 mgK	77:H	1H0



Subph atrix: WATER

Laboratory sample ID	Msample ID	h atrix: ACompoun:	CSM Number	h atrix: Mpike (h M) Report		
				Mpike Concentration	MpikeRecovery(%) h M	Recovery Limits (%) Low High
E5 020F: s yppof ed DeiBp f 4 ICPD S 1QCLOi:)) G3G 7b 9vot iy - ed						
ES60518R8p006	UGH ph kS	EG060ApT: Nic4el	7550p6p0	10 mgK	k5.5	70.0 1H0
		EG060ApT: Zinc	7550p8p8	10 mgK	kH5	70.0 1H0
E5 020T: ToiBhDeiBp f 4 ICPD S 1QCLOi:)) G3M2Wb						
ES60518R8p008	BY ph 17S	EG060ApT: Arsenic	7550p4k0	1 mgK	101	70.0 1H0
		EG060ApT: Cadmium	7550p7pR	0.69 mgK	Rk.5	70.0 1H0
		EG060ApT: CWormium	7550p7pH	1 mgK	R5.H	70.0 1H0
		EG060ApT: Co2zer	7550p0pK	1 mgK	R7.k	70.0 1H0
		EG060ApT: Lead	75H4R6pI	1 mgK	R0.5	70.0 1H0
		EG060ApT: Nic4el	7550p0p0	1 mgK	RR.k	70.0 1H0
		EG060ApT: Zinc	7550p8p8	1 mgK	R9.7	70.0 1H0
E5 01 J F: s yppof ed D erv- r4 f 4 FIDS 1QCLOi:)) G3G 0b						
ES60518R8p001	UGH ph kD	EG0H9F: h ercury	75H4R7p8	0.01 mgK	76.6	70.0 1H0
E5 01 J T: ToiBhRevo(erB le Derv- r4 f 4 FIDS 1QCLOi:)) G u07b						
Eh 6060RRk p006	Anonymous	EG0H9T: h ercury	75H4R7p8	0.01 mgK	77.5	70.0 1H0
E5 01 J T: ToiBhRevo(erB le Derv- r4 f 4 FIDS 1QCLOi:)) G u02b						
ES60518R8p00k	BY ph 1kS	EG0H9T: h ercury	75H4R7p8	0.01 mgK	# 9R7	70.0 1H0
E5 01 75 : Ferro- p Irot f 4 s yvreife At B4per 1QCLOi:)) GM G0b						
ES60518R8p001	UGH ph kD	EG091G: Ferrous Iron	ppp	1 mgK	7R9	70.0 1H0
EK0m D: S- l9de Ep S29 1QCLOi:)) nE3I nb						
ES6051H95p001	Anonymous	E/ 0k9: Sulfide as S6p	1k5R8p69jk	0.H mgK	10R	70.0 1H0
EP0m0: c TEXN 1QCLOi:)) nM G0b						
EB60H0R76p001	Anonymous	EP0k0: BenMene	71p5H6	69 µgK	k8.R	70.0 1H0
		EP0k0: Toluene	10kpkkpH	69 µgK	kk.k	70.0 1H0
		EP0k0: EtWylbenMene	100p51p5	69 µgK	R4.k	70.0 1H0
		EP0k0: metap& 2arapXylene	10kpkkpH	69 µgK	R49	70.0 1H0
			108p56pH			
		EP0k0: ortWopXylene	R9p57p8	69 µgK	R5.5	70.0 1H0
		EP0k0: Naz2W4lene	R1p60pH	69 µgK	k9.k	70.0 1H0



Work Order	: EM20793N3	Page	: 1 of 8
Client	: ESS COUM TI GP YI D TI g	Laboratory	: Environmental Division Sydney
Contact	: PAUL GIBBONS	Telephone	: +61 - 2724 2555
Project	: S18951- Balranald TO Ancillary	Date Samples received	: - 4NovR 9- 9
Site	: FRR	Issue Date	: 97DecR 9- 9
Sampler	: Hailtyn Brodie kBill Bull	No/ of samples received	: 15
Order number	: FRR	No/ of samples analysed	: 15

This report is automatically generated by the ATM TSM through interpretation of the ATM Quality Control Report and several Quality Assurance parameters measured by ATM. This automated report highlights any non-compliance activities. aster and more accurate data validation and is designed to assist internal expert and external Auditor review. Some components of this report contribute to the overall QO assessment and reporting or guideline compliance-

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

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control .KCCB report/

- UO S ethod F lank value outliers occur-
- UO guplicate outliers occur-
- UO Taf oratory Control outliers occur-
- S atripike outliers eBst , please see .ollowinb pabes .or .ull details-
- Hor all rebular sample matricesUO surrobrate recovery outliers occur-

Outliers : Analysis Holding Time Compliance

- Analysis q oldinb l ime Outliers eBst , please see .ollowinb pabes .or .ull details-

Outliers : Frequency of Quality Control Samples

- Quality Control Mample Hre(uency Outliers eBst , please see .ollowinb pabes .or .ull details-



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Outliers : Quality Control Samples
 Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

WatriY: WAI ER

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
SatriBpike JS WRecoveries							
ED941G: Sulfate . Turbidimetric	ES- 941686R91	UGWRW2D	Mul.tiate as MD7, I urf idimetric	14292R91R	Not Determined	RRRR	S Mrecovery not determined f ackground level breater than or e(ual to 7B spike level-
ED945G: Chloride by Discrete Analyser	ES- 941686R91	UGWRW2D	Chloride	16227R91R	Not Determined	RRRR	S Mrecovery not determined f ackground level breater than or e(ual to 7B spike level-
EG905T: Total 3 recoverable Mercury by FIWS	ES- 941686R92	Bx RWI2S	Sercury	7408R7R	58.7 %	79.9R09%	Recovery less than lower data (uality of jective

Outliers : Analysis Holding Time Compliance

WatriY: WAI ER

Method	Container / Client Sample ID.sQ	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EP 059P : Herrous Gon f y g iscrete Analyser							
Clear Yiastic F ottle , qCl , Hiltered	Bx RWI7DV Bx RWI2DV	RRRR	RRRR	RRRR	9- 1DecR 9- 9	- 4RNovR 9- 9	1
Clear Yiastic F ottle , qCl , Hiltered	UGWRW2DV UGWRW1- DV Bx RW- 1DV KA1	RRRR	RRRR	RRRR	9- 1DecR 9- 9	- 5RNovR 9- 9	K
E8015S : Mul.tide as M2,							
Clear Yiastic F ottle , Zinc Acetate/UaOq	Bx RWI7DV Bx RWI2DV	RRRR	RRRR	RRRR	- 5RNovR 9- 9	- 4RNovR 9- 9	9
EY010: FI EVU							
Amf er XOC Xial , Mul. uric Acid	Trip Spjie	9- 1DecR 9- 9	11RNovR 9- 9	29	9- 1DecR 9- 9	11RNovR 9- 9	29

Outliers : Frequency of Quality Control Samples

WatriY: WAI ER

Quality Control Sample Type	Method	Count		3 ate .%Q		Quality Control Specification
		KC	3 egular	Actual	Expected	
Laboratory/Duplicates .DUPQ	Gross Alpha and Beta Activity	1	15	6/67	19/99	NEPW - 910 B0 ; ALS KC Standard



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Analysis Holding Time Compliance

If samples are identified below, as having been analysed or extracted outside of recommended holding times this should be taken into consideration, when interpreting results/ This report summarizes extraction preparation and analysis times and compares each, with ALS recommended holding times, referencing USEPA S (246V APxAV AS and NEPWQ 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/ xolding 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 - 2 days; other metals 129 days/ A recorded breach does not guarantee a breach for all non-volatile parameters/ xolding 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) ey analytes of interest/ concern/

Waiver: **WAIER**

Evaluation: * = xolding time breach ✓ = (ithin holding time/

Method	Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA250: P ross Alpha and F eta Activity							
Clear Yiastic F otte , Uatural JEA2504							
Bx RW17DV	Bx RW17SV		RRR	RRR	60, Uov, 2020	16RWayR 9- 1	✓
Bx RW12DV	Bx RW12S	""	RRR	RRR			
Clear Yiastic F otte , Uatural JEA2504							
UGWRW2DV	UGWRW2SV		RRR	RRR	60, Uov, 2020	17RWayR 9- 1	✓
UGWRW1- DV	UGWRW1- SV	""	RRR	RRR			
Bx RW- 1DV	Bx RW- 1SV						
KA1							
EA250CA: P ross Alpha and F eta Activity							
Clear Yiastic F otte , Uatural JEA2504							
Bx RW17DV	Bx RW17SV		RRR	RRR	60, Uov, 2020	16RWayR 9- 1	✓
Bx RW12DV	Bx RW12S	""	RRR	RRR			
Clear Yiastic F otte , Uatural JEA2504							
UGWRW2DV	UGWRW2SV		RRR	RRR	60, Uov, 2020	17RWayR 9- 1	✓
UGWRW1- DV	UGWRW1- SV	""	RRR	RRR			
Bx RW- 1DV	Bx RW- 1SV						
KA1							
Eg 06K: Alkalinity f y YC I itrator							
Clear Yiastic F otte , Uatural JEG 06KY4							
Bx RW17DV	Bx RW17SV		RRR	RRR	25, Uov, 2020	91DecR 9- 9	✓
Bx RW12DV	Bx RW12S	""	RRR	RRR			
Clear Yiastic F otte , Uatural JEG 06KY4							
UGWRW2DV	UGWRW2SV		RRR	RRR	25, Uov, 2020	9- DecR 9- 9	✓
UGWRW1- DV	UGWRW1- SV	""	RRR	RRR			
Bx RW- 1DV	Bx RW- 1SV						
KA1							



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Watrny: WAI ER Evaluation: * = x olding time breach q ✓ = (ithin holding time/

Method	Sample Date	Extraction / Preparation		Analysis	
		Date extracted	Due for extraction	Ef aluation	Due for analysis
Eg079P : Mulate J urf idimetric4as IM07 2, f y gA					
Clear Ylastic F ottle , Uatural JEG079P 4	9K Uov,2020	''''	RRRR	RRRR	15DecR 9-9
Bx RW17SV Bx RW12SV					✓
Clear Ylastic F ottle , Uatural JEG079P 4	91, Uov,2020	''''	RRRR	RRRR	16DecR 9-9
UGWRW2SV UGWRW1 - SV Bx RW- 1SV KA1					✓
Eg075P : Chloride f y g iscrete Analyser					
Clear Ylastic F ottle , Uatural JEG075P 4	9K Uov,2020	''''	RRRR	RRRR	15DecR 9-9
Bx RW17SV Bx RW12SV					✓
Clear Ylastic F ottle , Uatural JEG075P 4	91, Uov,2020	''''	RRRR	RRRR	16DecR 9-9
UGWRW2SV UGWRW1 - DV Bx RW- 1DV KA1					✓
Eg0N6H: gissolved Sajor Cations					
Clear Ylastic F ottle , Uitric Acid; Hiltered JEG0N6H4	9K Uov,2020	''''	RRRR	RRRR	15DecR 9-9
Bx RW17DV Bx RW12DV					✓
Clear Ylastic F ottle , Uitric Acid; Hiltered JEG0N6H4	91, Uov,2020	''''	RRRR	RRRR	16DecR 9-9
UGWRW2SV UGWRW1 - DV Bx RW- 1DV KA1					✓
EP020H: gissolved Setais f y G,Y,S,M					
Clear Ylastic F ottle , Uitric Acid; Hiltered JEP020A,H4	9K Uov,2020	''''	RRRR	RRRR	16RWayR 9- 1
Bx RW17DV Bx RW12DV					✓
Clear Ylastic F ottle , Uitric Acid; Hiltered JEP020A,H4	91, Uov,2020	''''	RRRR	RRRR	17RWayR 9- 1
UGWRW2SV UGWRW1 - DV Bx RW- 1DV KA1					✓
EP020I : l otal Setais f y G,Y,S,M					
Clear Ylastic F ottle , Uitric Acid; L.n.liltered JEP020A,I 4	9K Uov,2020	09.g.ec,2020	16RWayR 9- 1	✓	16RWayR 9- 1
Bx RW17SV 3.B5					✓
Clear Ylastic F ottle , Uitric Acid; L.n.liltered JEP020A,I 4	91, Uov,2020	09.g.ec,2020	17RWayR 9- 1	✓	17RWayR 9- 1
UGWRW2SV Trip Blan) 1V					✓



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Method: WAI ER Evaluation: * = x olding time breach q ✓ = (ithin holding time/

Method	Sample Date	Extraction / Preparation		Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP 065H: gissolved Sercury f y H&M							
Clear Ylastic F ottle , Uitrlic Acid; Hiltered JEP065H4							
Bx RW17SV	9K Uov, 2020	''''	FRFR	FRFR	02, g ec, 2020	15DecR 9- 9	✓
Bx RW12DV							
Clear Ylastic F ottle , Uitrlic Acid; Hiltered JEP065H4							
UGWRW2DV	91, Uov, 2020	''''	FRFR	FRFR	02, g ec, 2020	16DecR 9- 9	✓
UGWRW1 - DV							
Bx RW- 1DV							
KA1							
EP 065I : l otal Recoveraf le Sercury f y H&M							
Clear Ylastic F ottle , Uitrlic Acid; L n.iltered JEP 065I 4							
Bx RW17SV	9K Uov, 2020	''''	FRFR	FRFR	02, g ec, 2020	15DecR 9- 9	✓
3 B5							
Clear Ylastic F ottle , Uitrlic Acid; L n.iltered JEP 065I 4							
UGWRW2SV	91, Uov, 2020	''''	FRFR	FRFR	02, g ec, 2020	16DecR 9- 9	✓
Trip Blan) 1V							
EP 059P : Herrous Gon f y g iscrete Analyser							
Clear Ylastic F ottle , q Cl , Hiltered JEP 059P 4							
Bx RW17DV	9K Uov, 2020	''''	FRFR	FRFR	02, g ec, 2020	- 4RNovR 9- 9	✗
Bx RW12DV							
Clear Ylastic F ottle , q Cl , Hiltered JEP 059P 4							
UGWRW2DV	91, Uov, 2020	''''	FRFR	FRFR	02, g ec, 2020	- 5RNovR 9- 9	✗
UGWRW1 - DV							
Bx RW- 1DV							
KA1							
E8 015S : Mul. ide as M2.							
Clear Ylastic F ottle , Zinc Acetate/UaOq J E8 0154							
Bx RW17DV	9K Uov, 2020	''''	FRFR	FRFR	25, Uov, 2020	- 4RNovR 9- 9	✗
Bx RW12DV							
Clear Ylastic F ottle , Zinc Acetate/UaOq J E8 0154							
UGWRW2DV	91, Uov, 2020	''''	FRFR	FRFR	25, Uov, 2020	- 5RNovR 9- 9	✓
UGWRW1 - DV							
Bx RW- 1DV							
KA1							
EY010: FI EVU							
Amfer XOC Xial , Mul. uric Acid J EY0104							
Trip Spi)e	21, Oct, 2020	02, g ec, 2020	11RNovR 9- 9	✗	02, g ec, 2020	11RNovR 9- 9	✗



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed, within the analytical lot, which the submitted sample, as 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: **WAIER**

Evaluation: * = Quality Control frequency not within specification, ✓ = Quality Control frequency within specification

Quality Control Sample Type	Method	Count			Rate (%)		Evaluation	Quality Control Specification
		QC	Regular	Actual	Expected			
Laboratory Duplicates .DUPQ								
Al)inity by PC Titrator	ED907R	-	-9	90-00	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Chloride by Discrete Analyser	ED945G	-	-9	90-00	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Dissolved Mercury by FIWS	EG905F	-	-9	90-00	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Dissolved Metals by ICP/RMS RSuite A	EG9-9AR	-	-9	90-00	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Ferrous Iron by Discrete Analyser	EG951G	-	-9	90-00	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Gross Alpha and Beta Activity	EA-59	1	15	3-3K	90-00	✗	NEPW - 910 B0 ; ALS KC Standard	
Major Cations Dissolved	ED980F	-	-9	90-00	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Sulfate . TurbidimetricQas SO4 - Rby Discrete Analyser	ED941G	-	-9	90-00	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Sulfide as S- R	EH925	-	17	99-43	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Total Mercury by FIWS	EG905T	4	49	90-00	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Total Metals by ICP/RMS RSuite A	EG9-9AR	-	-9	90-00	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
T3 x wolatilitesBTEX	EP929	-	-9	90-00	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Laboratory Control Samples .LCSQ								
Al)inity by PC Titrator	ED907R	-	-9	90-00	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Chloride by Discrete Analyser	ED945G	-	-9	90-00	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Dissolved Mercury by FIWS	EG905F	1	-9	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Dissolved Metals by ICP/RMS RSuite A	EG9-9AR	1	-9	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Ferrous Iron by Discrete Analyser	EG951G	1	-9	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Gross Alpha and Beta Activity	EA-59	-	15	96-66	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Major Cations Dissolved	ED980F	1	-9	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Sulfate . TurbidimetricQas SO4 - Rby Discrete Analyser	ED941G	-	-9	90-00	90-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Sulfide as S- R	EH925	1	17	5-11	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Total Mercury by FIWS	EG905T	-	49	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Total Metals by ICP/RMS RSuite A	EG9-9AR	1	-9	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
T3 x wolatilitesBTEX	EP929	1	-9	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Method Blank)s .MBQ								
Chloride by Discrete Analyser	ED945G	1	-9	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Dissolved Mercury by FIWS	EG905F	1	-9	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Dissolved Metals by ICP/RMS RSuite A	EG9-9AR	1	-9	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Ferrous Iron by Discrete Analyser	EG951G	1	-9	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Gross Alpha and Beta Activity	EA-59	1	15	3-3K	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Major Cations Dissolved	ED980F	1	-9	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Sulfate . TurbidimetricQas SO4 - Rby Discrete Analyser	ED941G	1	-9	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Sulfide as S- R	EH925	1	17	5-11	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Total Mercury by FIWS	EG905T	-	49	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
Total Metals by ICP/RMS RSuite A	EG9-9AR	1	-9	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	
T3 x wolatilitesBTEX	EP929	1	-9	5-00	5-00	✓	NEPW - 910 B0 ; ALS KC Standard	



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WatnY: WAI ER Evaluation: * = Quality Control frequency not , ithin specification q ✓ = Quality Control frequency , ithin specification /

Analytical Methods	Method	Count		Rate (%)		Ef aluation	Quality Control Specification
		QC	Regular	Actual	Expected		
Method Blans .MBCRContinued	EP929	1	-9	5-00	5-00	✓	NEPW -910 B0 ; ALS KC Standard
T3 x wolatilesBTEX							
WatnY Spies .WSQ							
Chloride by Discrete Analyser	ED945G	1	-9	5-00	5-00	✓	NEPW -910 B0 ; ALS KC Standard
Dissolved Mercury by FIWS	EG905F	1	-9	5-00	5-00	✓	NEPW -910 B0 ; ALS KC Standard
Dissolved Metals by ICP/MS RSuite A	EG9- 9AR	1	-9	5-00	5-00	✓	NEPW -910 B0 ; ALS KC Standard
Ferrous Iron by Discrete Analyser	EG951G	1	-9	5-00	5-00	✓	NEPW -910 B0 ; ALS KC Standard
Sulfate . TurbidimetricQas SO4 - Rby Discrete Analyser	ED941G	1	-9	5-00	5-00	✓	NEPW -910 B0 ; ALS KC Standard
Sulfide as S- R	EH925	1	17	5-11	5-00	✓	NEPW -910 B0 ; ALS KC Standard
Total Mercury by FIWS	EG905T	-	49	5-00	5-00	✓	NEPW -910 B0 ; ALS KC Standard
Total Metals by ICP/MS RSuite A	EG9- 9AR	1	-9	5-00	5-00	✓	NEPW -910 B0 ; ALS KC Standard
T3 x wolatilesBTEX	EP929	1	-9	5-00	5-00	✓	NEPW -910 B0 ; ALS KC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA VAPX AVAS and NEPW. 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
Gross Alpha and Beta Activity	EA-59	(ATE3	ASTW D7- 2006: Determination of gross alpha and gross beta radioactivity in , after samples by Liquid Scintillation Counting .LSCQ
Alkalinity by PC Titrator	ED907R	(ATE3	In house: 3 referenced to APx A - 0- 9 B This procedure determines alkalinity by automated measurement .e.g/ PC Titration on a settled supernatant aliquot of the sample using px 4/5 for indicating the total alkalinity endpoint/ This method is compliant , with NEPW Schedule B.0Q
Sulfate . Turbidimetric Qas SO4 - Rby Discrete Analyser	ED941G	(ATE3	In house: 3 referenced to APx A 4599RSO4/ Dissolved sulfate is determined in a 9/45um 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 SO4R concentration is determined by comparison of the reading , with a standard curve/ This method is compliant , with NEPW Schedule B.0Q
Chloride by Discrete Analyser	ED945G	(ATE3	In house: 3 referenced to APx A 4599 Cl RG/ The thiocyanate ion is liberated from mercuric thiocyanate through sequestration of mercury by the chloride ion to form noncoloured mercuric chloride/ in the presence of ferric ions the liberated thiocyanate forms highly coloured ferric thiocyanate , which is measured at 429 nm APx A seal method - 917R
Major Cations RDissolved	ED980F	(ATE3	In house: 3 referenced to APx A 01- 9 and 01- 5qUSEPA S(246 R6919 and 69- 9qCations are determined by either ICPAES or ICPMS techniques/ This method is compliant , with NEPW Schedule B.0Q Sodium Adsorption Ratio is calculated from CaWg and Na , which determined by ALS in house method K(IENED980F/ This method is compliant , with NEPW Schedule B.0Q hardness parameters are calculated based on APx A - 049 B/ This method is compliant , with NEPW Schedule B.0Q
Dissolved Metals by ICPMS RSuite A	EG9- 9AR	(ATE3	In house: 3 referenced to APx A 01- 5qUSEPA S(246 R69- 9VALS K(IENEG9- 9/ Samples are 9/45um 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 spectrometerV, 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 ICPMS RSuite A	EG9- 9AR	(ATE3	In house: 3 referenced to APx A 01- 5qUSEPA S(246 R69- 9VALS K(IENEG9- 9/ The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements/ Ions are then passed into a high vacuum mass spectrometerV, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector/
Dissolved Mercury by FIWS	EG905F	(ATE3	In house: 3 referenced to AS 0559VAPx A 011- x g RB .Flo, Rejection . SnCl- QCold vapour generationQAASQ Samples are 9/45um filtered prior to analysis/ FIWRAS is an automated flameless atomic absorption technique/ A bromatebromide reagent is used to oxidise any organic mercury compounds in the filtered sample/ The ionic mercury is reduced online to atomic mercury vapour by SnCl- , which is then purged into a heated quartz cell/ Kuantification is by comparing absorbance against a calibration curve/ This method is compliant , with NEPW Schedule B.0Q
Total Mercury by FIWS	EG905T	(ATE3	In house: 3 referenced to AS 0559VAPx A 011- x g RB .Flo, Rejection . SnCl- QCold vapour generationQAASQ FIWRAS is an automated flameless atomic absorption technique/ A bromatebromide reagent is used to oxidise any organic mercury compounds in the unfiltered sample/ The ionic mercury is reduced online to atomic mercury vapour by SnCl- , which is then purged into a heated quartz cell/ Kuantification is by comparing absorbance against a calibration curve/ This method is compliant , with NEPW Schedule B.0Q



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Analytical Methods		Method	Matrix	Method Descriptions
Ferrous Iron by Discrete Analyser	EG951G	(ATE3	In house: 3 referenced to APx A 0599 FeRB/ A colorimetric determination based on the reaction between phenanthroline and ferrous iron at pH 0/- 0/0 to form an orange-red complex that is measured against a five-point calibration curve/ This method is compliant , ith NEPW Schedule B.0Q	
Sulfide as S- R	EH925	(ATE3	In house: 3 referenced to APx A 4599RS- RD/ Sulfide species present in , ater samples are immediately precipitated , hen collected in pretreated caustic zinc acetate preserved sample containers/ The sulphides are coloured using methylene blue indicator/ NonRtetects may be screened by comparison against a standard at halfR O3 Vother , ise samples are measured using UwRMS detection at 664nm/ This method is compliant , ith NEPW Schedule B.0Q	
Ionic Balance by PCT DA and Turbi SO4 DA	* EN955 RPG	(ATE3	In house: 3 referenced to APx A 1909F/ This method is compliant , ith NEPW Schedule B.0Q	
T3x volatilesBTEX	EP929	(ATE3	In house: 3 eferenced to USEPA S(246 R2- 69 (ater 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 e&uilibrated in a headspace vial and a portion of the headspace determined by GC/MS analysis/ This method is compliant , ith the KC re&uirements of NEPW Schedule B.0Q	
Preparation Methods		Method	Matrix	Method Descriptions
Digestion for Total 3 recoverable Metals	EN- 5	(ATE3	In house: 3 eferenced to USEPA S(246R0995/ Method 0995 is a Nitric/ hydrochloric acid digestion procedure used to prepare surface and ground , ater samples for analysis by ICPAES or ICPWS/ This method is compliant , ith NEPW Schedule B.0Q	
volatiles (ater Preparation	O3 G16R	(ATE3	A 5 mL ali" or 5 mL of a diluted sample is added to a 49 mL wOC vial for purging/	

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20793

EnviroLab Services
Research Drive
Croydon South VIC 3136
Ph: (03) 9763 2500

Job No: 23502

Date Received: 25/11/20

Time Received: 4:15pm

Temp: 7.5°C

Received By: KS

Cooling: Ambient

Security: Intact/Broken/None

Carrier: TOLC

Received: 24/11/20
C/Note: 302094
Temp: 16.9°C
ICE / ICEBICKS

LAB USE ONLY	SAMPLED	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (vol%)	FRIO-BOTTLES	CONTAINER DIMENSIONS		ANALYSIS REQUIRED (indicate by X) (see Code Book for latest to amend this policy)	FOR LABORATORY USE ONLY (TYPED)							RECEIVED BY DATE/TIME	RECEIVED BY DATE/TIME	Additional Information			
						Width	Height		Where listed are required	Special	Special	Special	Special	Special	Special				Special	Special	
1	UGM-MTD	15/11/2020 12:15	W		4	116	23	25	20	23	11	10	1	0							
2	UGM-MTS	15/11/2020 12:30	W		4	116	23	25	20	23	11	10	1	0							
3	UGM-MED	16/11/2020 11:15	W		4	116	23	25	20	23	11	10	1	0							
4	UGM-MES	16/11/2020 11:30	W		4	116	23	25	20	23	11	10	1	0							
5	UGM-MD	16/11/2020 14:15	W		4	116	23	25	20	23	11	10	1	0							
6	UGM-MES	16/11/2020 16:45	W		4	116	23	25	20	23	11	10	1	0							
7	BHM-MED	16/11/2020 16:45	W		4	116	23	25	20	23	11	10	1	0							
8	BHM-MES	16/11/2020 16:45	W		4	116	23	25	20	23	11	10	1	0							
9	BHM-MD	16/11/2020 16:00	W		4	116	23	25	20	23	11	10	1	0							
10	BHM-MES	16/11/2020 17:15	W		4	116	23	25	20	23	11	10	1	0							
11	BHM-MD	16/11/2020 16:00	W		4	116	23	25	20	23	11	10	1	0							
12	BHM-MES	16/11/2020 14:30	W		4	116	23	25	20	23	11	10	1	0							
13	BHM-MD	16/11/2020 16:30	W		4	116	23	25	20	23	11	10	1	0							
14	BHM-MES	16/11/2020 10:30	W		4	116	23	25	20	23	11	10	1	0							
15	BHM-MD	16/11/2020 9:10	W		4	116	23	25	20	23	11	10	1	0							
16	BHM-MES	16/11/2020 9:45	W		4	116	23	25	20	23	11	10	1	0							
17	BHM-MD	16/11/2020 10:10	W		4	116	23	25	20	23	11	10	1	0							
18	BHM-MES	16/11/2020 11:00	W		4	116	23	25	20	23	11	10	1	0							
19	BHM-MD	16/11/2020 7:45	W		4	116	23	25	20	23	11	10	1	0							
20	BHM-MES	16/11/2020 7:15	W		4	116	23	25	20	23	11	10	1	0							
21	LESPB-4	16/11/2020 0:00	W		4	116	23	25	20	23	11	10	1	0							
22	CR2	16/11/2020 7:15	W		4	116	23	25	20	23	11	10	1	0							
23	SCR	16/11/2020 7:45	W		4	116	23	25	20	23	11	10	1	0							
24	TB3	16/11/2020 15:50	W		4	116	23	25	20	23	11	10	1	0							
25	TB4	16/11/2020 15:50	W		4	116	23	25	20	23	11	10	1	0							
26	TB5	16/11/2020 15:50	W		4	116	23	25	20	23	11	10	1	0							
27	RB3	16/11/2020 7:45	W		4	116	23	25	20	23	11	10	1	0							
28	RB4	16/11/2020 14:30	W		4	116	23	25	20	23	11	10	1	0							
29	RB5	16/11/2020 9:45	W		4	116	23	25	20	23	11	10	1	0							
TOTAL													116	23	25	20	23	11	10	1	0

EXTRAS:
29 RB1
30 RB2
15/11/20 10:35
14/11/20 7:55

Received: 24/11/20
C/Note: 302094
Temp: 16.9°C
ICE / ICEBICKS

Received: 24/11/20
C/Note: 302094
Temp: 16.9°C
ICE / ICEBICKS

Received: 24/11/20
C/Note: 302094
Temp: 16.9°C
ICE / ICEBICKS

Karley Spence

From: Paul Gibbons <pgibbons@emmconsulting.com.au>
Sent: Wednesday, 25 November 2020 5:59 PM
To: Karley Spence
Cc: Kaitlyn Brodie; Dan Condon; jewers@emmconsulting.com.au; Gemma Sliz; Pamela Adams
Subject: Re: Sample Receipt for 23502 S190512 Balranald T3 Ancillary

CAUTION: This email originated from outside of the organisation. Do not act on instructions, click links or open attachments unless you recognise the sender and know the content is authentic and safe.

Karley

Further to your email, yes we're happy for the Gross Alpha and Beta sampling to be subcontracted to ALS again and note your comment on the holding times.

Kind regards

Paul

Sent from my iPhone

On 25 Nov 2020, at 5:14 pm, Karley Spence <KSpence@envirolab.com.au> wrote:

CAUTION: This email originated outside of the Organisation.

Hi Paul/Daniel/Kaitlyn,

We have received a QC sample at the lab for S190512 Balranald T3 Ancillary.
Are you ok with us subcontracting the Gross Alpha Beta to ALS? (as we did with the previous job in September, Envirolab Job number: 22604)

As ALS is the primary lab we could send to SGS as an alternative.

Please note the the TAT may exceed 5 business days for radiological analysis.

CERTIFICATE OF ANALYSIS 23502

Client Details

Client	EMM
Attention	Paul Gibbons
Address	187 Coventry Street, South Melbourne, VIC, 3205

Sample Details

Your Reference	<u>S190512 Balranald T3 Ancillary</u>
Number of Samples	1 WATER
Date samples received	25/11/2020
Date completed instructions received	25/11/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	09/12/2020
Date of Issue	14/12/2020
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Results Approved By

Chris De Luca, Operations Manager
 Pamela Adams, Laboratory Manager, Melbourne

Authorised By

P. Adams.

Pamela Adams, Laboratory Manager

HM in water - dissolved		
Our Reference		23502-1
Your Reference	UNITS	QC2
Date Sampled		14/11/2020
Type of sample		WATER
Date prepared	-	30/11/2020
Date analysed	-	30/11/2020
Arsenic-Dissolved	µg/L	<1
Cadmium-Dissolved	µg/L	<0.2
Chromium-Dissolved	µg/L	1
Copper-Dissolved	µg/L	14
Lead-Dissolved	µg/L	<1
Nickel-Dissolved	µg/L	6
Zinc-Dissolved	µg/L	28
Mercury-Dissolved	µg/L	<0.05

Miscellaneous Inorganics		
Our Reference		23502-1
Your Reference	UNITS	QC2
Date Sampled		14/11/2020
Type of sample		WATER
Date prepared	-	27/11/2020
Date analysed	-	27/11/2020
Sulphide	mg/L	<0.5
Ferrous Iron	mg/L	<0.05

Ion Balance		
Our Reference		23502-1
Your Reference	UNITS	QC2
Date Sampled		14/11/2020
Type of sample		WATER
Date prepared	-	30/11/2020
Date analysed	-	30/11/2020
Calcium - Dissolved	mg/L	570
Potassium - Dissolved	mg/L	20
Sodium - Dissolved	mg/L	13,000
Magnesium - Dissolved	mg/L	1,600
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	310
Carbonate Alkalinity as CaCO ₃	mg/L	<5
Total Alkalinity as CaCO ₃	mg/L	310
Sulphate, SO ₄	mg/L	5,900
Chloride, Cl	mg/L	22,000
Hardness	mgCaCO ₃ /L	8,100
Ionic Balance	%	-2.4

External testing		
Our Reference		23502-1
Your Reference	UNITS	QC2
Date Sampled		14/11/2020
Type of sample		WATER
Gross Alpha	Bq/L	3.67
Gross Beta	Bq/L	<2.75
Gross Beta Activity -K40	Bq/L	<2.75

Client Reference: S190512 Balranald T3 Ancillary

Method ID	Methodology Summary
Ext-011	Subcontracted to ALS.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.
Inorg-051	Sulphide determined titrimetrically based on APHA latest edition 4500 S2- F. Note, the Sulphide is termed as Total Sulphide given any Sulphide contained in any sediment present may also included in the determination.
Inorg-076	A sample is determined colourimetrically by discrete analyser as referenced in APHA 3500 Fe-B (phenanthroline method). Water samples are filtered on receipt prior to analysis.
Inorg-087	Chloride by colourimetry using Discrete Analyser
Inorg-115	Sulphate by turbidity using Discrete Analyser
Metals-020 ICP-AES	Determination of various metals by ICP-AES.
Metals-021 CV-AAS	Determination of Mercury by Cold Vapour AAS.
Metals-022 ICP-MS	Determination of various metals by ICP-MS.

Client Reference: S190512 Balranald T3 Ancillary

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			30/11/2020	1	30/11/2020	30/11/2020		30/11/2020	[NT]
Date analysed	-			30/11/2020	1	30/11/2020	30/11/2020		30/11/2020	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	<1	[NT]		103	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022 ICP-MS	<0.1	1	<0.2	[NT]		103	[NT]
Chromium-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	1	[NT]		102	[NT]
Copper-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	14	[NT]		99	[NT]
Lead-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	<1	[NT]		103	[NT]
Nickel-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	6	[NT]		102	[NT]
Zinc-Dissolved	µg/L	1	Metals-022 ICP-MS	<1	1	28	[NT]		102	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021 CV-AAS	<0.05	1	<0.05	<0.05	0	94	[NT]

Client Reference: S190512 Balranald T3 Ancillary

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate			Spike Recovery %			
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			27/11/2020	1	27/11/2020	27/11/2020		27/11/2020	[NT]
Date analysed	-			27/11/2020	1	27/11/2020	27/11/2020		27/11/2020	[NT]
Sulphide	mg/L	0.5	Inorg-051	<0.5	1	<0.5	[NT]		90	[NT]
Ferrous Iron	mg/L	0.05	Inorg-076	<0.05	1	<0.05	<0.05	0	103	[NT]

Client Reference: S190512 Balranald T3 Ancillary

QUALITY CONTROL: Ion Balance					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			30/11/2020	[NT]	[NT]	[NT]	[NT]	30/11/2020	[NT]
Date analysed	-			30/11/2020	[NT]	[NT]	[NT]	[NT]	30/11/2020	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	105	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	104	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	82	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020 ICP-AES	<0.5	[NT]	[NT]	[NT]	[NT]	104	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	94	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	94	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-115	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Chloride, Cl	mg/L	1	Inorg-087	<1	[NT]	[NT]	[NT]	[NT]	102	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Sulphide analysed by Envirolab Sydney, report number 256796.
Gross alpha and beta analysed by ALS, report 863530

METALS: The PQL has been raised for Cadmium due to the sample matrix requiring dilution.

CERTIFICATE OF ANALYSIS 252055

Client Details

Client	EMM Consulting Pty Ltd
Attention	Daniel Condon
Address	188 Normanby Rd, SOUTHBANK, VIC, 3006

Sample Details

Your Reference	<u>S100512, Balranald T3 Ancillary</u>
Number of Samples	1 water
Date samples received	24/09/2020
Date completed instructions received	24/09/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

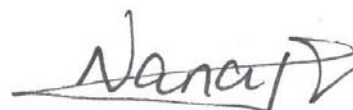
Report Details

Date results requested by	01/10/2020
Date of Issue	03/12/2020
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
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Results Approved By

Hannah Nguyen, Senior Chemist
 Ken Nguyen, Reporting Supervisor
 Priya Samarawickrama, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

HM in water - dissolved		
Our Reference		252055-1
Your Reference	UNITS	QA201
Date Sampled		18/09/2020
Type of sample		water
Date prepared	-	28/09/2020
Date analysed	-	28/09/2020
Arsenic-Dissolved	µg/L	3
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	2
Copper-Dissolved	µg/L	<1
Lead-Dissolved	µg/L	<1
Mercury-Dissolved	µg/L	<0.05
Nickel-Dissolved	µg/L	8
Zinc-Dissolved	µg/L	6

Ion Balance		
Our Reference		252055-1
Your Reference	UNITS	QA201
Date Sampled		18/09/2020
Type of sample		water
Date prepared	-	24/09/2020
Date analysed	-	24/09/2020
Calcium - Dissolved	mg/L	580
Potassium - Dissolved	mg/L	27
Sodium - Dissolved	mg/L	13,000
Magnesium - Dissolved	mg/L	1,400
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	340
Carbonate Alkalinity as CaCO ₃	mg/L	<5
Total Alkalinity as CaCO ₃	mg/L	340
Sulphate, SO ₄	mg/L	4,000
Chloride, Cl	mg/L	21,000
Ionic Balance	%	1.0

Miscellaneous Inorganics		
Our Reference		252055-1
Your Reference	UNITS	QA201
Date Sampled		18/09/2020
Type of sample		water
Date prepared	-	25/09/2020
Date analysed	-	25/09/2020
Ferrous Iron	mg/L	2.8
Sulphide	mg/L	<0.5

Radioactivity Analysis report		
Our Reference		252055-1
Your Reference	UNITS	QA201
Date Sampled		18/09/2020
Type of sample		water
Date prepared	-	30/11/2020
Date analysed	-	02/12/2020
Radium-226	Bq/L	#
Radium-228	Bq/L	#

Client Reference: S100512, Balranald T3 Ancillary

Method ID	Methodology Summary
Ext-041	Analysed by Australian Government - Australian Radiation Protection and Nuclear Safety Agency. VIC. Radium 226 is determined by liquid scintillation counting. Radium 228 is measured by high resolution gamma-ray spectrometry.
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.
Inorg-051	Sulphide determined titrimetrically based on APHA latest edition 4500 S2- F. Note, the Sulphide is termed as Total Sulphide given any Sulphide contained in any sediment present is also included in the determination.
Inorg-076	Ferrous Iron is determined colourimetrically by discrete analyser. Waters samples are filtered on receipt prior to analysis.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.

Client Reference: S100512, Balranald T3 Ancillary

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W3	[NT]
Date prepared	-			28/09/2020	[NT]	[NT]	[NT]	[NT]	28/09/2020	[NT]
Date analysed	-			28/09/2020	[NT]	[NT]	[NT]	[NT]	28/09/2020	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	101	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	105	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	106	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	109	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]

Client Reference: S100512, Balranald T3 Ancillary

QUALITY CONTROL: Ion Balance					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			24/09/2020	[NT]	[NT]	[NT]	[NT]	24/09/2020	[NT]
Date analysed	-			24/09/2020	[NT]	[NT]	[NT]	[NT]	24/09/2020	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	99	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	86	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	87	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	96	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	103	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	111	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]

Client Reference: S100512, Balranald T3 Ancillary

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			25/09/2020	[NT]	[NT]	[NT]	[NT]	25/09/2020	[NT]
Date analysed	-			25/09/2020	[NT]	[NT]	[NT]	[NT]	25/09/2020	[NT]
Ferrous Iron	mg/L	0.05	Inorg-076	<0.05	[NT]	[NT]	[NT]	[NT]	83	[NT]
Sulphide	mg/L	0.5	Inorg-051	<0.5	[NT]	[NT]	[NT]	[NT]	98	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Radioactivity analysed by SGS. Report no. ME316670
#View attached external report.

CHAIN OF CUSTODY
ALS Laboratory - please fax to
ALS Laboratory - please fax to

CLIENT: ENM CONSULTING
OFFICE: 20 Chuddeas Street, St Leonards
PROJECT: Balmoral T3 Ancillary
PURCHASE ORDER:
PROJECT NO.: S169512
COUNTRY OF ORIGIN:
PROJECT NO.: S169512

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OFFICE: 20 Chuddeas Street, St Leonards
PROJECT: Balmoral T3 Ancillary
PURCHASE ORDER:
PROJECT NO.: S169512
COUNTRY OF ORIGIN:
PROJECT NO.: S169512

LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)	TOTAL BOTTLES	ANALYSIS REQUIRED INCLUDING SUITES (NB. Suite Codes must be listed to allow table pilot)	Additional Information					
1	UGM-M8D	18/11/2020 8:30	W		5	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
2	UGM-M8S	18/11/2020 8:10	W		6	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
3	UGM-M12D	18/11/2020 12:10	W		5	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
4	UGM-M12S	18/11/2020 12:30	W		5	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
5	BH-M17D	17/11/2020 12:40	W		5	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
6	BH-M17S	17/11/2020 13:30	W		6	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
7	BH-M18D	17/11/2020 10:40	W		5	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
8	BH-M18S	17/11/2020 9:45	W		6	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
9	BH-M21D	18/11/2020 10:50	W		5	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
10	BH-M21S	18/11/2020 11:20	W		6	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
11	QA1	18/11/2020 8:30	W		5	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
12	QC1	18/11/2020 8:30	W		5	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
13	Trip Blank 1	18/11/2020 0:00	W		1	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
14	Trip Blank 2	18/11/2020 0:00	W		1	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
15	RB5	17/11/2020 11:00	W		1	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
	Trip spike		W		1	Major ions (ion balance NT-1 & NT-2) Sulphate (E005) (Yellow) Formaldehyde (E008) (Green) Dissolved metals (field filters) (E020) WZ (red) Total metals (E020) WZ-T (red) Gross alpha beta (E020) (L Green) TRH, BTXN						
					TOTAL	68	42	12	7	12	1	0

Environmental Division Sydney
Work Order Reference **ES2041696**

Telephone: +61-2-8784 8555

Comments on likely contaminant levels, dilutions, or samples requiring specific C/C analysis etc.

RECEIVED BY: **Scotty Ass**
DATE/TIME: **24/11/2020 14:00**

RELINQUISHED BY: **Kathryn Brodie**
DATE/TIME: **20/11/2020**

DATE RECEIVED: **25/11/2020**
TEMPERATURE: **17.0**
COOLING: **Ice Pack**
SECURITY: **Intact/Broken/None**

FOR LABORATORY USE ONLY
Outbox Seal Intact: **Yes**
Freeze: **Yes**
Random Sample Temperature on Receipt: **6.0**
Other comment: **None**

ANALYSIS REQUIRED INCLUDING SUITES (NB. Suite Codes must be listed to allow table pilot)
Where Metals are required, specify Total (unfiltered bottle request) or Dissolved (field filtered bottle required).

Water (W)
Water Cooler Codes: P = Unpreserved Plastic; N = Nitrite Preserved Plastic; CRG = Nitrite Preserved CRG; SH = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved Plastic; AP = Airtight Unpreserved Plastic; V = VOA Vol HCl Preserved; VB = VOA Vol Sodium Bisulfite Preserved; VS = VOA Vol Sulfuric Preserved; AV = Airtight Unpreserved Vol/SO₄ Sulfate Preserved; Amber Glass; H = HCl Preserved Plastic; HS = HCl Preserved Speciation Bottle; SP = Formaldehyde Preserved Glass; Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottle; ST = Shake Bottle; ASS = Plastic Bag for Acid Sulphate Solids; B = Unpreserved Bag; LI = Lugdunum Sodium Thiosulfate Preserved Bottle.

CERTIFICATE OF ANALYSIS 256648

Client Details

Client	EMM Consulting Pty Ltd
Attention	P Gibbons
Address	188 Normanby Rd, SOUTHBANK, VIC, 3006

Sample Details

Your Reference	<u>S190512, Balranald T3 Ancillary</u>
Number of Samples	1 water
Date samples received	25/11/2020
Date completed instructions received	25/11/2020

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
 Samples were analysed as received from the client. Results relate specifically to the samples as received.
 Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

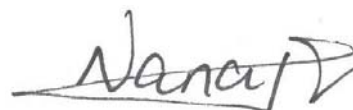
Report Details

Date results requested by	02/12/2020
Date of Issue	16/12/2020
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Loren Bardwell, Senior Chemist
 Nancy Zhang, Laboratory Manager, Sydney
 Priya Samarawickrama, Senior Chemist

Authorised By



Nancy Zhang, Laboratory Manager

HM in water - dissolved		
Our Reference		256648-1
Your Reference	UNITS	QC1
Date Sampled		18/11/2020
Type of sample		water
Date prepared	-	27/11/2020
Date analysed	-	27/11/2020
Arsenic-Dissolved	µg/L	<1
Cadmium-Dissolved	µg/L	<0.1
Chromium-Dissolved	µg/L	<1
Copper-Dissolved	µg/L	<1
Lead-Dissolved	µg/L	<1
Mercury-Dissolved	µg/L	<0.05
Nickel-Dissolved	µg/L	<1
Zinc-Dissolved	µg/L	<1

Ion Balance		
Our Reference		256648-1
Your Reference	UNITS	QC1
Date Sampled		18/11/2020
Type of sample		water
Date prepared	-	25/11/2020
Date analysed	-	25/11/2020
Calcium - Dissolved	mg/L	460
Potassium - Dissolved	mg/L	58
Sodium - Dissolved	mg/L	14,000
Magnesium - Dissolved	mg/L	2,000
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	<5
Bicarbonate Alkalinity as CaCO ₃	mg/L	390
Carbonate Alkalinity as CaCO ₃	mg/L	<5
Total Alkalinity as CaCO ₃	mg/L	390
Sulphate, SO ₄	mg/L	3,400
Chloride, Cl	mg/L	19,000
Ionic Balance	%	14

Miscellaneous Inorganics		
Our Reference		256648-1
Your Reference	UNITS	QC1
Date Sampled		18/11/2020
Type of sample		water
Date prepared	-	26/11/2020
Date analysed	-	26/11/2020
Ferrous Iron	mg/L	2.2
Sulphide	mg/L	<0.5

Radioactivity Analysis report		
Our Reference		256648-1
Your Reference	UNITS	QC1
Date Sampled		18/11/2020
Type of sample		water
Date prepared	-	14/12/2020
Date analysed	-	14/12/2020
Gross Alpha	Bq/L	0.0510
Gross Beta	Bq/L	0.0620

Client Reference: S190512, Balranald T3 Ancillary

Method ID	Methodology Summary
External data	Field data provided by client
Inorg-006	Alkalinity - determined titrimetrically in accordance with APHA latest edition, 2320-B.
Inorg-040	The concentrations of the major ions (mg/L) are converted to milliequivalents and summed. The ionic balance should be within +/- 10% ie total anions = total cations +/-10%.
Inorg-051	Sulphide determined titrimetrically based on APHA latest edition 4500 S2- F. Note, the Sulphide is termed as Total Sulphide given any Sulphide contained in any sediment present is also included in the determination.
Inorg-076	Ferrous Iron is determined colourimetrically by discrete analyser. Waters samples are filtered on receipt prior to analysis.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS.

Client Reference: S190512, Balranald T3 Ancillary

QUALITY CONTROL: HM in water - dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			27/11/2020	[NT]	[NT]	[NT]	[NT]	27/11/2020	[NT]
Date analysed	-			27/11/2020	[NT]	[NT]	[NT]	[NT]	27/11/2020	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	98	[NT]
Copper-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	99	[NT]
Lead-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	100	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	[NT]	[NT]	[NT]	[NT]	111	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	97	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	<1	[NT]	[NT]	[NT]	[NT]	103	[NT]

Client Reference: S190512, Balranald T3 Ancillary

QUALITY CONTROL: Ion Balance					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			25/11/2020	[NT]	[NT]	[NT]	[NT]	25/11/2020	[NT]
Date analysed	-			25/11/2020	[NT]	[NT]	[NT]	[NT]	25/11/2020	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	105	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	118	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	100	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	[NT]	[NT]	[NT]	[NT]	104	[NT]
Hydroxide Alkalinity (OH ⁻) as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Bicarbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Carbonate Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	[NT]	[NT]
Total Alkalinity as CaCO ₃	mg/L	5	Inorg-006	<5	[NT]	[NT]	[NT]	[NT]	105	[NT]
Sulphate, SO ₄	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	119	[NT]
Chloride, Cl	mg/L	1	Inorg-081	<1	[NT]	[NT]	[NT]	[NT]	88	[NT]

Client Reference: S190512, Balranald T3 Ancillary

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			26/11/2020	[NT]	[NT]	[NT]	[NT]	26/11/2020	[NT]
Date analysed	-			26/11/2020	[NT]	[NT]	[NT]	[NT]	26/11/2020	[NT]
Ferrous Iron	mg/L	0.05	Inorg-076	<0.05	[NT]	[NT]	[NT]	[NT]	86	[NT]
Sulphide	mg/L	0.5	Inorg-051	<0.5	[NT]	[NT]	[NT]	[NT]	90	[NT]

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.
Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.	
The recommended maximums for analytes in urine are taken from "2018 TLVs and BEIs", as published by ACGIH (where available). Limit provided for Nickel is a precautionary guideline as per Position Paper prepared by AIOH Exposure Standards Committee, 2016.	
Guideline limits for Rinse Water Quality reported as per analytical requirements and specifications of AS 4187, Amdt 2 2019, Table 7.2	

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% – see ELN-P05 QA/QC tables for details; <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals (not SPOCAS); 60-140% for organics/SPOCAS (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Analysis of aqueous samples typically involves the extraction/digestion and/or analysis of the liquid phase only (i.e. NOT any settled sediment phase but inclusive of suspended particles if present), unless stipulated on the Envirolab COC and/or by correspondence. Notable exceptions include certain Physical Tests (pH/EC/BOD/COD/Apparent Colour etc.), Solids testing, total recoverable metals and PFAS where solids are included by default.

Samples for Microbiological analysis (not Amoeba forms) received outside of the 2-8°C temperature range do not meet the ideal cooling conditions as stated in AS2031-2012.

Report Comments

Sulfide

Samples were out of the recommended holding time for this analysis.

Radioactivity analysed by SGS report ME317713 R0

Result reported from SGS as below

Gross Alpha	Bq/L	0.01	0.051 ±0.027
-------------	------	------	--------------

Gross Beta	Bq/L	0.01	0.062 ±0.044
------------	------	------	--------------



Appendix C

Groundwater sampling QA/QC reports



DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	BH-M16D, BH-M16S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, UGM-M1D, UGM-M1S, UGM-M6D, UGM-M6S, BH-M21S, BH-M21D, UGM-M12D, UGM-M12S, UGM-M4D, UGM-M2S, UGM-M2D, UGM-M8S, UGM-M8D, BH-M17D, BH-M17S, LPSPB04, UGM-M15S, UGM-M15D, UGM-M18S, UGM-M18D, QC101, QC201, QC100, QC200, RB100
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab, SGS (Secondary)
Sampling Events:	Round 1, 21-28 April 2020	Lab reference:	EM2006908, ES2014654 (ALS) 241966 (Envirolab, SGS)
Validation by:	B Bull	Date:	05/08/2020
Verification by:	D Condon	Date:	05/08/2020

Field QA/QC

Sampling personnel	Round 1 groundwater sampling was conducted by K Brodie and H Noakes on 21 to 28 April 2020.
Sampling Methodology	Groundwater samples were obtained via low flow purging method.
Chain of Custody (COC)	Chain of custody documents were completed by EMM (K Brodie and H Noakes).
Analysis Request	Laboratory analysis request and sample receipt notification reviewed and approved by EMM.
Field Blanks	No field blanks were analysed as part of this assessment.
Rinsate Blanks (RB100)	One rinsate blank was collected during the sampling event. The rinsate sample was collected from the groundwater pump. All reported concentrations were below the laboratory limit of reporting (LOR) for all analytes tested.
Trip Blanks	No trip blanks were analysed as part of this assessment.
Trip Spikes	No trip spikes were analysed as part of this assessment.
Intra-laboratory and interlaboratory duplicates (QC100, QC101, QC200 and QC201)	Intra- and inter-laboratory field duplicate samples were collected at a frequency of at least one per twenty primary samples (two of each).
Handling and preservation	All samples were received at the laboratories in appropriate sample containers. Water samples were received preserved and chilled at the laboratories (4.6°C, 0.8°C). These temperatures are within the recommended range for chemical analysis. (< 6°C).

Laboratory QA/QC

Tests requested/reported	Samples were analysed and reported as requested on the COC.
Holding time compliance	Samples were extracted and analysed within recommended holding times for all analytes.
Laboratory Accreditation	The laboratory analysis was conducted by ALS Environmental Pty Ltd in Melbourne (primary lab) and Envirolab Services Pty Ltd in Sydney (secondary lab), which are both both National Association of Testing Authorities (NATA) accredited laboratories.
Frequency of laboratory QC	The laboratories reported a sufficient frequency of quality control samples to assess whether the results have been reported to an acceptable accuracy and precision. The primary laboratory noted that the frequency of laboratory duplicates samples for the following analytes did not meet the expected rate as specified in the ASC NEPM: Laboratory duplicates: <ul style="list-style-type: none"> Radium 226 and radium 228 activity (0 of 10%)

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	BH-M16D, BH-M16S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, UGM-M1D, UGM-M1S, UGM-M6D, UGM-M6S, BH-M21S, BH-M21D, UGM-M12D, UGM-M12S, UGM-M4D, UGM-M2S, UGM-M2D, UGM-M8S, UGM-M8D, BH-M17D, BH-M17S, LPSPB04, UGM-M15S, UGM-M15D, UGM-M18S, UGM-M18D, QC101, QC201, QC100, QC200, RB100
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab, SGS (Secondary)
Sampling Events:	Round 1, 21-28 April 2020	Lab reference:	EM2006908, ES2014654 (ALS) 241966 (Envirolab, SGS)
Validation by:	B Bull	Date:	05/08/2020
Verification by:	D Condon	Date:	05/08/2020

Laboratory control samples:

- Gross alpha and beta activity (8.7 of 10%)
- Radium 226 and radium 228 activity (4.35 of 5%)

Matrix Spikes

- Dissolved metals by ICP-MS (0 of 5%)

It is noted that laboratory duplicate sample results for radium 226 and radium 228 activity were later received from SGS, satisfying the frequency criteria. The other frequency exceedances are due to the small sample batch size and are not expected to significantly affect the overall quality of the data.

Method Blank	Method blank concentrations were not detected above the LOR for all analytes.
Laboratory duplicate RPDs	Laboratory duplicate (LD) Relative Percentage Differences (RPD) were within control limits for all analytes.
Laboratory control spike recovery	One LCS outlier was noted. A gross alpha analysis reported a recovery spike of 102%, in exceedance of the 98-100% limits. This exceedance is not expected to have an impact on the integrity of the data.
Matrix spike recovery	<p>Matrix spike (MS) recoveries (where reported) were within control limits with the exception of the following, where the background level was greater than or equal to four times the spike level:</p> <ul style="list-style-type: none"> • Anonymous – Sulfate as SO₄ • Anonymous – Chloride • UGM-M15S – Sulfate as SO₄ • UGM-M15S – Chloride • UGM-M1D – Sulfide as S₂- (Recovery less than lower data quality objective) <p>As other QA/QC met control limits, these exceptions are not expected to have a material impact on data integrity.</p>
Surrogate spike recovery	Surrogate spike recoveries were within control limits.

Data Validation

Comparison of Field Observations and Laboratory Results	No anomalous results between field observations and analysis results were noted.
Data transcription	A random check of the laboratory results identified no anomalies between the electronic data, the laboratory reports, and tables generated by EMM.

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	BH-M16D, BH-M16S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, UGM-M1D, UGM-M1S, UGM-M6D, UGM-M6S, BH-M21S, BH-M21D, UGM-M12D, UGM-M12S, UGM-M4D, UGM-M2S, UGM-M2D, UGM-M8S, UGM-M8D, BH-M17D, BH-M17S, LPSPB04, UGM-M15S, UGM-M15D, UGM-M18S, UGM-M18D, QC101, QC201, QC100, QC200, RB100
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab, SGS (Secondary)
Sampling Events:	Round 1, 21-28 April 2020	Lab reference:	EM2006908, ES2014654 (ALS) 241966 (Envirolab, SGS)
Validation by:	B Bull	Date:	05/08/2020
Verification by:	D Condon	Date:	05/08/2020

Limits of Reporting (LOR)

LORs were sufficiently low to enable assessment against adopted guideline criteria.

Intra-laboratory duplicate RPDs (QC100, QC101)

All intra-laboratory field duplicate RPDs were reported within control limits with the exception of the following:

- QC100
 - Ionic balance (131%)
- QC101
 - Gross alpha (34%)
 - Ionic balance (35%)

Although the values are different, these intra-laboratory RPD exceedances are not expected to impact the overall data quality of the batch. As a conservative measure, the highest results will be used for reporting purposes and consideration should be taken when interpreting data for gross alpha and ionic balance from this batch.

Inter-laboratory duplicate RPDs (QC200, QC201)

Inter-laboratory field duplicate RPDs were reported within control limits with the exception of the following:

- QC201
 - Gross alpha (33%)
 - Ionic balance (46%)

Although the values are different, these inter-laboratory RPD exceedances are not expected to impact the overall data quality of the batch. As a conservative measure, the highest results will be used for reporting purposes and consideration should be taken when interpreting data for gross alpha and ionic balance from this batch.

Chromatograms

Not requested.

Comments

The assessment of field and laboratory QA/QC data indicated that the reported analytical results are representative of the conditions at the sample locations analysed and that the overall quality of the data produced is considered to be acceptably reliable for the purpose of this investigation. Despite the minor variations/outliers summarised above, the laboratory data are considered to provide an appropriate level of confidence in the accuracy, comparability, completeness and precision of the analytical results.

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA100, QA200, QA101, QA201, TS, TB, QA300, QA301, QA302, QA303, QA304, QA305, Trip Spike Control,
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 2, 19-24 August 2020	Lab reference:	EM2014666, ES2030077 (ALS) 22545 (Envirolab)
Validation by:	B Bull	Date:	21/09/2020
Verification by:	D Condon	Date:	01/10/2020

Field QA/QC

Sampling personnel	Round 2 groundwater sampling was conducted by K Brodie and H Noakes on 19 to 24 August 2020.
Sampling Methodology	Groundwater samples were obtained via low flow purging method.
Chain of Custody (COC)	Chain of custody documents were completed by EMM (K Brodie and H Noakes).
Analysis Request	Laboratory analysis request and sample receipt notification reviewed and approved by EMM.
Field Blanks	No field blanks were analysed as part of this assessment.
Rinsate Blanks (QA300, QA301, QA302, QA303, QA304, QA305)	Six rinsate blanks were collected during the sampling event, one on each day of sampling. The rinsate samples were collected from the groundwater pump. All reported concentrations were below the laboratory limit of reporting (LOR) for all analytes tested in each sample.
Trip Blanks (TB)	One trip blank was included with each set of eskies sent to the laboratory for analysis for a total of three trip blanks. The trip blanks were prepared by the laboratory.
Trip Spikes (TS)	One trip spike was included with each set of eskies sent to the laboratory for analysis for a total of three trip spikes. The trip spikes were prepared by the laboratory.
Intra-laboratory and interlaboratory duplicates (QA100, QA200, QA101, QA201)	Intra- and inter-laboratory field duplicate samples were collected at a frequency of at least one per twenty primary samples (two of each).
Handling and preservation	All samples were received at the laboratories in appropriate sample containers. Water samples were received preserved and chilled at the laboratories (0 to 1 °C). These temperatures are within the recommended range for chemical analysis. (< 6°C).

Laboratory QA/QC

Tests requested/reported	Samples were analysed and reported as requested on the COC.
Holding time compliance	All samples, except for the trip blanks, trip spikes and interlaboratory duplicates, were extracted and analysed within recommended holding times for all analytes. The trip blanks and spikes were prepared previously by the laboratory but were 12 to 21 days overdue at the time of analysis. The forwarding of the interlaboratory duplicates was delayed and due to this the holding times for sulphide, ferrous iron and alkalinity testing were exceeded.
Laboratory Accreditation	The laboratory analysis was conducted by ALS Environmental Pty Ltd in Melbourne (primary lab) and Envirolab Services Pty Ltd in Sydney (secondary lab), which are both National Association of Testing Authorities (NATA) accredited laboratories.

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA100, QA200, QA101, QA201, TS, TB, QA300, QA301, QA302, QA303, QA304, QA305, Trip Spike Control,
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 2, 19-24 August 2020	Lab reference:	EM2014666, ES2030077 (ALS) 22545 (Envirolab)
Validation by:	B Bull	Date:	21/09/2020
Verification by:	D Condon	Date:	01/10/2020

The laboratories reported a sufficient frequency of quality control samples to assess whether the results have been reported to an acceptable accuracy and precision.

The primary laboratory noted that the frequency of laboratory duplicate samples for the following analytes did not meet the expected rate as specified in the ASC NEPM:

Laboratory control samples:

- Gross alpha and beta activity (6.9 of 10%)

Frequency of laboratory QC

Matrix Spikes

- Dissolved metals by ICP-MS (0 of 5%)
- Total metals by ICP-MS (0 of 5%)

These frequency exceedances are due to the small sample batch size and are not expected to significantly affect the overall quality of the data.

Method Blank	Method blank concentrations were not detected above the LOR for all analytes.
Laboratory duplicate RPDs	Laboratory duplicate (LD) Relative Percentage Differences (RPD) were within control limits for all analytes.
Laboratory control spike recovery	No laboratory control spike outliers were noted.
Matrix spike recovery	<p>Matrix spike (MS) recoveries (where reported) were within control limits with the exception of the following, where the background level was greater than or equal to four times the spike level:</p> <ul style="list-style-type: none"> • QA200 – Sulfate as SO₄ – Turbidimetric • BH-M20D – Sulfate as SO₄ – Turbidimetric • Anonymous – Chloride • BH-M20D – Chloride • UGM-M1S – Sulfide as S₂- (Recovery less than lower data quality objective) • BH-M21S – Sulfide as S₂- (Recovery less than lower data quality objective) • Anonymous – C6-C9 Fraction • Anonymous – C6-C10 Fraction • Anonymous – Benzene <p>As other QA/QC met control limits, these exceptions are not expected to have a material impact on data integrity.</p>
Surrogate spike recovery	Surrogate spike recoveries were within control limits.

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA100, QA200, QA101, QA201, TS, TB, QA300, QA301, QA302, QA303, QA304, QA305, Trip Spike Control,
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 2, 19-24 August 2020	Lab reference:	EM2014666, ES2030077 (ALS) 22545 (Envirolab)
Validation by:	B Bull	Date:	21/09/2020
Verification by:	D Condon	Date:	01/10/2020

Data Validation

Comparison of Field Observations and Laboratory Results	No anomalous results between field observations and analysis results were noted.
Data transcription	A random check of the laboratory results identified no anomalies between the electronic data, the laboratory reports, and tables generated by EMM.
Limits of Reporting (LOR)	LORs were sufficiently low to enable assessment against adopted guideline criteria.
Intra-laboratory duplicate RPDs (QA100, QA101)	<p>All intra-laboratory field duplicate RPDs were reported within control limits with the exception of the following:</p> <ul style="list-style-type: none"> • QA100 <ul style="list-style-type: none"> – Ionic balance (105%) • QA201 <ul style="list-style-type: none"> – Ionic balance (41%) <p>Although the values are different, these intra-laboratory RPD exceedances are not expected to impact the overall data quality of the batch. As a conservative measure, the highest results will be used for reporting purposes and consideration should be taken when interpreting data for ionic balance from this batch.</p>
Inter-laboratory duplicate RPDs (QA201)	<p>Inter-laboratory field duplicate RPDs were reported within control limits with the exception of the following:</p> <ul style="list-style-type: none"> • QC201 <ul style="list-style-type: none"> – Potassium (32%) – Ionic balance (71%) <p>Although the values are different, these inter-laboratory RPD exceedances are not expected to impact the overall data quality of the batch. As a conservative measure, the highest results will be used for reporting purposes and consideration should be taken when interpreting data for potassium and ionic balance from this batch.</p>

Chromatograms

Not requested.

Comments

The assessment of field and laboratory QA/QC data indicated that the reported analytical results are representative of the conditions at the sample locations analysed and that the overall quality of the data produced is considered to be acceptably reliable for the purpose of this investigation. Despite the minor variations/outliers summarised above, the laboratory data are considered to provide an appropriate level of confidence in the accuracy, comparability, completeness and precision of the analytical results.

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA100, QA200, QA101, QA201, TS x 3, TB100, TB200, TB300, TB100, TB200, TB300, TB4, TB5, RB100, RB200, RB300, RB400, RB600, RB700, RB800
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 2, 19-24 August 2020	Lab reference:	EM2016060, EM2016426, ES2033456 (ALS) 22604, 252055 (Envirolab)
Validation by:	B Bull	Date:	08/10/2020
Verification by:	D Condon	Date:	
Field QA/QC			

Sampling personnel Round 2 groundwater sampling was conducted by K Brodie and B Bull/L Griffiths on 11 to 21 September 2020.

Sampling Methodology Groundwater samples were obtained via low flow purging method.

Chain of Custody (COC) Chain of custody documents were completed by EMM (K Brodie and B Bull/L Griffiths).

Analysis Request Laboratory analysis request and sample receipt notification reviewed and approved by EMM.

Field Blanks No field blanks were analysed as part of this assessment.

Seven rinsate blanks were collected during the sampling event, one on each day of sampling. The rinsate samples were collected from the groundwater pump. The following exceedances were observed in the rinsate blanks:

- RB100
 - Copper: 0.003 mg/L
 - Zinc: 0.008 mg/L
- RB200
 - Copper: 0.650 mg/L
 - Nickel: 0.006 mg/L
 - Lead: 0.034 mg/L
 - Zinc: 0.569 mg/L
- RB100
 - Copper: 0.030 mg/L
 - Lead: 0.002 mg/L
 - Zinc: 0.120 mg/L
- RB400
 - Chromium: 0.005 mg/L
 - Copper: 0.035 mg/L
 - Nickel: 0.003 mg/L
 - Lead: 0.003 mg/L
 - Zinc: 0.062 mg/L
- RB600
 - Copper: 0.005 mg/L
 - Zinc: 0.012 mg/L

Rinsate Blanks
(RB100, RB200, RB100, RB400,
RB600, RB700, RB800)

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA100, QA200, QA101, QA201, TS x 3, TB100, TB200, TB300, TB100, TB200, TB300, TB4, TB5, RB100, RB200, RB300, RB400, RB600, RB700, RB800
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 2, 19-24 August 2020	Lab reference:	EM2016060, EM2016426, ES2033456 (ALS) 22604, 252055 (Envirolab)
Validation by:	B Bull	Date:	08/10/2020
Verification by:	D Condon	Date:	

- RB800
 - Copper: 0.006 mg/L
 - Lead: 0.002 mg/L
 - Zinc: 0.016 mg/L

EMM will review the decontamination process and undertake the rinsate procedure and filling of trip blank bottles in a sterile environment with appropriate rinsate water suitable for metals analysis. Consideration will be taken when interpreting metals results from samples collected during this monitoring event.

Trip Blanks (TB100, TB200, TB300, TB100, TB200, TB300, TB4, TB5)	<p>One trip blank was included with each set of eskies sent to the laboratory for analysis for a total of eight trip blanks. The trip blanks were prepared on site by decanting deionised water into metals sample bottles. The following exceedances were observed in the trip blanks:</p> <ul style="list-style-type: none"> • TB100 <ul style="list-style-type: none"> – Zinc: 0.006 mg/L • TB200 <ul style="list-style-type: none"> – Zinc: 0.006 mg/L • TB300 <ul style="list-style-type: none"> – Zinc: 0.007 mg/L
Trip Spikes (TS)	<p>One trip spike was included with each set of eskies sent to the laboratory for analysis for a total of three trip spikes. The trip spikes were prepared by the laboratory.</p>
Intra-laboratory and interlaboratory duplicates (QA100, QA200, QA101, QA201)	<p>Intra- and inter-laboratory field duplicate samples were collected at a frequency of at least one per twenty primary samples (two of each).</p>
Handling and preservation	<p>All samples were received at the laboratories in appropriate sample containers.</p> <p>Water samples for workorders ES2033456 and ES2033648 were received by the lab chilled and preserved at a temperature of 2.8°C. These temperatures are within the recommended range for chemical analysis. (< 6°C).</p> <p>Water samples for workorders EM2016060 and EM2016426 were received with ice present, but at temperatures of 12.8°C and 18.2°C respectively. These temperatures are above the APHA/NEPM recommendations for water samples and should be considered when interpreting the results.</p>

Laboratory QA/QC

Tests requested/reported	Samples were analysed and reported as requested on the COC.
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DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA100, QA200, QA101, QA201, TS x 3, TB100, TB200, TB300, TB100, TB200, TB300, TB4, TB5, RB100, RB200, RB300, RB400, RB600, RB700, RB800
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 2, 19-24 August 2020	Lab reference:	EM2016060, EM2016426, ES2033456 (ALS) 22604, 252055 (Envirolab)
Validation by:	B Bull	Date:	08/10/2020
Verification by:	D Condon	Date:	

Holding time compliance	<p>All samples, except for the trip spikes and interlaboratory duplicates were extracted and analysed within the recommended holding times for all analytes.</p> <p>The trip spikes were prepared previously by the laboratory but were 40 days overdue at the time of analysis.</p> <p>The interlaboratory duplicate QA101 was in exceedance of the holding time for sulphide analysis upon arrival at the secondary laboratory.</p>
Laboratory Accreditation	<p>The laboratory analysis was conducted by ALS Environmental Pty Ltd in Melbourne (primary lab) and Envirolab Services Pty Ltd in Sydney (secondary lab), which are both National Association of Testing Authorities (NATA) accredited laboratories.</p>
Frequency of laboratory QC	<p>The laboratories reported a sufficient frequency of quality control samples to assess whether the results have been reported to an acceptable accuracy and precision.</p> <p>The primary laboratory noted that the frequency of laboratory duplicate samples for the following analytes did not meet the expected rate as specified in the ASC NEPM:</p> <p>Laboratory duplicates:</p> <ul style="list-style-type: none"> Gross alpha and beta activity (0 of 10%) – EM2016060 <p>Laboratory control samples:</p> <ul style="list-style-type: none"> Gross alpha and beta activity (5 of 10%) – EM2016060 <p>These frequency exceedances are due to the small sample batch size and are not expected to significantly affect the overall quality of the data.</p>
Method Blank	<p>Method blank concentrations were not detected above the LOR for all analytes.</p>
Laboratory duplicate RPDs	<p>Laboratory duplicate (LD) Relative Percentage Differences (RPD) were within control limits for all analytes.</p>
Laboratory control spike recovery	<p>No laboratory control spike outliers were noted.</p>
Matrix spike recovery	<p>Matrix spike (MS) recoveries (where reported) were within control limits with the exception of the following, where the background level was greater than or equal to four times the spike level:</p> <ul style="list-style-type: none"> Anonymous – Sulfate as SO₄ – Turbidimetric BH-M22S – Sulfate as SO₄ – Turbidimetric Anonymous – Chloride BH-M22S – Chloride

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA100, QA200, QA101, QA201, TS x 3, TB100, TB200, TB300, TB100, TB200, TB300, TB4, TB5, RB100, RB200, RB300, RB400, RB600, RB700, RB800
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 2, 19-24 August 2020	Lab reference:	EM2016060, EM2016426, ES2033456 (ALS) 22604, 252055 (Envirolab)
Validation by:	B Bull	Date:	08/10/2020
Verification by:	D Condon	Date:	

- UGM-M2S – Mercury
- UGM-M1S – Sulfide as S2-
- Anonymous – Chloride
- UGM-M15S – Mercury
- UGM-M15S – Sulfide as S2-
- UGM-M8D – Sulfate as SO4 – Turbidimetric
- UGM-M8D – Chloride
- UGM-M8S – Mercury
- BH-M20D – Ferrous Iron

As other QA/QC met control limits, these exceptions are not expected to have a material impact on data integrity.

Surrogate spike recovery Surrogate spike recoveries were within control limits.

Data Validation

Comparison of Field Observations and Laboratory Results No anomalous results between field observations and analysis results were noted.

Data transcription A random check of the laboratory results identified no anomalies between the electronic data, the laboratory reports, and tables generated by EMM.

Limits of Reporting (LOR) LORs were sufficiently low to enable assessment against adopted guideline criteria.

Intra-laboratory duplicate RPDs (QA100, QA200) All intra-laboratory field duplicate RPDs were reported within control limits with the exception of the following:

- QA100
 - Ionic balance (96.7%)
- QA200
 - Ionic balance (157.9%)

Although the values are different, these intra-laboratory RPD exceedances are not expected to impact the overall data quality of the batch. As a conservative measure, the highest results will be used for reporting purposes and consideration should be taken when interpreting data for ionic balance from this batch.

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA100, QA200, QA101, QA201, TS x 3, TB100, TB200, TB300, TB100, TB200, TB300, TB4, TB5, RB100, RB200, RB300, RB400, RB600, RB700, RB800
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 2, 19-24 August 2020	Lab reference:	EM2016060, EM2016426, ES2033456 (ALS) 22604, 252055 (Envirolab)
Validation by:	B Bull	Date:	08/10/2020
Verification by:	D Condon	Date:	

Inter-laboratory field duplicate RPDs were reported within control limits with the exception of the following:

- QA101
 - Ionic balance (78.9%)

Inter-laboratory duplicate RPDs
(QA101, QA201)

Although the values are different, these inter-laboratory RPD exceedances are not expected to impact the overall data quality of the batch. As a conservative measure, the highest results will be used for reporting purposes and consideration should be taken when interpreting data for potassium and ionic balance from this batch.

Chromatograms

Not requested.

Comments

The assessment of field and laboratory QA/QC data indicated that the reported analytical results are representative of the conditions at the sample locations analysed and that the overall quality of the data produced is considered to be acceptably reliable for the purpose of this investigation. Despite the minor variations/outliers summarised above, the laboratory data are considered to provide an appropriate level of confidence in the accuracy, comparability, completeness and precision of the analytical results.

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA1, QA2, QC1, QC2, TRIP BLANK_01, TRIP BLANK_02, TB1, TB2, TB3, TB4, TB5, , RIN_201002, RIN_201003, RB1, RB2, RB3, RB4, RB5, RB6,
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 3, 13 – 19 October 2020	Lab reference:	ES2035208, EM2018304, ES2036844(ALS) 253949 (Envirolab)
Validation by:	K Brodie	Date:	29/10/2020
Verification by:	D Condon	Date:	

Field QA/QC

Sampling personnel	Round 3 groundwater sampling was conducted by D Condon, K Brodie and B Bull on 2 to 3 October and 13 to 19 October 2020.
Sampling Methodology	Groundwater samples were obtained via low flow purging method and HydraSleeve.
Chain of Custody (COC)	Chain of custody documents were completed by EMM (D Condon, K Brodie and B Bull).
Analysis Request	Laboratory analysis request and sample receipt notification reviewed and approved by EMM.
Field Blanks	No field blanks were analysed as part of this assessment.
Rinsate Blanks (RIN_201002, RIN_201003, RB1, RB2, RB3, RB4, RB5, RB6)	Eight rinsate blanks were collected during the sampling event, one on each day of sampling. The rinsate samples were collected from the groundwater pump and the water level meter. All reported concentrations were below the laboratory limit of reporting (LOR) for all analytes tested in each sample.
Trip Blanks (TRIP BLANK_01, TRIP BLANK_02, TB1, TB2, TB3, TB4, TB5)	One trip blank was included with each set of eskies sent to the laboratory for analysis for a total of seven trip blanks. The trip blanks were prepared on site by decanting deionised water into metals sample bottles. . All reported concentrations were below the laboratory limit of reporting (LOR) for all analytes tested in each sample.
Trip Spikes (TS)	No trip spikes were analysed as part of this assessment.
Intra-laboratory and interlaboratory duplicates (QA1, QA2, QC1, QC2)	Intra- and inter-laboratory field duplicate samples were collected at a frequency of at least one per twenty primary samples (two of each).
Handling and preservation	All samples were received at the laboratories in appropriate sample containers. Water samples for workorder ES2035208 was received by the lab with ice present but at a temperature of 7.4°C. This temperature is above the APHA/NEPM recommendations for water samples and should be considered when interpreting the results. Water samples for workorder EM2018304 and ES2036844 were received by the lab with ice present, chilled and preserved at a temperature of 1.0°C and 1.5°C respectively. These temperatures are within the recommended range for chemical analysis. (< 6°C).

Laboratory QA/QC

Tests requested/reported	Samples were analysed and reported as requested on the COC.
Holding time compliance	All samples were extracted and analysed within the recommended holding times for all analytes.

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA1, QA2, QC1, QC2, TRIP BLANK_01, TRIP BLANK_02, TB1, TB2, TB3, TB4, TB5, , RIN_201002, RIN_201003, RB1, RB2, RB3, RB4, RB5, RB6,
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 3, 13 – 19 October 2020	Lab reference:	ES2035208, EM2018304, ES2036844(ALS) 253949 (Envirolab)
Validation by:	K Brodie	Date:	29/10/2020
Verification by:	D Condon	Date:	

Laboratory Accreditation The laboratory analysis was conducted by ALS Environmental Pty Ltd in Melbourne and Sydney (primary lab) and Envirolab Services Pty Ltd in Sydney (secondary lab), which are both National Association of Testing Authorities (NATA) accredited laboratories.

Frequency of laboratory QC The laboratories reported a sufficient frequency of quality control samples to assess whether the results have been reported to an acceptable accuracy and precision.

The primary laboratory noted that the frequency of laboratory duplicates samples for the following analytes did not meet the expected rate as specified in the ASC NEPM:

Laboratory duplicates:

- Dissolved metals by ICP-MS – Suite A (8.82 of 10%) – EM2018304

These frequency exceedances are due to the small sample batch size and are not expected to significantly affect the overall quality of the data.

Method Blank Method blank concentrations were not detected above the LOR for all analytes.

Laboratory duplicate RPDs Laboratory duplicate (LD) Relative Percentage Differences (RPD) were within control limits for all analytes.

Laboratory control spike recovery No laboratory control spike outliers were noted.

Matrix spike recovery Matrix spike (MS) recoveries (where reported) were within control limits with the exception of the following, where the background level was greater than or equal to four times the spike level:

- UGM-M8S – Sulfate as SO₄ – Turbidimetric
- UGM-M8S – Chloride
- BH-M21D – Mercury
- UGM-M8S – Mercury
- UGM-M8S – Sulfide as S²⁻
- QA1 – Sulfate as SO₄ – Turbidimetric
- QA1 – Chloride
- UGM-M2S – Mercury
- Anonymous – Chloride

As other QA/QC met control limits, these exceptions are not expected to have a material impact on data integrity.

Surrogate spike recovery Surrogate spike recoveries were within control limits.

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA1, QA2, QC1, QC2, TRIP BLANK_01, TRIP BLANK_02, TB1, TB2, TB3, TB4, TB5, , RIN_201002, RIN_201003, RB1, RB2, RB3, RB4, RB5, RB6,
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 3, 13 – 19 October 2020	Lab reference:	ES2035208, EM2018304, ES2036844(ALS) 253949 (Envirolab)
Validation by:	K Brodie	Date:	29/10/2020
Verification by:	D Condon	Date:	

Data Validation

Comparison of Field Observations and Laboratory Results	No anomalous results between field observations and analysis results were noted.
Data transcription	A random check of the laboratory results identified no anomalies between the electronic data, the laboratory reports, and tables generated by EMM.
Limits of Reporting (LOR)	LORs were sufficiently low to enable assessment against adopted guideline criteria.
Intra-laboratory duplicate RPDs (QA1, QA2)	<p>All intra-laboratory field duplicate RPDs were reported within control limits with the exception of the following:</p> <ul style="list-style-type: none"> • QA2 <ul style="list-style-type: none"> – Ionic balance (110.3%) <p>Although the values are different, these intra-laboratory RPD exceedances are not expected to impact the overall data quality of the batch. As a conservative measure, the highest results will be used for reporting purposes and consideration should be taken when interpreting data for ionic balance from this batch.</p>
Inter-laboratory duplicate RPDs (QC1, QC2)	<p>Inter-laboratory field duplicate RPDs were reported within control limits with the exception of the following:</p> <ul style="list-style-type: none"> • QC1 <ul style="list-style-type: none"> – Ionic balance (54.2%) • QC2 <ul style="list-style-type: none"> – Ionic balance (67.0%) <p>Although the values are different, these inter-laboratory RPD exceedances are not expected to impact the overall data quality of the batch. As a conservative measure, the highest results will be used for reporting purposes and consideration should be taken when interpreting data for ionic balance from this batch.</p>

Chromatograms

Not requested.

Comments

The assessment of field and laboratory QA/QC data indicated that the reported analytical results are representative of the conditions at the sample locations analysed and that the overall quality of the data produced is considered to be acceptably reliable for the purpose of this investigation. Despite the minor variations/outliers summarised above, the laboratory data are considered to provide an appropriate level of confidence in the accuracy, comparability, completeness and precision of the analytical results.

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA1, QA2, TB1, TB2, TB3, TB4, TB5, RB1, RB2, RB3, RB4, RB5, TS1, TS2
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 5, 13 – 18 November 2020	Lab reference:	EM2020793, ES2041696 (ALS) 23502, 252055, 256648 (Envirolab)
Validation by:	B Bull	Date:	04/01/2020
Verification by:	D Condon	Date:	

Field QA/QC

Sampling personnel	Round 5 groundwater sampling was conducted by K Brodie and B Bull between 13 and 18 November 2020.
Sampling Methodology	Groundwater samples were obtained via low flow purging.
Chain of Custody (COC)	Chain of custody documents were completed by EMM (K Brodie and B Bull).
Analysis Request	Laboratory analysis request and sample receipt notification reviewed and approved by EMM.
Field Blanks	No field blanks were analysed as part of this assessment.
Rinsate Blanks (RB1, RB2, RB3, RB4, RB5)	<p>Five rinsate blanks were collected during the sampling event, one on each day of sampling. The rinsate samples were collected from the groundwater pump and the water level meter. All reported concentrations were below the laboratory limit of reporting (LOR) for all analytes tested in each sample except for the following:</p> <ul style="list-style-type: none"> • RB3 – Copper: 0.002 mg/L <p>This low-level exceedance (LOR of 0.001 mg/L) is not expected to significantly affect results. Results for samples collected on the same day as RB3 (14 November 2020) will be analysed with consideration of this exceedance.</p>
Trip Blanks (TB1, TB2, TB3, TB4, TB5)	<p>One trip blank was included with each set of eskies sent to the laboratory for analysis for a total of five trip blanks. The trip blanks were prepared on site by decanting deionised water into metals sample bottles. All reported concentrations were below the laboratory limit of reporting (LOR) for all analytes tested in each sample except for the following:</p> <ul style="list-style-type: none"> • TB1 – Copper: 0.003 mg/L • TB2 – Copper: 0.004 mg/L • TB3 – Copper: 0.004 mg/L • TB4 – Copper: 0.004 mg/L • TB5 – Copper: 0.005 mg/L <p>These exceedances suggest that the deionized water used to prepare the samples had a low level of copper contamination. Copper results for all samples will be considered with respect to these exceedances.</p>
Trip Spikes (TS1, TS2)	Two trip spikes were analysed as part of this assessment. Levels of TRH, BTEXN and TPH were elevated in these samples as expected.
Intra-laboratory and interlaboratory duplicates (QA1, QA2, QC1, QC2)	Intra- and inter-laboratory field duplicate samples were collected at a frequency of at least one per twenty primary samples (two of each).
Handling and preservation	All samples were received at the laboratories in appropriate sample containers.

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA1, QA2, TB1, TB2, TB3, TB4, TB5, RB1, RB2, RB3, RB4, RB5, TS1, TS2
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 5, 13 – 18 November 2020	Lab reference:	EM2020793, ES2041696 (ALS) 23502, 252055, 256648 (Envirolab)
Validation by:	B Bull	Date:	04/01/2020
Verification by:	D Condon	Date:	

Water samples for workorder ES2020793 was received by the lab with ice present but at a temperature of 16.9°C. This temperature is above the APHA/NEPM recommendations for water samples and should be considered when interpreting the results.

Water samples for workorder ES2041696 were received by the lab with ice present, chilled and preserved at a temperature of 0.1°C respectively. This temperature is within the recommended range for chemical analysis. (< 6°C).

Laboratory QA/QC

Tests requested/reported	Samples were analysed and reported as requested on the COC.
Holding time compliance	<p>All samples were extracted and analysed within the recommended holding times for all analytes except for:</p> <ul style="list-style-type: none"> • Ferrous iron (8 days overdue) <ul style="list-style-type: none"> – BH-M17D, BH-M17S, BH-M18D, BH-M18S • Ferrous iron (7 days overdue) <ul style="list-style-type: none"> – UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, BH-M21D, BH-M21S, QA1 • Ferrous iron (5 days overdue) <ul style="list-style-type: none"> – BH-M16D, BH-M16S, BH-M24D, BH-M24S • Ferrous iron (4 days overdue) <ul style="list-style-type: none"> – BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M22D, BH-M22S, QA2 • Ferrous iron (3 days overdue) <ul style="list-style-type: none"> – UGM-M1D, UGM-M1S, UGM-M4D, UGM-M15S, LPSPB04 • Ferrous iron (2 days overdue) <ul style="list-style-type: none"> – UGM-M2D, UGM-M2S, BH-M23D, BH-M23S, BH-M25D, BH-M25S • Sulfide as S2- (5 days overdue) <ul style="list-style-type: none"> – BH-M16D, BH-M16S, BH-M24D, BH-M24S • Sulfide as S2- (4 days overdue) <ul style="list-style-type: none"> – BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M22D, BH-M22S, QA2 • Sulfide as S2- (3 days overdue) <ul style="list-style-type: none"> – UGM-M1D, UGM-M1S, UGM-M4D, UGM-M15S, LPSPB04 • Sulfide as S2- (2 days overdue) <ul style="list-style-type: none"> – UGM-M2D, UGM-M2S, BH-M23D, BH-M23S, BH-M25D, BH-M25S • Sulfide as S2- (1 day overdue) <ul style="list-style-type: none"> – BH-M17D, BH-M17S, BH-M18D, BH-M18S • TPH/TRH/BTEXN (14 days overdue)

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA1, QA2, TB1, TB2, TB3, TB4, TB5, RB1, RB2, RB3, RB4, RB5, TS1, TS2
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 5, 13 – 18 November 2020	Lab reference:	EM2020793, ES2041696 (ALS) 23502, 252055, 256648 (Envirolab)
Validation by:	B Bull	Date:	04/01/2020
Verification by:	D Condon	Date:	

- TS1
- BTEXN (21 days overdue)
- TS2

Laboratory Accreditation	The laboratory analysis was conducted by ALS Environmental Pty Ltd in Melbourne and Sydney (primary lab) and Envirolab Services Pty Ltd in Sydney (secondary lab), which are both National Association of Testing Authorities (NATA) accredited laboratories.
Frequency of laboratory QC	<p>The laboratories reported a sufficient frequency of quality control samples to assess whether the results have been reported to an acceptable accuracy and precision.</p> <p>The primary laboratory noted that the frequency of laboratory duplicates samples for the following analytes did not meet the expected rate as specified in the ASC NEPM:</p> <p>Laboratory duplicates:</p> <ul style="list-style-type: none"> • Gross alpha and beta activity – Suite A (6.67 of 10%) – ES2041696 <p>These frequency exceedances are due to the small sample batch size and are not expected to significantly affect the overall quality of the data.</p>
Method Blank	Method blank concentrations were not detected above the LOR for all analytes.
Laboratory duplicate RPDs	Laboratory duplicate (LD) Relative Percentage Differences (RPD) were within control limits for all analytes.
Laboratory control spike recovery	No laboratory control spike outliers were noted.
Matrix spike recovery	<p>Matrix spike (MS) recoveries (where reported) were within control limits with the exception of the following, where the background level was greater than or equal to four times the spike level:</p> <ul style="list-style-type: none"> • BH-M16S – Sulfate as SO₄ – Turbidimetric • Anonymous – Chloride • BH-M19D – Chloride • UGM-M1S – Mercury • QA2 – Mercury • UGM-M1S – Sulfide as S²⁻ • QA2 – Sulfide as S²⁻ • UGM-M8D – Sulfate as SO₄ – Turbidimetric • UGM-M8D – Chloride • BH-M18S – Mercury

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA1, QA2, TB1, TB2, TB3, TB4, TB5, RB1, RB2, RB3, RB4, RB5, TS1, TS2
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 5, 13 – 18 November 2020	Lab reference:	EM2020793, ES2041696 (ALS) 23502, 252055, 256648 (Envirolab)
Validation by:	B Bull	Date:	04/01/2020
Verification by:	D Condon	Date:	

As other QA/QC met control limits, these exceptions are not expected to have a material impact on data integrity.

Surrogate spike recovery Surrogate spike recoveries were within control limits.

Data Validation

Comparison of Field Observations and Laboratory Results No anomalous results between field observations and analysis results were noted.

Data transcription A random check of the laboratory results identified no anomalies between the electronic data, the laboratory reports, and tables generated by EMM.

Limits of Reporting (LOR) LORs were sufficiently low to enable assessment against adopted guideline criteria.

Intra-laboratory duplicate RPDs (QA1, QA2) All intra-laboratory field duplicate RPDs were reported within control limits with the exception of the following:

- QA1
 - Ionic balance (69.2%)

Although the values are different, these intra-laboratory RPD exceedances are not expected to impact the overall data quality of the batch. As a conservative measure, the highest results will be used for reporting purposes and consideration should be taken when interpreting data for ionic balance from this batch.

Inter-laboratory duplicate RPDs (QC1, QC2) Inter-laboratory field duplicate RPDs were reported within control limits with the exception of the following:

- QC1
 - Gross beta (189.2%)
 - Potassium (43.5%)
 - Ionic balance (35.3%)
- QC2
 - Potassium (43.1%)
 - Copper (56.4%)

Although the values are different, these inter-laboratory RPD exceedances are not expected to impact the overall data quality of the batch. As a conservative measure, the highest results will be used for reporting purposes and consideration should be taken when interpreting data for ionic balance from this batch.

Chromatograms

Not requested.

Comments

DATA QUALITY ASSURANCE AND QUALITY CONTROL REPORT

Project number:	S190512	Matrix type:	Water
Client:	Iluka Resources Limited	Samples analysed:	UGM-M1D, UGM-M1S, UGM-M2D, UGM-M2S, UGM-M4D, UGM-M8D, UGM-M8S, UGM-M12D, UGM-M12S, UGM-M15S, BH-M16D, BH-M16S, BH-M17D, BH-M17S, BH-M18D, BH-M18S, BH-M19D, BH-M19S, BH-M20D, BH-M20S, BH-M21D, BH-M21S, BH-M22D, BH-M22S, BH-M23D, BH-M23S, BH-M24D, BH-M24S, BH-M25D, BH-M25S, LPSPB04, QA1, QA2, TB1, TB2, TB3, TB4, TB5, RB1, RB2, RB3, RB4, RB5, TS1, TS2
Site(s):	Balranald, NSW	Laboratory:	ALS Environmental (Primary) Envirolab (Secondary)
Sampling Events:	Round 5, 13 – 18 November 2020	Lab reference:	EM2020793, ES2041696 (ALS) 23502, 252055, 256648 (Envirolab)
Validation by:	B Bull	Date:	04/01/2020
Verification by:	D Condon	Date:	

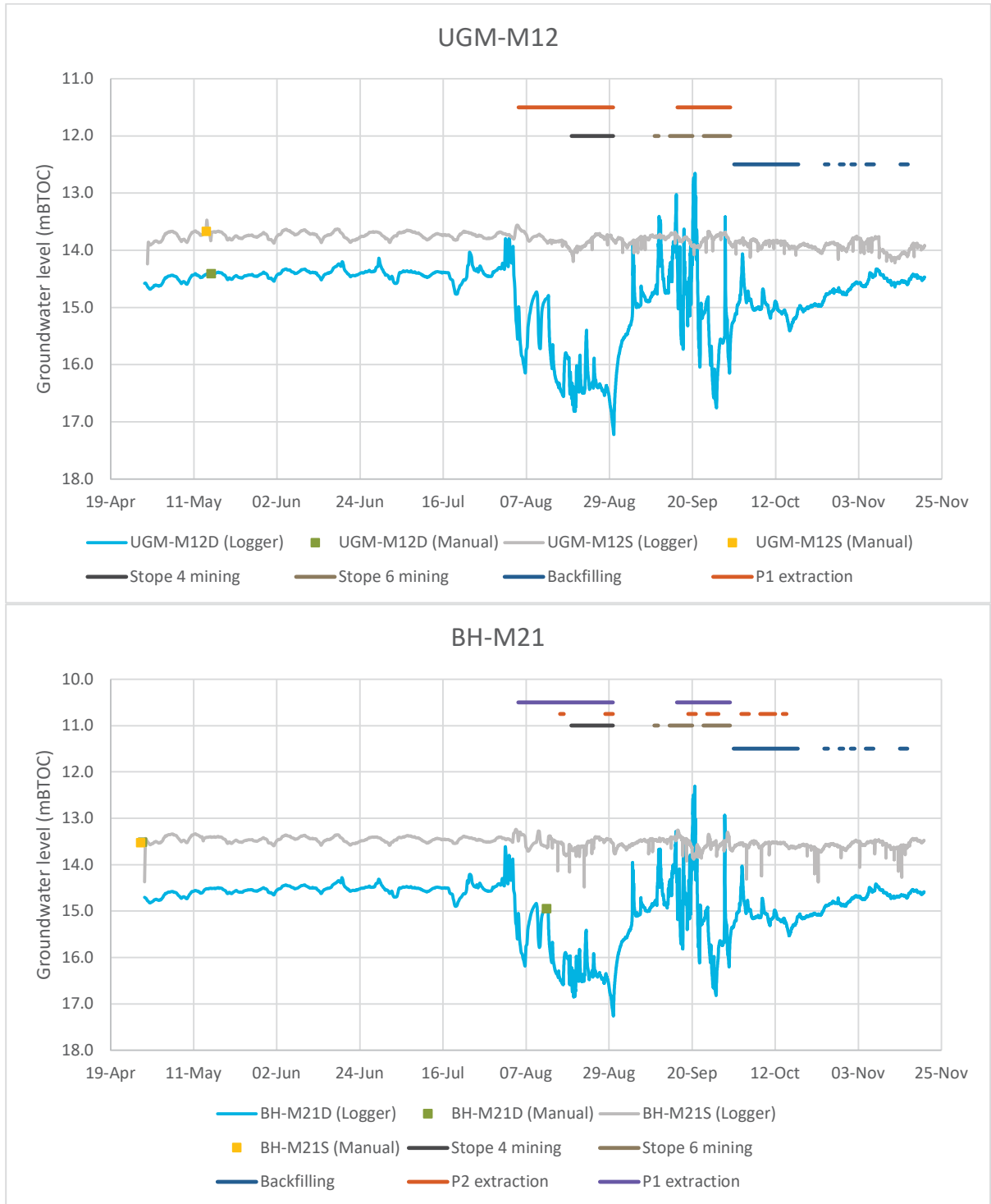
The assessment of field and laboratory QA/QC data indicated that the reported analytical results are representative of the conditions at the sample locations analysed and that the overall quality of the data produced is considered to be acceptably reliable for the purpose of this investigation. Despite the minor variations/outliers summarised above, the laboratory data are considered to provide an appropriate level of confidence in the accuracy, comparability, completeness and precision of the analytical results.

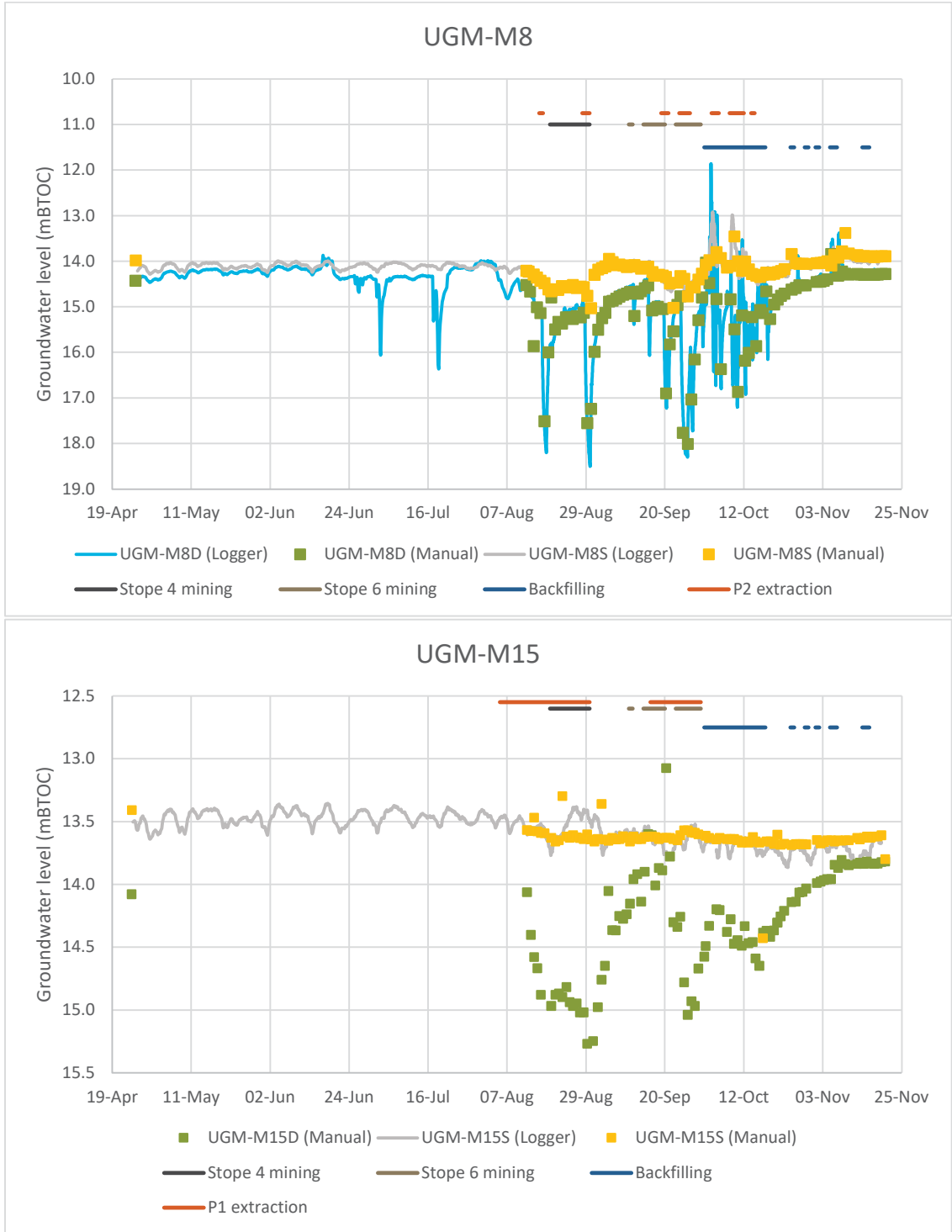


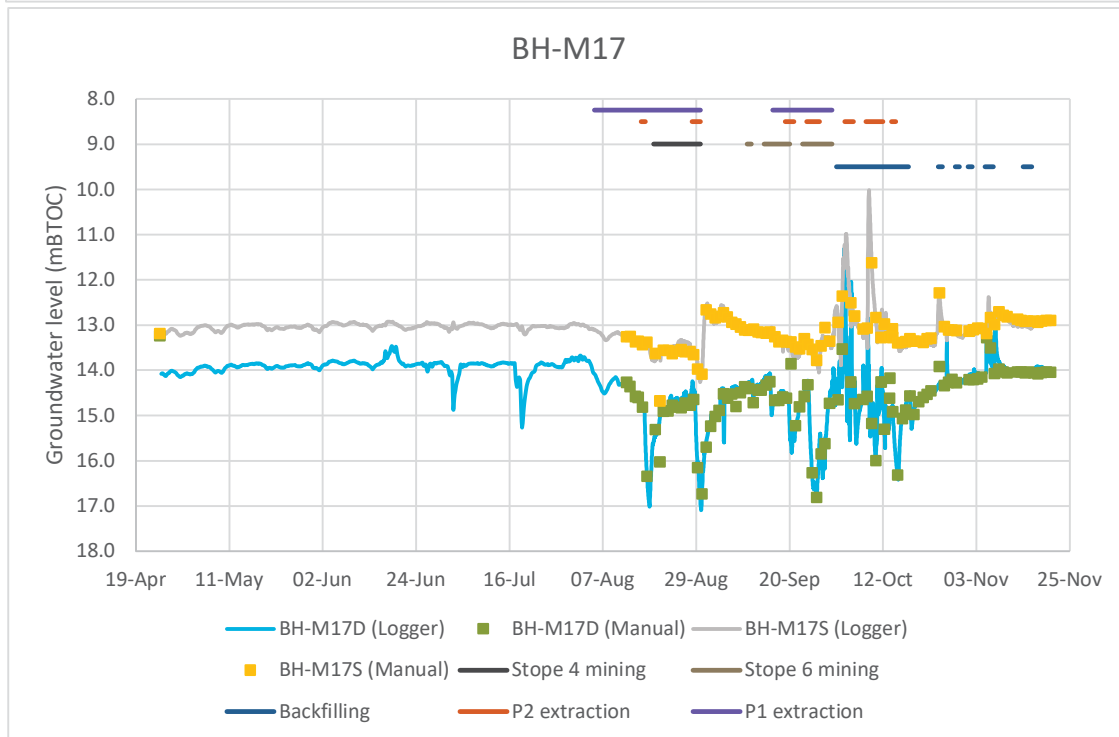
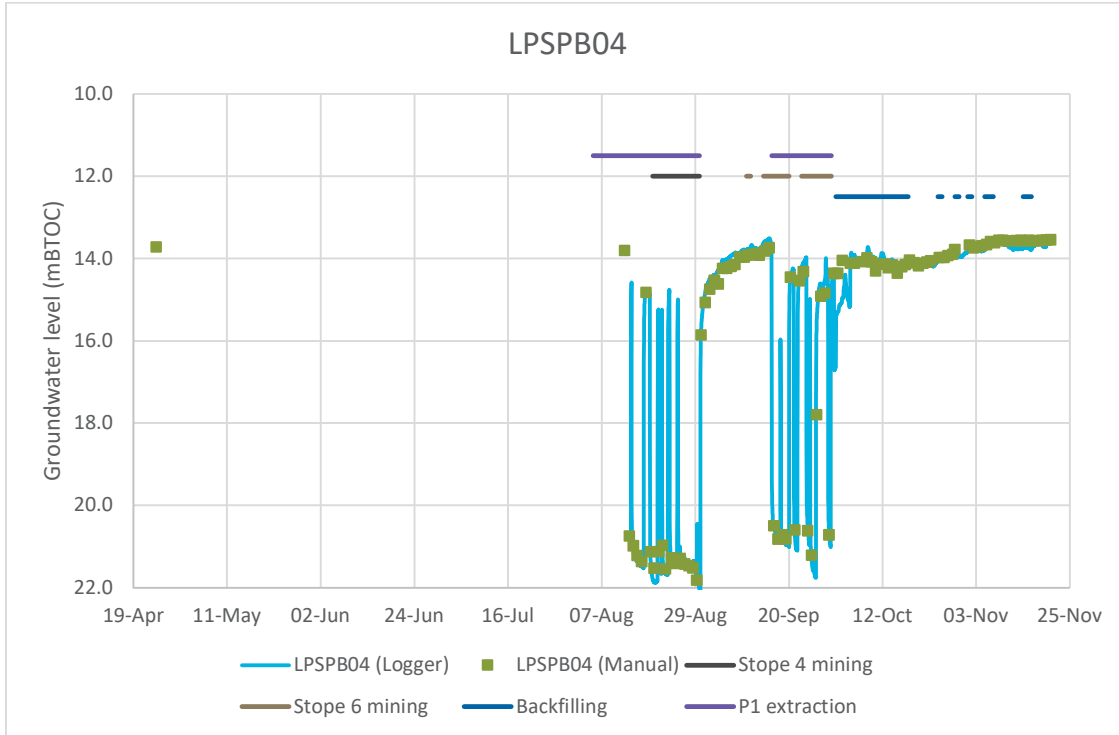
Appendix D

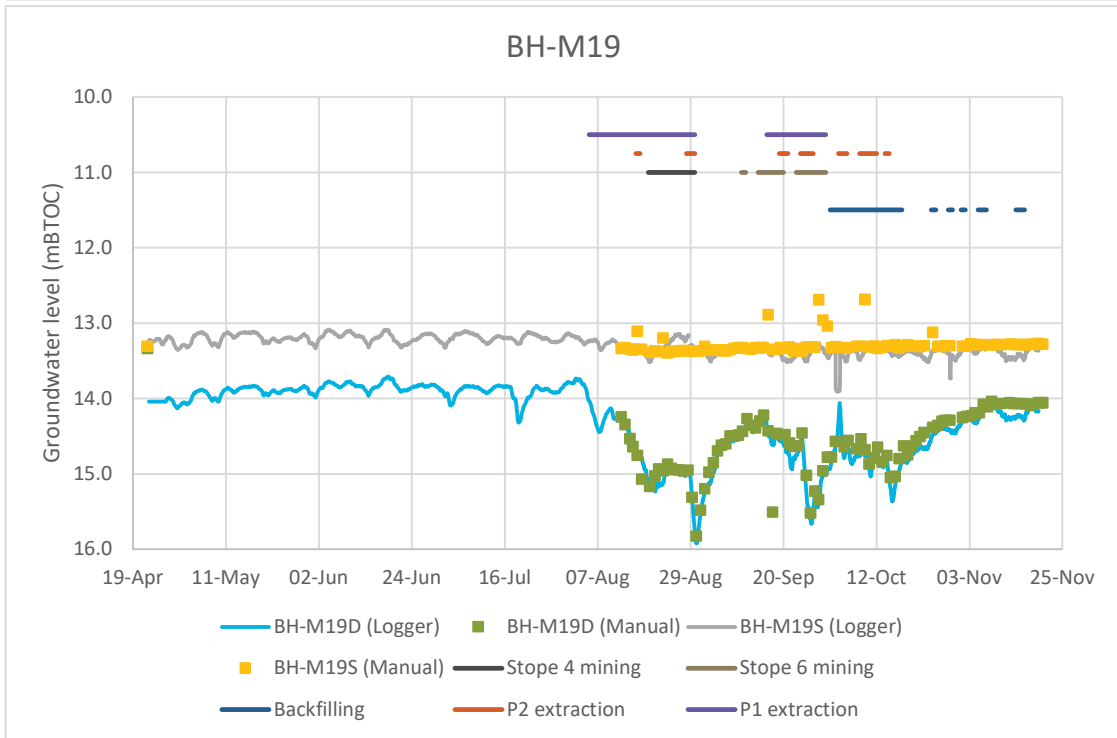
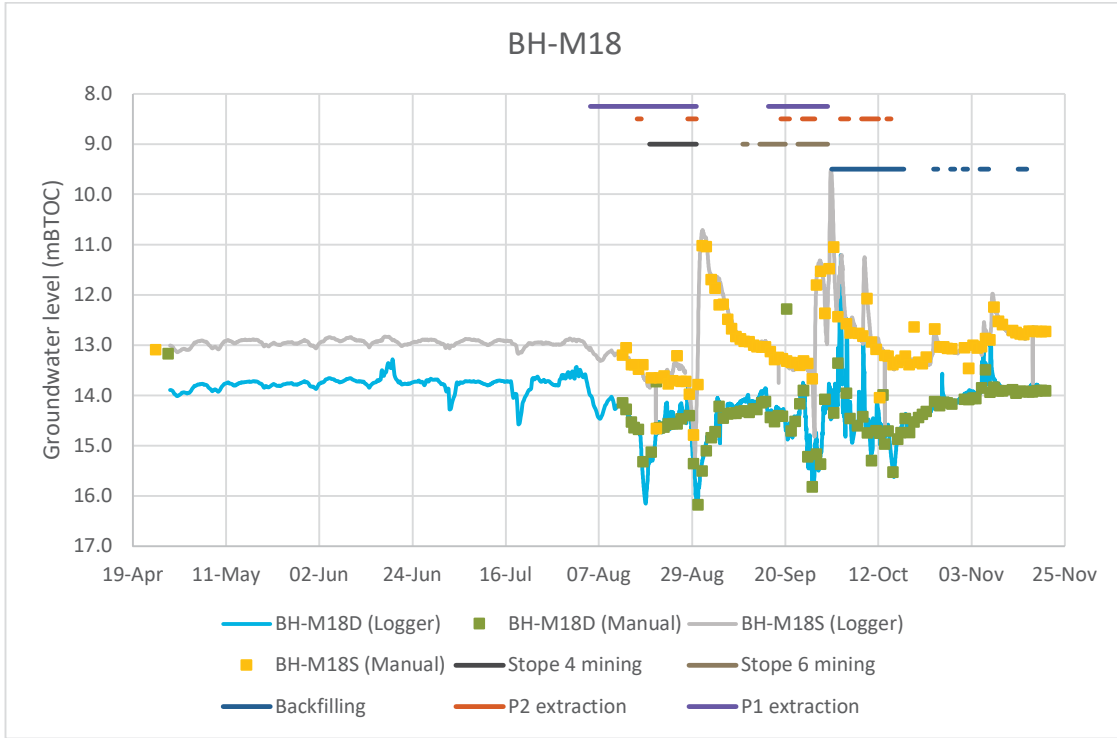
Hydrographs

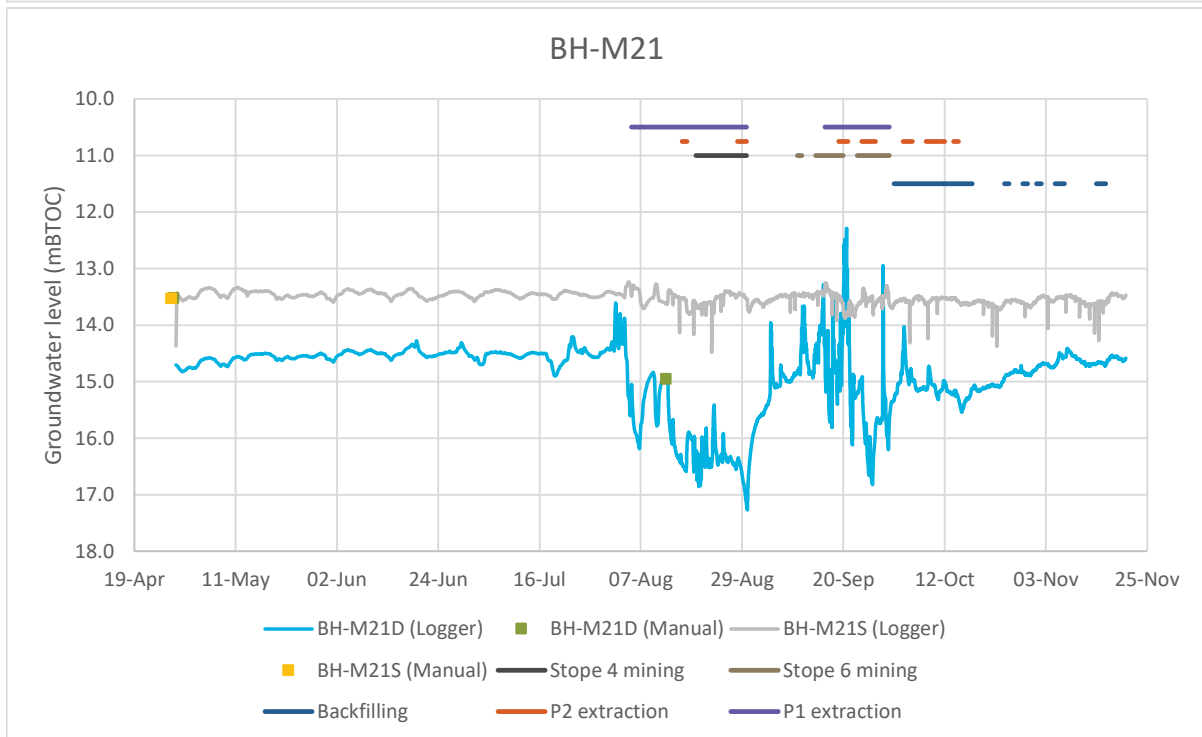
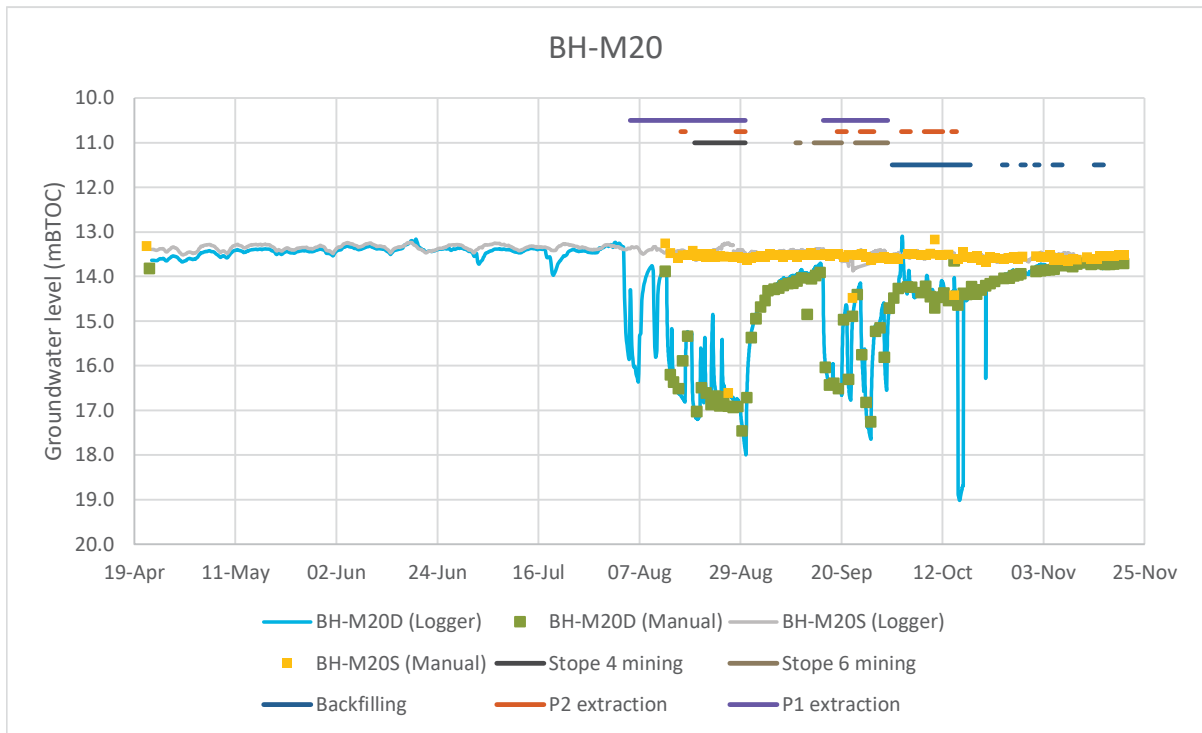


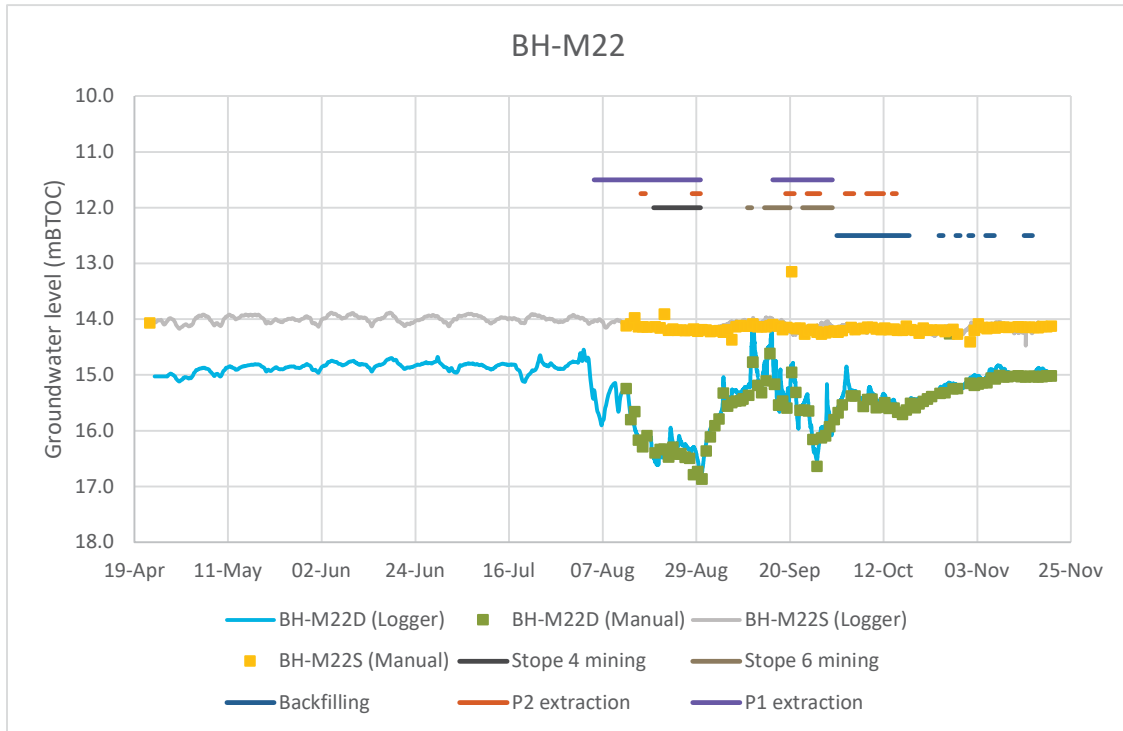


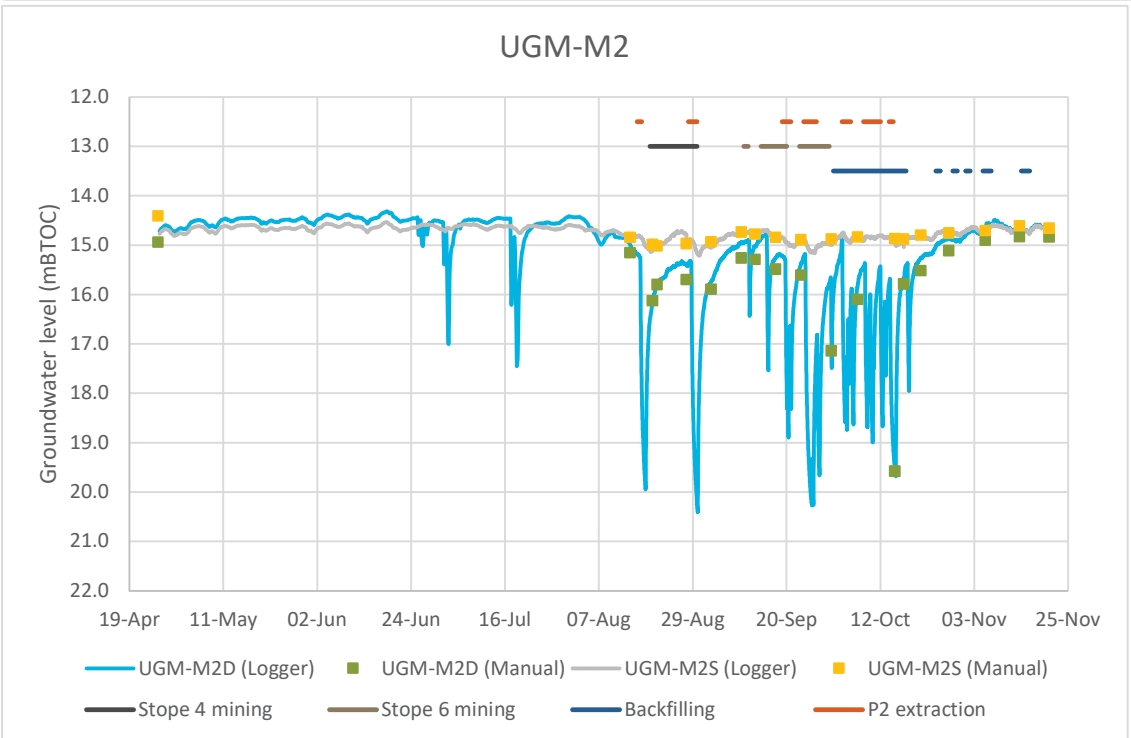
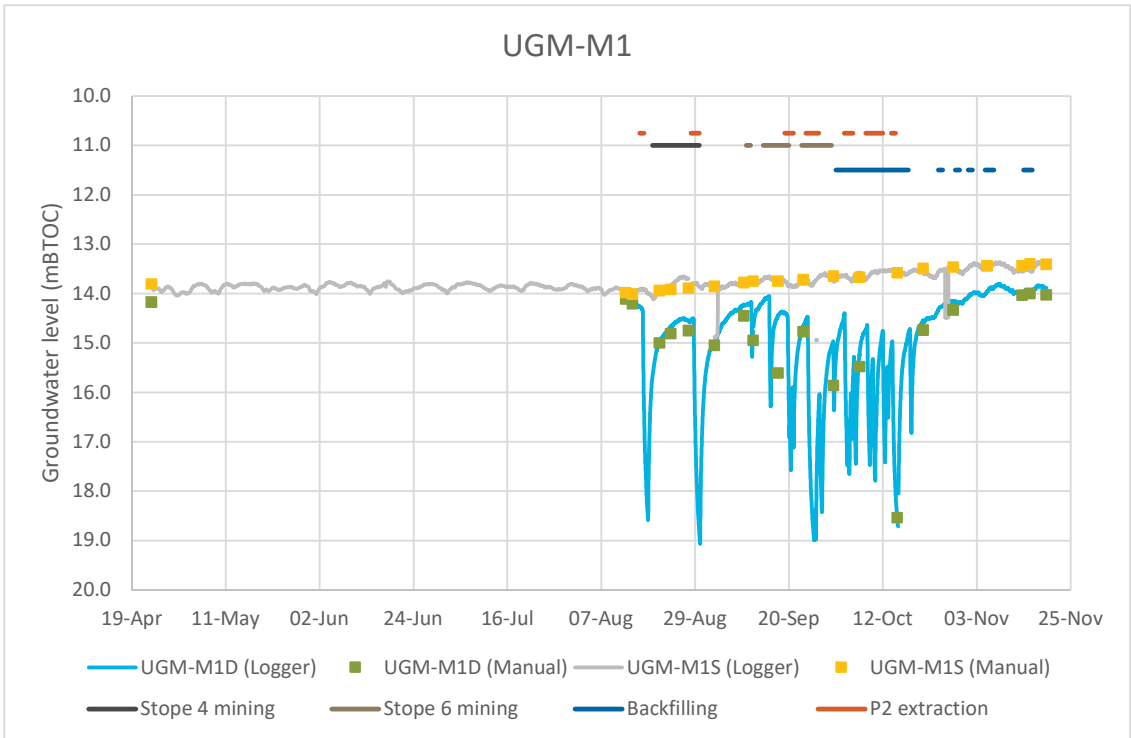


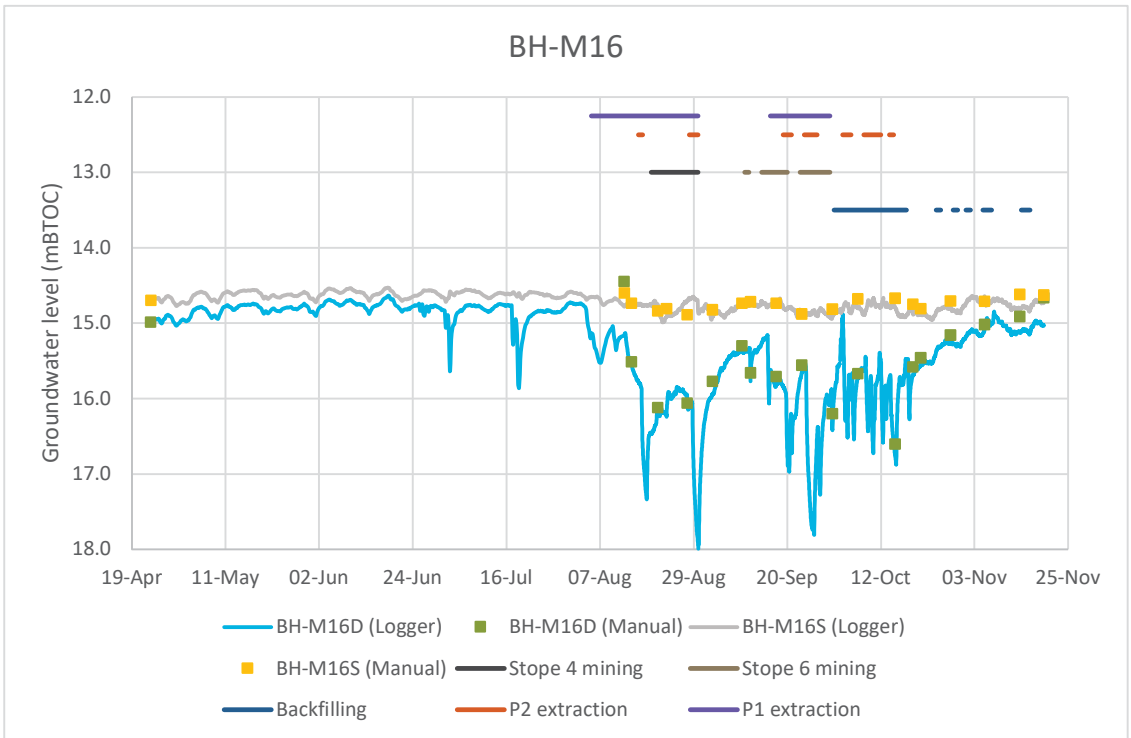
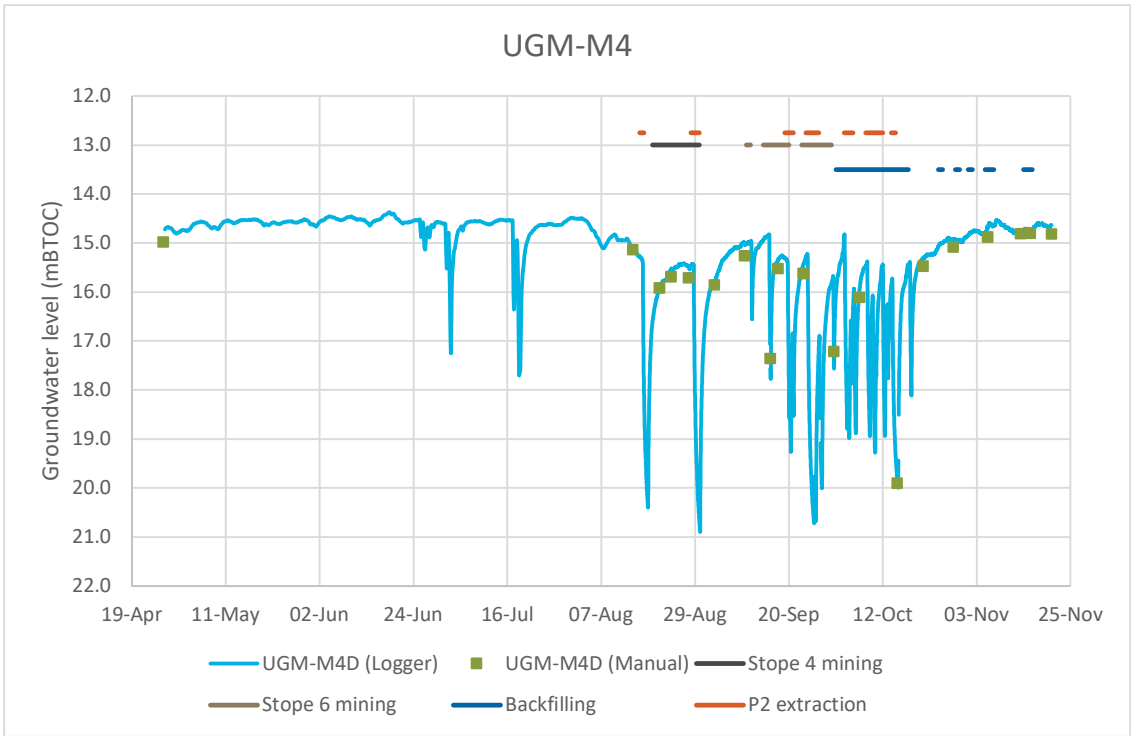


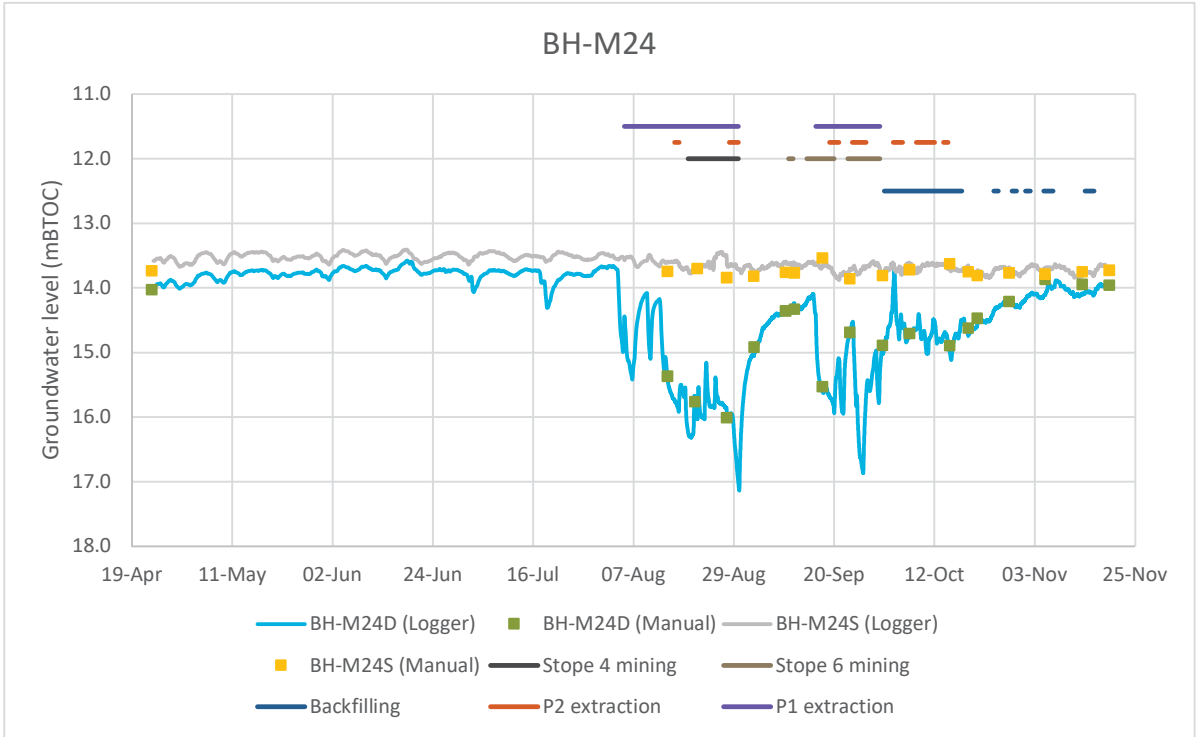
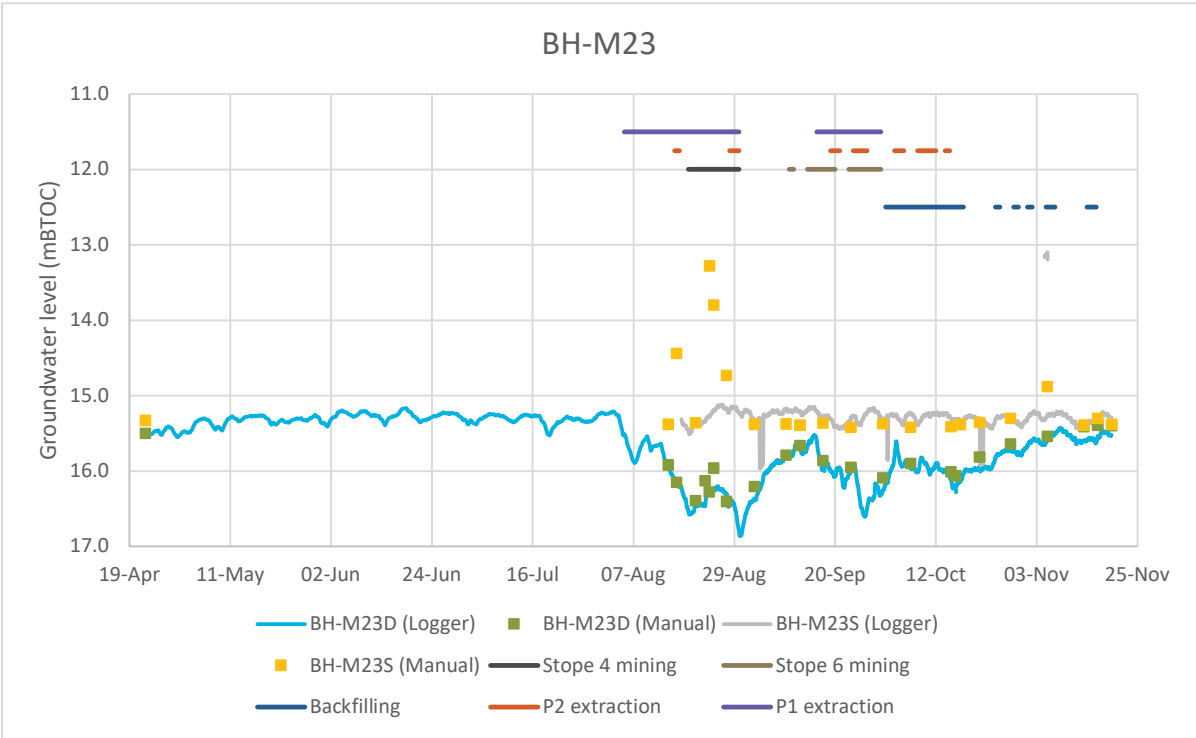


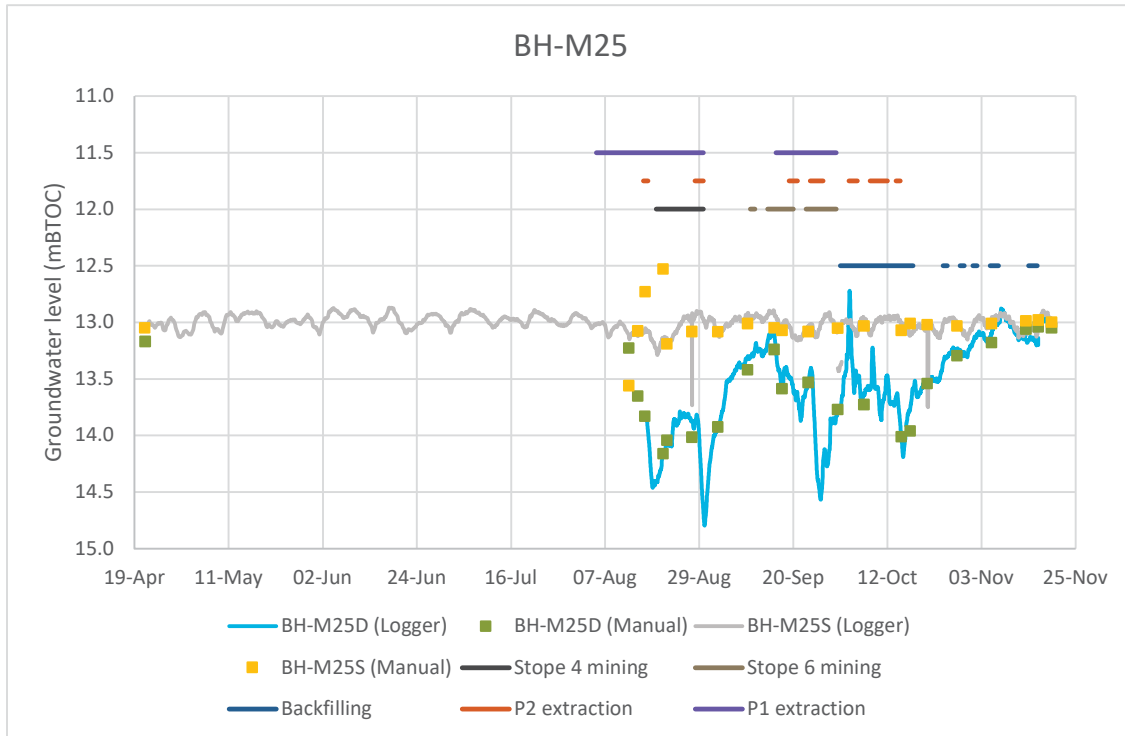














Appendix E

Field monitoring parameters



ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:17 am"/>	UGM-M8D:	<input type="text" value="14.52"/>
Time:	<input type="text" value="9:20 am"/>	UGM-M8S:	<input type="text" value="14.21"/>
Time:	<input type="text" value="12:42 pm"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text" value="12:42 pm"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="1:23 pm"/>	UGM-M15D:	<input type="text" value="14.065"/>
Time:	<input type="text" value="1:23 pm"/>	UGM-M15S:	<input type="text" value="13.57"/>
Time:	<input type="text" value="2:59 pm"/>	BH-M17D:	<input type="text" value="14.27"/>
Time:	<input type="text" value="2:47 pm"/>	BH-M17S:	<input type="text" value="13.264"/>
Time:	<input type="text" value="2:37 pm"/>	BH-M18D:	<input type="text" value="14.148"/>
Time:	<input type="text" value="2:28 pm"/>	BH-M18S:	<input type="text" value="13.20"/>
Time:	<input type="text" value="1:45 pm"/>	BH-M19D:	<input type="text" value="14.246"/>
Time:	<input type="text" value="1:42 pm"/>	BH-M19S:	<input type="text" value="13.34"/>
Time:	<input type="text" value="3:21 pm"/>	BH-M20D:	<input type="text" value="13.885"/>
Time:	<input type="text" value="3:16 pm"/>	BH-M20S:	<input type="text" value="13.26"/>
Time:	<input type="text" value="10:36 am"/>	BH-M21D:	<input type="text" value="14.951"/>
Time:	<input type="text" value="12:42 pm"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="12:53 pm"/>	BH-M22D:	<input type="text" value="15.247"/>
Time:	<input type="text" value="12:59 pm"/>	BH-M22S:	<input type="text" value="14.12"/>
Time:	<input type="text" value="10:24 am"/>	LPSPB04:	<input type="text" value="13.81"/>

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
UGM-M12S	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
BH-21D	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>
BH-21S	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>

FIELD pH

Spiral Plant Discharge:

Process Water Pond:

Time:

Time:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:35 am"/>	UGM-M8D:	<input type="text" value="14.665"/>
Time:	<input type="text" value="9:36 am"/>	UGM-M8S:	<input type="text" value="14.228"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="4:10 pm"/>	UGM-M15D:	<input type="text" value="14.403"/>
Time:	<input type="text" value="4:12 pm"/>	UGM-M15S:	<input type="text" value="13.577"/>
Time:	<input type="text" value="9:59 am"/>	BH-M17D:	<input type="text" value="14.363"/>
Time:	<input type="text" value="10:14 am"/>	BH-M17S:	<input type="text" value="13.255"/>
Time:	<input type="text" value="10:23 am"/>	BH-M18D:	<input type="text" value="14.28"/>
Time:	<input type="text" value="10:35 am"/>	BH-M18S:	<input type="text" value="13.055"/>
Time:	<input type="text" value="10:51 am"/>	BH-M19D:	<input type="text" value="14.35"/>
Time:	<input type="text" value="10:47 am"/>	BH-M19S:	<input type="text" value="13.327"/>
Time:	<input type="text" value="4:23 pm"/>	BH-M20D:	<input type="text" value="16.203"/>
Time:	<input type="text" value="4:27 pm"/>	BH-M20S:	<input type="text" value="13.478"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="3:50 pm"/>	BH-M22D:	<input type="text" value="15.80"/>
Time:	<input type="text" value="4:06 pm"/>	BH-M22S:	<input type="text" value="14.09"/>
Time:	<input type="text" value="11:37 am"/>	LPSPB04:	<input type="text" value="20.745"/>

Description of daily mining activities

No mining. Swivel head broken.
 BH-M17D - logger swaged with heat shrink. PVC coated stainless.
 BH-M18D - logger swaged with heat shrink. PVC coated stainless.
 BH-M19D - logger swaged with heat shrink. PVC coated stainless.

LPSPB04 - generator (pump) running close by. New M100 logger installed.

UGM-M12D/S and BH-M21D/S are logger downloads.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	2:50 pm	6.80	52544	-240.4		23.4	0.4
UGM-M12S	5:46 pm	7.84	65379	56.4		16.44	0.25
BH-21D	1:55 pm	6.49	55406	-138.1		20.59	1.0
BH-21S	2:03 pm	6.47	265.06	36.3		23.41	0.90

FIELD pH

SPD-HM:	7.33	SPD-SAND:	7.68	Process Water Pond:	7.39
Time:	9:03 am	Time:	9:16 am	Time:	9:11 am



Description: Spiral heavy mineral sample point.



Description: Purge 2 buckets MINIMUM to clear the process water pipe.

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="11:01 am"/>	UGM-M8D:	<input type="text" value="15.86"/>
Time:	<input type="text" value="11:08 am"/>	UGM-M8S:	<input type="text" value="14.29"/>
Time:	<input type="text" value="12:23 pm"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text" value="12:23 pm"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="2:54 pm"/>	UGM-M15D:	<input type="text" value="14.58"/>
Time:	<input type="text" value="2:58 pm"/>	UGM-M15S:	<input type="text" value="13.47"/>
Time:	<input type="text" value="4:36 pm"/>	BH-M17D:	<input type="text" value="14.58"/>
Time:	<input type="text" value="4:31 pm"/>	BH-M17S:	<input type="text" value="13.37"/>
Time:	<input type="text" value="4:20 pm"/>	BH-M18D:	<input type="text" value="14.53"/>
Time:	<input type="text" value="4:10 pm"/>	BH-M18S:	<input type="text" value="13.39"/>
Time:	<input type="text" value="3:26 pm"/>	BH-M19D:	<input type="text" value="14.535"/>
Time:	<input type="text" value="3:14 pm"/>	BH-M19S:	<input type="text" value="13.345"/>
Time:	<input type="text" value="10:31 am"/>	BH-M20D:	<input type="text" value="16.365"/>
Time:	<input type="text" value="10:35 am"/>	BH-M20S:	<input type="text" value="13.425"/>
Time:	<input type="text" value="12:23 pm"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text" value="12:23 pm"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="1:49 pm"/>	BH-M22D:	<input type="text" value="15.66"/>
Time:	<input type="text" value="1:53 pm"/>	BH-M22S:	<input type="text" value="13.98"/>
Time:	<input type="text" value="11:36 am"/>	LPSPB04:	<input type="text" value="20.987"/>

Description of daily mining activities

M15S bad reading - dipper constantly beeping. Same with every reading after 3pm.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:59 pm	6.85	80.10	-127.2	9.55	14.06	1.0
UGM-M12S	1:10 pm	7.60	67653	17.1	7.00	14.12	0.15
BH-21D	12:42 pm	6.77	132.06	52.4	9.34	15.22	1.0
BH-21S	12:26 pm	6.3	146.96	141.2	8.01	15.56	0.6

FIELD pH

SPD-HM:	8.02	SPD-SAND:	7.56	Process Water Pond:	7.65
Time:	6:29 am	Time:	6:32 am	Time:	6:36 am

Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

20200814_KB

Date:

14 August 2020

STANDING WATER LEVEL (mbTOC)

Time:	7:11 am	UGM-M1D:	14.205
Time:	7:10 am	UGM-M1S:	14.01
Time:	7:35 am	UGM-M2D:	15.155
Time:	7:38 am	UGM-M2S:	14.845
Time:	8:49 am	UGM-M4D:	15.134
Time:	9:43 am	UGM-M16D:	15.515
Time:	9:39 am	UGM-M16S:	14.74
Time:	2:36 pm	UGM-M23D:	15.92
Time:	2:20 pm	UGM-M23S:	15.38
Time:	10:12 am	UGM-M24D:	15.37
Time:	10:20 am	UGM-M24S:	13.749
Time:	3:56 pm	UGM-M25D:	13.65
Time:	3:47 pm	UGM-M25S:	13.075

Description of daily mining activities

Tripping rods but no mining

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener	7:57 am	7.80	93.76	109.3	9.85	15.01
HBF Tank Tap	8:36 am	7.64	53468	99.7		13.7
Stockpile Sump	6:42 am	7.74	51772	121.6	7.87	13.48

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:51 am"/>	UGM-M8D:	<input type="text" value="15.01"/>
Time:	<input type="text" value="7:53 am"/>	UGM-M8S:	<input type="text" value="14.36"/>
Time:	<input type="text" value="10:10 am"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text" value="10:10 am"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="11:10 am"/>	UGM-M15D:	<input type="text" value="14.67"/>
Time:	<input type="text" value="11:14 am"/>	UGM-M15S:	<input type="text" value="13.58"/>
Time:	<input type="text" value="8:14 am"/>	BH-M17D:	<input type="text" value="14.605"/>
Time:	<input type="text" value="8:20 am"/>	BH-M17S:	<input type="text" value="13.36"/>
Time:	<input type="text" value="8:27 am"/>	BH-M18D:	<input type="text" value="14.64"/>
Time:	<input type="text" value="8:30 am"/>	BH-M18S:	<input type="text" value="13.39"/>
Time:	<input type="text" value="8:49 am"/>	BH-M19D:	<input type="text" value="14.64"/>
Time:	<input type="text" value="8:47 am"/>	BH-M19S:	<input type="text" value="13.36"/>
Time:	<input type="text" value="11:34 am"/>	BH-M20D:	<input type="text" value="16.51"/>
Time:	<input type="text" value="11:30 am"/>	BH-M20S:	<input type="text" value="13.59"/>
Time:	<input type="text" value="10:10 am"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text" value="10:10 am"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="11:02 am"/>	BH-M22D:	<input type="text" value="16.17"/>
Time:	<input type="text" value="11:04 am"/>	BH-M22S:	<input type="text" value="14.14"/>
Time:	<input type="text" value="9:19 am"/>	LPSPB04:	<input type="text" value="21.22"/>

Description of daily mining activities

No mining. Tripping cross

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:36 am	6.83	56079	-152.7	4.35	14.93	0.8
UGM-M12S	10:29 am	7.52	62882	179.9	7.26	14.9	0.15
BH-21D	9:56 am	6.54	56310.6	34.4	1.56	16.6	1.0
BH-21S	10:07 am	4.94	61836.7	194.2	0.90	16.06	0.3

FIELD pH

SPD-HM:	6.67	SPD-SAND:	7.24	Process Water Pond:	5.79
Time:	7:16 am	Time:	7:18 am	Time:	7:14 am



Description:

Pump near LPSPB04



Description:

BH-M21D iron

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:06 am"/>	UGM-M8D:	<input type="text" value="15.14"/>
Time:	<input type="text" value="7:11 am"/>	UGM-M8S:	<input type="text" value="14.43"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="10:11 am"/>	UGM-M15D:	<input type="text" value="14.88"/>
Time:	<input type="text" value="10:13 am"/>	UGM-M15S:	<input type="text" value="13.59"/>
Time:	<input type="text" value="8:57 am"/>	BH-M17D:	<input type="text" value="14.82"/>
Time:	<input type="text" value="8:54 am"/>	BH-M17S:	<input type="text" value="13.44"/>
Time:	<input type="text" value="8:49 am"/>	BH-M18D:	<input type="text" value="14.68"/>
Time:	<input type="text" value="8:45 am"/>	BH-M18S:	<input type="text" value="13.48"/>
Time:	<input type="text" value="8:31 am"/>	BH-M19D:	<input type="text" value="14.76"/>
Time:	<input type="text" value="8:36 am"/>	BH-M19S:	<input type="text" value="13.11"/>
Time:	<input type="text" value="9:21 am"/>	BH-M20D:	<input type="text" value="15.89"/>
Time:	<input type="text" value="9:22 am"/>	BH-M20S:	<input type="text" value="13.52"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:38 am"/>	BH-M22D:	<input type="text" value="16.29"/>
Time:	<input type="text" value="9:41 am"/>	BH-M22S:	<input type="text" value="14.14"/>
Time:	<input type="text" value="9:29 am"/>	LPSPB04:	<input type="text" value="21.37"/>

Description of daily mining activities

Tripping rods, no mining. 3 tries before successfully calibrating the WQM - pH was very wrong, SPC slightly out. See daily calibration for more details.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	1:45 pm	7.43	5.25	-119.1	8.51	16.22	0.5
UGM-M12S	2:03 pm	7.46	40486	37.7	10.28	16.06	0.25
BH-21D	1:30 pm	6.8	0.9	-123.6	9.09	16.46	1.0
BH-21S	1:21 pm	6.90	0.54	91.4	8.96	16.46	0.25

FIELD pH

SPD-HM:	7.30	SPD-SAND:	7.48	Process Water Pond:	7.09
Time:	12:44 pm	Time:	12:48 pm	Time:	12:46 pm



Description: Sampling setup at daily bores (UGM-M12 / BH-M21)

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:23 am"/>	UGM-M8D:	<input type="text" value="17.51"/>
Time:	<input type="text" value="9:21 am"/>	UGM-M8S:	<input type="text" value="14.48"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="11:03 am"/>	UGM-M15D:	<input type="text" value="15.86"/>
Time:	<input type="text" value="11:04 am"/>	UGM-M15S:	<input type="text" value="13.595"/>
Time:	<input type="text" value="9:41 am"/>	BH-M17D:	<input type="text" value="16.35"/>
Time:	<input type="text" value="9:38 am"/>	BH-M17S:	<input type="text" value="13.385"/>
Time:	<input type="text" value="9:49 am"/>	BH-M18D:	<input type="text" value="15.32"/>
Time:	<input type="text" value="9:52 am"/>	BH-M18S:	<input type="text" value="13.39"/>
Time:	<input type="text" value="10:00 am"/>	BH-M19D:	<input type="text" value="15.07"/>
Time:	<input type="text" value="9:59 am"/>	BH-M19S:	<input type="text" value="13.35"/>
Time:	<input type="text" value="12:23 pm"/>	BH-M20D:	<input type="text" value="15.34"/>
Time:	<input type="text" value="12:20 pm"/>	BH-M20S:	<input type="text" value="13.53"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text" value="12:11 pm"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="11:14 am"/>	BH-M22D:	<input type="text" value="16.09"/>
Time:	<input type="text" value="11:12 am"/>	BH-M22S:	<input type="text" value="14.142"/>
Time:	<input type="text" value="10:31 am"/>	LPSPB04:	<input type="text" value="14.83"/>

Description of daily mining activities

No mining, tripping rods.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	1:07 pm	6.91	40.61	-95.8	9.07	16.15	0.25
UGM-M12S	11:58 am	7.12	702	71.2	0.24	16.61	0.3
BH-21D	1:21 pm	7.46	24.07	-153.5	9.08	16.4	0.8
BH-21S	1:32 pm	7.14	18.42	-48.5	8.74	17.6	0.6

FIELD pH

SPD-HM:	6.22	SPD-SAND:	7.61	Process Water Pond:	7.48
Time:	8:23 am	Time:	8:27 am	Time:	8:29 am

Description:

Description:

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="12:55 pm"/>	UGM-M8D:	<input type="text" value="16.00"/>
Time:	<input type="text" value="12:58 pm"/>	UGM-M8S:	<input type="text" value="14.62"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text"/>	UGM-M15D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M15S:	<input type="text"/>
Time:	<input type="text"/>	BH-M17D:	<input type="text"/>
Time:	<input type="text"/>	BH-M17S:	<input type="text"/>
Time:	<input type="text"/>	BH-M18D:	<input type="text"/>
Time:	<input type="text"/>	BH-M18S:	<input type="text"/>
Time:	<input type="text"/>	BH-M19D:	<input type="text"/>
Time:	<input type="text"/>	BH-M19S:	<input type="text"/>
Time:	<input type="text"/>	BH-M20D:	<input type="text"/>
Time:	<input type="text"/>	BH-M20S:	<input type="text"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text"/>	BH-M22D:	<input type="text"/>
Time:	<input type="text"/>	BH-M22S:	<input type="text"/>
Time:	<input type="text" value="12:40 pm"/>	LPSPB04:	<input type="text" value="21.13"/>

Description of daily mining activities

No process water discharge in the morning hence a later reading. Pump beside LPSPB04 was pumping. Unblocking blockage at 372m, no mining.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:15 pm	6.85	0.07	23.7	9.14	15.6	0.2
UGM-M12S	12:24 pm	7.05	0.08	8.0	9.22	15.46	0.19
BH-21D	11:50 am	7.12	0.67	-108.1	8.64	18.36	1
BH-21S	11:59 am	7.28	0.07	-25	8.72	16.63	0.13

FIELD pH

SPD-HM: <input style="width: 100px;" type="text" value="8.15"/>	SPD-SAND: <input style="width: 100px;" type="text" value="8.84"/>	Process Water Pond: <input style="width: 100px;" type="text" value="6.92"/>
Time: <input style="width: 100px;" type="text" value="6:43 am"/>	Time: <input style="width: 100px;" type="text" value="6:47 am"/>	Time: <input style="width: 100px;" type="text" value="11:13 am"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:02 am"/>	UGM-M8D:	<input type="text" value="15.265"/>
Time:	<input type="text" value="9:15 am"/>	UGM-M8S:	<input type="text" value="14.518"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="10:05 am"/>	UGM-M15D:	<input type="text" value="14.970"/>
Time:	<input type="text" value="10:08 am"/>	UGM-M15S:	<input type="text" value="13.610"/>
Time:	<input type="text" value="11:38 am"/>	BH-M17D:	<input type="text" value="14.830"/>
Time:	<input type="text" value="11:35 am"/>	BH-M17S:	<input type="text" value="13.550"/>
Time:	<input type="text" value="11:42 am"/>	BH-M18D:	<input type="text" value="14.567"/>
Time:	<input type="text" value="11:46 am"/>	BH-M18S:	<input type="text" value="13.215"/>
Time:	<input type="text" value="11:21 am"/>	BH-M19D:	<input type="text" value="14.950"/>
Time:	<input type="text" value="11:17 am"/>	BH-M19S:	<input type="text" value="13.375"/>
Time:	<input type="text" value="9:28 am"/>	BH-M20D:	<input type="text" value="16.695"/>
Time:	<input type="text" value="9:32 am"/>	BH-M20S:	<input type="text" value="13.555"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="10:00 am"/>	BH-M22D:	<input type="text" value="16.414"/>
Time:	<input type="text" value="9:35 am"/>	BH-M22S:	<input type="text" value="14.195"/>
Time:	<input type="text" value="11:57 am"/>	LPSPB04:	<input type="text" value="21.290"/>

Description of daily mining activities

Mining summary: Mining from 517.58m back to 509.33m for a total of 628 tonne. Pulling back at 250mm/15min. I didn't get

Daily water usage summary
Pumping in the bore BESIDE LPSPB04.

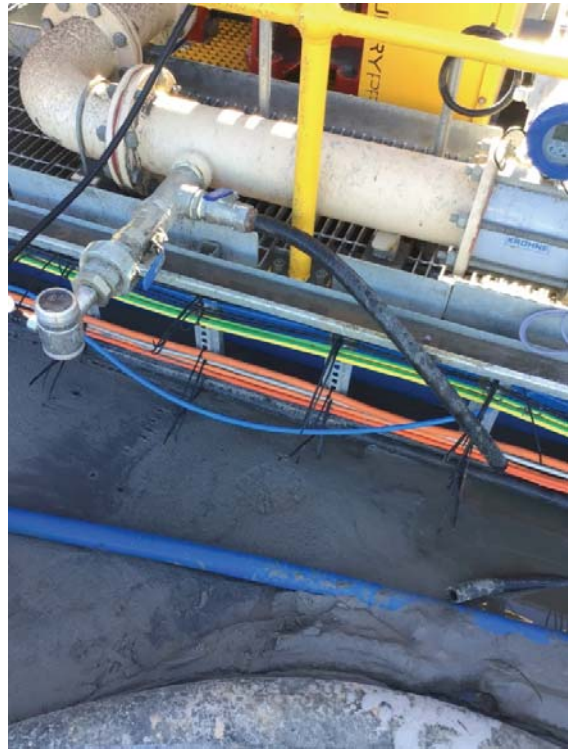
Totaliser value at 10:09 was 433667KL pumping at 13.51L/second.
P2 bore removed and cleaned

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	1:42 pm	6.95	38802	48.6	7.60	13.52	0.5
UGM-M12S	1:29 pm	7.55	46263	35.6	2.08	12.68	0.4
BH-M21D	12:57 pm	6.67	38674	-191.4	0.32	18.16	2.3
BH-M21S	12:32 pm	6.61	42649	116.2	0.42	17.00	0.0

FIELD pH

SPD-HM:	7.72	SPD-SAND:	7.81	Process Water Pond:	7.82
Time:	8:22 am	Time:	8:25 am	Time:	8:30 am



Description: SPD-HM

Description: SPD-Sand

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="10:01 am"/>	UGM-M8D:	<input type="text" value="15.203"/>
Time:	<input type="text" value="10:05 am"/>	UGM-M8S:	<input type="text" value="14.587"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:58 am"/>	UGM-M15D:	<input type="text" value="14.950"/>
Time:	<input type="text" value="9:00 am"/>	UGM-M15S:	<input type="text" value="13.627"/>
Time:	<input type="text" value="10:14 am"/>	BH-M17D:	<input type="text" value="14.725"/>
Time:	<input type="text" value="10:11 am"/>	BH-M17S:	<input type="text" value="13.593"/>
Time:	<input type="text" value="10:17 am"/>	BH-M18D:	<input type="text" value="14.466"/>
Time:	<input type="text" value="10:20 am"/>	BH-M18S:	<input type="text" value="13.724"/>
Time:	<input type="text" value="9:12 am"/>	BH-M19D:	<input type="text" value="14.950"/>
Time:	<input type="text" value="9:07 am"/>	BH-M19S:	<input type="text" value="13.371"/>
Time:	<input type="text" value="8:35 am"/>	BH-M20D:	<input type="text" value="16.907"/>
Time:	<input type="text" value="8:38 am"/>	BH-M20S:	<input type="text" value="13.614"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:49 am"/>	BH-M22D:	<input type="text" value="16.479"/>
Time:	<input type="text" value="8:51 am"/>	BH-M22S:	<input type="text" value="14.206"/>
Time:	<input type="text"/>	LPSPB04:	<input type="text" value="21.427"/>

Description of daily mining activities

Mining summary

Day shift:
MD from 491m to 479m
Pipe #83-81
934 tonnes

Night shift:
MD from 479m to 467m
Pipe #79
822 tonnes

Pullback 200mm/10mins
HP 150m³/hr
MP 140m³/hr

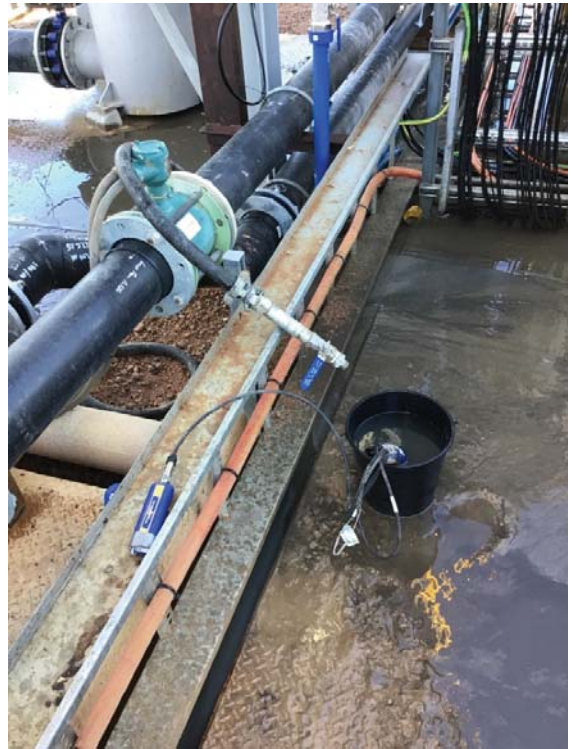
Pullback rate increased as suspected of over mining

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:05 pm	6.70	33807	-3.6	8.09	13.04	0.22
UGM-M12S	12:33 pm	7.49	40321	50.5	1.41	13.67	0.05
BH-M21D	11:34 am	6.42	32959	-200.7	0.31	18.50	3.4
BH-M21S	11:50 am	6.40	37456	-40.7	5.93	12.29	0.1

FIELD pH

SPD-HM:	7.70	SPD-SAND:	7.63	Process Water Pond:	7.60
Time:	7:58 am	Time:	8:00 am	Time:	8:04 am



Description: SPD-HM

Description: Process water

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="12:41 pm"/>	UGM-M8D:	<input type="text" value="15.230"/>
Time:	<input type="text" value="12:43 pm"/>	UGM-M8S:	<input type="text" value="14.556"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:40 am"/>	UGM-M15D:	<input type="text" value="15.023"/>
Time:	<input type="text" value="8:43 am"/>	UGM-M15S:	<input type="text" value="13.632"/>
Time:	<input type="text" value="1:26 pm"/>	BH-M17D:	<input type="text" value="14.778"/>
Time:	<input type="text" value="1:25 pm"/>	BH-M17S:	<input type="text" value="13.590"/>
Time:	<input type="text" value="1:47 pm"/>	BH-M18D:	<input type="text" value="14.490"/>
Time:	<input type="text" value="1:43 pm"/>	BH-M18S:	<input type="text" value="13.724"/>
Time:	<input type="text" value="8:26 am"/>	BH-M19D:	<input type="text" value="14.965"/>
Time:	<input type="text" value="8:27 am"/>	BH-M19S:	<input type="text" value="13.367"/>
Time:	<input type="text" value="9:44 am"/>	BH-M20D:	<input type="text" value="16.932"/>
Time:	<input type="text" value="9:43 am"/>	BH-M20S:	<input type="text" value="13.570"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:22 am"/>	BH-M22D:	<input type="text" value="16.498"/>
Time:	<input type="text" value="9:19 am"/>	BH-M22S:	<input type="text" value="14.201"/>
Time:	<input type="text" value="2:08 pm"/>	LPSPB04:	<input type="text" value="21.470"/>

Description of daily mining activities

Mining summary

Day shift:
MD from 467m to 452m
Pipe #79-77
894 tonnes

Night shift:
MD from 452m to 438m
Pipe #76-74
1048 tonnes (rep 581)

Pullback 100mm/15mins
HP 150m³/hr
MP 140m³/hr

Daily water usage summary
Pumping in the bore beside LPSPB04.
Totaliser value at 2pm was 437052KL.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	3:29 pm	6.47	53841	-216.6	0.54	15.88	0.9
UGM-M12S	3:16 pm	7.49	62109	7.1	1.07	15.56	0.05
BH-M21D	2:52 pm	6.84	53722	-186.1	0.38	19.14	3.2
BH-M21S	2:38 pm	6.34	57058	171.3	0.40	17.74	0.1

FIELD pH

SPD-HM:	7.85	SPD-SAND:	7.55	Process Water Pond:	7.46
Time:	7:20 am	Time:	7:22 am	Time:	7:27 am

Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

Dan Condon

Date:

27 August 2020

STANDING WATER LEVEL (mbTOC)

Time:	11:39 am	UGM-M1D:	14.750
Time:	11:41 am	UGM-M1S:	13.892
Time:	12:06 pm	UGM-M2D:	15.695
Time:	12:07 pm	UGM-M2S:	14.972
Time:	12:27 pm	UGM-M4D:	15.715
Time:	11:12 am	UGM-M16D:	16.064
Time:	11:17 am	UGM-M16S:	14.891
Time:	8:58 am	UGM-M23D:	16.402
Time:	8:56 am	UGM-M23S:	14.730
Time:	10:08 am	UGM-M24D:	16.010
Time:	10:10 am	UGM-M24S:	13.845
Time:	8:11 am	UGM-M25D:	14.015
Time:	7:55 am	UGM-M25S:	13.080

Description of daily mining activities

Mining summary

Day shift:
MD from 467m to 452m
Pipe #79-77
894 tonnes

Night shift:
MD from 452m to 438m
Pipe #76-74
1048 tonnes (rep 581)

Pullback 100mm/15mins
HP 150m³/hr
MP 140m³/hr

Daily water usage summary

Pumping in the bore beside LPSPB04.
Totaliser value at 2pm was 437052KL.

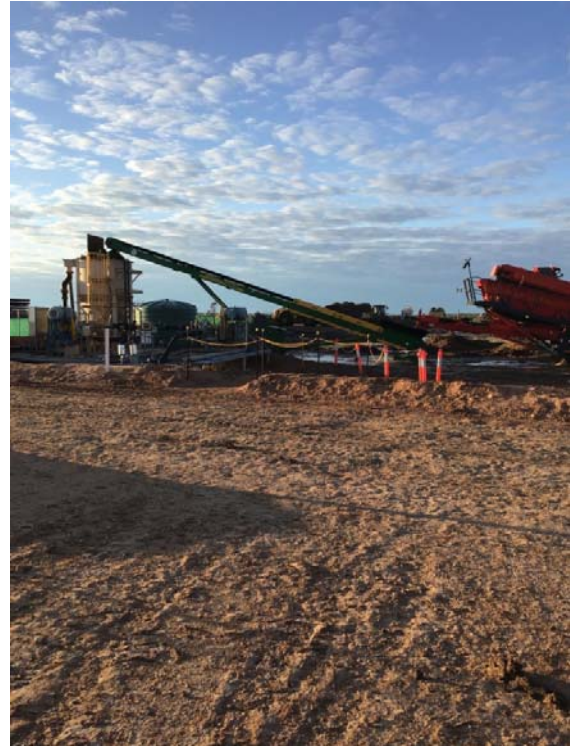
FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener	7:14 am	7.30	52052	118.22	8.13	7.41
HBF Tank Tap						
Stockpile Sump	7:32 am	7.58	52336	126.60	7.36	8.13



Description:

Fines thickener



Description:

HBF Tank not in use



Description:

Stockpile sump. Field parameters taken from overflow stream

Description:



ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

Dan Condon

Date:

27 August 2020

STANDING WATER LEVEL (mbTOC)

Time:	11:39 am	UGM-M1D:	14.750
Time:	11:41 am	UGM-M1S:	13.892
Time:	12:06 pm	UGM-M2D:	15.695
Time:	12:07 pm	UGM-M2S:	14.972
Time:	12:27 pm	UGM-M4D:	15.715
Time:	11:12 am	UGM-M16D:	16.064
Time:	11:17 am	UGM-M16S:	14.891
Time:	8:58 am	UGM-M23D:	16.402
Time:	8:56 am	UGM-M23S:	14.730
Time:	10:08 am	UGM-M24D:	16.010
Time:	10:10 am	UGM-M24S:	13.845
Time:	8:11 am	UGM-M25D:	14.015
Time:	7:55 am	UGM-M25S:	13.080

Description of daily mining activities

Mining summary

Day shift:
MD from 467m to 452m
Pipe #79-77
894 tonnes

Night shift:
MD from 452m to 438m
Pipe #76-74
1048 tonnes (rep 581)

Pullback 100mm/15mins
HP 150m³/hr
MP 140m³/hr

Daily water usage summary

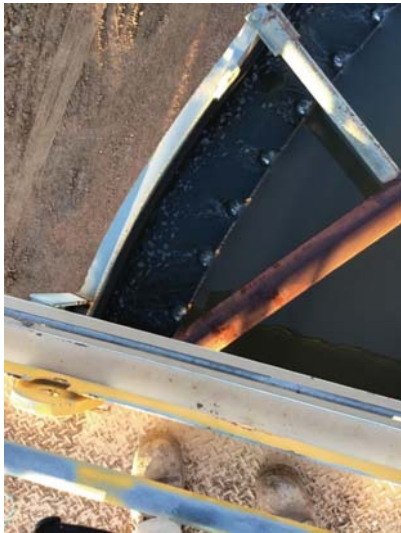
Pumping in the bore beside LPSPB04.
Totaliser value at 2pm was 437052KL.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener	7:14 am	7.30	52052	118.22	8.13	7.41
HBF Tank Tap						
Stockpile Sump	7:32 am	7.58	52336	126.60	7.36	8.13

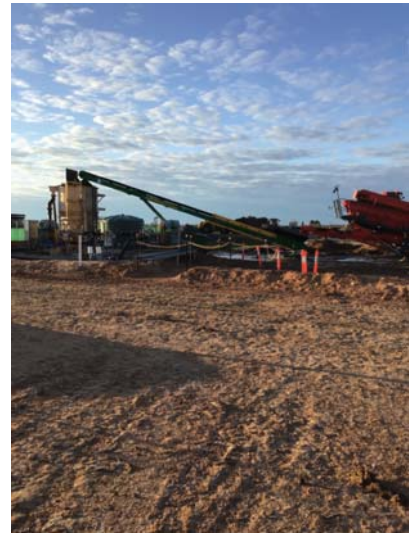
FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
T2 Stockpile Sump	<input style="width: 100%; height: 30px;" type="text"/>	<input style="width: 100%; height: 30px;" type="text"/>	<input style="width: 100%; height: 30px;" type="text"/>	<input style="width: 100%; height: 30px;" type="text"/>	<input style="width: 100%; height: 30px;" type="text"/>	<input style="width: 100%; height: 30px;" type="text"/>
Spill dam	<input style="width: 100%; height: 30px;" type="text"/>	<input style="width: 100%; height: 30px;" type="text"/>	<input style="width: 100%; height: 30px;" type="text"/>	<input style="width: 100%; height: 30px;" type="text"/>	<input style="width: 100%; height: 30px;" type="text"/>	<input style="width: 100%; height: 30px;" type="text"/>



Description:

Fines thickener



Description:

HBF Tank not in use



Description:

Stockpile sump. Field parameters

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:53 am"/>	UGM-M8D:	<input type="text" value="15.127"/>
Time:	<input type="text" value="9:55 am"/>	UGM-M8S:	<input type="text" value="14.570"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:57 am"/>	UGM-M15D:	<input type="text" value="15.020"/>
Time:	<input type="text" value="9:00 am"/>	UGM-M15S:	<input type="text" value="13.640"/>
Time:	<input type="text" value="9:40 am"/>	BH-M17D:	<input type="text" value="14.645"/>
Time:	<input type="text" value="9:34 am"/>	BH-M17S:	<input type="text" value="13.659"/>
Time:	<input type="text" value="9:44 am"/>	BH-M18D:	<input type="text" value="14.405"/>
Time:	<input type="text" value="9:47 am"/>	BH-M18S:	<input type="text" value="13.977"/>
Time:	<input type="text" value="8:50 am"/>	BH-M19D:	<input type="text" value="14.955"/>
Time:	<input type="text" value="8:53 am"/>	BH-M19S:	<input type="text" value="13.372"/>
Time:	<input type="text" value="9:27 am"/>	BH-M20D:	<input type="text" value="16.915"/>
Time:	<input type="text" value="9:24 am"/>	BH-M20S:	<input type="text" value="13.555"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:14 am"/>	BH-M22D:	<input type="text" value="16.790"/>
Time:	<input type="text" value="9:06 am"/>	BH-M22S:	<input type="text" value="14.180"/>
Time:	<input type="text" value="10:53 am"/>	LPSPB04:	<input type="text" value="21.520"/>

Description of daily mining activities

Mining summary

Day shift:
MD from 438m to 424m
Pipe #74-72
864 tonnes

Night shift:
MD from 424m to 410m
Pipe #72-70
1146 tonnes

Pullback 200mm/10mins
HP 150m³/hr
MP 140m³/hr

Daily water usage summary
Pumping in the bore beside LPSPB04.
Totaliser value at 11am was 438033KL.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:31 pm	6.59	54766	-221.5	0.59	14.51	1.2
UGM-M12S	12:16 pm	7.58	65250	7.2	1.52	13.99	0.0
BH-M21D	11:30 am	6.57	54767	-204.6	0.67	16.36	2.8
BH-M21S	11:15 am	6.53	58523	120.9	5.25	13.08	0.12

FIELD pH

SPD-HM:	7.76	SPD-SAND:	7.68	Process Water Pond:	7.67
Time:	8:10 am	Time:	7:57 am	Time:	8:13 am

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="8:47 am"/>	UGM-M8D:	<input type="text" value="17.550"/>
Time:	<input type="text" value="8:51 am"/>	UGM-M8S:	<input type="text" value="14.760"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:10 am"/>	UGM-M15D:	<input type="text" value="15.270"/>
Time:	<input type="text" value="8:13 am"/>	UGM-M15S:	<input type="text" value="13.603"/>
Time:	<input type="text" value="9:00 am"/>	BH-M17D:	<input type="text" value="16.160"/>
Time:	<input type="text" value="9:05 am"/>	BH-M17S:	<input type="text" value="13.977"/>
Time:	<input type="text" value="9:15 am"/>	BH-M18D:	<input type="text" value="15.360"/>
Time:	<input type="text" value="9:09 am"/>	BH-M18S:	<input type="text" value="14.790"/>
Time:	<input type="text" value="8:04 am"/>	BH-M19D:	<input type="text" value="15.315"/>
Time:	<input type="text" value="8:07 am"/>	BH-M19S:	<input type="text" value="13.375"/>
Time:	<input type="text" value="8:30 am"/>	BH-M20D:	<input type="text" value="17.460"/>
Time:	<input type="text" value="8:32 am"/>	BH-M20S:	<input type="text" value="13.590"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:21 am"/>	BH-M22D:	<input type="text" value="16.735"/>
Time:	<input type="text" value="8:19 am"/>	BH-M22S:	<input type="text" value="14.215"/>
Time:	<input type="text" value="9:28 am"/>	LPSPB04:	<input type="text" value="21.820"/>

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:43 am	6.59	54051	-213.8	0.74	15.42	1.0
UGM-M12S	11:24 am	7.50	64038	50.9	1.32	14.88	0.0
BH-M21D	10:56 am	6.51	53926	-159.2	0.29	18.88	2.4
BH-M21S	10:24 am	6.39	59306	243.0	5.89	13.60	0.05

FIELD pH

SPD-HM:	7.49	SPD-SAND:	7.29	Process Water Pond:	7.41
Time:	7:37 am	Time:	7:40 am	Time:	7:45 am

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:54 am"/>	UGM-M8D:	<input type="text" value="17.235"/>
Time:	<input type="text" value="9:56 am"/>	UGM-M8S:	<input type="text" value="15.030"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:02 am"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:12 am"/>	UGM-M15D:	<input type="text" value="15.615"/>
Time:	<input type="text" value="8:14 am"/>	UGM-M15S:	<input type="text" value="13.645"/>
Time:	<input type="text" value="8:57 am"/>	BH-M17D:	<input type="text" value="16.740"/>
Time:	<input type="text" value="9:01 am"/>	BH-M17S:	<input type="text" value="14.090"/>
Time:	<input type="text" value="9:18 am"/>	BH-M18D:	<input type="text" value="16.180"/>
Time:	<input type="text" value="9:14 am"/>	BH-M18S:	<input type="text" value="13.790"/>
Time:	<input type="text" value="8:02 am"/>	BH-M19D:	<input type="text" value="15.830"/>
Time:	<input type="text" value="8:06 am"/>	BH-M19S:	<input type="text" value="13.370"/>
Time:	<input type="text" value="8:26 am"/>	BH-M20D:	<input type="text" value="16.720"/>
Time:	<input type="text" value="8:30 am"/>	BH-M20S:	<input type="text" value="13.630"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:19 am"/>	BH-M22D:	<input type="text" value="16.870"/>
Time:	<input type="text" value="8:17 am"/>	BH-M22S:	<input type="text" value="14.190"/>
Time:	<input type="text" value="9:33 am"/>	LPSPB04:	<input type="text" value="15.862"/>

Description of daily mining activities

Mining summary

Day shift:
MD from 383m to 374m
Pipe #65-64

Stope 4 mining has stopped at around noon.

Pump next to LPSPB04 not operating.
Totaliser at 439982KL

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:48 pm	6.65	53714	-220.1	0.87	17.15	1.2
UGM-M12S	12:28 pm	7.56	64961	51.7	1.16	15.59	0.0
BH-M21D	12:01 pm	6.57	54546	-177.7	0.25	20.15	3.4
BH-M21S	11:23 am	6.56	59760	196.6	6.78	16.34	0.1

FIELD pH

SPD-HM:	7.52	SPD-SAND:	7.55	Process Water Pond:	7.35
Time:	7:18 am	Time:	7:20 am	Time:	7:25 am

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="8:59 am"/>	UGM-M8D:	<input type="text" value="15.985"/>
Time:	<input type="text" value="9:01 am"/>	UGM-M8S:	<input type="text" value="14.295"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:24 am"/>	UGM-M15D:	<input type="text" value="15.250"/>
Time:	<input type="text" value="8:25 am"/>	UGM-M15S:	<input type="text" value="13.660"/>
Time:	<input type="text" value="9:09 am"/>	BH-M17D:	<input type="text" value="15.700"/>
Time:	<input type="text" value="9:11 am"/>	BH-M17S:	<input type="text" value="12.670"/>
Time:	<input type="text" value="9:23 am"/>	BH-M18D:	<input type="text" value="15.502"/>
Time:	<input type="text" value="9:18 am"/>	BH-M18S:	<input type="text" value="11.025"/>
Time:	<input type="text" value="8:17 am"/>	BH-M19D:	<input type="text" value="15.485"/>
Time:	<input type="text" value="8:20 am"/>	BH-M19S:	<input type="text" value="13.370"/>
Time:	<input type="text" value="8:42 am"/>	BH-M20D:	<input type="text" value="15.370"/>
Time:	<input type="text" value="8:46 am"/>	BH-M20S:	<input type="text" value="13.582"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:37 am"/>	BH-M22D:	<input type="text" value="16.365"/>
Time:	<input type="text" value="8:34 am"/>	BH-M22S:	<input type="text" value="14.197"/>
Time:	<input type="text" value="9:30 am"/>	LPSPB04:	<input type="text" value="15.070"/>

Description of daily mining activities

No mining activity occurring. Spiral plant is not in operation.

Pump beside LPSPB04 not in operation. Totaliser at 439982KL

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:48 am	6.60	53675	-222.7	0.66	15.94	0.8
UGM-M12S	11:27 am	7.54	64099	49.0	1.09	14.87	0.0
BH-M21D	10:52 am	6.56	53597	-193.6	0.29	18.86	3.2
BH-M21S	10:36 am	6.56	59121	162.0	7.02	12.93	0.0

FIELD pH

SPD-HM:	7.89	SPD-SAND:	7.71	Process Water Pond:	7.54
Time:	7:45 am	Time:	7:48 am	Time:	7:53 am



Description: Spiral plant not operational

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="8:58 am"/>	UGM-M8D:	<input type="text" value="15.504"/>
Time:	<input type="text" value="9:00 am"/>	UGM-M8S:	<input type="text" value="14.185"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:29 am"/>	UGM-M15D:	<input type="text" value="14.980"/>
Time:	<input type="text" value="8:32 am"/>	UGM-M15S:	<input type="text" value="13.640"/>
Time:	<input type="text" value="9:06 am"/>	BH-M17D:	<input type="text" value="15.240"/>
Time:	<input type="text" value="9:08 am"/>	BH-M17S:	<input type="text" value="12.760"/>
Time:	<input type="text" value="9:14 am"/>	BH-M18D:	<input type="text" value="15.105"/>
Time:	<input type="text" value="9:11 am"/>	BH-M18S:	<input type="text" value="11.040"/>
Time:	<input type="text" value="8:21 am"/>	BH-M19D:	<input type="text" value="15.201"/>
Time:	<input type="text" value="8:26 am"/>	BH-M19S:	<input type="text" value="13.308"/>
Time:	<input type="text" value="8:44 am"/>	BH-M20D:	<input type="text" value="14.945"/>
Time:	<input type="text" value="8:46 am"/>	BH-M20S:	<input type="text" value="13.570"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:38 am"/>	BH-M22D:	<input type="text" value="16.115"/>
Time:	<input type="text" value="8:37 am"/>	BH-M22S:	<input type="text" value="14.225"/>
Time:	<input type="text" value="9:20 am"/>	LPSPB04:	<input type="text" value="14.750"/>

Description of daily mining activities

No mining activity occurring. Spiral plant is not in operation.

Pump beside LPSPB04 not in operation. Totaliser at 439982KL

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:39 pm	6.76	51494	-251.4	0.77	15.06	1.4
UGM-M12S	11:59 am	7.58	64063	-8.7	0.89	14.99	0.0
BH-M21D	11:52 am	6.58	50620	-200.1	0.33	18.77	2.6
BH-M21S	11:29 am	6.57	58619	128.2	7.22	13.16	0.0

FIELD pH

SPD-HM:	7.83	SPD-SAND:	7.79	Process Water Pond:	7.74
Time:	7:58 am	Time:	8:00 am	Time:	8:03 am

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="12:09 pm"/>	UGM-M8D:	<input type="text" value="15.250"/>
Time:	<input type="text" value="12:10 pm"/>	UGM-M8S:	<input type="text" value="14.150"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:46 am"/>	UGM-M15D:	<input type="text" value="14.760"/>
Time:	<input type="text" value="8:47 am"/>	UGM-M15S:	<input type="text" value="13.360"/>
Time:	<input type="text" value="12:23 pm"/>	BH-M17D:	<input type="text" value="15.025"/>
Time:	<input type="text" value="12:28 pm"/>	BH-M17S:	<input type="text" value="12.845"/>
Time:	<input type="text" value="12:37 pm"/>	BH-M18D:	<input type="text" value="14.845"/>
Time:	<input type="text" value="12:34 pm"/>	BH-M18S:	<input type="text" value="11.695"/>
Time:	<input type="text" value="8:28 am"/>	BH-M19D:	<input type="text" value="14.980"/>
Time:	<input type="text" value="8:32 am"/>	BH-M19S:	<input type="text" value="13.360"/>
Time:	<input type="text" value="9:40 am"/>	BH-M20D:	<input type="text" value="14.685"/>
Time:	<input type="text" value="9:43 am"/>	BH-M20S:	<input type="text" value="13.544"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:23 am"/>	BH-M22D:	<input type="text" value="15.910"/>
Time:	<input type="text" value="9:20 am"/>	BH-M22S:	<input type="text" value="14.210"/>
Time:	<input type="text" value="12:52 pm"/>	LPSPB04:	<input type="text" value="14.535"/>

Description of daily mining activities

No mining activities occurring and no sampling able to be taken from Spiral Plant Discharge locations

No pumping at bore beside LPSPB4

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	2:41 pm	6.80	56051	-229.6	0.76	16.93	1.2
UGM-M12S	2:25 pm	7.76	64135	1.5	0.77	16.76	0.0
BH-M21D	2:01 pm	6.76	56261	-194.2	0.37	19.49	5.2
BH-M21S	1:53 pm	6.65	62834	140.8	6.66	16.65	0.0

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="7.82"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="7:39 am"/>

Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

Dan Condon

Date:

2 September 2020

STANDING WATER LEVEL (mbTOC)

Time:	11:23 am	UGM-M1D:	15.050
Time:	11:24 am	UGM-M1S:	13.855
Time:	6:51 am	UGM-M2D:	15.894
Time:	6:53 am	UGM-M2S:	14.936
Time:	11:49 am	UGM-M4D:	15.855
Time:	10:08 am	UGM-M16D:	15.775
Time:	10:10 am	UGM-M16S:	14.825
Time:	9:06 am	UGM-M23D:	16.205
Time:	9:06 am	UGM-M23S:	15.380
Time:	9:57 am	UGM-M24D:	14.920
Time:	9:55 am	UGM-M24S:	13.820
Time:	8:15 am	UGM-M25D:	13.925
Time:	8:11 am	UGM-M25S:	13.083

Description of daily mining activities

No mining activities occurring. Will still collect baseline field parameters for comparison purposes.

HBF tank not in operation

Fines thickener also not in operation but parameters taken from holding water

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener	10:51 am	8.01	52243	142.41	7.48	14.57
HBF Tank Tap						
Stockpile Sump	7:43 am	7.96	57444	117.79	8.06	9.43

FIELD PARAMETERS

Well ID	Time	pH Units	Sp. Cond us/cm	Redox mV	DO Mg/L	Temp Deg Celcius
T2 Stockpile Sump	7:32 am	7.77	57017	125.36	6.16	10.59
Spill dam	7:50 am	8.07	53218	118.59	7.30	11.59



Description:

T2 stockpile sump



Description:

Stockpile sump



Description:

Spill Dam



Description:

Fines thickener

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:47 am"/>	UGM-M8D:	<input type="text" value="15.135"/>
Time:	<input type="text" value="9:48 am"/>	UGM-M8S:	<input type="text" value="14.112"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:49 am"/>	UGM-M15D:	<input type="text" value="14.650"/>
Time:	<input type="text" value="8:51 am"/>	UGM-M15S:	<input type="text" value="13.645"/>
Time:	<input type="text" value="9:54 am"/>	BH-M17D:	<input type="text" value="14.890"/>
Time:	<input type="text" value="9:56 am"/>	BH-M17S:	<input type="text" value="12.815"/>
Time:	<input type="text" value="10:06 am"/>	BH-M18D:	<input type="text" value="14.722"/>
Time:	<input type="text" value="10:02 am"/>	BH-M18S:	<input type="text" value="11.867"/>
Time:	<input type="text" value="8:29 am"/>	BH-M19D:	<input type="text" value="14.855"/>
Time:	<input type="text" value="8:31 am"/>	BH-M19S:	<input type="text" value="13.358"/>
Time:	<input type="text" value="9:03 am"/>	BH-M20D:	<input type="text" value="14.542"/>
Time:	<input type="text" value="9:05 am"/>	BH-M20S:	<input type="text" value="13.563"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:57 am"/>	BH-M22D:	<input type="text" value="15.790"/>
Time:	<input type="text" value="8:56 am"/>	BH-M22S:	<input type="text" value="14.205"/>
Time:	<input type="text" value="10:31 am"/>	LPSPB04:	<input type="text" value="14.623"/>

Description of daily mining activities

No mining occurring and therefore no Spiral plant in operation.

No pumping beside LPSPB04

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:47 am	6.60	53815	-163.0	0.45	16.98	1.0
UGM-M12S	11:22 am	7.61	64072	20.2	0.84	17.14	0.0
BH-M21D	10:59 am	6.62	53778	-186.4	0.33	19.65	4.2
BH-M21S	10:48 am	6.60	61786	147.4	1.37	17.51	0.0

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="7.49"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="7:14 am"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:56 am"/>	UGM-M8D:	<input type="text" value="14.885"/>
Time:	<input type="text" value="9:58 am"/>	UGM-M8S:	<input type="text" value="13.950"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:46 am"/>	UGM-M15D:	<input type="text" value="14.055"/>
Time:	<input type="text" value="7:48 am"/>	UGM-M15S:	<input type="text" value="13.655"/>
Time:	<input type="text" value="10:14 am"/>	BH-M17D:	<input type="text" value="14.523"/>
Time:	<input type="text" value="10:27 am"/>	BH-M17S:	<input type="text" value="12.734"/>
Time:	<input type="text" value="10:39 am"/>	BH-M18D:	<input type="text" value="14.219"/>
Time:	<input type="text" value="10:41 am"/>	BH-M18S:	<input type="text" value="12.202"/>
Time:	<input type="text" value="7:37 am"/>	BH-M19D:	<input type="text" value="14.701"/>
Time:	<input type="text" value="7:42 am"/>	BH-M19S:	<input type="text" value="13.365"/>
Time:	<input type="text" value="8:24 am"/>	BH-M20D:	<input type="text" value="14.320"/>
Time:	<input type="text" value="8:31 am"/>	BH-M20S:	<input type="text" value="13.490"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:19 am"/>	BH-M22D:	<input type="text" value="15.325"/>
Time:	<input type="text" value="8:17 am"/>	BH-M22S:	<input type="text" value="14.235"/>
Time:	<input type="text" value="11:10 am"/>	LPSPB04:	<input type="text" value="14.240"/>

Description of daily mining activities

Rig has been moved and rods have been tripped in overnight. 12 rods to go today.

Spiral plant and HBF not in operation.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:24 pm	6.52	54129	168.3	0.44	16.65	0.4
UGM-M12S	12:02 pm	7.45	64447	16.7	0.9	16.17	0.0
BH-M21D	11:37 am	6.55	53884	-172.0	0.34	18.76	4.8
BH-M21S	11:21 am	6.64	62042	185.8	5.82	15.18	0.0

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="7.67"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="7:23 am"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="10:32 am"/>	UGM-M8D:	<input type="text" value="14.867"/>
Time:	<input type="text" value="10:33 am"/>	UGM-M8S:	<input type="text" value="14.022"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:17 am"/>	UGM-M15D:	<input type="text" value="14.366"/>
Time:	<input type="text" value="8:19 am"/>	UGM-M15S:	<input type="text" value="13.630"/>
Time:	<input type="text" value="9:21 am"/>	BH-M17D:	<input type="text" value="14.619"/>
Time:	<input type="text" value="9:19 am"/>	BH-M17S:	<input type="text" value="12.822"/>
Time:	<input type="text" value="9:27 am"/>	BH-M18D:	<input type="text" value="14.455"/>
Time:	<input type="text" value="9:24 am"/>	BH-M18S:	<input type="text" value="12.188"/>
Time:	<input type="text" value="7:57 am"/>	BH-M19D:	<input type="text" value="14.622"/>
Time:	<input type="text" value="7:59 am"/>	BH-M19S:	<input type="text" value="13.355"/>
Time:	<input type="text" value="8:42 am"/>	BH-M20D:	<input type="text" value="14.290"/>
Time:	<input type="text" value="8:41 am"/>	BH-M20S:	<input type="text" value="13.510"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:36 am"/>	BH-M22D:	<input type="text" value="15.560"/>
Time:	<input type="text" value="8:32 am"/>	BH-M22S:	<input type="text" value="14.190"/>
Time:	<input type="text" value="9:33 am"/>	LPSPB04:	<input type="text" value="14.240"/>

Description of daily mining activities

Rig preparing for mining next week.
 HBF prep and testing to occur soon

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:30 pm	6.70	53329	-216.2	0.58	16.59	0.4
UGM-M12S	12:11 pm	7.59	63650	-29.1	1.18	16.33	0.0
BH-M21D	11:50 am	6.71	53245	-197.8	0.26	19.48	5.0
BH-M21S	11:38 am	6.65	60952	-56.6	0.69	17.56	0.05

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="7.72"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="9:13 am"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:49 am"/>	UGM-M8D:	<input type="text" value="14.825"/>
Time:	<input type="text" value="9:50 am"/>	UGM-M8S:	<input type="text" value="14.085"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:07 am"/>	UGM-M15D:	<input type="text" value="14.367"/>
Time:	<input type="text" value="8:10 am"/>	UGM-M15S:	<input type="text" value="13.645"/>
Time:	<input type="text" value="9:58 am"/>	BH-M17D:	<input type="text" value="14.531"/>
Time:	<input type="text" value="9:56 am"/>	BH-M17S:	<input type="text" value="12.942"/>
Time:	<input type="text" value="10:01 am"/>	BH-M18D:	<input type="text" value="14.366"/>
Time:	<input type="text" value="10:03 am"/>	BH-M18S:	<input type="text" value="12.485"/>
Time:	<input type="text" value="7:53 am"/>	BH-M19D:	<input type="text" value="14.605"/>
Time:	<input type="text" value="7:58 am"/>	BH-M19S:	<input type="text" value="13.372"/>
Time:	<input type="text" value="8:57 am"/>	BH-M20D:	<input type="text" value="14.260"/>
Time:	<input type="text" value="8:58 am"/>	BH-M20S:	<input type="text" value="13.530"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:40 am"/>	BH-M22D:	<input type="text" value="15.502"/>
Time:	<input type="text" value="8:28 am"/>	BH-M22S:	<input type="text" value="14.370"/>
Time:	<input type="text" value="10:14 am"/>	LPSPB04:	<input type="text" value="14.190"/>

Description of daily mining activities

No mining occurring. HBF process tested in the afternoon using water only.

All morning field parameters monitoring are for background reference only.

HBF process delayed and will be reviewed.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:23 am	6.53	53335	-225.3	0.60	17.15	1.1
UGM-M12S	11:04 am	7.45	63636	-10.8	0.93	16.95	0.1
BH-M21D	10:42 am	6.56	53324	-201.7	0.33	19.22	4.8
BH-M21S	10:27 am	6.58	60984	45.4	5.46	15.79	0.0

FIELD pH

SPD-HM:	7.83	SPD-SAND:	7.80	Process Water Pond:	7.74
Time:	7:30 am	Time:	7:32 am	Time:	7:27 am

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="8:34 am"/>	UGM-M8D:	<input type="text" value="14.777"/>
Time:	<input type="text" value="8:36 am"/>	UGM-M8S:	<input type="text" value="14.067"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:45 am"/>	UGM-M15D:	<input type="text" value="14.253"/>
Time:	<input type="text" value="7:47 am"/>	UGM-M15S:	<input type="text" value="13.642"/>
Time:	<input type="text" value="8:45 am"/>	BH-M17D:	<input type="text" value="14.807"/>
Time:	<input type="text" value="8:43 am"/>	BH-M17S:	<input type="text" value="12.982"/>
Time:	<input type="text" value="8:51 am"/>	BH-M18D:	<input type="text" value="14.355"/>
Time:	<input type="text" value="8:49 am"/>	BH-M18S:	<input type="text" value="12.677"/>
Time:	<input type="text" value="7:38 am"/>	BH-M19D:	<input type="text" value="14.502"/>
Time:	<input type="text" value="7:40 am"/>	BH-M19S:	<input type="text" value="13.355"/>
Time:	<input type="text" value="8:21 am"/>	BH-M20D:	<input type="text" value="14.202"/>
Time:	<input type="text" value="8:23 am"/>	BH-M20S:	<input type="text" value="13.563"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:03 am"/>	BH-M22D:	<input type="text" value="15.469"/>
Time:	<input type="text" value="7:52 am"/>	BH-M22S:	<input type="text" value="14.140"/>
Time:	<input type="text" value="8:58 am"/>	LPSPB04:	<input type="text" value="14.150"/>

Description of daily mining activities

No mining occurring.
 HBF process delayed and will be reviewed.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:25 am	6.51	54342	-178.1	0.48	17.66	1.6
UGM-M12S	11:01 am	7.48	64597	-10.4	0.93	17.21	0.1
BH-M21D	10:41 am	6.55	54006	-190.7	0.37	19.57	5.0
BH-M21S	10:29 am	6.42	54760	120.7	0.47	18.42	0.15

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="7.71"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="7:25 am"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:06 am"/>	UGM-M8D:	<input type="text" value="14.740"/>
Time:	<input type="text" value="9:04 am"/>	UGM-M8S:	<input type="text" value="14.090"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:26 am"/>	UGM-M15D:	<input type="text" value="14.275"/>
Time:	<input type="text" value="8:30 am"/>	UGM-M15S:	<input type="text" value="13.619"/>
Time:	<input type="text" value="9:32 am"/>	BH-M17D:	<input type="text" value="14.500"/>
Time:	<input type="text" value="9:29 am"/>	BH-M17S:	<input type="text" value="13.047"/>
Time:	<input type="text" value="9:23 am"/>	BH-M18D:	<input type="text" value="14.358"/>
Time:	<input type="text" value="9:19 am"/>	BH-M18S:	<input type="text" value="12.834"/>
Time:	<input type="text" value="8:20 am"/>	BH-M19D:	<input type="text" value="14.500"/>
Time:	<input type="text" value="8:16 am"/>	BH-M19S:	<input type="text" value="13.335"/>
Time:	<input type="text" value="8:49 am"/>	BH-M20D:	<input type="text" value="14.165"/>
Time:	<input type="text" value="8:47 am"/>	BH-M20S:	<input type="text" value="13.525"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:39 am"/>	BH-M22D:	<input type="text" value="15.461"/>
Time:	<input type="text" value="8:35 am"/>	BH-M22S:	<input type="text" value="14.118"/>
Time:	<input type="text" value="10:45 am"/>	LPSPB04:	<input type="text" value="13.970"/>

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:17 am	6.57	53516	-204.5	0.38	19.44	0.5
UGM-M12S	10:50 am	7.56	63616	103.5	0.96	18.52	0.45
BH-21D	11:33 am	6.62	53566	-214.1	0.32	21.11	5.2
BH-21S	11:57 am	6.48	60380	-25.2	0.64	19.99	0.1

FIELD pH

SPD-HM:	NA	SPD-SAND:	NA	Process Water Pond:	7.77
Time:		Time:		Time:	7:53 am

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="10:10 am"/>	UGM-M8D:	<input type="text" value="14.71"/>
Time:	<input type="text" value="10:05 am"/>	UGM-M8S:	<input type="text" value="14.13"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="7:46 am"/>	UGM-M15D:	<input type="text" value="14.24"/>
Time:	<input type="text" value="7:48 am"/>	UGM-M15S:	<input type="text" value="13.63"/>
Time:	<input type="text" value="10:46 am"/>	BH-M17D:	<input type="text" value="14.37"/>
Time:	<input type="text" value="10:41 am"/>	BH-M17S:	<input type="text" value="13.11"/>
Time:	<input type="text" value="10:23 am"/>	BH-M18D:	<input type="text" value="14.32"/>
Time:	<input type="text" value="10:28 am"/>	BH-M18S:	<input type="text" value="12.88"/>
Time:	<input type="text" value="7:28 am"/>	BH-M19D:	<input type="text" value="14.49"/>
Time:	<input type="text" value="7:33 am"/>	BH-M19S:	<input type="text" value="13.33"/>
Time:	<input type="text" value="8:36 am"/>	BH-M20D:	<input type="text" value="14.15"/>
Time:	<input type="text" value="8:31 am"/>	BH-M20S:	<input type="text" value="13.51"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="8:24 am"/>	BH-M22D:	<input type="text" value="15.43"/>
Time:	<input type="text" value="8:18 am"/>	BH-M22S:	<input type="text" value="14.13"/>
Time:	<input type="text" value="11:28 am"/>	LPSPB04:	<input type="text" value="13.97"/>

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:49 am	7.43	4.82	8.69	8.69		0.1
UGM-M12S	12:48 pm	7.10	67640	123.5	5.60	15.9	0.4
BH-21D	1:25 pm	6.67	57092	-207.9	0.36	19.31	4.3
BH-21S	1:10 pm	6.51	64567	93.6	0.82	18.12	0

FIELD pH

SPD-HM: <input style="width: 80px;" type="text" value="NA"/>	SPD-SAND: <input style="width: 80px;" type="text" value="NA"/>	Process Water Pond: <input style="width: 80px;" type="text" value="8.03"/>
Time: <input style="width: 80px;" type="text"/>	Time: <input style="width: 80px;" type="text"/>	Time: <input style="width: 80px;" type="text" value="3:12 pm"/>

Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

KB BB

Date:

9 September 2020

STANDING WATER LEVEL (mbTOC)

Time:	9:40 am	UGM-M1D:	14.45
Time:	9:44 am	UGM-M1S:	13.78
Time:	9:57 am	UGM-M2D:	15.26
Time:	9:54 am	UGM-M2S:	14.74
Time:	2:31 pm	UGM-M4D:	15.26
Time:	8:51 am	UGM-M16D:	15.30
Time:	8:55 am	UGM-M16S:	14.74
Time:	8:06 am	UGM-M23D:	15.79
Time:	8:02 am	UGM-M23S:	15.375
Time:	8:43 am	UGM-M24D:	14.36
Time:	8:40 am	UGM-M24S:	13.76
Time:	7:22 am	UGM-M25D:	13.42
Time:	7:11 am	UGM-M25S:	13.01

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener	2:46 pm	8.02	55431	20.7	7.61	17.39
HBF Tank Tap	3:00 pm	7.73	50597	41.2	4.84	22.4
Stockpile Sump	3:15 pm	7.88	35351	26.9	2.58	18.56

FIELD PARAMETERS

Well ID	Time	pH Units	Sp. Cond us/cm	Redox mV	DO Mg/L	Temp Deg Celcius
T2 Stockpile Sump	2:52 pm	7.67	65532	36.9	6.04	15.12
Spill dam	3:22 pm	8.19	22030	10.7	9.03	19.16



Description:

UGM-M4 and stockpile

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:44 am"/>	UGM-M8D:	<input type="text" value="14.67"/>
Time:	<input type="text" value="7:46 am"/>	UGM-M8S:	<input type="text" value="14.115"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:07 am"/>	UGM-M15D:	<input type="text" value="14.155"/>
Time:	<input type="text" value="7:08 am"/>	UGM-M15S:	<input type="text" value="13.66"/>
Time:	<input type="text" value="7:58 am"/>	BH-M17D:	<input type="text" value="14.41"/>
Time:	<input type="text" value="8:00 am"/>	BH-M17S:	<input type="text" value="13.12"/>
Time:	<input type="text" value="7:53 am"/>	BH-M18D:	<input type="text" value="14.31"/>
Time:	<input type="text" value="7:54 am"/>	BH-M18S:	<input type="text" value="12.925"/>
Time:	<input type="text" value="7:02 am"/>	BH-M19D:	<input type="text" value="14.44"/>
Time:	<input type="text" value="7:00 am"/>	BH-M19S:	<input type="text" value="13.33"/>
Time:	<input type="text" value="7:23 am"/>	BH-M20D:	<input type="text" value="14.10"/>
Time:	<input type="text" value="7:24 am"/>	BH-M20S:	<input type="text" value="13.57"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:14 am"/>	BH-M22D:	<input type="text" value="15.37"/>
Time:	<input type="text" value="7:16 am"/>	BH-M22S:	<input type="text" value="14.13"/>
Time:	<input type="text" value="8:23 am"/>	LPSPB04:	<input type="text" value="13.92"/>

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	8:45 am	6.60	57169	-222.3	0.67	16.40	1.0
UGM-M12S	8:32 am	7.53	68211	180.1	0.9	16.28	0.1
BH-21D	9:16 am	6.62	57147	-209.2	0.28	19.33	4.6
BH-21S	9:00 am	6.45	61259	-90.3	0.51	19.07	0.2

FIELD pH

SPD-HM: <input style="width: 100px;" type="text" value="7.84"/>	SPD-SAND: <input style="width: 100px;" type="text" value="7.78"/>	Process Water Pond: <input style="width: 100px;" type="text" value="8.02"/>
Time: <input style="width: 100px;" type="text" value="10:17 am"/>	Time: <input style="width: 100px;" type="text" value="10:19 am"/>	Time: <input style="width: 100px;" type="text" value="10:21 am"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="11:35 am"/>	UGM-M8D:	<input type="text" value="15.20"/>
Time:	<input type="text" value="11:37 am"/>	UGM-M8S:	<input type="text" value="14.085"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="7:11 am"/>	UGM-M15D:	<input type="text" value="13.96"/>
Time:	<input type="text" value="7:13 am"/>	UGM-M15S:	<input type="text" value="13.62"/>
Time:	<input type="text" value="11:52 am"/>	BH-M17D:	<input type="text" value="14.72"/>
Time:	<input type="text" value="11:53 am"/>	BH-M17S:	<input type="text" value="13.09"/>
Time:	<input type="text" value="11:46 am"/>	BH-M18D:	<input type="text" value="14.34"/>
Time:	<input type="text" value="11:48 am"/>	BH-M18S:	<input type="text" value="12.93"/>
Time:	<input type="text" value="7:07 am"/>	BH-M19D:	<input type="text" value="14.27"/>
Time:	<input type="text" value="7:06 am"/>	BH-M19S:	<input type="text" value="13.34"/>
Time:	<input type="text" value="7:23 am"/>	BH-M20D:	<input type="text" value="14.03"/>
Time:	<input type="text" value="7:25 am"/>	BH-M20S:	<input type="text" value="13.53"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="7:17 am"/>	BH-M22D:	<input type="text" value="14.77"/>
Time:	<input type="text" value="7:20 am"/>	BH-M22S:	<input type="text" value="14.09"/>
Time:	<input type="text" value="12:11 pm"/>	LPSPB04:	<input type="text" value="13.90"/>

Description of daily mining activities

Totaliser beside LPSPB04: 439982
 UGM-M12D sulphur odour
 Spiral plant operating periodically (during mining)

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:22 pm	6.69	56761	-235.8	0.54	18.28	3.6
UGM-M12S	12:48 pm	7.64	67604	-32.0	0.93	18.48	0.0
BH-21D	1:16 pm	6.70	56176	-210.4	0.50	20.01	1.0
BH-21S	1:38 pm	6.55	54697	2.1	0.84	19.22	0.15

FIELD pH

SPD-HM: <input style="width: 100%;" type="text"/>	SPD-SAND: <input style="width: 100%;" type="text"/>	Process Water Pond: <input style="width: 100%; text-align: center; value: 8.00;" type="text"/>
Time: <input style="width: 100%;" type="text"/>	Time: <input style="width: 100%;" type="text"/>	Time: <input style="width: 100%; text-align: center; value: 6:51 am;" type="text"/>



Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

KB BB

Date:

11 September 2020

STANDING WATER LEVEL (mbTOC)

Time:	2:07 pm	UGM-M1D:	14.95
Time:	2:08 pm	UGM-M1S:	13.75
Time:		UGM-M2D:	
Time:		UGM-M2S:	
Time:		UGM-M4D:	
Time:	9:29 am	UGM-M16D:	15.66
Time:	9:33 am	UGM-M16S:	14.72
Time:		UGM-M23D:	
Time:		UGM-M23S:	
Time:	7:29 am	UGM-M24D:	14.33
Time:	7:31 am	UGM-M24S:	13.77
Time:		UGM-M25D:	
Time:		UGM-M25S:	

Description of daily mining activities

UGM-M1S sulphur odour

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener						
HBF Tank Tap						
Stockpile Sump						

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
T2 Stockpile Sump	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Spill dam	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="12:48 pm"/>	UGM-M8D:	<input type="text" value="14.71"/>
Time:	<input type="text" value="12:51 pm"/>	UGM-M8S:	<input type="text" value="14.12"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:48 am"/>	UGM-M15D:	<input type="text" value="13.92"/>
Time:	<input type="text" value="7:50 am"/>	UGM-M15S:	<input type="text" value="13.64"/>
Time:	<input type="text" value="1:04 pm"/>	BH-M17D:	<input type="text" value="14.44"/>
Time:	<input type="text" value="1:06 pm"/>	BH-M17S:	<input type="text" value="13.16"/>
Time:	<input type="text" value="12:58 pm"/>	BH-M18D:	<input type="text" value="14.27"/>
Time:	<input type="text" value="1:00 pm"/>	BH-M18S:	<input type="text" value="13.00"/>
Time:	<input type="text" value="7:44 am"/>	BH-M19D:	<input type="text" value="14.36"/>
Time:	<input type="text" value="7:37 am"/>	BH-M19S:	<input type="text" value="13.35"/>
Time:	<input type="text" value="12:34 pm"/>	BH-M20D:	<input type="text" value="14.85"/>
Time:	<input type="text" value="12:36 pm"/>	BH-M20S:	<input type="text" value="13.51"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="11:07 am"/>	BH-M22D:	<input type="text" value="15.19"/>
Time:	<input type="text" value="11:02 am"/>	BH-M22S:	<input type="text" value="14.14"/>
Time:	<input type="text" value="1:28 pm"/>	LPSPB04:	<input type="text" value="13.88"/>

Description of daily mining activities

No mining, fixing swivel head
Spiral plant not operating
Pump next to LPSPB04 not operating,
same totaliser value as yesterday.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	1:54 pm	6.65	55336	-234	0.74	19.03	4.0
UGM-M12S	1:27 pm	7.37	66055	63.7	1.90	20.08	0.1
BH-21D	2:10 pm	6.62	55527	-204	0.31	21.22	4.2
BH-21S	2:17 pm	6.54	61196	-70.8	0.75	20.28	0.3

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="8.00"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="6:50 am"/>

Description:

Description:

FIELD PARAMETERS

Well ID	Time	pH Units	Sp. Cond us/cm	Redox mV	DO Mg/L	Temp Deg Celcius
T2 Stockpile Sump	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Spill dam	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:32 am"/>	UGM-M8D:	<input type="text" value="14.66"/>
Time:	<input type="text" value="7:29 am"/>	UGM-M8S:	<input type="text" value="14.16"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:39 am"/>	UGM-M15D:	<input type="text" value="14.14"/>
Time:	<input type="text" value="9:41 am"/>	UGM-M15S:	<input type="text" value="13.64"/>
Time:	<input type="text" value="7:41 am"/>	BH-M17D:	<input type="text" value="14.44"/>
Time:	<input type="text" value="7:44 am"/>	BH-M17S:	<input type="text" value="13.17"/>
Time:	<input type="text" value="7:48 am"/>	BH-M18D:	<input type="text" value="14.28"/>
Time:	<input type="text" value="7:31 am"/>	BH-M18S:	<input type="text" value="13.03"/>
Time:	<input type="text" value="9:32 am"/>	BH-M19D:	<input type="text" value="14.39"/>
Time:	<input type="text" value="9:30 am"/>	BH-M19S:	<input type="text" value="13.33"/>
Time:	<input type="text" value="9:58 am"/>	BH-M20D:	<input type="text" value="14.05"/>
Time:	<input type="text" value="9:57 am"/>	BH-M20S:	<input type="text" value="13.48"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:49 am"/>	BH-M22D:	<input type="text" value="15.32"/>
Time:	<input type="text" value="9:46 am"/>	BH-M22S:	<input type="text" value="14.14"/>
Time:	<input type="text" value="8:24 am"/>	LPSPB04:	<input type="text" value="13.92"/>

Description of daily mining activities

Pump beside LPSPB04 not operating. Same totaliser value as yesterday.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	8:21 am	6.75	57372	-252	0.57	17.92	4.0
UGM-M12S	8:39 am	7.69	68592	-59.9	1.09	17.73	0.1
BH-21D	9:05 am	6.76	57442	-228	0.22	20.46	4.6
BH-21S	9:00 am	5.33	61861	11.5	5.33	17.62	0.18

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="8.03"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="7:15 am"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:33 am"/>	UGM-M8D:	<input type="text" value="14.59"/>
Time:	<input type="text" value="9:35 am"/>	UGM-M8S:	<input type="text" value="14.13"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:08 am"/>	UGM-M15D:	<input type="text" value="13.90"/>
Time:	<input type="text" value="9:10 am"/>	UGM-M15S:	<input type="text" value="13.625"/>
Time:	<input type="text" value="9:52 am"/>	BH-M17D:	<input type="text" value="14.33"/>
Time:	<input type="text" value="9:50 am"/>	BH-M17S:	<input type="text" value="13.18"/>
Time:	<input type="text" value="9:43 am"/>	BH-M18D:	<input type="text" value="14.15"/>
Time:	<input type="text" value="9:46 am"/>	BH-M18S:	<input type="text" value="13.04"/>
Time:	<input type="text" value="9:05 am"/>	BH-M19D:	<input type="text" value="14.30"/>
Time:	<input type="text" value="9:03 am"/>	BH-M19S:	<input type="text" value="13.33"/>
Time:	<input type="text" value="9:21 am"/>	BH-M20D:	<input type="text" value="13.98"/>
Time:	<input type="text" value="9:23 am"/>	BH-M20S:	<input type="text" value="13.52"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:13 am"/>	BH-M22D:	<input type="text" value="15.11"/>
Time:	<input type="text" value="9:16 am"/>	BH-M22S:	<input type="text" value="14.14"/>
Time:	<input type="text" value="10:11 am"/>	LPSPB04:	<input type="text" value="13.82"/>

Description of daily mining activities

Pump beside LPSPB04 not operating. Totaliser value is the same as yesterday - 439982.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:20 am	6.59	56814	-232	0.32	17.92	4.0
UGM-M12S	10:38 am	7.62	67803	-54.6	0.97	17.42	0.0
BH-21D	10:49 am	6.63	56739	-219	0.27	19.94	5.4
BH-21S	11:06 am	6.49	57461	2.1	6.05	17.19	0.2

FIELD pH

SPD-HM: <input style="width: 100px; height: 25px;" type="text"/>	SPD-SAND: <input style="width: 100px; height: 25px;" type="text"/>	Process Water Pond: <input style="width: 100px; height: 25px; text-align: center; value: 8.05;" type="text"/>
Time: <input style="width: 100px; height: 25px;" type="text"/>	Time: <input style="width: 100px; height: 25px;" type="text"/>	Time: <input style="width: 100px; height: 25px; text-align: center; value: 11:25 am;" type="text"/>



Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="8:29 am"/>	UGM-M8D:	<input type="text" value="14.53"/>
Time:	<input type="text" value="8:31 am"/>	UGM-M8S:	<input type="text" value="14.12"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:56 am"/>	UGM-M15D:	<input type="text" value="13.60"/>
Time:	<input type="text" value="7:56 am"/>	UGM-M15S:	<input type="text" value="13.62"/>
Time:	<input type="text" value="9:01 am"/>	BH-M17D:	<input type="text" value="14.26"/>
Time:	<input type="text" value="9:02 am"/>	BH-M17S:	<input type="text" value="13.16"/>
Time:	<input type="text" value="8:42 am"/>	BH-M18D:	<input type="text" value="14.12"/>
Time:	<input type="text" value="8:46 am"/>	BH-M18S:	<input type="text" value="13.035"/>
Time:	<input type="text" value="7:49 am"/>	BH-M19D:	<input type="text" value="14.225"/>
Time:	<input type="text" value="7:47 am"/>	BH-M19S:	<input type="text" value="13.33"/>
Time:	<input type="text" value="8:17 am"/>	BH-M20D:	<input type="text" value="13.91"/>
Time:	<input type="text" value="8:20 am"/>	BH-M20S:	<input type="text" value="13.52"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:08 am"/>	BH-M22D:	<input type="text" value="14.62"/>
Time:	<input type="text" value="8:10 am"/>	BH-M22S:	<input type="text" value="14.12"/>
Time:	<input type="text" value="9:13 am"/>	LPSPB04:	<input type="text" value="13.74"/>

Description of daily mining activities

BH-M22D smells strongly of the araldite PVC glue

HBF reinjection pump totaliser reading 20288.839

UGM-M12D - sulphur odour
BH-M21D - sulphur odour

P2 - 30L/second since 08:50

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:13 am	6.68	54309	-251.6	0.58	17.66	3.0
UGM-M12S	9:50 am	7.61	67029	81.7	1.48	16.5	0.1
BH-21D	10:43 am	6.67	54855	-213.5	0.34	29.7	5
BH-21S	10:32 am	6.54	62088	-31.6	5.84	16.99	0.18

FIELD pH

SPD-HM:	7.98	SPD-SAND:	8.06	Process Water Pond:	8.00
Time:	11:29 am	Time:	11:32 am	Time:	11:37 am

Totaliser readings

P2 bore:		Time:	
LPSPB04 :	439982.299	Time:	9:13 am

Description:

Description:

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
T2 Stockpile Sump	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Spill dam	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="11:38 am"/>	UGM-M8D:	<input type="text" value="15.08"/>
Time:	<input type="text" value="11:40 am"/>	UGM-M8S:	<input type="text" value="14.24"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="10:00 am"/>	UGM-M15D:	<input type="text" value="13.61"/>
Time:	<input type="text" value="10:01 am"/>	UGM-M15S:	<input type="text" value="13.62"/>
Time:	<input type="text" value="11:51 am"/>	BH-M17D:	<input type="text" value="14.67"/>
Time:	<input type="text" value="11:52 am"/>	BH-M17S:	<input type="text" value="13.26"/>
Time:	<input type="text" value="11:46 am"/>	BH-M18D:	<input type="text" value="14.44"/>
Time:	<input type="text" value="11:48 am"/>	BH-M18S:	<input type="text" value="13.13"/>
Time:	<input type="text" value="8:26 am"/>	BH-M19D:	<input type="text" value="14.43"/>
Time:	<input type="text" value="8:25 am"/>	BH-M19S:	<input type="text" value="12.89"/>
Time:	<input type="text" value="10:54 am"/>	BH-M20D:	<input type="text" value="16.04"/>
Time:	<input type="text" value="10:55 am"/>	BH-M20S:	<input type="text" value="13.50"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="10:45 am"/>	BH-M22D:	<input type="text" value="15:17"/>
Time:	<input type="text" value="10:48 am"/>	BH-M22S:	<input type="text" value="14.10"/>
Time:	<input type="text" value="12:01 pm"/>	LPSPB04:	<input type="text" value="20.50"/>

Description of daily mining activities

BH M22D smelled of PVC glue

BH M19D, UGM-M12D, BH-M21D smelled of sulphur

Bore beside LPSPB04 pumping at 7.7 sec/10L. Totaliser value in KL

HBF totaliser value 20288.825kL

P2 bore not operating today or overnight.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:24 pm	6.69	55925	-241.6	0.51	18.78	3.8
UGM-M12S	12:51 pm	7.76	66570	-17.6	0.82	18.66	0.075
BH-21D	1:07 pm	6.69	55816	-220.3	0.25	21	4
BH-21S	1:24 pm	6.60	60956	-34.9	0.74	19.81	0.6

FIELD pH

SPD-HM:	7.89	SPD-SAND:	7.93	Process Water Pond:	7.91
Time:	6:57 am	Time:	7:00 am	Time:	7:03 am

Totaliser readings

P2 bore:		Time:	1:46 pm
LPSPB04 :	440609.039	Time:	12:03 pm

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="10:57 am"/>	UGM-M8D:	<input type="text" value="15.03"/>
Time:	<input type="text" value="10:48 am"/>	UGM-M8S:	<input type="text" value="14.313"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:54 am"/>	UGM-M15D:	<input type="text" value="14.01"/>
Time:	<input type="text" value="8:51 am"/>	UGM-M15S:	<input type="text" value="13.625"/>
Time:	<input type="text" value="11:24 am"/>	BH-M17D:	<input type="text" value="14.67"/>
Time:	<input type="text" value="11:26 am"/>	BH-M17S:	<input type="text" value="13.37"/>
Time:	<input type="text" value="11:17 am"/>	BH-M18D:	<input type="text" value="14.525"/>
Time:	<input type="text" value="11:16 am"/>	BH-M18S:	<input type="text" value="13.29"/>
Time:	<input type="text" value="8:43 am"/>	BH-M19D:	<input type="text" value="15.508"/>
Time:	<input type="text" value="8:46 am"/>	BH-M19S:	<input type="text" value="13.355"/>
Time:	<input type="text" value="9:29 am"/>	BH-M20D:	<input type="text" value="16.43"/>
Time:	<input type="text" value="9:31 am"/>	BH-M20S:	<input type="text" value="13.55"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:23 am"/>	BH-M22D:	<input type="text" value="15.54"/>
Time:	<input type="text" value="9:17 am"/>	BH-M22S:	<input type="text" value="14.125"/>
Time:	<input type="text" value="11:40 am"/>	LPSPB04:	<input type="text" value="20.82"/>

Description of daily mining activities

PSD_02: 7.90 pH at 0755
 Bore beside LPSPB04 pumping at 10L/7.7 seconds
 HBF totaliser value 20288.825kL
 P2 bore not operating

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:02 pm	6.76	54627	-260.2	0.85	18.88	4.0
UGM-M12S	12:20 pm	7.82	69850	-77.4	0.88	18.88	0.2
BH-21D	12:33 pm	6.73	58727	-214.6	0.24	20.95	3.8
BH-21S	1:03 pm	6.66	53624	-1.2	2.36	19.79	0.4

FIELD pH

SPD-HM:	7.81	SPD-SAND:	7.97	Process Water Pond:	7.86
Time:	7:50 am	Time:	7:50 am	Time:	7:53 am



Totaliser readings

P2 bore:		Time:	
LPSPB04 :	441718.258	Time:	11:42 am

Description: HBF totaliser location (near LPSPB04)

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

Kaitlyn Brodie Luke

Date:

17 September 2020

STANDING WATER LEVEL (mbTOC)

Time:	10:13 am	UGM-M1D:	15.61
Time:	10:14 am	UGM-M1S:	13.75
Time:	10:27 am	UGM-M2D:	15.487
Time:	10:23 am	UGM-M2S:	14.845
Time:	10:33 am	UGM-M4D:	15.518
Time:	9:52 am	BH-M16D:	14.74
Time:	9:49 am	BH-M16S:	15.705
Time:	9:04 am	BH-M23D:	15.86
Time:	9:01 am	BH-M23S:	15.365
Time:	9:42 am	BH-M24D:	15.53
Time:	9:39 am	BH-M24S:	12.54
Time:	8:31 am	BH-M25D:	13.585
Time:	8:37 am	BH-M25S:	13.07

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener	7:28 am	7.84	55905	18.2	7.02	21.65
HBF Tank Tap	7:47 am	8.08	22386	51.6	4.04	15.14
Stockpile Sump	8:04 am	8.04	55917	78.1	6.81	17.9

FIELD PARAMETERS

Well ID	Time	pH Units	Sp. Cond us/cm	Redox mV	DO Mg/L	Temp Deg Celcius
T2 Stockpile Sump	7:37 am	7.85	69044	49.7	5.71	14.37
Spill dam	8:11 am	8.05	55436	62.2	6.39	17.97

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="8:24 am"/>	UGM-M8D:	<input type="text" value="15.00"/>
Time:	<input type="text" value="8:22 am"/>	UGM-M8S:	<input type="text" value="14.30"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="7:22 am"/>	UGM-M15D:	<input type="text" value="13.87"/>
Time:	<input type="text" value="7:20 am"/>	UGM-M15S:	<input type="text" value="13.64"/>
Time:	<input type="text" value="10:20 am"/>	BH-M17D:	<input type="text" value="14.595"/>
Time:	<input type="text" value="10:18 am"/>	BH-M17S:	<input type="text" value="13.34"/>
Time:	<input type="text" value="9:07 am"/>	BH-M18D:	<input type="text" value="14.405"/>
Time:	<input type="text" value="8:36 am"/>	BH-M18S:	<input type="text" value="13.24"/>
Time:	<input type="text" value="7:15 am"/>	BH-M19D:	<input type="text" value="14.465"/>
Time:	<input type="text" value="7:13 am"/>	BH-M19S:	<input type="text" value="13.35"/>
Time:	<input type="text" value="7:33 am"/>	BH-M20D:	<input type="text" value="16.393"/>
Time:	<input type="text" value="7:35 am"/>	BH-M20S:	<input type="text" value="13.50"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="7:27 am"/>	BH-M22D:	<input type="text" value="15.47"/>
Time:	<input type="text" value="7:28 am"/>	BH-M22S:	<input type="text" value="14.19"/>
Time:	<input type="text" value="11:57 am"/>	LPSPB04:	<input type="text" value="20.722"/>

Description of daily mining activities

PSD_02 pH - 7.88

Bore beside LPSPB04 pumping at about 10L/7.7 seconds

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:37 pm	6.75	58035	-201.7	0.52	19.99	3.4
UGM-M12S	12:20 pm	7.79	69091	38.7	0.96	19.67	0.125
BH-21D	12:51 pm	6.75	58029	-218.1	0.31	21.37	4.4
BH-21S	1:06 pm	6.65	63993	-61.6	0.71	20.36	0.3

FIELD pH

SPD-HM: <input style="width: 100%;" type="text" value="7.74"/>	SPD-SAND: <input style="width: 100%;" type="text" value="7.90"/>	Process Water Pond: <input style="width: 100%;" type="text" value="7.84"/>
Time: <input style="width: 100%;" type="text" value="6:43 am"/>	Time: <input style="width: 100%;" type="text" value="6:47 am"/>	Time: <input style="width: 100%;" type="text" value="6:50 am"/>

Totaliser readings

P2 bore: <input style="width: 100%;" type="text" value="Not running"/>	Time: <input style="width: 100%;" type="text" value="1:22 pm"/>
LPSPB04 : <input style="width: 100%;" type="text" value="442816.750"/>	Time: <input style="width: 100%;" type="text" value="12:01 pm"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:48 am"/>	UGM-M8D:	<input type="text" value="15.05"/>
Time:	<input type="text" value="7:50 am"/>	UGM-M8S:	<input type="text" value="14.313"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="7:25 am"/>	UGM-M15D:	<input type="text" value="13.89"/>
Time:	<input type="text" value="7:24 am"/>	UGM-M15S:	<input type="text" value="13.63"/>
Time:	<input type="text" value="7:57 am"/>	BH-M17D:	<input type="text" value="14.62"/>
Time:	<input type="text" value="7:59 am"/>	BH-M17S:	<input type="text" value="13.372"/>
Time:	<input type="text" value="8:02 am"/>	BH-M18D:	<input type="text" value="14.417"/>
Time:	<input type="text" value="8:04 am"/>	BH-M18S:	<input type="text" value="13.27"/>
Time:	<input type="text" value="7:19 am"/>	BH-M19D:	<input type="text" value="14.48"/>
Time:	<input type="text" value="7:16 am"/>	BH-M19S:	<input type="text" value="13.327"/>
Time:	<input type="text" value="7:39 am"/>	BH-M20D:	<input type="text" value="16.51"/>
Time:	<input type="text" value="7:38 am"/>	BH-M20S:	<input type="text" value="13.494"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="7:31 am"/>	BH-M22D:	<input type="text" value="15.596"/>
Time:	<input type="text" value="7:29 am"/>	BH-M22S:	<input type="text" value="14.15"/>
Time:	<input type="text" value="8:18 am"/>	LPSPB04:	<input type="text" value="20.825"/>

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	8:34 am	6.62	55177	-244.1	0.58	19.02	3.4
UGM-M12S	8:54 am	7.68	65920	-71.0	1.0	18.84	0.6
BH-21D	9:21 am	6.64	55917	-214.6	0.22	20.67	3.4
BH-21S	9:37 am	6.47	53459	-45.6	2.27	19.47	0.3

FIELD pH

SPD-HM: <input style="width: 100px;" type="text" value="7.89"/>	SPD-SAND: <input style="width: 100px;" type="text" value="7.92"/>	Process Water Pond: <input style="width: 100px;" type="text" value="7.71"/>
Time: <input style="width: 100px;" type="text" value="10:15 am"/>	Time: <input style="width: 100px;" type="text" value="10:17 am"/>	Time: <input style="width: 100px;" type="text" value="10:04 am"/>

Totaliser readings

P2 bore: <input style="width: 100px;" type="text" value="Not"/>	Time: <input style="width: 100px;" type="text"/>
LPSPB04 : <input style="width: 100px;" type="text" value="443765.820"/>	Time: <input style="width: 100px;" type="text" value="8:19 am"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician: Kaitlyn Brodie Luke Griffiths

Date: 20 September 2020

STANDING WATER LEVEL (mbTOC)

Time:	7:51 am	UGM-M8D:	16.90
Time:	7:48 am	UGM-M8S:	14.345
Time:		UGM-M12D:	
Time:		UGM-M12S:	
Time:	10:05 am	UGM-M15D:	13.077
Time:	10:06 am	UGM-M15S:	13.63
Time:	8:00 am	BH-M17D:	13.86
Time:	8:02 am	BH-M17S:	13.38
Time:	8:09 am	BH-M18D:	12.28
Time:	8:13 am	BH-M18S:	13.32
Time:	8:21 am	BH-M19D:	14.48
Time:	8:19 am	BH-M19S:	13.34
Time:	9:32 am	BH-M20D:	14.97
Time:	9:33 am	BH-M20S:	13.565
Time:		BH-M21D:	
Time:		BH-M21S:	
Time:	9:55 am	BH-M22D:	14.955
Time:	9:58 am	BH-M22S:	13.15
Time:	8:55 am	LPSPB04:	14.455

Description of daily mining activities

HBF Tap: pH 7.70 at 07:10
 Dipper not working well
 bore beside LPSPB04 not operating

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	9:15 am	6.60	55271	-217.6	0.51	18.39	3.0
UGM-M12S	9:08 am	7.65	66029	194.4	6.32	17.26	0.1
BH-21D	9:53 am	6.56	54744	-199.4	0.23	20.23	4.2
BH-21S	9:43 am	6.52	58899	-62.3	0.92	19.50	0.1

FIELD pH

SPD-HM:	7.59	SPD-SAND:	7.73	Process Water Pond:	7.62
Time:	7:04 am	Time:	7:06 am	Time:	7:10 am

Totaliser readings

P2 bore:		Time:	
LPSPB04 :	444516.232	Time:	8:55 am

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:07 am"/>	UGM-M8D:	<input type="text" value="15.827"/>
Time:	<input type="text" value="9:11 am"/>	UGM-M8S:	<input type="text" value="14.487"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="9:40 am"/>	UGM-M15D:	<input type="text" value="13.78"/>
Time:	<input type="text" value="9:42 am"/>	UGM-M15S:	<input type="text" value="13.63"/>
Time:	<input type="text" value="9:20 am"/>	BH-M17D:	<input type="text" value="15.23"/>
Time:	<input type="text" value="9:21 am"/>	BH-M17S:	<input type="text" value="13.49"/>
Time:	<input type="text" value="9:25 am"/>	BH-M18D:	<input type="text" value="14.71"/>
Time:	<input type="text" value="9:27 am"/>	BH-M18S:	<input type="text" value="13.347"/>
Time:	<input type="text" value="9:35 am"/>	BH-M19D:	<input type="text" value="14.595"/>
Time:	<input type="text" value="9:33 am"/>	BH-M19S:	<input type="text" value="13.322"/>
Time:	<input type="text" value="12:04 pm"/>	BH-M20D:	<input type="text" value="16.309"/>
Time:	<input type="text" value="12:01 pm"/>	BH-M20S:	<input type="text" value="13.518"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="9:51 am"/>	BH-M22D:	<input type="text" value="15.315"/>
Time:	<input type="text" value="9:48 am"/>	BH-M22S:	<input type="text" value="14.17"/>
Time:	<input type="text" value="9:59 am"/>	LPSPB04:	<input type="text" value="20.60"/>

Description of daily mining activities

PSD_02 pH 7.77 at 08:53
 Bore beside LPSPB04 pumping
 P2 bore not running
 HBF trialled but not operating long enough to get a sample

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:21 am	6.67	59711	-233.6	0.68	18.24	2.6
UGM-M12S	10:36 am	7.69	71250	-78.3	0.93	8.48	0
BH-21D	10:52 am	6.63	59828	-2018	0.25	20.36	4.2
BH-21S	11:16 am	6.34	62738	-16.5	2.29	18.68	0.5

FIELD pH

SPD-HM:	7.84	SPD-SAND:	7.90	Process Water Pond:	7.56
Time:	2:23 pm	Time:	2:26 pm	Time:	8:53 am

Totaliser readings

P2 bore:		Time:	2:26 pm
LPSPB04 :	444824.205	Time:	10:00 am

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="1:21 pm"/>	UGM-M8D:	<input type="text" value="16.37"/>
Time:	<input type="text" value="1:26 pm"/>	UGM-M8S:	<input type="text" value="13.93"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="6:41 am"/>	UGM-M15D:	<input type="text" value="14.207"/>
Time:	<input type="text" value="6:44 am"/>	UGM-M15S:	<input type="text" value="13.63"/>
Time:	<input type="text" value="7:05 am"/>	BH-M17D:	<input type="text" value="14.74"/>
Time:	<input type="text" value="7:03 am"/>	BH-M17S:	<input type="text" value="12.803"/>
Time:	<input type="text" value="7:00 am"/>	BH-M18D:	<input type="text" value="14.463"/>
Time:	<input type="text" value="7:59 am"/>	BH-M18S:	<input type="text" value="12.756"/>
Time:	<input type="text" value="6:37 am"/>	BH-M19D:	<input type="text" value="14.56"/>
Time:	<input type="text" value="6:38 am"/>	BH-M19S:	<input type="text" value="13.333"/>
Time:	<input type="text" value="6:49 am"/>	BH-M20D:	<input type="text" value="14.239"/>
Time:	<input type="text" value="6:52 am"/>	BH-M20S:	<input type="text" value="13.503"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="6:47 am"/>	BH-M22D:	<input type="text" value="15.379"/>
Time:	<input type="text" value="6:45 am"/>	BH-M22S:	<input type="text" value="14.19"/>
Time:	<input type="text" value="8:37 am"/>	LPSPB04:	<input type="text" value="14.123"/>

Description of daily mining activities

No mining activities occurring and no sampling able to be taken from Spiral Plant Discharge locations.

No pumping at bore beside LPSPB04.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	8:15 am	6.68	57916	0.9	0.47	18.55	1.8
UGM-M12S	8:01 am	7.64	68033	23.9	0.87	18.21	0.1
BH-21D	7:37 am	6.72	58141	19.9	0.28	19.12	4.8
BH-21S	7:30 am	6.63	66130	157.7	0.41	19.49	0.0

FIELD pH

SPD-HM: SPD-SAND: Process Water Pond:
Time: Time: Time:

Totaliser readings

P2 bore: Time:
LPSPB04 : Time:
HBF pH: Time:
HBF pH: Time:

Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

Kaitlyn

Date:

6 October 2020

STANDING WATER LEVEL (mbTOC)

Time:	2:02 pm	UGM-M1D:	15.48
Time:	2:04 pm	UGM-M1S:	13.67
Time:	2:20 pm	UGM-M2D:	16.105
Time:	2:22 pm	UGM-M2S:	14.84
Time:	2:37 pm	UGM-M4D:	16.112
Time:	1:46 pm	BH-M16D:	15.67
Time:	1:43 pm	BH-M16S:	14.68
Time:	12:40 pm	BH-M23D:	15.90
Time:	12:24 pm	BH-M23S:	15.42
Time:	1:29 pm	BH-M24D:	14.71
Time:	1:32 pm	BH-M24S:	13.72
Time:	11:51 am	BH-M25D:	13.725
Time:	11:52 am	BH-M25S:	13.03

Description of daily mining activities

Temperature parameters aren't accurate

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener	2:58 pm	7.64	20400.8	106.9	2.54	
HBF Tank Tap	3:10 pm	7.85	13819.9	-2.5	3.19	
Stockpile Sump	3:22 pm	7.54	18759	-25.1	0.8	

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
T2 Stockpile Sump	3:03 pm	7.67	23455.6	31.7	2.74	
Spill dam	3:29 pm	7.84	18396.1	-37.4	3.11	

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="10:50 am"/>	UGM-M8D:	<input type="text" value="15.39"/>
Time:	<input type="text" value="10:52 am"/>	UGM-M8S:	<input type="text" value="14.188"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="12:07 pm"/>	UGM-M15D:	<input type="text" value="14.472"/>
Time:	<input type="text" value="12:12 pm"/>	UGM-M15S:	<input type="text" value="13.64"/>
Time:	<input type="text" value="10:35 am"/>	BH-M17D:	<input type="text" value="15.06"/>
Time:	<input type="text" value="10:38 am"/>	BH-M17S:	<input type="text" value="13.007"/>
Time:	<input type="text" value="10:12 am"/>	BH-M18D:	<input type="text" value="14.73"/>
Time:	<input type="text" value="10:16 am"/>	BH-M18S:	<input type="text" value="12.59"/>
Time:	<input type="text" value="11:32 am"/>	BH-M19D:	<input type="text" value="14.775"/>
Time:	<input type="text" value="11:29 am"/>	BH-M19S:	<input type="text" value="13.32"/>
Time:	<input type="text" value="1:06 pm"/>	BH-M20D:	<input type="text" value="14.47"/>
Time:	<input type="text" value="1:08 pm"/>	BH-M20S:	<input type="text" value="13.42"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="12:50 pm"/>	BH-M22D:	<input type="text" value="15.55"/>
Time:	<input type="text" value="12:52 pm"/>	BH-M22S:	<input type="text" value="14.11"/>
Time:	<input type="text" value="8:02 am"/>	LPSPB04:	<input type="text" value="14.173"/>

Description of daily mining activities

Minor backfill into sinkhole. No mining therefore SPD not operating.

Temperature probe not accurate.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	9:06 am	6.73	21995.1	23.4	0.14	31.2	1.5
UGM-M12S	9:18 am	7.59	25643.5	-33.8	0.48	30.7	1.1
BH-21D	9:37 am	6.82	22566	-9.4	0.04	31	2.0
BH-21S	9:44 am	5.55	24559	161.2	-0.11	32	0.15

FIELD pH

SPD-HM: <input style="width: 100%;" type="text"/>	SPD-SAND: <input style="width: 100%;" type="text"/>	Process Water Pond: <input style="width: 100%; text-align: center; value: 7.62;" type="text"/>
Time: <input style="width: 100%;" type="text"/>	Time: <input style="width: 100%;" type="text"/>	Time: <input style="width: 100%; text-align: center; value: 3:16 pm;" type="text"/>

Totaliser readings

P2 bore: <input style="width: 100%;" type="text"/>	Time: <input style="width: 100%;" type="text"/>
LPSPB04 : <input style="width: 100%; text-align: center; value: 448537.750;" type="text"/>	Time: <input style="width: 100%; text-align: center; value: 8:03 am;" type="text"/>
HBF pH: <input style="width: 100%;" type="text"/>	Time: <input style="width: 100%;" type="text"/>
HBF pH: <input style="width: 100%;" type="text"/>	Time: <input style="width: 100%;" type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text"/>	UGM-M8D:	<input type="text"/>
Time:	7:01 am	UGM-M8S:	14.14
Time:	<input type="text"/>	UGM-M12D:	Logger
Time:	<input type="text"/>	UGM-M12S:	Logger
Time:	6:39 am	UGM-M15D:	14.38
Time:	6:40 am	UGM-M15S:	13.64
Time:	7:19 am	BH-M17D:	14.645
Time:	7:24 am	BH-M17S:	13.095
Time:	7:12 am	BH-M18D:	14.61
Time:	7:15 am	BH-M18S:	12.77
Time:	6:33 am	BH-M19D:	14.67
Time:	6:35 am	BH-M19S:	13.31
Time:	6:52 am	BH-M20D:	14.36
Time:	6:50 am	BH-M20S:	13.52
Time:	<input type="text"/>	BH-M21D:	Logger
Time:	<input type="text"/>	BH-M21S:	Logger
Time:	6:46 am	BH-M22D:	15.57
Time:	6:44 am	BH-M22S:	14.17
Time:	8:08 am	LPSPB04:	14.08

Description of daily mining activities

HBF in stope 6

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	8:09 am	6.89	19294.3	100.7	2.78		0.2
UGM-M12S	7:56 am	7.52	23322.9		3.05		0.1
BH-21D	8:46 am	6.81	21017.7	-2.3	-0.02		1.6
BH-21S	8:34 am	6.64	23029.3	128.8	0.03		0.15

FIELD pH

SPD-HM:		SPD-SAND:		Process Water Pond:	7.57
Time:		Time:		Time:	9:43 am

Totaliser readings

P2 bore:		Time:	
LPSPB04 :		Time:	
HBF pH:	7.77	Time:	9:54 am
HBF pH:		Time:	

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="6:38 am"/>	UGM-M8D:	<input type="text" value="14.835"/>
Time:	<input type="text" value="6:37 am"/>	UGM-M8S:	<input type="text" value="14.103"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:20 am"/>	UGM-M15D:	<input type="text" value="14.28"/>
Time:	<input type="text" value="7:21 am"/>	UGM-M15S:	<input type="text" value="13.64"/>
Time:	<input type="text" value="7:49 am"/>	BH-M17D:	<input type="text" value="14.58"/>
Time:	<input type="text" value="7:48 am"/>	BH-M17S:	<input type="text" value="13.075"/>
Time:	<input type="text" value="7:42 am"/>	BH-M18D:	<input type="text" value="14.425"/>
Time:	<input type="text" value="7:40 am"/>	BH-M18S:	<input type="text" value="12.82"/>
Time:	<input type="text" value="7:33 am"/>	BH-M19D:	<input type="text" value="14.54"/>
Time:	<input type="text" value="7:31 am"/>	BH-M19S:	<input type="text" value="13.31"/>
Time:	<input type="text" value="6:59 am"/>	BH-M20D:	<input type="text" value="14.22"/>
Time:	<input type="text" value="7:00 am"/>	BH-M20S:	<input type="text" value="13.51"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:11 am"/>	BH-M22D:	<input type="text" value="15.44"/>
Time:	<input type="text" value="7:13 am"/>	BH-M22S:	<input type="text" value="14.145"/>
Time:	<input type="text" value="8:25 am"/>	LPSPB04:	<input type="text" value="13.995"/>

Description of daily mining activities

HBF - started at 08:40 to 17:00
Injecting at about 220m³/h for a total 450 tonnes

BH-M18D 12:48 - 13.125
BH-M18D 15:07 - 13.605
BH-M18D 17:42 - 13.78

BH-M18S 12:52 - 11.84
BH-M18S 15:01 - 11.355
BH-M18S 17:48 - 11.24

BH-M17D 12:59 - 13.463
BH-M17D 15:17 - 13.985
BH-M17D 17:32 - 14.22

BH-M17S 12:57 - 11.004
BH-M17S 15:13 - 10.191
BH-M17S 17:35 - 10.02

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:08 am		58078	-184.4	0.54	17.4	3.2
UGM-M12S	10:52 am	7.47	70867	16.5	0.61	17.4	0.16
BH-21D	9:44 am	6.65	56937	-147.9	0.16	19.3	3.4
BH-21S	10:04 am	6.55	57767	21	0.54	18.5	0.1

FIELD pH

SPD-HM: <input style="width: 100px; height: 25px;" type="text"/>	SPD-SAND: <input style="width: 100px; height: 25px;" type="text"/>	Process Water Pond: <input style="width: 100px; height: 25px; text-align: center; value: 7.55;" type="text"/>
Time: <input style="width: 100px; height: 25px;" type="text"/>	Time: <input style="width: 100px; height: 25px;" type="text"/>	Time: <input style="width: 100px; height: 25px; text-align: center; value: 12:15 pm;" type="text"/>



Totaliser readings

P2 bore: <input style="width: 100px; height: 25px;" type="text"/>	Time: <input style="width: 100px; height: 25px;" type="text"/>
LPSPB04 : <input style="width: 100px; height: 25px; text-align: center; value: 448537.751;" type="text"/>	Time: <input style="width: 100px; height: 25px; text-align: center; value: 8:25 am;" type="text"/>
HBF pH: <input style="width: 100px; height: 25px; text-align: center; value: 7.37;" type="text"/>	Time: <input style="width: 100px; height: 25px; text-align: center; value: 12:07 pm;" type="text"/>
HBF pH: <input style="width: 100px; height: 25px; text-align: center; value: 7.26;" type="text"/>	Time: <input style="width: 100px; height: 25px; text-align: center; value: 3:56 pm;" type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="8:18 am"/>	UGM-M8D:	<input type="text" value="15.495"/>
Time:	<input type="text" value="8:19 am"/>	UGM-M8S:	<input type="text" value="13.454"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:14 am"/>	UGM-M15D:	<input type="text" value="14.475"/>
Time:	<input type="text" value="7:17 am"/>	UGM-M15S:	<input type="text" value="13.64"/>
Time:	<input type="text" value="8:50 am"/>	BH-M17D:	<input type="text" value="15.18"/>
Time:	<input type="text" value="8:47 am"/>	BH-M17S:	<input type="text" value="11.628"/>
Time:	<input type="text" value="8:37 am"/>	BH-M18D:	<input type="text" value="14.747"/>
Time:	<input type="text" value="8:34 am"/>	BH-M18S:	<input type="text" value="12.078"/>
Time:	<input type="text" value="7:06 am"/>	BH-M19D:	<input type="text" value="14.68"/>
Time:	<input type="text" value="7:04 am"/>	BH-M19S:	<input type="text" value="12.689"/>
Time:	<input type="text" value="7:39 am"/>	BH-M20D:	<input type="text" value="14.453"/>
Time:	<input type="text" value="7:37 am"/>	BH-M20S:	<input type="text" value="13.49"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:27 am"/>	BH-M22D:	<input type="text" value="15.435"/>
Time:	<input type="text" value="7:24 am"/>	BH-M22S:	<input type="text" value="14.148"/>
Time:	<input type="text" value="11:36 am"/>	LPSPB04:	<input type="text" value="14.083"/>

Description of daily mining activities

Clean water injected into HBF. No slurry today

BH-M17D 13:08 - 14.965

BH-M17D 14:27 - 14.88

BH-M17S 13:13 - 11.985

BH-M17S 14:30 - 12.065

BH-M18D 13:22 - 14.81

BH-M18D 14:34 - 14.605

BH-M18S 13:25 - 12.29

BH-M18S 14:36 - 12.345

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:32 am	6.25	55840	-141.4	0.27	17.7	3.2
UGM-M12S	10:55 am	6.93	68419	-22.2	0.7	17.2	0.25
BH-21D	11:43 am	6.22	56245	-157.1	0.11	19.7	3.8
BH-21S	11:25 am	6.2	57064	84.3	0.43	18.2	0.0

FIELD pH

SPD-HM:	<input style="width: 90%;" type="text"/>	SPD-SAND:	<input style="width: 90%;" type="text"/>	Process Water Pond:	<input style="width: 90%; text-align: center; value: 6.92;" type="text"/>
Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%; text-align: center; value: 12:43 pm;" type="text"/>

Totaliser readings

P2 bore:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
LPSPB04 :	<input style="width: 90%; text-align: center; value: 448537.751;" type="text"/>	Time:	<input style="width: 90%; text-align: center; value: 11:36 am;" type="text"/>
HBF pH:	<input style="width: 90%; text-align: center; value: 6.80;" type="text"/>	Time:	<input style="width: 90%; text-align: center; value: 12:28 pm;" type="text"/>
HBF pH:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text"/>	UGM-M8D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M8S:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text"/>	UGM-M15D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M15S:	<input type="text"/>
Time:	<input type="text"/>	BH-M17D:	<input type="text"/>
Time:	<input type="text"/>	BH-M17S:	<input type="text"/>
Time:	<input type="text"/>	BH-M18D:	<input type="text"/>
Time:	<input type="text"/>	BH-M18S:	<input type="text"/>
Time:	<input type="text"/>	BH-M19D:	<input type="text"/>
Time:	<input type="text"/>	BH-M19S:	<input type="text"/>
Time:	<input type="text"/>	BH-M20D:	<input type="text"/>
Time:	<input type="text"/>	BH-M20S:	<input type="text"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text"/>	BH-M22D:	<input type="text"/>
Time:	<input type="text"/>	BH-M22S:	<input type="text"/>
Time:	<input type="text"/>	LPSPB04:	<input type="text"/>

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
UGM-M12S	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
BH-21D	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
BH-21S	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

FIELD pH

Spiral Plant Discharge:

Process Water Pond:

Time:

Time:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:49 am"/>	UGM-M8D:	<input type="text" value="15.538"/>
Time:	<input type="text" value="9:59 am"/>	UGM-M8S:	<input type="text" value="15.026"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:12 am"/>	UGM-M15D:	<input type="text" value="14.302"/>
Time:	<input type="text" value="9:14 am"/>	UGM-M15S:	<input type="text" value="13.643"/>
Time:	<input type="text" value="8:50 am"/>	BH-M17D:	<input type="text" value="14.809"/>
Time:	<input type="text" value="8:52 am"/>	BH-M17S:	<input type="text" value="13.530"/>
Time:	<input type="text" value="8:57 am"/>	BH-M18D:	<input type="text" value="14.521"/>
Time:	<input type="text" value="8:55 am"/>	BH-M18S:	<input type="text" value="13.352"/>
Time:	<input type="text" value="9:03 am"/>	BH-M19D:	<input type="text" value="14.638"/>
Time:	<input type="text" value="9:07 am"/>	BH-M19S:	<input type="text" value="13.372"/>
Time:	<input type="text" value="9:31 am"/>	BH-M20D:	<input type="text" value="14.893"/>
Time:	<input type="text" value="9:34 am"/>	BH-M20S:	<input type="text" value="14.482"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:23 am"/>	BH-M22D:	<input type="text" value="15.637"/>
Time:	<input type="text" value="9:19 am"/>	BH-M22S:	<input type="text" value="14.165"/>
Time:	<input type="text" value="11:36 am"/>	LPSPB04:	<input type="text" value="14.542"/>

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:39 am	6.64	53952	-245.1	0.71	18.01	0.8
UGM-M12S	11:28 am	7.56	64430	-14.4	0.92	17.96	0.0
BH-M21D	11:01 am	6.56	54047	-212.4	0.28	20.23	5.2
BH-M21S	10:44 am	6.58	61152	54.4	0.58	19.09	0.0

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="7.48"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="8:25 am"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="12:01 pm"/>	UGM-M8D:	<input type="text" value="14.961"/>
Time:	<input type="text" value="12:05 pm"/>	UGM-M8S:	<input type="text" value="14.470"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="11:02 am"/>	UGM-M15D:	<input type="text" value="14.340"/>
Time:	<input type="text" value="11:04 am"/>	UGM-M15S:	<input type="text" value="13.650"/>
Time:	<input type="text" value="11:52 am"/>	BH-M17D:	<input type="text" value="14.580"/>
Time:	<input type="text" value="11:48 am"/>	BH-M17S:	<input type="text" value="13.310"/>
Time:	<input type="text" value="11:37 am"/>	BH-M18D:	<input type="text" value="14.170"/>
Time:	<input type="text" value="11:33 am"/>	BH-M18S:	<input type="text" value="13.400"/>
Time:	<input type="text" value="11:14 am"/>	BH-M19D:	<input type="text" value="14.630"/>
Time:	<input type="text" value="11:14 am"/>	BH-M19S:	<input type="text" value="13.340"/>
Time:	<input type="text" value="10:04 am"/>	BH-M20D:	<input type="text" value="14.410"/>
Time:	<input type="text" value="9:59 am"/>	BH-M20S:	<input type="text" value="13.530"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="10:37 am"/>	BH-M22D:	<input type="text" value="15.630"/>
Time:	<input type="text" value="10:40 am"/>	BH-M22S:	<input type="text" value="14.270"/>
Time:	<input type="text" value="10:18 am"/>	LPSPB04:	<input type="text" value="14.320"/>

Description of daily mining activities

Tripping rods back into stope 6 overnight. Mining commenced at around 9:00. First SPD value is background.

Day shift:
MD from 527m to 519m
Pipe #89-88
392 tonnes

Night shift:
MD from 519m to 512m
Pipe #88-86
600 tonnes

Pullback 200mm/10mins
HP 150m³/hr
MP 140m³/hr

Daily water usage summary
Pumping in the bore beside LPSPB04.
Totaliser value at 11:30 was 445918kL.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	2:33 pm	6.59	60204	-253.0	0.65	17.55	1.6
UGM-M12S	2:07 pm	7.58	69169	-50.7	0.97	17.45	0.1
BH-M21D	1:41 pm	6.58	60228	-223.6	0.43	19.39	5.2
BH-M21S	1:30 pm	6.59	69256	181.4	0.56	18.74	0.0

FIELD pH

SPD-HM:	7.79	SPD-SAND:	7.82	Process Water Pond:	7.75
Time:	7:50 am	Time:	7:55 am	Time:	8:01 am



Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

Dan Condon

Date:

23 September 2020

STANDING WATER LEVEL (mbTOC)

Time:	8:26 am	UGM-M1D:	14.777
Time:	8:32 am	UGM-M1S:	13.720
Time:	8:47 am	UGM-M2D:	15.610
Time:	8:47 am	UGM-M2S:	14.890
Time:	9:03 am	UGM-M4D:	15.620
Time:	9:31 am	UGM-M16D:	15.560
Time:	9:33 am	UGM-M16S:	14.880
Time:	10:50 am	UGM-M23D:	15.950
Time:	10:49 am	UGM-M23S:	15.420
Time:	9:45 am	UGM-M24D:	14.690
Time:	9:47 am	UGM-M24S:	13.860
Time:	11:25 am	UGM-M25D:	13.530
Time:	11:22 am	UGM-M25S:	13.080

Description of daily mining activities

Spill dam dry. Tripping rods back into stope 6 overnight. Mining commenced at around 9:00.

Day shift:

MD from 527m to 519m

Pipe #89-88

392 tonnes

Night shift:

MD from 519m to 512m

Pipe #88-86

600 tonnes

Pullback 200mm/10mins

HP 150m³/hr

MP 140m³/hr

Daily water usage summary

Pumping in the bore beside LPSPB04.

Totaliser value at 11:30 was 445918kL.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener	7:45 am	7.75	56852	221.80	7.45	14.41
HBF Tank Tap						
Stockpile Sump	8:09 am	7.79	53466	139.44	7.78	12.68

FIELD PARAMETERS

Well ID	Time	pH Units	Sp. Cond us/cm	Redox mV	DO Mg/L	Temp Deg Celcius
T2 Stockpile Sump	7:37 am	6.83	33544	199.27	6.35	14.80
Spill dam						



Description:

T2 stockpile sump



Description:

Dry spill dam

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:41 am"/>	UGM-M8D:	<input type="text" value="14.768"/>
Time:	<input type="text" value="7:44 am"/>	UGM-M8S:	<input type="text" value="14.327"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:22 am"/>	UGM-M15D:	<input type="text" value="14.260"/>
Time:	<input type="text" value="8:23 am"/>	UGM-M15S:	<input type="text" value="13.610"/>
Time:	<input type="text" value="7:52 am"/>	BH-M17D:	<input type="text" value="14.320"/>
Time:	<input type="text" value="7:49 am"/>	BH-M17S:	<input type="text" value="13.432"/>
Time:	<input type="text" value="7:59 am"/>	BH-M18D:	<input type="text" value="13.902"/>
Time:	<input type="text" value="8:03 am"/>	BH-M18S:	<input type="text" value="13.320"/>
Time:	<input type="text" value="8:12 am"/>	BH-M19D:	<input type="text" value="14.462"/>
Time:	<input type="text" value="8:14 am"/>	BH-M19S:	<input type="text" value="13.372"/>
Time:	<input type="text" value="8:58 am"/>	BH-M20D:	<input type="text" value="15.750"/>
Time:	<input type="text" value="8:58 am"/>	BH-M20S:	<input type="text" value="13.495"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:47 am"/>	BH-M22D:	<input type="text" value="15.650"/>
Time:	<input type="text" value="8:45 am"/>	BH-M22S:	<input type="text" value="14.202"/>
Time:	<input type="text" value="11:29 am"/>	LPSPB04:	<input type="text" value="20.618"/>

Description of daily mining activities

Mining summary

Day shift:
MD from 512m to 505m
Pipe #86-85
420 tonnes

Night shift:
MD from 505m to 495m
Pipe #85-84
747tonnes

Pullback at 85% recovery
HP 160m³/hr
MP 150m³/hr

Daily water usage summary
Pumping in the bore beside LPSPB04.
Totaliser value at 7:30am was 446705kl

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:08 am	6.51	54685	-249.0	0.78	16.83	1.4
UGM-M12S	10:55 am	7.43	65258	-63.0	1.15	16.90	0.1
BH-M21D	10:24 am	6.44	54240	-235.2	0.39	19.41	4.8
BH-M21S	10:10 am	6.48	62040	57.2	0.47	18.98	0.0

FIELD pH

SPD-HM:	7.71	SPD-SAND:	7.73	Process Water Pond:	7.68
Time:	7:21 am	Time:	7:23 am	Time:	7:28 am

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:36 am"/>	UGM-M8D:	<input type="text" value="17.762"/>
Time:	<input type="text" value="9:39 am"/>	UGM-M8S:	<input type="text" value="14.382"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:16 am"/>	UGM-M15D:	<input type="text" value="14.782"/>
Time:	<input type="text" value="9:15 am"/>	UGM-M15S:	<input type="text" value="13.572"/>
Time:	<input type="text" value="8:52 am"/>	BH-M17D:	<input type="text" value="16.272"/>
Time:	<input type="text" value="8:47 am"/>	BH-M17S:	<input type="text" value="13.541"/>
Time:	<input type="text" value="8:54 am"/>	BH-M18D:	<input type="text" value="15.222"/>
Time:	<input type="text" value="8:56 am"/>	BH-M18S:	<input type="text" value="13.365"/>
Time:	<input type="text" value="9:03 am"/>	BH-M19D:	<input type="text" value="15.021"/>
Time:	<input type="text" value="9:05 am"/>	BH-M19S:	<input type="text" value="13.320"/>
Time:	<input type="text" value="8:36 am"/>	BH-M20D:	<input type="text" value="16.820"/>
Time:	<input type="text" value="8:34 am"/>	BH-M20S:	<input type="text" value="13.561"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:24 am"/>	BH-M22D:	<input type="text" value="16.162"/>
Time:	<input type="text" value="9:21 am"/>	BH-M22S:	<input type="text" value="14.188"/>
Time:	<input type="text" value="7:48 am"/>	LPSPB04:	<input type="text" value="21.210"/>

Description of daily mining activities

Mining summary

Day shift:

MD from 495m to 486m
Pipe #84-82
668 tonnes

Night shift:

MD from 486m to 476m
Pipe #82-80
888 tonnes

Pullback at 85% recovery
HP 165m³/hr
MP 145m³/hr

Daily water usage summary

Pumping in the bore beside LPSPB04.
Totaliser value at 7:30am was 446705kl

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	8:38 am	6.44	54707	-249.2	0.68	16.43	1.9
UGM-M12S	8:17 am	7.71	65056	-66.3	1.21	15.72	0.1
BH-M21D	7:53 am	6.36	54765	-232.4	0.42	18.21	4.6
BH-M21S	7:31 am	6.32	62272	103.4	0.61	16.58	0.0

FIELD pH

SPD-HM:	7.61	SPD-SAND:	7.77	Process Water Pond:	7.49
Time:	10:51 am	Time:	10:55 am	Time:	11:01 am



Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="8:37 am"/>	UGM-M8D:	<input type="text" value="18.010"/>
Time:	<input type="text" value="8:39 am"/>	UGM-M8S:	<input type="text" value="14.770"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:20 am"/>	UGM-M15D:	<input type="text" value="15.040"/>
Time:	<input type="text" value="9:22 am"/>	UGM-M15S:	<input type="text" value="13.572"/>
Time:	<input type="text" value="8:51 am"/>	BH-M17D:	<input type="text" value="16.818"/>
Time:	<input type="text" value="8:48 am"/>	BH-M17S:	<input type="text" value="13.785"/>
Time:	<input type="text" value="8:59 am"/>	BH-M18D:	<input type="text" value="15.820"/>
Time:	<input type="text" value="9:01 am"/>	BH-M18S:	<input type="text" value="13.670"/>
Time:	<input type="text" value="9:09 am"/>	BH-M19D:	<input type="text" value="15.520"/>
Time:	<input type="text" value="9:11 am"/>	BH-M19S:	<input type="text" value="13.320"/>
Time:	<input type="text" value="9:43 am"/>	BH-M20D:	<input type="text" value="17.260"/>
Time:	<input type="text" value="9:43 am"/>	BH-M20S:	<input type="text" value="13.625"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:29 am"/>	BH-M22D:	<input type="text" value="16.642"/>
Time:	<input type="text" value="9:28 am"/>	BH-M22S:	<input type="text" value="14.231"/>
Time:	<input type="text" value="12:09 pm"/>	LPSPB04:	<input type="text" value="17.802"/>

Description of daily mining activities

Mining summary

Day shift:

No mining due to thickener being clogged

Night shift:

MD from 476m to 456m

Pipe #80-77

388 tonnes

HP 165m³/hr

MP 145m³/hr

Daily water usage summary

No pumping in the bore beside LPSPB04.

Totaliser value at 11:30am was 447852kl

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:58 pm	6.61	56450	-190.3	0.51	16.15	1.2
UGM-M12S	12:34 pm	7.59	67274	-21.4	1.10	16.21	0.1
BH-M21D	12:11 pm	6.59	56389	-190.4	0.34	18.12	5.4
BH-M21S	11:40 am	6.60	64272	50.4	0.47	17.52	0.0

FIELD pH

SPD-HM:		SPD-SAND:		Process Water Pond:	7.41
Time:		Time:		Time:	8:32 am



Description: Process water

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:05 am"/>	UGM-M8D:	<input type="text" value="17.032"/>
Time:	<input type="text" value="9:07 am"/>	UGM-M8S:	<input type="text" value="14.571"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:46 am"/>	UGM-M15D:	<input type="text" value="14.932"/>
Time:	<input type="text" value="9:48 am"/>	UGM-M15S:	<input type="text" value="13.587"/>
Time:	<input type="text" value="9:18 am"/>	BH-M17D:	<input type="text" value="15.852"/>
Time:	<input type="text" value="9:16 am"/>	BH-M17S:	<input type="text" value="13.465"/>
Time:	<input type="text" value="9:28 am"/>	BH-M18D:	<input type="text" value="15.172"/>
Time:	<input type="text" value="9:30 am"/>	BH-M18S:	<input type="text" value="11.810"/>
Time:	<input type="text" value="9:38 am"/>	BH-M19D:	<input type="text" value="15.231"/>
Time:	<input type="text" value="9:39 am"/>	BH-M19S:	<input type="text" value="13.320"/>
Time:	<input type="text" value="10:07 am"/>	BH-M20D:	<input type="text" value="15.230"/>
Time:	<input type="text" value="10:10 am"/>	BH-M20S:	<input type="text" value="13.580"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:58 am"/>	BH-M22D:	<input type="text" value="16.130"/>
Time:	<input type="text" value="9:56 am"/>	BH-M22S:	<input type="text" value="14.270"/>
Time:	<input type="text" value="11:22 am"/>	LPSPB04:	<input type="text" value="14.920"/>

Description of daily mining activities

Mining summary

Day shift:

MD from 456m to 444m

Pipe #77-75

760 tonnes

Night shift:

No mining due to pump issues

HP 165m³/hr

MP 145m³/hr

Daily water usage summary

No pumping in the bore beside LPSPB04.

Totaliser value at 11:30am was 447852kl

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:20 pm	6.54	56116	-194.0	0.56	16.18	1.4
UGM-M12S	11:57 am	7.48	66869	-20.8	1.02	16.11	0.1
BH-M21D	11:37 am	6.64	55836	-212.7	0.35	19.01	5.3
BH-M21S	11:30 am	6.63	65195	77.0	0.51	17.61	0.0

FIELD pH

SPD-HM:	7.56	SPD-SAND:	7.63	Process Water Pond:	7.54
Time:	8:47 am	Time:	8:50 am	Time:	8:57 am

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:32 am"/>	UGM-M8D:	<input type="text" value="16.154"/>
Time:	<input type="text" value="7:35 am"/>	UGM-M8S:	<input type="text" value="14.571"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:52 am"/>	UGM-M15D:	<input type="text" value="14.970"/>
Time:	<input type="text" value="8:54 am"/>	UGM-M15S:	<input type="text" value="13.590"/>
Time:	<input type="text" value="7:42 am"/>	BH-M17D:	<input type="text" value="15.624"/>
Time:	<input type="text" value="7:42 am"/>	BH-M17S:	<input type="text" value="13.060"/>
Time:	<input type="text" value="8:06 am"/>	BH-M18D:	<input type="text" value="15.370"/>
Time:	<input type="text" value="8:04 am"/>	BH-M18S:	<input type="text" value="11.530"/>
Time:	<input type="text" value="8:45 am"/>	BH-M19D:	<input type="text" value="15.346"/>
Time:	<input type="text" value="8:42 am"/>	BH-M19S:	<input type="text" value="12.692"/>
Time:	<input type="text" value="9:13 am"/>	BH-M20D:	<input type="text" value="15.155"/>
Time:	<input type="text" value="9:14 am"/>	BH-M20S:	<input type="text" value="13.590"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:02 am"/>	BH-M22D:	<input type="text" value="16.092"/>
Time:	<input type="text" value="9:01 am"/>	BH-M22S:	<input type="text" value="14.245"/>
Time:	<input type="text" value="11:20 am"/>	LPSPB04:	<input type="text" value="14.841"/>

Description of daily mining activities

Mining summary

Day shift:

No mining due to pump to fines thickener being repaired

Night shift:

MD from 444m to 433m

Pipe #75-73

612 tonnes

HP 160m³/hr

MP 150m³/hr

Daily water usage summary

No pumping in the bore beside LPSPB04.

Totaliser value at 11:30am was 447852kl

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:45 am	6.50	54899	-229.0	0.83	16.35	0.8
UGM-M12S	11:29 am	7.43	65512	-36.9	1.02	16.30	0.1
BH-M21D	11:06 am	6.50	54967	-206.3	0.40	18.80	5.0
BH-M21S	10:56 am	6.60	64112	197.1	0.63	17.64	0.0

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="7.46"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="7:24 am"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="8:56 am"/>	UGM-M8D:	<input type="text" value="15.293"/>
Time:	<input type="text" value="8:56 am"/>	UGM-M8S:	<input type="text" value="14.400"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:08 am"/>	UGM-M15D:	<input type="text" value="14.671"/>
Time:	<input type="text" value="8:09 am"/>	UGM-M15S:	<input type="text" value="13.602"/>
Time:	<input type="text" value="9:40 am"/>	BH-M17D:	<input type="text" value="14.730"/>
Time:	<input type="text" value="9:38 am"/>	BH-M17S:	<input type="text" value="13.360"/>
Time:	<input type="text" value="9:09 am"/>	BH-M18D:	<input type="text" value="14.082"/>
Time:	<input type="text" value="9:07 am"/>	BH-M18S:	<input type="text" value="12.370"/>
Time:	<input type="text" value="7:55 am"/>	BH-M19D:	<input type="text" value="14.961"/>
Time:	<input type="text" value="7:58 am"/>	BH-M19S:	<input type="text" value="12.960"/>
Time:	<input type="text" value="8:21 am"/>	BH-M20D:	<input type="text" value="15.812"/>
Time:	<input type="text" value="8:22 am"/>	BH-M20S:	<input type="text" value="13.556"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:14 am"/>	BH-M22D:	<input type="text" value="15.930"/>
Time:	<input type="text" value="8:12 am"/>	BH-M22S:	<input type="text" value="14.230"/>
Time:	<input type="text" value="9:50 am"/>	LPSPB04:	<input type="text" value="20.720"/>

Description of daily mining activities

Mining summary

Day shift:
MD from 433m to 415m
Pipe #73-70
781 tonnes

Night shift:
MD from 415m to 393m
Pipe #70-67
834 tonnes

HP 165m³/hr
MP 145m³/hr

Daily water usage summary. Pumping in the bore beside LPSPB04. Totaliser value at 11:30am was 448085kl at 0945

The Vu-Situ water quality meter Comms device had broken and now no longer works. We are getting a replacement unit sent to site ASAP.

No Water Quality data available to be recorded.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
UGM-M12S	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
BH-M21D	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
BH-M21S	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

FIELD pH

SPD-HM: <input type="text"/>	SPD-SAND: <input type="text"/>	Process Water Pond: <input type="text"/>	
Time: <input type="text"/>	Time: <input type="text"/>	Time: <input type="text"/>	

Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

Dan Condon

Date:

30 September 2020

STANDING WATER LEVEL (mbTOC)

Time:	11:40 am	UGM-M1D:	15.862
Time:	11:42 am	UGM-M1S:	13.650
Time:	12:04 pm	UGM-M2D:	17.143
Time:	12:06 pm	UGM-M2S:	14.872
Time:	12:20 pm	UGM-M4D:	17.215
Time:	2:26 pm	UGM-M16D:	16.201
Time:	2:27 pm	UGM-M16S:	14.815
Time:	9:46 am	UGM-M23D:	16.090
Time:	9:46 am	UGM-M23S:	15.372
Time:	2:14 pm	UGM-M24D:	14.890
Time:	2:13 pm	UGM-M24S:	13.810
Time:	8:58 am	UGM-M25D:	13.771
Time:	8:57 am	UGM-M25S:	13.052

Description of daily mining activities

Mining summary

Day shift:
MD from 393m to 380m
Pipe #67-65
490 tonnes

Night shift:
Mining completed at stope 6. Tripping out rods

HP 165m³/hr
MP 145m³/hr

The water quality data values were recorded on 3/10.

No water in spill dam

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener	7:11 am	7.85	56551	112.1	7.52	18.48
HBF Tank Tap	2:02 pm	7.33	56040	89.1	6.59	28.37
Stockpile Sump	7:23 am	7.67	54146	103.9	2.63	17.73

FIELD PARAMETERS

Well ID	Time	pH Units	Sp. Cond us/cm	Redox mV	DO Mg/L	Temp Deg Celcius
T2 Stockpile Sump	7:03 am	7.88	63978.2	229.6	5.74	16.53
Spill dam						



Description:

T2 stockpile sump

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:52 am"/>	UGM-M8D:	<input type="text" value="14.792"/>
Time:	<input type="text" value="7:53 am"/>	UGM-M8S:	<input type="text" value="14.270"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:31 am"/>	UGM-M15D:	<input type="text" value="14.577"/>
Time:	<input type="text" value="9:32 am"/>	UGM-M15S:	<input type="text" value="13.625"/>
Time:	<input type="text" value="8:20 am"/>	BH-M17D:	<input type="text" value="14.181"/>
Time:	<input type="text" value="8:18 am"/>	BH-M17S:	<input type="text" value="13.087"/>
Time:	<input type="text" value="8:36 am"/>	BH-M18D:	<input type="text" value="13.990"/>
Time:	<input type="text" value="8:38 am"/>	BH-M18S:	<input type="text" value="11.478"/>
Time:	<input type="text" value="9:13 am"/>	BH-M19D:	<input type="text" value="14.782"/>
Time:	<input type="text" value="9:18 am"/>	BH-M19S:	<input type="text" value="13.045"/>
Time:	<input type="text" value="10:26 am"/>	BH-M20D:	<input type="text" value="14.710"/>
Time:	<input type="text" value="10:27 am"/>	BH-M20S:	<input type="text" value="13.601"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="10:06 am"/>	BH-M22D:	<input type="text" value="15.802"/>
Time:	<input type="text" value="10:04 am"/>	BH-M22S:	<input type="text" value="14.210"/>
Time:	<input type="text" value="2:47 pm"/>	LPSPB04:	<input type="text" value="14.365"/>

Description of daily mining activities

Mining summary

Day shift:
MD from 393m to 380m
Pipe #67-65
490 tonnes

Night shift:
Mining completed at stope 6. Tripping out rods

HP 165m³/hr
MP 145m³/hr

Daily water usage summary. No pumping in the bore beside LPSPB04. Totaliser value at 1500 was 448537kl.

The Vu-Situ water quality meter Comms device had broken and now no longer works. We are getting a replacement unit sent to site ASAP.

No Water Quality data available to be recorded.

M18d-13.970
M18s-10.260

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
UGM-M12S	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
BH-M21D	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
BH-M21S	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

FIELD pH

SPD-HM: <input type="text"/>	SPD-SAND: <input type="text"/>	Process Water Pond: <input type="text"/>	
Time: <input type="text"/>	Time: <input type="text"/>	Time: <input type="text"/>	

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="10:45 am"/>	UGM-M8D:	<input type="text" value="14.032"/>
Time:	<input type="text" value="10:46 am"/>	UGM-M8S:	<input type="text" value="14.080"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:36 am"/>	UGM-M15D:	<input type="text" value="14.492"/>
Time:	<input type="text" value="8:37 am"/>	UGM-M15S:	<input type="text" value="13.615"/>
Time:	<input type="text" value="10:54 am"/>	BH-M17D:	<input type="text" value="14.653"/>
Time:	<input type="text" value="10:53 am"/>	BH-M17S:	<input type="text" value="12.942"/>
Time:	<input type="text" value="11:02 am"/>	BH-M18D:	<input type="text" value="14.348"/>
Time:	<input type="text" value="10:59 am"/>	BH-M18S:	<input type="text" value="11.051"/>
Time:	<input type="text" value="8:26 am"/>	BH-M19D:	<input type="text" value="14.776"/>
Time:	<input type="text" value="8:26 am"/>	BH-M19S:	<input type="text" value="13.330"/>
Time:	<input type="text" value="9:25 am"/>	BH-M20D:	<input type="text" value="14.485"/>
Time:	<input type="text" value="9:27 am"/>	BH-M20S:	<input type="text" value="13.595"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:17 am"/>	BH-M22D:	<input type="text" value="15.681"/>
Time:	<input type="text" value="9:16 am"/>	BH-M22S:	<input type="text" value="14.231"/>
Time:	<input type="text" value="11:33 am"/>	LPSPB04:	<input type="text" value="14.362"/>

Description of daily mining activities

Daily water usage summary. No pumping in the bore beside LPSPB04. Totaliser value at 1500 was 448537kl.

The Vu-Situ water quality meter Comms device had broken and now no longer works. We are getting a replacement unit sent to site ASAP.

No Water Quality data available to be recorded.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
UGM-M12S	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
BH-M21D	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
BH-M21S	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:55 am"/>	UGM-M8D:	<input type="text" value="14.485"/>
Time:	<input type="text" value="9:55 am"/>	UGM-M8S:	<input type="text" value="13.978"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:02 am"/>	UGM-M15D:	<input type="text" value="14.332"/>
Time:	<input type="text" value="8:04 am"/>	UGM-M15S:	<input type="text" value="13.632"/>
Time:	<input type="text" value="10:38 am"/>	BH-M17D:	<input type="text" value="13.532"/>
Time:	<input type="text" value="10:37 am"/>	BH-M17S:	<input type="text" value="12.365"/>
Time:	<input type="text" value="10:57 am"/>	BH-M18D:	<input type="text" value="13.360"/>
Time:	<input type="text" value="10:53 am"/>	BH-M18S:	<input type="text" value="12.432"/>
Time:	<input type="text" value="7:42 am"/>	BH-M19D:	<input type="text" value="14.572"/>
Time:	<input type="text" value="7:43 am"/>	BH-M19S:	<input type="text" value="13.315"/>
Time:	<input type="text" value="8:28 am"/>	BH-M20D:	<input type="text" value="14.270"/>
Time:	<input type="text" value="8:30 am"/>	BH-M20S:	<input type="text" value="13.615"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:11 am"/>	BH-M22D:	<input type="text" value="15.535"/>
Time:	<input type="text" value="8:08 am"/>	BH-M22S:	<input type="text" value="14.205"/>
Time:	<input type="text" value="12:25 pm"/>	LPSPB04:	<input type="text" value="14.052"/>

Description of daily mining activities

No mining occurring. Tripping out rods

Daily water usage summary. No pumping in the bore beside LPSPB04. Totaliser value at 1500 was 448537kl.

The Vu-Situ water quality meter Comms device had broken and now no longer works. We are getting a replacement unit sent to site ASAP.

No Water Quality data available to be recorded.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
UGM-M12S	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
BH-M21D	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
BH-M21S	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

FIELD pH

SPD-HM: <input type="text"/>	SPD-SAND: <input type="text"/>	Process Water Pond: <input type="text"/>	
Time: <input type="text"/>	Time: <input type="text"/>	Time: <input type="text"/>	

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="11:16 am"/>	UGM-M8D:	<input type="text" value="15.862"/>
Time:	<input type="text" value="11:19 am"/>	UGM-M8S:	<input type="text" value="13.088"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:33 am"/>	UGM-M15D:	<input type="text" value="13.747"/>
Time:	<input type="text" value="8:36 am"/>	UGM-M15S:	<input type="text" value="13.642"/>
Time:	<input type="text" value="12:13 pm"/>	BH-M17D:	<input type="text" value="14.890"/>
Time:	<input type="text" value="12:12 pm"/>	BH-M17S:	<input type="text" value="11.294"/>
Time:	<input type="text" value="11:22 am"/>	BH-M18D:	<input type="text" value="13.970"/>
Time:	<input type="text" value="11:21 am"/>	BH-M18S:	<input type="text" value="11.670"/>
Time:	<input type="text" value="7:49 am"/>	BH-M19D:	<input type="text" value="14.031"/>
Time:	<input type="text" value="8:21 am"/>	BH-M19S:	<input type="text" value="13.340"/>
Time:	<input type="text" value="8:57 am"/>	BH-M20D:	<input type="text" value="13.537"/>
Time:	<input type="text" value="8:59 am"/>	BH-M20S:	<input type="text" value="13.561"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:50 am"/>	BH-M22D:	<input type="text" value="15.032"/>
Time:	<input type="text" value="8:48 am"/>	BH-M22S:	<input type="text" value="14.172"/>
Time:	<input type="text" value="12:48 pm"/>	LPSPB04:	<input type="text" value="13.821"/>

Description of daily mining activities

No mining activities occurring and no sampling able to be taken from Spiral Plant Discharge locations

No pumping at bore beside LPSPB4

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	1:49 pm	6.71	57318	3.5	1.54	20.38	2.6
UGM-M12S	1:15 pm	7.61	67973		1.05	19.37	0.4
BH-M21D	12:53 pm	6.72	56681	18.8	0.20	20.91	5.5
BH-M21S	12:39 pm	6.76	67094	105.8	0.34	19.71	0.2

FIELD pH

SPD-HM:	<input style="width: 90%;" type="text"/>	SPD-SAND:	<input style="width: 90%;" type="text"/>	Process Water Pond:	<input style="width: 90%; text-align: center; value: 7.71;" type="text"/>
Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%; text-align: center; value: 7:19 am;" type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="10:09 am"/>	UGM-M8D:	<input type="text" value="14.832"/>
Time:	<input type="text" value="10:13 am"/>	UGM-M8S:	<input type="text" value="13.800"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:53 am"/>	UGM-M15D:	<input type="text" value="14.201"/>
Time:	<input type="text" value="8:55 am"/>	UGM-M15S:	<input type="text" value="13.645"/>
Time:	<input type="text" value="10:19 am"/>	BH-M17D:	<input type="text" value="14.266"/>
Time:	<input type="text" value="10:17 am"/>	BH-M17S:	<input type="text" value="12.510"/>
Time:	<input type="text" value="10:29 am"/>	BH-M18D:	<input type="text" value="13.955"/>
Time:	<input type="text" value="10:25 am"/>	BH-M18S:	<input type="text" value="12.572"/>
Time:	<input type="text" value="8:47 am"/>	BH-M19D:	<input type="text" value="14.640"/>
Time:	<input type="text" value="8:48 am"/>	BH-M19S:	<input type="text" value="13.328"/>
Time:	<input type="text" value="9:37 am"/>	BH-M20D:	<input type="text" value="14.235"/>
Time:	<input type="text" value="9:39 am"/>	BH-M20S:	<input type="text" value="13.490"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:13 am"/>	BH-M22D:	<input type="text" value="15.377"/>
Time:	<input type="text" value="9:12 am"/>	BH-M22S:	<input type="text" value="14.149"/>
Time:	<input type="text" value="10:33 am"/>	LPSPB04:	<input type="text" value="14.120"/>

Description of daily mining activities

No mining activities occurring and no sampling able to be taken from Spiral Plant Discharge locations

No pumping at bore beside LPSPB4

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:05 pm	6.69	56187	-2.0	0.55	20.61	2.1
UGM-M12S	11:44 am	7.63	67410	37.8	0.84	20.42	0.4
BH-M21D	11:15 am	6.70	56891	28.5	0.19	21.30	5.4
BH-M21S	11:04 am	6.67	66021	118.0	0.35	20.48	0.0

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="7.51"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="8:31 am"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:31 am"/>	UGM-M8D:	<input type="text" value="16.87"/>
Time:	<input type="text" value="7:32 am"/>	UGM-M8S:	<input type="text" value="13.997"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="6:45 am"/>	UGM-M15D:	<input type="text" value="14.445"/>
Time:	<input type="text" value="6:46 am"/>	UGM-M15S:	<input type="text" value="13.65"/>
Time:	<input type="text" value="7:47 am"/>	BH-M17D:	<input type="text" value="16.005"/>
Time:	<input type="text" value="7:51 am"/>	BH-M17S:	<input type="text" value="12.84"/>
Time:	<input type="text" value="8:02 am"/>	BH-M18D:	<input type="text" value="15.297"/>
Time:	<input type="text" value="8:06 am"/>	BH-M18S:	<input type="text" value="12.94"/>
Time:	<input type="text" value="6:39 am"/>	BH-M19D:	<input type="text" value="14.87"/>
Time:	<input type="text" value="6:38 am"/>	BH-M19S:	<input type="text" value="13.315"/>
Time:	<input type="text" value="7:08 am"/>	BH-M20D:	<input type="text" value="14.703"/>
Time:	<input type="text" value="7:08 am"/>	BH-M20S:	<input type="text" value="13.17"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="6:57 am"/>	BH-M22D:	<input type="text" value="15.59"/>
Time:	<input type="text" value="6:52 am"/>	BH-M22S:	<input type="text" value="14.18"/>
Time:	<input type="text" value="8:23 am"/>	LPSPB04:	<input type="text" value="14.305"/>

Description of daily mining activities

Field parameters for upwelled water vs ponded rain water. Last rained on 7/10/2020

Temp C - 9.3 9.7
 DO% - 62.6 82.6
 DO mg/L - 5.66 8.64
 SPC uS/cm - 53456 20423
 EC uS/cm - 37994 13311
 TDS mg/L - 34781 13962
 pH - 6.71 7.32
 ORP mV - 94.8 82.6

HBF getting setup in 1B, injecting tomorrow.

UGM-M4 dip: 12:38 - 17.703mbTOC

P2 bore running periodically since 9/10/2020.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:34 am	6.28	49051	-158.7	0.33	18.2	3.0
UGM-M12S	10:03 am	6.78	67962	34	12.4	17.8	0.2
BH-21D	10:49 am	6.29	50742	-159.7	0.22	19.8	3.8
BH-21S	11:18 am	6.17	65645	99.3	2.75	17.1	0

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="6.79"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="11:57 am"/>

Totaliser readings

P2 bore:	<input type="text"/>	Time:	<input type="text"/>
LPSPB04 :	<input type="text" value="448537.751"/>	Time:	<input type="text" value="8:25 am"/>
HBF pH:	<input type="text"/>	Time:	<input type="text"/>
HBF pH:	<input type="text"/>	Time:	<input type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="11:46 am"/>	UGM-M8D:	<input type="text" value="15.19"/>
Time:	<input type="text" value="11:49 am"/>	UGM-M8S:	<input type="text" value="14.213"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="11:13 am"/>	UGM-M15D:	<input type="text" value="14.49"/>
Time:	<input type="text" value="11:14 am"/>	UGM-M15S:	<input type="text" value="13.67"/>
Time:	<input type="text" value="2:07 pm"/>	BH-M17D:	<input type="text" value="14.265"/>
Time:	<input type="text" value="2:11 pm"/>	BH-M17S:	<input type="text" value="13.28"/>
Time:	<input type="text" value="11:58 am"/>	BH-M18D:	<input type="text" value="14.704"/>
Time:	<input type="text" value="12:02 pm"/>	BH-M18S:	<input type="text" value="13.082"/>
Time:	<input type="text" value="11:04 am"/>	BH-M19D:	<input type="text" value="14.79"/>
Time:	<input type="text" value="11:07 am"/>	BH-M19S:	<input type="text" value="13.305"/>
Time:	<input type="text" value="11:26 am"/>	BH-M20D:	<input type="text" value="14.465"/>
Time:	<input type="text" value="11:28 am"/>	BH-M20S:	<input type="text" value="13.53"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="11:22 am"/>	BH-M22D:	<input type="text" value="15.58"/>
Time:	<input type="text" value="11:20 am"/>	BH-M22S:	<input type="text" value="14.19"/>
Time:	<input type="text" value="12:13 pm"/>	LPSPB04:	<input type="text" value="14.146"/>

Description of daily mining activities

UGM-M8D 14:20 13.76
 UGM-M8D 17:10 13.85

 UGM-M8S 14:21 14.235
 UGM-M8S 17:11 13.89

 22 tonnes of HBF (slimes) injected down stope 3.

 Stope 1B HBF injection point connected and minimal clean water injected.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	1:18 pm	6.45	55970	-140.5	0.42	18.4	2.8
UGM-M12S	1:00 pm	6.92	67771	160.9	5.47	17.7	0.1
BH-21D	1:54 pm	6.49	56220	-157.5	0.3	19.6	4
BH-21S	1:40 pm	6.39	65410	30.4	0.63	19.4	0.0

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="7.24"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="2:46 pm"/>



Totaliser readings

P2 bore:	<input type="text"/>	Time:	<input type="text"/>
LPSPB04 :	<input type="text"/>	Time:	<input type="text"/>
HBF pH:	<input type="text" value="7.33"/>	Time:	<input type="text" value="10:43 am"/>
HBF pH:	<input type="text" value="7.26"/>	Time:	<input type="text" value="2:44 pm"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:26 am"/>	UGM-M8D:	<input type="text" value="16.185"/>
Time:	<input type="text" value="7:28 am"/>	UGM-M8S:	<input type="text" value="14.01"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="6:56 am"/>	UGM-M15D:	<input type="text" value="14.335"/>
Time:	<input type="text" value="6:58 am"/>	UGM-M15S:	<input type="text" value="13.66"/>
Time:	<input type="text" value="7:56 am"/>	BH-M17D:	<input type="text" value="15.305"/>
Time:	<input type="text" value="7:50 am"/>	BH-M17S:	<input type="text" value="12.982"/>
Time:	<input type="text" value="7:44 am"/>	BH-M18D:	<input type="text" value="14.755"/>
Time:	<input type="text" value="7:43 am"/>	BH-M18S:	<input type="text" value="14.048"/>
Time:	<input type="text" value="6:50 am"/>	BH-M19D:	<input type="text" value="14.65"/>
Time:	<input type="text" value="6:48 am"/>	BH-M19S:	<input type="text" value="13.34"/>
Time:	<input type="text" value="7:15 am"/>	BH-M20D:	<input type="text" value="14.375"/>
Time:	<input type="text" value="7:12 am"/>	BH-M20S:	<input type="text" value="13.515"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:07 am"/>	BH-M22D:	<input type="text" value="15.499"/>
Time:	<input type="text" value="7:03 am"/>	BH-M22S:	<input type="text" value="14.166"/>
Time:	<input type="text" value="9:30 am"/>	LPSPB04:	<input type="text" value="14.137"/>

Description of daily mining activities

UGM-M8D 11:46 - 16.845
UGM-M8D 15:08 - 15.745

UGM-M8S 11:50 - 14.07
UGM-M8S 15:11 - 13.89

UGM-M4D 15:22 - 18.005

15tonnes slimes, 42 tonnes sand injected into Stope 3 rig end for 1 hour 23 minutes starting at 13:00.

Surface expression near 1B.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	9:22 am		57135	-132.8	3.5	18.6	3.4
UGM-M12S	9:53 am	6.87	69556	-10.9	0.71	18.5	0.43
BH-21D	10:56 am	6.43	58465	-161.6	0.13	20.6	3.8
BH-21S	11:22 am	6.25	66664	79.9	0.78	19.4	0

FIELD pH

SPD-HM:	7.54	SPD-SAND:	7.59	Process Water Pond:	7.11
Time:	12:11 pm	Time:	12:18 pm	Time:	12:23 pm

Totaliser readings

P2 bore:		Time:	
LPSPB04 :	448537.751	Time:	9:31 am
HBF pH:	7.22	Time:	4:34 pm
HBF pH:		Time:	

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:03 am"/>	UGM-M8D:	<input type="text" value="16.01"/>
Time:	<input type="text" value="9:00 am"/>	UGM-M8S:	<input type="text" value="14.18"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:42 am"/>	UGM-M15D:	<input type="text" value="14.47"/>
Time:	<input type="text" value="7:43 am"/>	UGM-M15S:	<input type="text" value="13.67"/>
Time:	<input type="text" value="2:35 pm"/>	BH-M17D:	<input type="text" value="14.62"/>
Time:	<input type="text" value="2:40 pm"/>	BH-M17S:	<input type="text" value="13.26"/>
Time:	<input type="text" value="12:39 pm"/>	BH-M18D:	<input type="text" value="14.97"/>
Time:	<input type="text" value="12:24 pm"/>	BH-M18S:	<input type="text" value="13.21"/>
Time:	<input type="text" value="7:34 am"/>	BH-M19D:	<input type="text" value="14.84"/>
Time:	<input type="text" value="7:36 am"/>	BH-M19S:	<input type="text" value="13.32"/>
Time:	<input type="text" value="8:01 am"/>	BH-M20D:	<input type="text" value="14.54"/>
Time:	<input type="text" value="7:57 am"/>	BH-M20S:	<input type="text" value="13.51"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:51 am"/>	BH-M22D:	<input type="text" value="15.60"/>
Time:	<input type="text" value="7:50 am"/>	BH-M22S:	<input type="text" value="14.19"/>
Time:	<input type="text" value="10:32 am"/>	LPSPB04:	<input type="text" value="14.23"/>

Description of daily mining activities

UGM-M8D sampled at 09:15
 UGM-M8S sampled at 09:30
 BH-M18S sampled at 12:45
 BH-M18D sampled at 13:45
 RB1 sampled at 13:20
 BH-M17D sampled at 15:00 no total metals
 BH-M17S sampled at 16:00

Water into far end 1B for 9 minutes.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:54 am	6.69	56146.5		0.35	20.51	4.0
UGM-M12S	11:19 am	7.7	66220	501.2	0.86	20.94	0.0
BH-21D	11:49 am	6.73	56104.6	2.9	0.61	21.3	4.6
BH-21S	11:40 am	6.71	63306.9	491.3	0.9	20.87	0.0

FIELD pH

SPD-HM:	8.24	SPD-SAND:	8.16	Process Water Pond:	7.41
Time:	4:41 pm	Time:	4:45 pm	Time:	8:49 am

Totaliser readings

P2 bore:		Time:	
LPSPB04 :	448537.751	Time:	10:33 am
HBF pH:	7.11	Time:	8:44 am
HBF pH:		Time:	

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:14 am"/>	UGM-M8D:	<input type="text" value="15.225"/>
Time:	<input type="text" value="7:15 am"/>	UGM-M8S:	<input type="text" value="14.28"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="11:39 am"/>	UGM-M15D:	<input type="text" value="14.46"/>
Time:	<input type="text" value="11:41 am"/>	UGM-M15S:	<input type="text" value="13.66"/>
Time:	<input type="text" value="7:29 am"/>	BH-M17D:	<input type="text" value="14.92"/>
Time:	<input type="text" value="7:28 am"/>	BH-M17S:	<input type="text" value="13.28"/>
Time:	<input type="text" value="7:23 am"/>	BH-M18D:	<input type="text" value="14.705"/>
Time:	<input type="text" value="7:24 am"/>	BH-M18S:	<input type="text" value="13.22"/>
Time:	<input type="text" value="10:08 am"/>	BH-M19D:	<input type="text" value="14.76"/>
Time:	<input type="text" value="10:06 am"/>	BH-M19S:	<input type="text" value="13.30"/>
Time:	<input type="text" value="1:04 pm"/>	BH-M20D:	<input type="text" value="13.65"/>
Time:	<input type="text" value="1:08 pm"/>	BH-M20S:	<input type="text" value="14.42"/>
Time:	<input type="text" value="10:08 am"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="12:28 pm"/>	BH-M22D:	<input type="text" value="15.595"/>
Time:	<input type="text" value="12:30 pm"/>	BH-M22S:	<input type="text" value="14.18"/>
Time:	<input type="text" value="7:53 am"/>	LPSPB04:	<input type="text" value="14.155"/>

Description of daily mining activities

UGM-12S sampled at 7:50 no TM
 UGM-12D sampled at 8:30 no TM
 BH-M21S sampled at 9:25 no TM
 BH-M21D sampled at 9:05 no TM
 BH-M19S sample at 10:20 no TM
 BH-M19D sampled at 10:50 no TM
 UGM-15S sampled at 12:00 TM
 sampled
 BH-M20S sampled 13:50 no TM
 BH-M20D sampled 13:30 no TM

55tonnes slimes into 1B rig end as of 16:15 (running from 11:41 to current-16:15).

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	8:30 am	6.74	54176	-120.9	0.41	20.54	3.9
UGM-M12S	8:02 am	7.63	64118	116	0.82	20.41	0.0
BH-21D	9:04 am	6.75	53967	-122	0.24	21.46	4.8
BH-21S	9:22 am	6.62	61671	118.5	0.48	20.7	0.16

FIELD pH

SPD-HM:	7.22	SPD-SAND:	7.87	Process Water Pond:	7.77
Time:	6:50 am	Time:	6:53 am	Time:	6:58 am

Totaliser readings

P2 bore:		Time:	
LPSPB04 :	448537	Time:	7:53 am
HBF pH:	7.68	Time:	6:56 am
HBF pH:	7.32	Time:	4:08 pm

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="10:16 am"/>	UGM-M8D:	<input type="text" value="15.86"/>
Time:	<input type="text" value="10:18 am"/>	UGM-M8S:	<input type="text" value="14.32"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="6:58 am"/>	UGM-M15D:	<input type="text" value="14.59"/>
Time:	<input type="text" value="7:00 am"/>	UGM-M15S:	<input type="text" value="13.66"/>
Time:	<input type="text" value="10:50 am"/>	BH-M17D:	<input type="text" value="16.32"/>
Time:	<input type="text" value="10:52 am"/>	BH-M17S:	<input type="text" value="13.40"/>
Time:	<input type="text" value="10:31 am"/>	BH-M18D:	<input type="text" value="15.53"/>
Time:	<input type="text" value="10:34 am"/>	BH-M18S:	<input type="text" value="13.39"/>
Time:	<input type="text" value="6:48 am"/>	BH-M19D:	<input type="text" value="15.05"/>
Time:	<input type="text" value="6:46 am"/>	BH-M19S:	<input type="text" value="13.31"/>
Time:	<input type="text" value="7:44 am"/>	BH-M20D:	<input type="text" value="14.64"/>
Time:	<input type="text" value="7:41 am"/>	BH-M20S:	<input type="text" value="13.61"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:34 am"/>	BH-M22D:	<input type="text" value="15.67"/>
Time:	<input type="text" value="7:28 am"/>	BH-M22S:	<input type="text" value="14.20"/>
Time:	<input type="text" value="11:06 am"/>	LPSPB04:	<input type="text" value="14.36"/>

Description of daily mining activities

UGM-M1D sampled at 14:10 no TM
 UGM-M1S sampled at 14:20 with aTM
 UGM-M4D sampled at 15:30 no TM,
 QA1 and QC1

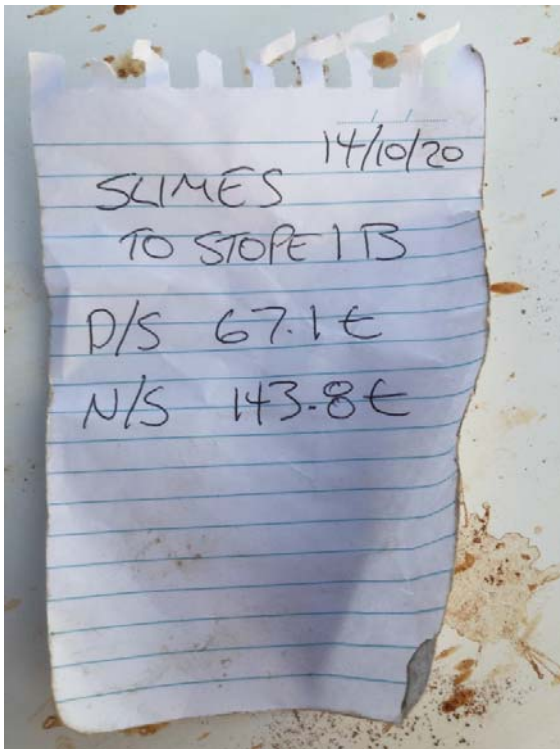
100 tonnes slimes 05:00 to 16:26

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:15 am		55454	-214	0.46	23.2	3.2
UGM-M12S	11:25 am	7.53	65810	60.4	5.49	24	0.0
BH-21D	11:59 am	6.68	56178	-144	0.00	22.73	4.29
BH-21S	11:48 am	6.45	63549	158.7	0.77	23.35	0.0

FIELD pH

SPD-HM: <input style="width: 100px;" type="text" value="7.60"/>	SPD-SAND: <input style="width: 100px;" type="text" value="7.57"/>	Process Water Pond: <input style="width: 100px;" type="text" value="7.54"/>
Time: <input style="width: 100px;" type="text" value="12:31 pm"/>	Time: <input style="width: 100px;" type="text" value="12:34 pm"/>	Time: <input style="width: 100px;" type="text" value="12:37 pm"/>



Totaliser readings

P2 bore: <input style="width: 100px;" type="text"/>	Time: <input style="width: 100px;" type="text"/>
LPSPB04 : <input style="width: 100px;" type="text" value="448537"/>	Time: <input style="width: 100px;" type="text" value="11:06 am"/>
HBF pH: <input style="width: 100px;" type="text" value="7.06"/>	Time: <input style="width: 100px;" type="text" value="10:07 am"/>
HBF pH: <input style="width: 100px;" type="text" value="7.09"/>	Time: <input style="width: 100px;" type="text" value="4:16 pm"/>

Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

Date:

15 October 2020

STANDING WATER LEVEL (mbTOC)

Time:	8:46 am	UGM-M1D:	18.54
Time:	8:48 am	UGM-M1S:	13.58
Time:	9:07 am	UGM-M2D:	19.58
Time:	9:02 am	UGM-M2S:	14.87
Time:	9:12 am	UGM-M4D:	19.90
Time:	8:28 am	BH-M16D:	16.605
Time:	8:24 am	BH-M16S:	14.67
Time:	7:11 am	BH-M23D:	16.01
Time:	7:14 am	BH-M23S:	15.41
Time:	8:13 am	BH-M24D:	14.895
Time:	8:12 am	BH-M24S:	13.36
Time:	6:33 am	BH-M25D:	14.01
Time:	6:36 am	BH-M25S:	13.07

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener	12:21 pm	7.57	52842	76.8	5.97	23.5
HBF Tank Tap						
Stockpile Sump	12:41 pm	7.50	53526	129.6	5.77	24.16

FIELD PARAMETERS

Well ID	Time	pH Units	Sp. Cond us/cm	Redox mV	DO Mg/L	Temp Deg Celcius
T2 Stockpile Sump	12:25 pm	7.71	68517	116.8	4.58	21.4
Spill dam	12:46 pm	7.60	54887.4	135.2	5.59	25.06

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="12:54 pm"/>	UGM-M8D:	<input type="text" value="15.07"/>
Time:	<input type="text" value="12:56 pm"/>	UGM-M8S:	<input type="text" value="14.345"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:41 am"/>	UGM-M15D:	<input type="text" value="14.65"/>
Time:	<input type="text" value="8:42 am"/>	UGM-M15S:	<input type="text" value="13.67"/>
Time:	<input type="text" value="1:10 pm"/>	BH-M17D:	<input type="text" value="15.07"/>
Time:	<input type="text" value="1:12 pm"/>	BH-M17S:	<input type="text" value="13.39"/>
Time:	<input type="text" value="1:04 pm"/>	BH-M18D:	<input type="text" value="14.87"/>
Time:	<input type="text" value="1:06 pm"/>	BH-M18S:	<input type="text" value="13.34"/>
Time:	<input type="text" value="8:37 am"/>	BH-M19D:	<input type="text" value="15.035"/>
Time:	<input type="text" value="8:38 am"/>	BH-M19S:	<input type="text" value="13.29"/>
Time:	<input type="text" value="12:34 pm"/>	BH-M20D:	<input type="text" value="14.38"/>
Time:	<input type="text" value="12:32 pm"/>	BH-M20S:	<input type="text" value="13.45"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="10:59 am"/>	BH-M22D:	<input type="text" value="15.71"/>
Time:	<input type="text" value="10:54 am"/>	BH-M22S:	<input type="text" value="14.20"/>
Time:	<input type="text" value="1:28 pm"/>	LPSPB04:	<input type="text" value="14.20"/>

Description of daily mining activities

105t of slimes injected during the day yesterday. 141.2t injected during the night. Stope 1B.

BH-M25S sampled at 07:40 no TM
 BH-M25D sampled at 08:10 no TM
 BH-M23S sampled at 09:10 no TM
 BH-M23D sampled at 09:50 no TM
 BH-M22S sampled at 11:15 no TM
 BH-M22D sampled at 12:00 no TM
 LPSPB04 samples at 15:00 no TM

05:00 to 11:38 41tonnes slimes into stope 1 rig end.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	1:59 pm	6.73	55218	-159.4	0.41	20.98	1.4
UGM-M12S	1:43 pm	7.46	65762	125.5	1.27	20.97	0.05
BH-21D	2:15 pm	6.76	55296	-154	0.18	21.32	3.8
BH-21S	2:40 pm	6.51	62342	124.8	1.96	21.83	0.1

FIELD pH

SPD-HM:	7.69	SPD-SAND:	7.82	Process Water Pond:	7.31
Time:	6:45 am	Time:	6:50 am	Time:	6:59 am

Totaliser readings

P2 bore:		Time:	
LPSPB04 :	448537	Time:	1:28 pm
HBF pH:	6.73	Time:	6:55 am
HBF pH:		Time:	

Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

kB/bb

Date:

16 October 2020

STANDING WATER LEVEL (mbTOC)

Time:		UGM-M1D:	
Time:		UGM-M1S:	
Time:		UGM-M2D:	
Time:		UGM-M2S:	
Time:		UGM-M4D:	
Time:		BH-M16D:	
Time:		BH-M16S:	
Time:	8:51 am	BH-M23D:	16.065
Time:	8:50 am	BH-M23S:	15.385
Time:		BH-M24D:	
Time:		BH-M24S:	
Time:	7:25 am	BH-M25D:	13.96
Time:	7:22 am	BH-M25S:	13.01

Description of daily mining activities

BH-M25S sampled at

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener						
HBF Tank Tap						
Stockpile Sump						

FIELD PARAMETERS

Well ID	Time	pH Units	Sp. Cond us/cm	Redox mV	DO Mg/L	Temp Deg Celcius
T2 Stockpile Sump	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Spill dam	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:21 am"/>	UGM-M8D:	<input type="text" value="15.14"/>
Time:	<input type="text" value="7:23 am"/>	UGM-M8S:	<input type="text" value="14.30"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:51 am"/>	UGM-M15D:	<input type="text" value="14.385"/>
Time:	<input type="text" value="7:52 am"/>	UGM-M15S:	<input type="text" value="14.43"/>
Time:	<input type="text" value="8:17 am"/>	BH-M17D:	<input type="text" value="14.88"/>
Time:	<input type="text" value="8:15 am"/>	BH-M17S:	<input type="text" value="13.37"/>
Time:	<input type="text" value="8:10 am"/>	BH-M18D:	<input type="text" value="14.74"/>
Time:	<input type="text" value="8:09 am"/>	BH-M18S:	<input type="text" value="13.30"/>
Time:	<input type="text" value="8:00 am"/>	BH-M19D:	<input type="text" value="14.80"/>
Time:	<input type="text" value="7:48 am"/>	BH-M19S:	<input type="text" value="13.33"/>
Time:	<input type="text" value="8:29 am"/>	BH-M20D:	<input type="text" value="14.41"/>
Time:	<input type="text" value="8:31 am"/>	BH-M20S:	<input type="text" value="13.56"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:43 am"/>	BH-M22D:	<input type="text" value="15.63"/>
Time:	<input type="text" value="7:45 am"/>	BH-M22S:	<input type="text" value="14.13"/>
Time:	<input type="text" value="8:37 am"/>	LPSPB04:	<input type="text" value="14.15"/>

Description of daily mining activities

LPSPB04 logger cable shortened
 LPSPB04 samplers at 09:20 no TM
 UGM-M2D samples at 11:30 no TM
 UGM-M2S sampled at 12:00 QA2 QC2 collected here. TM collected.
 RB5 12:40

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	7:59 am		54895	-147	0.38	19.88	3.8
UGM-M12S	8:20 am	7.51	65160	93.5	5.86	19.6	0.05
BH-21D	8:51 am	6.70	54840	-165	0.16	20.76	5.0
BH-21S	8:34 am	6.61	61718	113	0.38	20.54	0.0

FIELD pH

SPD-HM:	7.52	SPD-SAND:	7.34	Process Water Pond:	7.44
Time:	6:52 am	Time:	6:50 am	Time:	7:00 am

Totaliser readings

P2 bore:		Time:	
LPSPB04 :		Time:	
HBF pH:	7.41	Time:	6:57 am
HBF pH:		Time:	

Description:

Description:

FIELD PARAMETERS

Well ID	Time	pH Units	Sp. Cond us/cm	Redox mV	DO Mg/L	Temp Deg Celcius
T2 Stockpile Sump	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Spill dam	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="6:53 am"/>	UGM-M8D:	<input type="text" value="14.66"/>
Time:	<input type="text" value="6:55 am"/>	UGM-M8S:	<input type="text" value="14.25"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="9:02 am"/>	UGM-M15D:	<input type="text" value="14.37"/>
Time:	<input type="text" value="9:03 am"/>	UGM-M15S:	<input type="text" value="13.66"/>
Time:	<input type="text" value="9:21 am"/>	BH-M17D:	<input type="text" value="14.57"/>
Time:	<input type="text" value="9:19 am"/>	BH-M17S:	<input type="text" value="13.31"/>
Time:	<input type="text" value="9:17 am"/>	BH-M18D:	<input type="text" value="14.46"/>
Time:	<input type="text" value="9:15 am"/>	BH-M18S:	<input type="text" value="13.22"/>
Time:	<input type="text" value="9:10 am"/>	BH-M19D:	<input type="text" value="14.63"/>
Time:	<input type="text" value="9:09 am"/>	BH-M19S:	<input type="text" value="13.30"/>
Time:	<input type="text" value="7:33 am"/>	BH-M20D:	<input type="text" value="14.23"/>
Time:	<input type="text" value="7:32 am"/>	BH-M20S:	<input type="text" value="13.59"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="8:56 am"/>	BH-M22D:	<input type="text" value="15.51"/>
Time:	<input type="text" value="8:58 am"/>	BH-M22S:	<input type="text" value="14.19"/>
Time:	<input type="text" value="7:25 am"/>	LPSPB04:	<input type="text" value="14.04"/>

Description of daily mining activities

Process water collected from SP other tap may be broken.

No HBF readings- area flooded

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	7:46 am	6.65	53633		0.38	18.67	3.2
UGM-M12S	7:35 am	7.40	64021	165	1.2	18.05	0
BH-21D	8:00 am	6.74	53774.5	-176.1	0.39	18.0	2.2
BH-21S	8:45 am	6.54	60558	86.3	0.57	18.49	0.16

FIELD pH

SPD-HM: <input style="width: 80%;" type="text" value="7.38"/>	SPD-SAND: <input style="width: 80%;" type="text" value="7.43"/>	Process Water Pond: <input style="width: 80%;" type="text" value="7.59"/>
Time: <input style="width: 80%;" type="text" value="9:46 am"/>	Time: <input style="width: 80%;" type="text" value="9:48 am"/>	Time: <input style="width: 80%;" type="text" value="9:55 am"/>



Totaliser readings

P2 bore: <input style="width: 80%;" type="text"/>	Time: <input style="width: 80%;" type="text"/>
LPSPB04 : <input style="width: 80%;" type="text"/>	Time: <input style="width: 80%;" type="text"/>
HBF pH: <input style="width: 80%;" type="text"/>	Time: <input style="width: 80%;" type="text"/>
HBF pH: <input style="width: 80%;" type="text"/>	Time: <input style="width: 80%;" type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:03 am"/>	UGM-M8D:	<input type="text" value="15.27"/>
Time:	<input type="text" value="7:04 am"/>	UGM-M8S:	<input type="text" value="14.29"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:22 am"/>	UGM-M15D:	<input type="text" value="14.42"/>
Time:	<input type="text" value="9:23 am"/>	UGM-M15S:	<input type="text" value="13.66"/>
Time:	<input type="text" value="7:11 am"/>	BH-M17D:	<input type="text" value="14.98"/>
Time:	<input type="text" value="7:11 am"/>	BH-M17S:	<input type="text" value="13.36"/>
Time:	<input type="text" value="7:17 am"/>	BH-M18D:	<input type="text" value="14.74"/>
Time:	<input type="text" value="7:14 am"/>	BH-M18S:	<input type="text" value="13.39"/>
Time:	<input type="text" value="9:31 am"/>	BH-M19D:	<input type="text" value="14.75"/>
Time:	<input type="text" value="9:29 am"/>	BH-M19S:	<input type="text" value="13.29"/>
Time:	<input type="text" value="9:51 am"/>	BH-M20D:	<input type="text" value="14.40"/>
Time:	<input type="text" value="9:51 am"/>	BH-M20S:	<input type="text" value="13.55"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:43 am"/>	BH-M22D:	<input type="text" value="15.59"/>
Time:	<input type="text" value="9:42 am"/>	BH-M22S:	<input type="text" value="14.20"/>
Time:	<input type="text" value="8:20 am"/>	LPSPB04:	<input type="text" value="14.11"/>

Description of daily mining activities

HBF Tap clogged and area flooded. No morning reading. Process water collected from SPD.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	8:14 am	6.68	53077	-134.4	0.34	18.90	0.9
UGM-M12S	8:34 am	7.57	62185	75.6	0.89	19.12	0.13
BH-21D	7:49 am	6.64	53500	-176.4	0.19	19.74	4.8
BH-21S	7:36 am	6.52	60107.5	202.9	5.25	17.31	0.1

FIELD pH

SPD-HM:	7.38	SPD-SAND:	7.46	Process Water Pond:	7.33
Time:	1:48 pm	Time:	1:52 pm	Time:	2:15 pm

Totaliser readings

P2 bore:		Time:	
LPSPB04 :	448537	Time:	8:20 am
HBF pH:	7.24	Time:	2:09 pm
HBF pH:		Time:	

Description:

Description:

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
T2 Stockpile Sump	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Spill dam	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="10:20 am"/>	UGM-M8D:	<input type="text" value="14.950"/>
Time:	<input type="text" value="10:21 am"/>	UGM-M8S:	<input type="text" value="14.275"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:22 am"/>	UGM-M15D:	<input type="text" value="14.367"/>
Time:	<input type="text" value="9:23 am"/>	UGM-M15S:	<input type="text" value="13.680"/>
Time:	<input type="text" value="10:36 am"/>	BH-M17D:	<input type="text" value="14.702"/>
Time:	<input type="text" value="10:36 am"/>	BH-M17S:	<input type="text" value="13.359"/>
Time:	<input type="text" value="10:42 am"/>	BH-M18D:	<input type="text" value="14.530"/>
Time:	<input type="text" value="10:44 am"/>	BH-M18S:	<input type="text" value="12.640"/>
Time:	<input type="text" value="9:30 am"/>	BH-M19D:	<input type="text" value="14.637"/>
Time:	<input type="text" value="9:32 am"/>	BH-M19S:	<input type="text" value="13.305"/>
Time:	<input type="text" value="9:44 am"/>	BH-M20D:	<input type="text" value="14.301"/>
Time:	<input type="text" value="9:45 am"/>	BH-M20S:	<input type="text" value="13.640"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="9:14 am"/>	BH-M22D:	<input type="text" value="15.520"/>
Time:	<input type="text" value="9:12 am"/>	BH-M22S:	<input type="text" value="14.252"/>
Time:	<input type="text" value="12:13 pm"/>	LPSPB04:	<input type="text" value="14.182"/>

Description of daily mining activities

No mining or HBF occurring today.
Pump has broken down.

No SPD or HBF readings taken.

Process water pump was not operational so none of the process water sample locations were able to be sampled.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:10 pm	6.65	56199	-130.0	0.34	19.32	1.5
UGM-M12S	11:47 am	7.53	66680	41.3	0.78	19.04	0.05
BH-M21D	11:22 am	6.65	56244	-184.0	0.32	20.11	3.2
BH-M21S	11:10 am	6.51	63249	48.6	0.55	19.52	0.05

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="11:05 am"/>	UGM-M8D:	<input type="text" value="14.842"/>
Time:	<input type="text" value="11:06 am"/>	UGM-M8S:	<input type="text" value="14.238"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:33 am"/>	UGM-M15D:	<input type="text" value="14.307"/>
Time:	<input type="text" value="8:35 am"/>	UGM-M15S:	<input type="text" value="13.605"/>
Time:	<input type="text" value="11:25 am"/>	BH-M17D:	<input type="text" value="14.602"/>
Time:	<input type="text" value="11:24 am"/>	BH-M17S:	<input type="text" value="13.382"/>
Time:	<input type="text" value="11:37 am"/>	BH-M18D:	<input type="text" value="14.443"/>
Time:	<input type="text" value="11:38 am"/>	BH-M18S:	<input type="text" value="13.344"/>
Time:	<input type="text" value="8:22 am"/>	BH-M19D:	<input type="text" value="14.563"/>
Time:	<input type="text" value="8:22 am"/>	BH-M19S:	<input type="text" value="13.308"/>
Time:	<input type="text" value="9:02 am"/>	BH-M20D:	<input type="text" value="14.211"/>
Time:	<input type="text" value="9:09 am"/>	BH-M20S:	<input type="text" value="13.666"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="8:47 am"/>	BH-M22D:	<input type="text" value="15.472"/>
Time:	<input type="text" value="8:45 am"/>	BH-M22S:	<input type="text" value="14.162"/>
Time:	<input type="text" value="11:54 am"/>	LPSPB04:	<input type="text" value="14.123"/>

Description of daily mining activities

No mining or HBF occurring today.
Pump has broken down.

No SPD or HBF readings taken.

Process water pump was not operational so none of the process water sample locations were able to be sampled.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	1:34 pm	6.66	54670	-133.9	0.34	20.58	1.5
UGM-M12S	1:16 pm	7.55	64922	94.2	0.86	20.32	0.0
BH-M21D	12:55 pm	6.69	54796	-190.6	0.23	21.25	3.4
BH-M21S	12:47 pm	6.59	61375	109.8	0.54	20.71	0.05

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text"/>

Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

Dan Condon

Date:

21 October 2020

STANDING WATER LEVEL (mbTOC)

Time:	10:18 am	UGM-M1D:	14.740
Time:	10:21 am	UGM-M1S:	13.490
Time:	10:39 am	UGM-M2D:	15.520
Time:	10:37 am	UGM-M2S:	14.795
Time:	10:54 am	UGM-M4D:	15.470
Time:	9:34 am	UGM-M16D:	15.460
Time:	9:34 am	UGM-M16S:	14.810
Time:	2:14 pm	UGM-M23D:	15.813
Time:	2:12 pm	UGM-M23S:	15.357
Time:	9:20 am	UGM-M24D:	14.470
Time:	9:19 am	UGM-M24S:	13.810
Time:	7:58 am	UGM-M25D:	13.540
Time:	7:53 am	UGM-M25S:	13.020

Description of daily mining activities

No mining or HBF occurring today.
Pump has broken down.

No SPD or HBF readings taken.

Process water pump was not operational so none of the process water sample locations were able to be sampled.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener	7:10 am	7.30	52439	112.8	5.57	19.07
HBF Tank Tap						
Stockpile Sump	7:36 am	7.25	55500	89.2	0.20	16.75

FIELD PARAMETERS

Well ID	Time	pH Units	Sp. Cond us/cm	Redox mV	DO Mg/L	Temp Deg Celcius
T2 Stockpile Sump	7:15 am	7.41	70820	116.5	5.06	16.08
Spill dam	7:42 am	7.40	56713	69.2	3.88	15.72



Description:

T2 stockpile sump



Description:

Stockpile sump

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="8:42 am"/>	UGM-M8D:	<input type="text" value="14.762"/>
Time:	<input type="text" value="8:42 am"/>	UGM-M8S:	<input type="text" value="14.217"/>
Time:	<input type="text" value="7:28 am"/>	UGM-M15D:	<input type="text" value="14.258"/>
Time:	<input type="text" value="7:29 am"/>	UGM-M15S:	<input type="text" value="13.685"/>
Time:	<input type="text" value="8:49 am"/>	BH-M17D:	<input type="text" value="14.535"/>
Time:	<input type="text" value="8:47 am"/>	BH-M17S:	<input type="text" value="13.305"/>
Time:	<input type="text" value="8:59 am"/>	BH-M18D:	<input type="text" value="14.378"/>
Time:	<input type="text" value="9:00 am"/>	BH-M18S:	<input type="text" value="13.371"/>
Time:	<input type="text" value="7:21 am"/>	BH-M19D:	<input type="text" value="14.510"/>
Time:	<input type="text" value="7:23 am"/>	BH-M19S:	<input type="text" value="13.312"/>
Time:	<input type="text" value="8:10 am"/>	BH-M20D:	<input type="text" value="14.162"/>
Time:	<input type="text" value="8:11 am"/>	BH-M20S:	<input type="text" value="13.572"/>
Time:	<input type="text" value="8:04 am"/>	BH-M22D:	<input type="text" value="15.433"/>
Time:	<input type="text" value="8:02 am"/>	BH-M22S:	<input type="text" value="14.199"/>
Time:	<input type="text" value="9:07 am"/>	LPSPB04:	<input type="text" value="14.093"/>

Description of daily mining activities

No mining or HBF occurring today.
Pump has broken down.

No SPD or HBF readings taken.

Process water pump was not operational so none of the process water sample locations were able to be sampled.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:44 am	6.65	54863	-176	0.30	20.76	1.9
UGM-M12S	10:27 am	7.50	64982	98.3	0.88	20.59	0.05
BH-M21D	10:09 am	6.66	54799	-95.6	0.32	21.21	3.8
BH-M21S	10:01 am	6.56	61586	97.9	0.42	20.94	0.05

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:47 am"/>	UGM-M8D:	<input type="text" value="14.712"/>
Time:	<input type="text" value="7:49 am"/>	UGM-M8S:	<input type="text" value="14.170"/>
Time:	<input type="text" value="6:31 am"/>	UGM-M15D:	<input type="text" value="14.212"/>
Time:	<input type="text" value="6:32 am"/>	UGM-M15S:	<input type="text" value="13.677"/>
Time:	<input type="text" value="7:55 am"/>	BH-M17D:	<input type="text" value="14.462"/>
Time:	<input type="text" value="7:54 am"/>	BH-M17S:	<input type="text" value="13.295"/>
Time:	<input type="text" value="7:59 am"/>	BH-M18D:	<input type="text" value="14.320"/>
Time:	<input type="text" value="8:00 am"/>	BH-M18S:	<input type="text" value="13.234"/>
Time:	<input type="text" value="6:27 am"/>	BH-M19D:	<input type="text" value="14.455"/>
Time:	<input type="text" value="6:28 am"/>	BH-M19S:	<input type="text" value="13.302"/>
Time:	<input type="text" value="7:19 am"/>	BH-M20D:	<input type="text" value="14.113"/>
Time:	<input type="text" value="7:20 am"/>	BH-M20S:	<input type="text" value="13.590"/>
Time:	<input type="text" value="6:37 am"/>	BH-M22D:	<input type="text" value="15.388"/>
Time:	<input type="text" value="6:36 am"/>	BH-M22S:	<input type="text" value="14.195"/>
Time:	<input type="text" value="8:05 am"/>	LPSPB04:	<input type="text" value="14.055"/>

Description of daily mining activities

No mining or HBF occurring today.
Pump has broken down.

No SPD or HBF readings taken.

Process water pump was not operational so none of the process water sample locations were able to be sampled.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	9:49 am	6.70	56137	-199	0.56	21.30	0.8
UGM-M12S	9:34 am	7.51	66804	68.2	0.78	21.14	0.0
BH-M21D	9:12 am	6.68	55970	-178.9	0.19	21.52	4.1
BH-M21S	9:03 am	6.55	62898	110.9	0.53	21.38	0.05

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:24 am"/>	UGM-M8D:	<input type="text" value="14.621"/>
Time:	<input type="text" value="7:25 am"/>	UGM-M8S:	<input type="text" value="13.840"/>
Time:	<input type="text" value="7:57 am"/>	UGM-M15D:	<input type="text" value="14.144"/>
Time:	<input type="text" value="7:58 am"/>	UGM-M15S:	<input type="text" value="13.688"/>
Time:	<input type="text" value="7:36 am"/>	BH-M17D:	<input type="text" value="13.920"/>
Time:	<input type="text" value="7:34 am"/>	BH-M17S:	<input type="text" value="12.290"/>
Time:	<input type="text" value="7:40 am"/>	BH-M18D:	<input type="text" value="14.120"/>
Time:	<input type="text" value="7:43 am"/>	BH-M18S:	<input type="text" value="12.682"/>
Time:	<input type="text" value="7:50 am"/>	BH-M19D:	<input type="text" value="14.385"/>
Time:	<input type="text" value="7:52 am"/>	BH-M19S:	<input type="text" value="13.125"/>
Time:	<input type="text" value="8:15 am"/>	BH-M20D:	<input type="text" value="14.047"/>
Time:	<input type="text" value="8:17 am"/>	BH-M20S:	<input type="text" value="13.615"/>
Time:	<input type="text" value="8:06 am"/>	BH-M22D:	<input type="text" value="15.332"/>
Time:	<input type="text" value="8:04 am"/>	BH-M22S:	<input type="text" value="14.195"/>
Time:	<input type="text" value="9:32 am"/>	LPSPB04:	<input type="text" value="13.980"/>

Description of daily mining activities

No mining or HBF occurring today.

No SPD or HBF readings taken.

Process water pump was not operational so none of the process water sample locations were able to be sampled.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	9:43 am	6.78	55379	-151.9	0.33	18.73	1.8
UGM-M12S	9:25 am	7.59	65689	165.5	0.81	18.39	0.0
BH-M21D	10:27 am	6.78	55334	-176.1	0.22	19.60	4.1
BH-M21S	10:18 am	6.67	66440	77.5	0.40	19.52	0.0

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="11:02 am"/>	UGM-M8D:	<input type="text" value="14.585"/>
Time:	<input type="text" value="11:03 am"/>	UGM-M8S:	<input type="text" value="14.040"/>
Time:	<input type="text" value="11:56 am"/>	UGM-M15D:	<input type="text" value="14.140"/>
Time:	<input type="text" value="11:57 am"/>	UGM-M15S:	<input type="text" value="13.682"/>
Time:	<input type="text" value="11:10 am"/>	BH-M17D:	<input type="text" value="14.345"/>
Time:	<input type="text" value="11:12 am"/>	BH-M17S:	<input type="text" value="13.040"/>
Time:	<input type="text" value="11:16 am"/>	BH-M18D:	<input type="text" value="14.202"/>
Time:	<input type="text" value="11:27 am"/>	BH-M18S:	<input type="text" value="13.036"/>
Time:	<input type="text" value="11:48 am"/>	BH-M19D:	<input type="text" value="14.360"/>
Time:	<input type="text" value="11:50 am"/>	BH-M19S:	<input type="text" value="13.310"/>
Time:	<input type="text" value="12:10 pm"/>	BH-M20D:	<input type="text" value="14.034"/>
Time:	<input type="text" value="12:11 pm"/>	BH-M20S:	<input type="text" value="13.595"/>
Time:	<input type="text" value="12:03 pm"/>	BH-M22D:	<input type="text" value="15.322"/>
Time:	<input type="text" value="12:01 pm"/>	BH-M22S:	<input type="text" value="14.220"/>
Time:	<input type="text" value="12:33 pm"/>	LPSPB04:	<input type="text" value="13.980"/>

Description of daily mining activities

No mining or HBF occurring today.
 No SPD or HBF readings taken.
 Process water pump was not operational so none of the process water sample locations were able to be sampled.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	8:42 am	6.83	57197	-201	0.47	17.59	0.9
UGM-M12S	8:31 am	7.72	67557	114.5	0.71	17.47	0.0
BH-M21D	7:49 am	6.68	57285	-174	0.28	18.72	3.1
BH-M21S	7:39 am	6.44	63511	126.1	0.42	19.13	0.0

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="11:25 am"/>	UGM-M8D:	<input type="text" value="14.525"/>
Time:	<input type="text" value="11:27 am"/>	UGM-M8S:	<input type="text" value="14.057"/>
Time:	<input type="text" value="11:50 am"/>	UGM-M15D:	<input type="text" value="14.066"/>
Time:	<input type="text" value="11:51 am"/>	UGM-M15S:	<input type="text" value="13.682"/>
Time:	<input type="text" value="11:32 am"/>	BH-M17D:	<input type="text" value="14.271"/>
Time:	<input type="text" value="11:33 am"/>	BH-M17S:	<input type="text" value="13.111"/>
Time:	<input type="text" value="11:37 am"/>	BH-M18D:	<input type="text" value="14.140"/>
Time:	<input type="text" value="11:38 am"/>	BH-M18S:	<input type="text" value="13.040"/>
Time:	<input type="text" value="11:44 am"/>	BH-M19D:	<input type="text" value="14.305"/>
Time:	<input type="text" value="11:45 am"/>	BH-M19S:	<input type="text" value="13.312"/>
Time:	<input type="text" value="12:07 pm"/>	BH-M20D:	<input type="text" value="13.984"/>
Time:	<input type="text" value="12:08 pm"/>	BH-M20S:	<input type="text" value="13.577"/>
Time:	<input type="text" value="11:59 am"/>	BH-M22D:	<input type="text" value="14.264"/>
Time:	<input type="text" value="11:57 am"/>	BH-M22S:	<input type="text" value="14.200"/>
Time:	<input type="text" value="9:50 am"/>	LPSPB04:	<input type="text" value="13.935"/>

Description of daily mining activities

Limited HBF of slimes occurring

Process water able to be sampled but no Spiral Plant locations

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:03 am	6.73	58847	-142.6	0.33	17.69	0.9
UGM-M12S	9:46 am	7.66	69797	91.2	0.74	17.11	0.0
BH-M21D	9:22 am	6.74	58872	-183.6	0.21	18.99	1.8
BH-M21S	9:15 am	6.63	65498	47.2	0.32	18.75	0.0

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="7.51"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="10:23 am"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="12:13 pm"/>	UGM-M8D:	<input type="text" value="14.524"/>
Time:	<input type="text" value="12:14 pm"/>	UGM-M8S:	<input type="text" value="14.055"/>
Time:	<input type="text" value="7:46 am"/>	UGM-M15D:	<input type="text" value="14.062"/>
Time:	<input type="text" value="7:48 am"/>	UGM-M15S:	<input type="text" value="13.682"/>
Time:	<input type="text" value="6:41 am"/>	BH-M17D:	<input type="text" value="14.205"/>
Time:	<input type="text" value="6:39 am"/>	BH-M17S:	<input type="text" value="13.113"/>
Time:	<input type="text" value="6:52 am"/>	BH-M18D:	<input type="text" value="14.150"/>
Time:	<input type="text" value="6:57 am"/>	BH-M18S:	<input type="text" value="13.066"/>
Time:	<input type="text" value="7:32 am"/>	BH-M19D:	<input type="text" value="14.295"/>
Time:	<input type="text" value="7:34 am"/>	BH-M19S:	<input type="text" value="13.305"/>
Time:	<input type="text" value="8:36 am"/>	BH-M20D:	<input type="text" value="13.965"/>
Time:	<input type="text" value="8:37 am"/>	BH-M20S:	<input type="text" value="13.613"/>
Time:	<input type="text" value="8:20 am"/>	BH-M22D:	<input type="text" value="15.250"/>
Time:	<input type="text" value="8:19 am"/>	BH-M22S:	<input type="text" value="14.188"/>
Time:	<input type="text" value="12:44 pm"/>	LPSPB04:	<input type="text" value="13.901"/>

Description of daily mining activities

No HBF occurring

Process water able to be sampled but no Spiral Plant locations

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	1:25 pm	6.75	58523	-178.3	0.28	18.89	2.3
UGM-M12S	1:08 pm	7.66	69218	107.4	0.70	18.45	0.0
BH-M21D	12:46 pm	6.76	58503	-170.6	0.25	19.98	4.8
BH-M21S	12:35 pm	6.66	64986	70.7	0.41	19.51	0.4

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	7.93
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	10:38 am

Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

Dan Condon

Date:

28 October 2020

STANDING WATER LEVEL (mbTOC)

Time:	11:24 am	UGM-M1D:	14.330
Time:	11:26 am	UGM-M1S:	13.460
Time:	12:00 pm	UGM-M2D:	15.112
Time:	12:00 pm	UGM-M2S:	14.754
Time:	12:25 pm	UGM-M4D:	15.080
Time:	9:07 am	UGM-M16D:	15.160
Time:	9:07 am	UGM-M16S:	14.706
Time:	8:04 am	UGM-M23D:	15.640
Time:	8:00 am	UGM-M23S:	15.303
Time:	8:52 am	UGM-M24D:	14.210
Time:	8:50 am	UGM-M24S:	13.772
Time:	7:19 am	UGM-M25D:	13.295
Time:	7:18 am	UGM-M25S:	13.032

Description of daily mining activities

No HBF occurring

Process water able to be sampled but no Spiral Plant locations

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener	10:19 am	7.91	53507	29.6	6.96	17.75
HBF Tank Tap	10:13 am	7.90	16933	-211	0.01	19.83
Stockpile Sump	10:45 am	7.92	51305	85.8	4.68	16.48

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
T2 Stockpile Sump	10:31 am	7.78	72418	61.7	3.25	17.91
Spill dam	10:50 am	7.93	55334	85.4	6.39	19.17

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="6:42 am"/>	UGM-M8D:	<input type="text" value="14.532"/>
Time:	<input type="text" value="6:42 am"/>	UGM-M8S:	<input type="text" value="14.060"/>
Time:	<input type="text" value="9:20 am"/>	UGM-M15D:	<input type="text" value="14.034"/>
Time:	<input type="text" value="9:22 am"/>	UGM-M15S:	<input type="text" value="13.683"/>
Time:	<input type="text" value="8:30 am"/>	BH-M17D:	<input type="text" value="14.280"/>
Time:	<input type="text" value="8:30 am"/>	BH-M17S:	<input type="text" value="13.122"/>
Time:	<input type="text" value="8:38 am"/>	BH-M18D:	<input type="text" value="14.175"/>
Time:	<input type="text" value="8:36 am"/>	BH-M18S:	<input type="text" value="13.075"/>
Time:	<input type="text" value="8:50 am"/>	BH-M19D:	<input type="text" value="14.290"/>
Time:	<input type="text" value="8:49 am"/>	BH-M19S:	<input type="text" value="13.300"/>
Time:	<input type="text" value="9:36 am"/>	BH-M20D:	<input type="text" value="13.940"/>
Time:	<input type="text" value="9:37 am"/>	BH-M20S:	<input type="text" value="13.558"/>
Time:	<input type="text" value="9:26 am"/>	BH-M22D:	<input type="text" value="15.245"/>
Time:	<input type="text" value="9:28 am"/>	BH-M22S:	<input type="text" value="14.270"/>
Time:	<input type="text" value="12:00 pm"/>	LPSPB04:	<input type="text" value="13.785"/>

Description of daily mining activities

No HBF occurring
 Process water able to be sampled but no Spiral Plant locations

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:32 am	6.71	58568	-158.6	0.33	19.51	2.3
UGM-M12S	11:51 am	7.66	69854	88.9	0.76	19.34	0.1
BH-M21D	11:07 am	6.76	58509	-191.3	0.18	20.67	3.0
BH-M21S	10:55 am	6.68	64982	103.6	0.38	19.91	0.2

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	7.83
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	7:38 am

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:23 am"/>	UGM-M8D:	<input type="text" value="14.455"/>
Time:	<input type="text" value="7:24 am"/>	UGM-M8S:	<input type="text" value="14.044"/>
Time:	<input type="text" value="8:02 am"/>	UGM-M15D:	<input type="text" value="13.992"/>
Time:	<input type="text" value="8:03 am"/>	UGM-M15S:	<input type="text" value="13.649"/>
Time:	<input type="text" value="7:38 am"/>	BH-M17D:	<input type="text" value="14.211"/>
Time:	<input type="text" value="7:39 am"/>	BH-M17S:	<input type="text" value="13.140"/>
Time:	<input type="text" value="7:43 am"/>	BH-M18D:	<input type="text" value="14.078"/>
Time:	<input type="text" value="7:45 am"/>	BH-M18S:	<input type="text" value="13.055"/>
Time:	<input type="text" value="7:53 am"/>	BH-M19D:	<input type="text" value="14.255"/>
Time:	<input type="text" value="7:52 am"/>	BH-M19S:	<input type="text" value="13.308"/>
Time:	<input type="text" value="8:42 am"/>	BH-M20D:	<input type="text" value="13.888"/>
Time:	<input type="text" value="8:44 am"/>	BH-M20S:	<input type="text" value="13.545"/>
Time:	<input type="text" value="8:19 am"/>	BH-M22D:	<input type="text" value="15.150"/>
Time:	<input type="text" value="8:15 am"/>	BH-M22S:	<input type="text" value="14.406"/>
Time:	<input type="text" value="10:32 am"/>	LPSPB04:	<input type="text" value="13.680"/>

Description of daily mining activities

Refining of ore occurring and filling of sinkholes later in the day with sand tails/slimes.

All records able to be collected

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:17 am	6.73	58424	-168.4	0.36	19.42	1.4
UGM-M12S	10:59 am	7.66	69058	97.9	0.72	19.25	0.1
BH-M21D	10:36 am	6.73	58748	-192.8	0.18	20.10	3.4
BH-M21S	10:23 am	6.59	64989	100	0.55	19.25	0.0

FIELD pH

SPD-HM:	7.84	SPD-SAND:	8.00	Process Water Pond:	7.73
Time:	7:05 am	Time:	7:12 am	Time:	7:02 am

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:30 am"/>	UGM-M8D:	<input type="text" value="14.445"/>
Time:	<input type="text" value="7:32 am"/>	UGM-M8S:	<input type="text" value="14.036"/>
Time:	<input type="text" value="8:44 am"/>	UGM-M15D:	<input type="text" value="13.980"/>
Time:	<input type="text" value="8:45 am"/>	UGM-M15S:	<input type="text" value="13.675"/>
Time:	<input type="text" value="7:43 am"/>	BH-M17D:	<input type="text" value="14.211"/>
Time:	<input type="text" value="7:44 am"/>	BH-M17S:	<input type="text" value="13.103"/>
Time:	<input type="text" value="8:10 am"/>	BH-M18D:	<input type="text" value="14.085"/>
Time:	<input type="text" value="8:11 am"/>	BH-M18S:	<input type="text" value="13.465"/>
Time:	<input type="text" value="8:37 am"/>	BH-M19D:	<input type="text" value="14.237"/>
Time:	<input type="text" value="8:39 am"/>	BH-M19S:	<input type="text" value="13.308"/>
Time:	<input type="text" value="9:00 am"/>	BH-M20D:	<input type="text" value="13.875"/>
Time:	<input type="text" value="9:01 am"/>	BH-M20S:	<input type="text" value="13.577"/>
Time:	<input type="text" value="8:53 am"/>	BH-M22D:	<input type="text" value="15.190"/>
Time:	<input type="text" value="8:53 am"/>	BH-M22S:	<input type="text" value="14.201"/>
Time:	<input type="text" value="9:54 am"/>	LPSPB04:	<input type="text" value="13.745"/>

Description of daily mining activities

No refining of ore or backfilling occurring.

Cleanup and moving ore only

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:23 am	6.67	58242	-216.9	0.37	20.52	1.0
UGM-M12S	10:52 am	7.49	688000	96.2	0.83	20.61	0.0
BH-M21D	10:25 am	6.60	58401	-206.4	0.29	21.03	2.6
BH-M21S	10:17 am	6.50	64652	161.7	0.46	20.78	0.05

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="7.34"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="7:30 am"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:27 am"/>	UGM-M8D:	<input type="text" value="14.43"/>
Time:	<input type="text" value="7:30 am"/>	UGM-M8S:	<input type="text" value="14.025"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="8:05 am"/>	UGM-M15D:	<input type="text" value="13.968"/>
Time:	<input type="text" value="8:07 am"/>	UGM-M15S:	<input type="text" value="13.666"/>
Time:	<input type="text" value="8:40 am"/>	BH-M17D:	<input type="text" value="14.19"/>
Time:	<input type="text" value="8:36 am"/>	BH-M17S:	<input type="text" value="13.07"/>
Time:	<input type="text" value="8:31 am"/>	BH-M18D:	<input type="text" value="14.055"/>
Time:	<input type="text" value="8:26 am"/>	BH-M18S:	<input type="text" value="13.005"/>
Time:	<input type="text" value="8:17 am"/>	BH-M19D:	<input type="text" value="14.23"/>
Time:	<input type="text" value="8:15 am"/>	BH-M19S:	<input type="text" value="13.278"/>
Time:	<input type="text" value="7:47 am"/>	BH-M20D:	<input type="text" value="13.86"/>
Time:	<input type="text" value="7:49 am"/>	BH-M20S:	<input type="text" value="13.56"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="7:56 am"/>	BH-M22D:	<input type="text" value="15.16"/>
Time:	<input type="text" value="7:59 am"/>	BH-M22S:	<input type="text" value="14.084"/>
Time:	<input type="text" value="8:55 am"/>	LPSPB04:	<input type="text" value="13.71"/>

Description of daily mining activities

No HBF. As of 14:00 Spiral plant not operating.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:46 am	6.63	58101.1	-174	0.41	22.23	3.4
UGM-M12S	11:16 am	7.55	69443.5	380.5	0.81	2.63	0.05
BH-21D	9:52 am	6.54	58437.14		0.13	21.79	4
BH-21S	10:03 am	6.48	65003	89.7	0.49	21.72	0.3

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="7.83"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="12:50 pm"/>

Totaliser readings

P2 bore:	<input type="text"/>	Time:	<input type="text"/>
LPSPB04 :	<input type="text"/>	Time:	<input type="text"/>
HBF pH:	<input type="text"/>	Time:	<input type="text"/>
HBF pH:	<input type="text"/>	Time:	<input type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="6:22 am"/>	UGM-M8D:	<input type="text" value="14.395"/>
Time:	<input type="text" value="6:24 am"/>	UGM-M8S:	<input type="text" value="14.00"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="6:55 am"/>	UGM-M15D:	<input type="text" value="13.96"/>
Time:	<input type="text" value="6:55 am"/>	UGM-M15S:	<input type="text" value="13.65"/>
Time:	<input type="text" value="7:33 am"/>	BH-M17D:	<input type="text" value="14.155"/>
Time:	<input type="text" value="7:30 am"/>	BH-M17S:	<input type="text" value="13.08"/>
Time:	<input type="text" value="7:12 am"/>	BH-M18D:	<input type="text" value="14.06"/>
Time:	<input type="text" value="7:10 am"/>	BH-M18S:	<input type="text" value="13.06"/>
Time:	<input type="text" value="7:03 am"/>	BH-M19D:	<input type="text" value="14.19"/>
Time:	<input type="text" value="7:03 am"/>	BH-M19S:	<input type="text" value="13.285"/>
Time:	<input type="text" value="7:48 am"/>	BH-M20D:	<input type="text" value="13.85"/>
Time:	<input type="text" value="7:50 am"/>	BH-M20S:	<input type="text" value="13.51"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="6:46 am"/>	BH-M22D:	<input type="text" value="15.142"/>
Time:	<input type="text" value="6:49 am"/>	BH-M22S:	<input type="text" value="14.149"/>
Time:	<input type="text" value="7:58 am"/>	LPSPB04:	<input type="text" value="13.69"/>

Description of daily mining activities

No HBF

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:24 am	6.67	58009.4	-147.4	0.31	21.12	2.8
UGM-M12S	10:03 am	7.50	68915.2	101.2	1.58	21.27	0.1
BH-21D	9:33 am	6.69	57954.4	-198.4	0.23	21.27	2.2
BH-21S	9:22 am	6.67	63939.9	91.7	4.77	21.46	0.05

FIELD pH

SPD-HM:	7.64	SPD-SAND:	7.81	Process Water Pond:	7.89
Time:	10:48 am	Time:	10:51 am	Time:	10:53 am

Totaliser readings

P2 bore:		Time:	
LPSPB04 :		Time:	
HBF pH:		Time:	
HBF pH:		Time:	

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:24 am"/>	UGM-M8D:	<input type="text" value="13.84"/>
Time:	<input type="text" value="9:25 am"/>	UGM-M8S:	<input type="text" value="14.09"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="8:04 am"/>	UGM-M15D:	<input type="text" value="13.96"/>
Time:	<input type="text" value="8:06 am"/>	UGM-M15S:	<input type="text" value="13.65"/>
Time:	<input type="text" value="9:14 am"/>	BH-M17D:	<input type="text" value="13.28"/>
Time:	<input type="text" value="9:07 am"/>	BH-M17S:	<input type="text" value="13.19"/>
Time:	<input type="text" value="8:58 am"/>	BH-M18D:	<input type="text" value="13.85"/>
Time:	<input type="text" value="8:53 am"/>	BH-M18S:	<input type="text" value="13.03"/>
Time:	<input type="text" value="8:22 am"/>	BH-M19D:	<input type="text" value="14.19"/>
Time:	<input type="text" value="8:16 am"/>	BH-M19S:	<input type="text" value="13.29"/>
Time:	<input type="text" value="6:53 am"/>	BH-M20D:	<input type="text" value="13.84"/>
Time:	<input type="text" value="6:52 am"/>	BH-M20S:	<input type="text" value="13.64"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="7:10 am"/>	BH-M22D:	<input type="text" value="15.14"/>
Time:	<input type="text" value="7:42 am"/>	BH-M22S:	<input type="text" value="14.17"/>
Time:	<input type="text" value="11:38 am"/>	LPSPB04:	<input type="text" value="13.66"/>

Description of daily mining activities

BH-M17D 13:25 dip 13.83
BH-M17S 13:28 dip 12.91

ISitu Troll not working, changed to YSI probe. YSI probe not calibrating well - pH took a while. HBF, stockpile, spill dam with YSI.

Continue injecting slimes and sand tonight. Will provide total tonnage in the morning.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:49 pm	6.64	58237.9	-97	0.28	20.53	3.4
UGM-M12S	1:12 pm	7.54	69103.9	166.4	1.12	20.49	0.0
BH-21D	11:59 am	6.54	57938.3	-195.2	0.21	21.12	2.4
BH-21S	12:24 pm	6.53	63578.9	170	0.86	20.85	0.2

FIELD pH

SPD-HM:	<input style="width: 80px;" type="text" value="7.79"/>	SPD-SAND:	<input style="width: 80px;" type="text" value="7.61"/>	Process Water Pond:	<input style="width: 80px;" type="text" value="7.34"/>
Time:	<input style="width: 80px;" type="text" value="3:55 pm"/>	Time:	<input style="width: 80px;" type="text" value="3:59 pm"/>	Time:	<input style="width: 80px;" type="text" value="3:57 pm"/>



Totaliser readings

P2 bore:	<input style="width: 80px;" type="text"/>	Time:	<input style="width: 80px;" type="text"/>
LPSPB04 :	<input style="width: 80px;" type="text"/>	Time:	<input style="width: 80px;" type="text"/>
HBF pH:	<input style="width: 80px;" type="text" value="6.81"/>	Time:	<input style="width: 80px;" type="text" value="4:02 pm"/>
HBF pH:	<input style="width: 80px;" type="text"/>	Time:	<input style="width: 80px;" type="text"/>

Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

Kaitlyn

Date:

5 November 2020

STANDING WATER LEVEL (mbTOC)

Time:	10:11 am	UGM-M1D:	
Time:	10:11 am	UGM-M1S:	13.44
Time:	1:50 pm	UGM-M2D:	14.90
Time:	1:52 pm	UGM-M2S:	14.71
Time:	1:37 pm	UGM-M4D:	14.88
Time:	9:51 am	BH-M16D:	15.02
Time:	9:49 am	BH-M16S:	14.71
Time:	7:52 am	BH-M23D:	15.54
Time:	7:50 am	BH-M23S:	14.88
Time:	6:34 am	BH-M24D:	13.87
Time:	6:36 am	BH-M24S:	13.79
Time:	8:35 am	BH-M25D:	13.18
Time:	8:34 am	BH-M25S:	13.01

Description of daily mining activities

ISitu Troll not working, changed to YSI probe. YSI probe not calibrating well - pH took a while. HBF, stockpile, spill dam with YSI.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener	2:26 pm	7.89	51504.4	113.4	9.8	19.87
HBF Tank Tap	4:03 pm	6.81	53736	117.1	5.90	22.2
Stockpile Sump	4:06 pm	6.96	49345	29.2	6.96	20.1

FIELD PARAMETERS

Well ID	Time	pH Units	Sp. Cond us/cm	Redox mV	DO Mg/L	Temp Deg Celcius
T2 Stockpile Sump	2:13 pm	7.81	74050.6	103.7	5.61	17.06
Spill dam	4:10 pm	6.86	60480	30.1	6.39	22.5

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="6:38 am"/>	UGM-M8D:	<input type="text" value="14.02"/>
Time:	<input type="text" value="6:36 am"/>	UGM-M8S:	<input type="text" value="13.87"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="7:18 am"/>	UGM-M15D:	<input type="text" value="13.845"/>
Time:	<input type="text" value="7:16 am"/>	UGM-M15S:	<input type="text" value="13.66"/>
Time:	<input type="text" value="6:48 am"/>	BH-M17D:	<input type="text" value="13.51"/>
Time:	<input type="text" value="6:51 am"/>	BH-M17S:	<input type="text" value="12.835"/>
Time:	<input type="text" value="6:56 am"/>	BH-M18D:	<input type="text" value="13.495"/>
Time:	<input type="text" value="6:58 am"/>	BH-M18S:	<input type="text" value="12.867"/>
Time:	<input type="text" value="7:08 am"/>	BH-M19D:	<input type="text" value="14.08"/>
Time:	<input type="text" value="7:07 am"/>	BH-M19S:	<input type="text" value="13.29"/>
Time:	<input type="text" value="7:41 am"/>	BH-M20D:	<input type="text" value="13.705"/>
Time:	<input type="text" value="7:39 am"/>	BH-M20S:	<input type="text" value="13.59"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="7:26 am"/>	BH-M22D:	<input type="text" value="15.057"/>
Time:	<input type="text" value="7:23 am"/>	BH-M22S:	<input type="text" value="14.15"/>
Time:	<input type="text" value="8:27 am"/>	LPSPB04:	<input type="text" value="13.59"/>

Description of daily mining activities

Spiral plant being decommissioned. No more samples. Pipe for HBF (sinkhole fill) blocked. Plant shut down. Process water parameters taken from the dam.

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:28 am	6.59	58678	-59.3	0.31	19.49	3.8
UGM-M12S	10:05 am	7.37	69295.1	439.8	5.8	19.79	0.13
BH-21D	9:42 am	6.63	57987.6	-31.2	0.09	21.48	4.0
BH-21S	9:22 am	6.39	63434.5	201.3	5.05	20.92	0.1

FIELD pH

SPD-HM:	<input style="width: 90%;" type="text"/>	SPD-SAND:	<input style="width: 90%;" type="text"/>	Process Water Pond:	<input style="width: 90%; text-align: center; border: none;" type="text" value="7.44"/>
Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%; text-align: center; border: none;" type="text" value="11:14 am"/>

Totaliser readings

P2 bore:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
LPSPB04 :	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
HBF pH:	<input style="width: 90%; text-align: center; border: none;" type="text" value="7.65"/>	Time:	<input style="width: 90%; text-align: center; border: none;" type="text" value="11:21 am"/>
HBF pH:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>

Description:	<input style="width: 98%; height: 50px;" type="text"/>
Description:	<input style="width: 98%; height: 50px;" type="text"/>

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:13 am"/>	UGM-M8D:	<input type="text" value="14.32"/>
Time:	<input type="text" value="7:16 am"/>	UGM-M8S:	<input type="text" value="13.92"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="6:43 am"/>	UGM-M15D:	<input type="text" value="13.87"/>
Time:	<input type="text" value="6:45 am"/>	UGM-M15S:	<input type="text" value="13.65"/>
Time:	<input type="text" value="7:25 am"/>	BH-M17D:	<input type="text" value="14.075"/>
Time:	<input type="text" value="7:28 am"/>	BH-M17S:	<input type="text" value="12.995"/>
Time:	<input type="text" value="7:32 am"/>	BH-M18D:	<input type="text" value="13.94"/>
Time:	<input type="text" value="7:36 am"/>	BH-M18S:	<input type="text" value="12.895"/>
Time:	<input type="text" value="6:33 am"/>	BH-M19D:	<input type="text" value="14.11"/>
Time:	<input type="text" value="6:30 am"/>	BH-M19S:	<input type="text" value="13.29"/>
Time:	<input type="text" value="7:03 am"/>	BH-M20D:	<input type="text" value="13.76"/>
Time:	<input type="text" value="7:02 am"/>	BH-M20S:	<input type="text" value="13.63"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="6:54 am"/>	BH-M22D:	<input type="text" value="15.07"/>
Time:	<input type="text" value="6:52 am"/>	BH-M22S:	<input type="text" value="14.16"/>
Time:	<input type="text" value="7:52 am"/>	LPSPB04:	<input type="text" value="13.62"/>

Description of daily mining activities

BH-M17D: 12:22 - 13.007
 BH-M17S: 12:26 - 12.90
 BH-M18D: 12:30 - 13.13
 BH-M18S: 12:32 - 12.80
 UGM-M8D: 13:09 - 13.57
 UGM-M8S: 13:12 - 13.87

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	9:29 am	6.63	56909.9	19.1	0.28	20.67	3.6
UGM-M12S	9:51 am	7.47	67649.4	398.6	1.02	20.85	0.05
BH-21D	8:34 am	6.45	57312.3	-132.8	0.14	20.98	6.4
BH-21S	8:59 am	6.54	63002.8	422.8	0.44	20.67	0.1

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="7.56"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="10:22 am"/>

Totaliser readings

P2 bore:	<input type="text"/>	Time:	<input type="text"/>
LPSPB04 :	<input type="text"/>	Time:	<input type="text"/>
HBF pH:	<input type="text" value="7.56"/>	Time:	<input type="text" value="10:37 am"/>
HBF pH:	<input type="text"/>	Time:	<input type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:36 am"/>	UGM-M8D:	<input type="text" value="14.225"/>
Time:	<input type="text" value="7:33 am"/>	UGM-M8S:	<input type="text" value="13.784"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="6:36 am"/>	UGM-M15D:	<input type="text" value="13.807"/>
Time:	<input type="text" value="6:38 am"/>	UGM-M15S:	<input type="text" value="13.655"/>
Time:	<input type="text" value="7:56 am"/>	BH-M17D:	<input type="text" value="13.975"/>
Time:	<input type="text" value="7:59 am"/>	BH-M17S:	<input type="text" value="12.71"/>
Time:	<input type="text" value="7:51 am"/>	BH-M18D:	<input type="text" value="13.84"/>
Time:	<input type="text" value="7:49 am"/>	BH-M18S:	<input type="text" value="12.248"/>
Time:	<input type="text" value="6:32 am"/>	BH-M19D:	<input type="text" value="14.038"/>
Time:	<input type="text" value="6:30 am"/>	BH-M19S:	<input type="text" value="13.293"/>
Time:	<input type="text" value="7:08 am"/>	BH-M20D:	<input type="text" value="13.67"/>
Time:	<input type="text" value="7:03 am"/>	BH-M20S:	<input type="text" value="13.65"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="6:52 am"/>	BH-M22D:	<input type="text" value="15.011"/>
Time:	<input type="text" value="6:55 am"/>	BH-M22S:	<input type="text" value="14.145"/>
Time:	<input type="text" value="8:09 am"/>	LPSPB04:	<input type="text" value="13.56"/>

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:29 am	6.70	56848.2	-93.6	0.39	20.86	2.8
UGM-M12S	10:06 am	7.61	67453.3	399.9	5.89	21.2	0.1
BH-21D	9:33 am	6.62	56736.2	-123.6	0.28	21.36	6.6
BH-21S	9:26 am	6.50	62752.4	441.5	0.89	20.81	0.1

FIELD pH

SPD-HM:		SPD-SAND:		Process Water Pond:	
Time:		Time:		Time:	

Totaliser readings

P2 bore:		Time:	
LPSPB04 :		Time:	
HBF pH:		Time:	
HBF pH:		Time:	

Description:		Description:	
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ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:25 am"/>	UGM-M8D:	<input type="text" value="14.275"/>
Time:	<input type="text" value="7:26 am"/>	UGM-M8S:	<input type="text" value="13.382"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="6:40 am"/>	UGM-M15D:	<input type="text" value="13.84"/>
Time:	<input type="text" value="6:42 am"/>	UGM-M15S:	<input type="text" value="13.65"/>
Time:	<input type="text" value="7:42 am"/>	BH-M17D:	<input type="text" value="14.04"/>
Time:	<input type="text" value="7:45 am"/>	BH-M17S:	<input type="text" value="12.785"/>
Time:	<input type="text" value="7:38 am"/>	BH-M18D:	<input type="text" value="13.91"/>
Time:	<input type="text" value="7:36 am"/>	BH-M18S:	<input type="text" value="12.53"/>
Time:	<input type="text" value="6:35 am"/>	BH-M19D:	<input type="text" value="14.08"/>
Time:	<input type="text" value="6:33 am"/>	BH-M19S:	<input type="text" value="13.285"/>
Time:	<input type="text" value="6:59 am"/>	BH-M20D:	<input type="text" value="13.78"/>
Time:	<input type="text" value="6:56 am"/>	BH-M20S:	<input type="text" value="13.61"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="6:50 am"/>	BH-M22D:	<input type="text" value="15.04"/>
Time:	<input type="text" value="6:47 am"/>	BH-M22S:	<input type="text" value="14.142"/>
Time:	<input type="text" value="7:53 am"/>	LPSPB04:	<input type="text" value="13.565"/>

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:37 am	6.68	56813.1	-115.6	0.35	22.01	4.6
UGM-M12S	10:12 am	7.10	6771.8	409.4	5.87	23.19	0.1
BH-21D	9:21 am	6.80	56473.8	-139.9	0.15	22.32	6.2
BH-21S	9:53 am	6.57	62672.0	396.8	0.86	23.12	0.25

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text"/>

Totaliser readings

P2 bore:	<input type="text"/>	Time:	<input type="text"/>
LPSPB04 :	<input type="text"/>	Time:	<input type="text"/>
HBF pH:	<input type="text"/>	Time:	<input type="text"/>
HBF pH:	<input type="text"/>	Time:	<input type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:03 am"/>	UGM-M8D:	<input type="text" value="14.29"/>
Time:	<input type="text" value="7:02 am"/>	UGM-M8S:	<input type="text" value="13.83"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="6:31 am"/>	UGM-M15D:	<input type="text" value="13.85"/>
Time:	<input type="text" value="6:32 am"/>	UGM-M15S:	<input type="text" value="13.65"/>
Time:	<input type="text" value="7:15 am"/>	BH-M17D:	<input type="text" value="14.06"/>
Time:	<input type="text" value="7:17 am"/>	BH-M17S:	<input type="text" value="12.82"/>
Time:	<input type="text" value="7:11 am"/>	BH-M18D:	<input type="text" value="13.91"/>
Time:	<input type="text" value="7:11 am"/>	BH-M18S:	<input type="text" value="12.59"/>
Time:	<input type="text" value="6:27 am"/>	BH-M19D:	<input type="text" value="14.07"/>
Time:	<input type="text" value="6:25 am"/>	BH-M19S:	<input type="text" value="13.29"/>
Time:	<input type="text" value="6:47 am"/>	BH-M20D:	<input type="text" value="13.72"/>
Time:	<input type="text" value="6:45 am"/>	BH-M20S:	<input type="text" value="13.62"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="6:39 am"/>	BH-M22D:	<input type="text" value="15.03"/>
Time:	<input type="text" value="6:37 am"/>	BH-M22S:	<input type="text" value="14.15"/>
Time:	<input type="text" value="7:58 am"/>	LPSPB04:	<input type="text" value="13.58"/>

Description of daily mining activities

Process water field parameters taken at process water dam

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	8:42 am	6.68	56892.3	-16.1	0.3	23.01	4.2
UGM-M12S	9:00 am	7.53	67842.0	62.8	0.72	23.08	0.28
BH-21D	8:14 am	6.69	56774.9	-175.5	0.15	22.49	5.6
BH-21S	8:03 am	6.53	62938.7	238.9	4.89	23.58	0.0

FIELD pH

SPD-HM:	<input style="width: 90%;" type="text"/>	SPD-SAND:	<input style="width: 90%;" type="text"/>	Process Water Pond:	<input style="width: 90%; text-align: center; border: none;" type="text" value="7.91"/>
Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%; text-align: center; border: none;" type="text" value="12:24 pm"/>

Totaliser readings

P2 bore:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
LPSPB04 :	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
HBF pH:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
HBF pH:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>

Description:	<input style="width: 98%; height: 50px;" type="text"/>
Description:	<input style="width: 98%; height: 50px;" type="text"/>

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="3:19 pm"/>	UGM-M8D:	<input type="text" value="14.28"/>
Time:	<input type="text" value="3:18 pm"/>	UGM-M8S:	<input type="text" value="13.87"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="2:51 pm"/>	UGM-M15D:	<input type="text" value="13.84"/>
Time:	<input type="text" value="2:48 pm"/>	UGM-M15S:	<input type="text" value="13.63"/>
Time:	<input type="text" value="4:12 pm"/>	BH-M17D:	<input type="text" value="14.04"/>
Time:	<input type="text" value="4:15 pm"/>	BH-M17S:	<input type="text" value="12.87"/>
Time:	<input type="text" value="4:18 pm"/>	BH-M18D:	<input type="text" value="13.89"/>
Time:	<input type="text" value="4:20 pm"/>	BH-M18S:	<input type="text" value="12.71"/>
Time:	<input type="text" value="2:40 pm"/>	BH-M19D:	<input type="text" value="14.06"/>
Time:	<input type="text" value="2:38 pm"/>	BH-M19S:	<input type="text" value="13.28"/>
Time:	<input type="text" value="11:33 am"/>	BH-M20D:	<input type="text" value="13.695"/>
Time:	<input type="text" value="11:34 am"/>	BH-M20S:	<input type="text" value="13.57"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="2:59 pm"/>	BH-M22D:	<input type="text" value="15.02"/>
Time:	<input type="text" value="3:02 pm"/>	BH-M22S:	<input type="text" value="14.14"/>
Time:	<input type="text" value="11:24 am"/>	LPSPB04:	<input type="text" value="13.57"/>

Description of daily mining activities

BH-M21D 11:00, no TM
 BH-M21S 11:15, no TM - QA1/QC1
 UGM-M12D 13:00 no TM
 UGM-M12S 12:30 no TM
 UGM-M8D 16:00 no TM
 UGM-M8S 15:30, TM REQUIRED

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	1:14 pm	6.75	59197	-211.5	0.35	22.18	3.2
UGM-M12S	12:32 pm	7.77	74841	26.7	4.31	24.68	0.48
BH-21D	11:01 am	6.78	61424	-195.1	0.04	22.18	4.8
BH-21S	11:19 am	6.93	68989	5.8	4.21	23.43	0.15

FIELD pH

SPD-HM:	<input style="width: 90%;" type="text"/>	SPD-SAND:	<input style="width: 90%;" type="text"/>	Process Water Pond:	<input style="width: 90%; text-align: center; value: 8.08;" type="text"/>
Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%; text-align: center; value: 4:45 pm;" type="text"/>

Totaliser readings

P2 bore:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
LPSPB04 :	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
HBF pH:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
HBF pH:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="12:21 pm"/>	UGM-M8D:	<input type="text" value="14.29"/>
Time:	<input type="text" value="12:23 pm"/>	UGM-M8S:	<input type="text" value="13.89"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="8:11 am"/>	UGM-M15D:	<input type="text" value="13.83"/>
Time:	<input type="text" value="8:12 am"/>	UGM-M15S:	<input type="text" value="13.645"/>
Time:	<input type="text" value="12:56 pm"/>	BH-M17D:	<input type="text" value="14.045"/>
Time:	<input type="text" value="12:51 pm"/>	BH-M17S:	<input type="text" value="12.90"/>
Time:	<input type="text" value="12:35 pm"/>	BH-M18D:	<input type="text" value="13.96"/>
Time:	<input type="text" value="12:39 pm"/>	BH-M18S:	<input type="text" value="12.75"/>
Time:	<input type="text" value="8:30 am"/>	BH-M19D:	<input type="text" value="14.07"/>
Time:	<input type="text" value="8:27 am"/>	BH-M19S:	<input type="text" value="13.285"/>
Time:	<input type="text" value="9:14 am"/>	BH-M20D:	<input type="text" value="13.728"/>
Time:	<input type="text" value="9:16 am"/>	BH-M20S:	<input type="text" value="13.61"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="7:39 am"/>	BH-M22D:	<input type="text" value="15.03"/>
Time:	<input type="text" value="7:43 am"/>	BH-M22S:	<input type="text" value="14.145"/>
Time:	<input type="text" value="1:20 pm"/>	LPSPB04:	<input type="text" value="13.56"/>

Description of daily mining activities

BH-M23D sampled at 10:10 no TM
 BH-M23S sampled at 11:00 no TM
 RB1 sampled at 10:35
 BH-M16S sampled at 15:45 no TM
 BH-M16D sampled at 16:45 no TM

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	1:23 pm	6.66	54544	-217.7	0.40	21.57	3.2
UGM-M12S	1:42 pm	7.59	72199	-75.2	0.93	21.82	0.2
BH-21D	2:13 pm	6.74	60358	-180.4	0.19	21.66	6.0
BH-21S	2:02 pm	6.57	62567	-10.4	0.46	21.79	0.18

FIELD pH

SPD-HM:		SPD-SAND:		Process Water Pond:	8.05
Time:		Time:		Time:	7:07 am

Totaliser readings

P2 bore:		Time:	
LPSPB04 :		Time:	
HBF pH:		Time:	
HBF pH:		Time:	

Description:		Description:	
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ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

BB KB

Date:

13 November 2020

STANDING WATER LEVEL (mbTOC)

Time:	3:11 pm	UGM-M1D:	14.035
Time:	3:09 pm	UGM-M1S:	13.44
Time:	2:28 pm	UGM-M2D:	14.833
Time:	2:26 pm	UGM-M2S:	14.615
Time:	7:03 am	UGM-M4D:	14.813
Time:	3:23 pm	BH-M16D:	14.915
Time:	3:21 pm	BH-M16S:	14.62
Time:	7:59 am	BH-M23D:	15.41
Time:	7:54 am	BH-M23S:	15.39
Time:	9:27 am	BH-M24D:	13.95
Time:	9:31 am	BH-M24S:	13.752
Time:	8:41 am	BH-M25D:	13.06
Time:	8:38 am	BH-M25S:	12.986

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener						
HBF Tank Tap						
Stockpile Sump						

FIELD PARAMETERS

Well ID	Time	pH Units	Sp. Cond us/cm	Redox mV	DO Mg/L	Temp Deg Celcius
T2 Stockpile Sump						
Spill dam	5:24 pm	7.91	56489	1.1	8.53	26.7

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="11:09 am"/>	UGM-M8D:	<input type="text" value="14.295"/>
Time:	<input type="text" value="11:07 am"/>	UGM-M8S:	<input type="text" value="13.89"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="8:52 am"/>	UGM-M15D:	<input type="text" value="13.84"/>
Time:	<input type="text" value="8:54 am"/>	UGM-M15S:	<input type="text" value="13.63"/>
Time:	<input type="text" value="11:22 am"/>	BH-M17D:	<input type="text" value="14.06"/>
Time:	<input type="text" value="11:24 am"/>	BH-M17S:	<input type="text" value="12.92"/>
Time:	<input type="text" value="11:18 am"/>	BH-M18D:	<input type="text" value="13.925"/>
Time:	<input type="text" value="11:19 am"/>	BH-M18S:	<input type="text" value="12.78"/>
Time:	<input type="text" value="6:59 am"/>	BH-M19D:	<input type="text" value="14.07"/>
Time:	<input type="text" value="6:56 am"/>	BH-M19S:	<input type="text" value="13.29"/>
Time:	<input type="text" value="1:54 pm"/>	BH-M20D:	<input type="text" value="13.71"/>
Time:	<input type="text" value="1:57 pm"/>	BH-M20S:	<input type="text" value="13.61"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="9:00 am"/>	BH-M22D:	<input type="text" value="15.04"/>
Time:	<input type="text" value="9:02 am"/>	BH-M22S:	<input type="text" value="14.15"/>
Time:	<input type="text" value="12:37 pm"/>	LPSPB04:	<input type="text" value="13.58"/>

Description of daily mining activities

BH-M19S sampled at 07:15 no TM
 BH-M19D sampled at 08:00 no TM
 BH-M22S sampled at 10:20 no TM
 BH-M22D sampled at 09:30 no TM
 BH-M20S sampled at 1430 no tm
 BH-M20D sampled at 15:00 no TM

RB2 sampled at 07:55

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:24 pm	6.76	57134	-223.8	0.66	22.28	2.2
UGM-M12S	12:35 pm	7.65	67954	-117	4.51	24.49	0.1
BH-21D	11:44 am	6.83	57236	-178.3	0.22	22.19	5.2
BH-21S	12:08 pm	6.62	57739	33.1	0.31	22.09	0.22

FIELD pH

SPD-HM:		SPD-SAND:		Process Water Pond:	8.13
Time:		Time:		Time:	1:44 pm

Totaliser readings

P2 bore:		Time:	
LPSPB04 :		Time:	
HBF pH:		Time:	
HBF pH:		Time:	

Description:	
Description:	

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="8:13 am"/>	UGM-M8D:	<input type="text" value="14.29"/>
Time:	<input type="text" value="8:13 am"/>	UGM-M8S:	<input type="text" value="13.895"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="6:58 am"/>	UGM-M15D:	<input type="text" value="13.82"/>
Time:	<input type="text" value="7:00 am"/>	UGM-M15S:	<input type="text" value="13.62"/>
Time:	<input type="text" value="8:25 am"/>	BH-M17D:	<input type="text" value="14.045"/>
Time:	<input type="text" value="8:24 am"/>	BH-M17S:	<input type="text" value="12.918"/>
Time:	<input type="text" value="8:20 am"/>	BH-M18D:	<input type="text" value="13.923"/>
Time:	<input type="text" value="8:18 am"/>	BH-M18S:	<input type="text" value="12.789"/>
Time:	<input type="text" value="6:52 am"/>	BH-M19D:	<input type="text" value="14.07"/>
Time:	<input type="text" value="6:51 am"/>	BH-M19S:	<input type="text" value="13.285"/>
Time:	<input type="text" value="8:06 am"/>	BH-M20D:	<input type="text" value="13.71"/>
Time:	<input type="text" value="8:04 am"/>	BH-M20S:	<input type="text" value="13.55"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text" value="Logger"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text" value="Logger"/>
Time:	<input type="text" value="7:58 am"/>	BH-M22D:	<input type="text" value="15.023"/>
Time:	<input type="text" value="7:59 am"/>	BH-M22S:	<input type="text" value="14.142"/>
Time:	<input type="text" value="8:34 am"/>	LPSPB04:	<input type="text" value="13.56"/>

Description of daily mining activities

UGM-M15S - 07:20 TM required
 LPSPB04 - 09:00 no TM
 UGM-M1D - 12:15 no TM
 UGM-M1S - 12:30 TM required
 UGM-M4D - 14:15 no TM
 RB3 - 14:30

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	10:48 am	6.68	62532	-216.4	0.52	23.11	2.0
UGM-M12S	10:36 am	7.61	74647	13.2	1.09	24.42	0.1
BH-21D	10:11 am	6.74	61952	-191.0	0.24	22.89	5.6
BH-21S	10:02 am	6.72	69267	97.3	4.14	24.76	0.1

FIELD pH

SPD-HM:	<input type="text"/>	SPD-SAND:	<input type="text"/>	Process Water Pond:	<input type="text" value="8.15"/>
Time:	<input type="text"/>	Time:	<input type="text"/>	Time:	<input type="text" value="2:46 pm"/>

Totaliser readings

P2 bore:	<input type="text"/>	Time:	<input type="text"/>
LPSPB04 :	<input type="text"/>	Time:	<input type="text"/>
HBF pH:	<input type="text" value="7.93"/>	Time:	<input type="text" value="2:54 pm"/>
HBF pH:	<input type="text"/>	Time:	<input type="text"/>

Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

KB BB

Date:

15 November 2020

STANDING WATER LEVEL (mbTOC)

Time:	11:29 am	UGM-M1D:	14.00
Time:	11:27 am	UGM-M1S:	13.40
Time:		UGM-M2D:	
Time:		UGM-M2S:	
Time:	1:44 pm	UGM-M4D:	14.80
Time:		BH-M16D:	
Time:		BH-M16S:	
Time:		BH-M23D:	
Time:		BH-M23S:	
Time:		BH-M24D:	
Time:		BH-M24S:	
Time:		BH-M25D:	
Time:		BH-M25S:	

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener						
HBF Tank Tap						
Stockpile Sump						

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
T2 Stockpile Sump	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Spill dam	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Description:

Description:

Description:

Description:

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

BB KB

Date:

16 November 2020

STANDING WATER LEVEL (mbTOC)

Time:		UGM-M1D:	
Time:		UGM-M1S:	
Time:		UGM-M2D:	
Time:		UGM-M2S:	
Time:		UGM-M4D:	
Time:		BH-M16D:	
Time:		BH-M16S:	
Time:	8:36 am	BH-M23D:	15.39
Time:	8:52 am	BH-M23S:	15.30
Time:		BH-M24D:	
Time:		BH-M24S:	
Time:	6:56 am	BH-M25D:	13.04
Time:	6:52 am	BH-M25S:	12.98

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener						
HBF Tank Tap						
Stockpile Sump						

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
T2 Stockpile Sump	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Spill dam	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="12:41 pm"/>	UGM-M8D:	<input type="text" value="14.29"/>
Time:	<input type="text" value="12:42 pm"/>	UGM-M8S:	<input type="text" value="13.89"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="8:25 am"/>	UGM-M15D:	<input type="text" value="13.835"/>
Time:	<input type="text" value="8:26 am"/>	UGM-M15S:	<input type="text" value="13.63"/>
Time:	<input type="text" value="12:57 pm"/>	BH-M17D:	<input type="text" value="14.06"/>
Time:	<input type="text" value="12:59 pm"/>	BH-M17S:	<input type="text" value="12.915"/>
Time:	<input type="text" value="12:53 pm"/>	BH-M18D:	<input type="text" value="13.93"/>
Time:	<input type="text" value="12:51 pm"/>	BH-M18S:	<input type="text" value="12.72"/>
Time:	<input type="text" value="8:22 am"/>	BH-M19D:	<input type="text" value="14.075"/>
Time:	<input type="text" value="8:20 am"/>	BH-M19S:	<input type="text" value="13.295"/>
Time:	<input type="text" value="10:10 am"/>	BH-M20D:	<input type="text" value="13.73"/>
Time:	<input type="text" value="10:11 am"/>	BH-M20S:	<input type="text" value="13.55"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="10:05 am"/>	BH-M22D:	<input type="text" value="15.03"/>
Time:	<input type="text" value="10:05 am"/>	BH-M22S:	<input type="text" value="14.147"/>
Time:	<input type="text" value="1:29 pm"/>	LPSPB04:	<input type="text" value="13.57"/>

Description of daily mining activities

BH-M25S sampled no TM 07:15
 BH-M25D sampled 0745 with TM
 BH-M23D sampled 09:10 with TM
 BH-M23S sampled 0945 no TM
 UGM-M2D sampled 11:15 no TM
 UGM-M2S sampled 11:30 with TM

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	2:17 pm	6.57	65864	-212.2	0.28	22.96	3.6
UGM-M12S	2:37 pm	7.50	78614	-38.1	1.05	24.02	0.16
BH-21D	1:32 pm	6.66	65730	-194.2	0.25	23.57	5.8
BH-21S	1:50 pm	6.44	71723	10.9	0.53	23.5	0.32

FIELD pH

SPD-HM: SPD-SAND: Process Water Pond:
Time: Time: Time:

Totaliser readings

P2 bore: Time:
LPSPB04 : Time:
HBF pH: Time:
HBF pH: Time:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="9:10 am"/>	UGM-M8D:	<input type="text" value="14.30"/>
Time:	<input type="text" value="9:12 am"/>	UGM-M8S:	<input type="text" value="13.907"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="8:45 am"/>	UGM-M15D:	<input type="text" value="13.84"/>
Time:	<input type="text" value="8:47 am"/>	UGM-M15S:	<input type="text" value="13.62"/>
Time:	<input type="text" value="12:05 pm"/>	BH-M17D:	<input type="text" value="14.08"/>
Time:	<input type="text" value="12:07 pm"/>	BH-M17S:	<input type="text" value="12.94"/>
Time:	<input type="text" value="9:25 am"/>	BH-M18D:	<input type="text" value="13.928"/>
Time:	<input type="text" value="9:22 am"/>	BH-M18S:	<input type="text" value="12.725"/>
Time:	<input type="text" value="8:39 am"/>	BH-M19D:	<input type="text" value="14.09"/>
Time:	<input type="text" value="8:40 am"/>	BH-M19S:	<input type="text" value="13.285"/>
Time:	<input type="text" value="9:02 am"/>	BH-M20D:	<input type="text" value="13.725"/>
Time:	<input type="text" value="9:00 am"/>	BH-M20S:	<input type="text" value="13.547"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="8:52 am"/>	BH-M22D:	<input type="text" value="15.04"/>
Time:	<input type="text" value="8:54 am"/>	BH-M22S:	<input type="text" value="14.153"/>
Time:	<input type="text" value="2:25 pm"/>	LPSPB04:	<input type="text" value="13.58"/>

Description of daily mining activities

BH-M17S sampled at 13:30 with TM
 BH-M17D sampled at 12:40 no TM
 BH-M18S sampled at 09:45 TM required
 BH-M18D sampled at 10:40 no TM
 RB5 at 1100

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	3:17 pm	6.62	75090	-226.1	0.5	23.54	4.2
UGM-M12S	3:06 pm	7.54	89755	6.6	0.92	23.85	0.12
BH-21D	2:44 pm	6.68	75321	-202.5	0.23	23.22	6
BH-21S	2:42 pm	6.41	83168	84.8	1.09	24.80	0.44

FIELD pH

SPD-HM:	<input style="width: 90%;" type="text"/>	SPD-SAND:	<input style="width: 90%;" type="text"/>	Process Water Pond:	<input style="width: 90%; text-align: center; border: none;" type="text" value="8.08"/>
Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%; text-align: center; border: none;" type="text" value="8:28 am"/>

Totaliser readings

P2 bore:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
LPSPB04 :	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
HBF pH:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
HBF pH:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="7:46 am"/>	UGM-M8D:	<input type="text" value="14.29"/>
Time:	<input type="text" value="7:48 am"/>	UGM-M8S:	<input type="text" value="13.897"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="7:19 am"/>	UGM-M15D:	<input type="text" value="13.835"/>
Time:	<input type="text" value="7:19 am"/>	UGM-M15S:	<input type="text" value="13.62"/>
Time:	<input type="text" value="10:03 am"/>	BH-M17D:	<input type="text" value="14.055"/>
Time:	<input type="text" value="10:05 am"/>	BH-M17S:	<input type="text" value="12.917"/>
Time:	<input type="text" value="9:57 am"/>	BH-M18D:	<input type="text" value="13.91"/>
Time:	<input type="text" value="9:55 am"/>	BH-M18S:	<input type="text" value="12.725"/>
Time:	<input type="text" value="7:12 am"/>	BH-M19D:	<input type="text" value="14.08"/>
Time:	<input type="text" value="7:15 am"/>	BH-M19S:	<input type="text" value="13.28"/>
Time:	<input type="text" value="7:34 am"/>	BH-M20D:	<input type="text" value="13.72"/>
Time:	<input type="text" value="7:32 am"/>	BH-M20S:	<input type="text" value="13.54"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="7:27 am"/>	BH-M22D:	<input type="text" value="15.028"/>
Time:	<input type="text" value="7:24 am"/>	BH-M22S:	<input type="text" value="14.135"/>
Time:	<input type="text" value="10:40 am"/>	LPSPB04:	<input type="text" value="13.565"/>

Description of daily mining activities

UGM-M8D 08:30 no TM QA/QC
 UGM-M8S 08:10, TM required
 UGM-M12D 12:10 no TM
 UGM-M12S 12:30 no TM
 BH-M21D 10:50, no TM
 BH-M21S 11:20, TM required

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	12:08 pm	6.56	60749	-220.1	0.62	24.11	4
UGM-M12S	12:36 pm	7.51	72523	-4.1	1.01	24.6	
BH-21D	10:59 am	6.62	60528	-191.3	0.26	23.1	5.2
BH-21S	11:25 am	6.41	67018	67.3	0.97	24.78	0.5

FIELD pH

SPD-HM:		SPD-SAND:		Process Water Pond:	8.07
Time:		Time:		Time:	6:56 am

Totaliser readings

P2 bore:		Time:	
LPSPB04 :		Time:	
HBF pH:		Time:	
HBF pH:		Time:	

Description:		Description:	
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ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="11:02 am"/>	UGM-M8D:	<input type="text" value="14.28"/>
Time:	<input type="text" value="11:03 am"/>	UGM-M8S:	<input type="text" value="13.89"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="8:41 am"/>	UGM-M15D:	<input type="text" value="13.824"/>
Time:	<input type="text" value="8:44 am"/>	UGM-M15S:	<input type="text" value="13.61"/>
Time:	<input type="text" value="11:31 am"/>	BH-M17D:	<input type="text" value="14.043"/>
Time:	<input type="text" value="11:35 am"/>	BH-M17S:	<input type="text" value="12.905"/>
Time:	<input type="text" value="11:22 am"/>	BH-M18D:	<input type="text" value="13.90"/>
Time:	<input type="text" value="11:19 am"/>	BH-M18S:	<input type="text" value="12.735"/>
Time:	<input type="text" value="8:55 am"/>	BH-M19D:	<input type="text" value="14.06"/>
Time:	<input type="text" value="8:53 am"/>	BH-M19S:	<input type="text" value="13.275"/>
Time:	<input type="text" value="7:57 am"/>	BH-M20D:	<input type="text" value="13.702"/>
Time:	<input type="text" value="7:55 am"/>	BH-M20S:	<input type="text" value="13.53"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="8:13 am"/>	BH-M22D:	<input type="text" value="15.02"/>
Time:	<input type="text" value="8:15 am"/>	BH-M22S:	<input type="text" value="14.137"/>
Time:	<input type="text" value="11:57 am"/>	LPSPB04:	<input type="text" value="13.555"/>

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	1:42 pm	6.58	54862	-196.2	0.45	24.74	4.6
UGM-M12S	1:21 pm	7.46	65232	28.6	1.37	26.21	0.24
BH-21D	12:52 pm	6.66	54916	-190.9	0.21	24.08	6
BH-21S	12:39 pm	6.64	59840	153.6	4.54	28.13	0.28

FIELD pH

SPD-HM:	<input style="width: 90%;" type="text"/>	SPD-SAND:	<input style="width: 90%;" type="text"/>	Process Water Pond:	<input style="width: 90%; text-align: center; border: none;" type="text" value="7.87"/>
Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%; text-align: center; border: none;" type="text" value="6:34 am"/>

Totaliser readings

P2 bore:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
LPSPB04 :	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
HBF pH:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
HBF pH:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>

Description:	<input style="width: 95%; height: 50px;" type="text"/>
Description:	<input style="width: 95%; height: 50px;" type="text"/>

ILUKA BALRANALD WEEKLY FIELD SAMPLING FORM



Job No: S190512

EMM Technician:

Kaitlyn

Date:

19 November 2020

STANDING WATER LEVEL (mbTOC)

Time:	7:06 am	UGM-M1D:	14.03
Time:	7:08 am	UGM-M1S:	13.41
Time:		UGM-M2D:	
Time:		UGM-M2S:	
Time:		UGM-M4D:	
Time:	7:24 am	BH-M16D:	14.665
Time:	7:22 am	BH-M16S:	14.63
Time:	8:30 am	BH-M23D:	15.40
Time:	8:28 am	BH-M23S:	15.38
Time:	7:38 am	BH-M24D:	13.96
Time:	7:40 am	BH-M24S:	13.73
Time:	9:10 am	BH-M25D:	13.05
Time:	9:12 am	BH-M25S:	12.997

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
Fines Thickener						
HBF Tank Tap						
Stockpile Sump						

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
T2 Stockpile Sump	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Spill dam	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Description:

Description:

Description:

Description:

ILUKA BALRANALD DAILY FIELD SAMPLING FORM



Job Number: S190512

EMM Technician:

Date:

STANDING WATER LEVEL (mbTOC)

Time:	<input type="text" value="10:13 am"/>	UGM-M8D:	<input type="text" value="14.28"/>
Time:	<input type="text" value="10:15 am"/>	UGM-M8S:	<input type="text" value="13.89"/>
Time:	<input type="text"/>	UGM-M12D:	<input type="text"/>
Time:	<input type="text"/>	UGM-M12S:	<input type="text"/>
Time:	<input type="text" value="9:25 am"/>	UGM-M15D:	<input type="text" value="13.82"/>
Time:	<input type="text" value="9:27 am"/>	UGM-M15S:	<input type="text" value="13.80"/>
Time:	<input type="text" value="10:43 am"/>	BH-M17D:	<input type="text" value="14.05"/>
Time:	<input type="text" value="10:43 am"/>	BH-M17S:	<input type="text" value="12.90"/>
Time:	<input type="text" value="10:21 am"/>	BH-M18D:	<input type="text" value="13.91"/>
Time:	<input type="text" value="10:22 am"/>	BH-M18S:	<input type="text" value="12.73"/>
Time:	<input type="text" value="9:21 am"/>	BH-M19D:	<input type="text" value="14.06"/>
Time:	<input type="text" value="9:20 am"/>	BH-M19S:	<input type="text" value="13.28"/>
Time:	<input type="text" value="9:50 am"/>	BH-M20D:	<input type="text" value="13.71"/>
Time:	<input type="text" value="9:49 am"/>	BH-M20S:	<input type="text" value="13.53"/>
Time:	<input type="text"/>	BH-M21D:	<input type="text"/>
Time:	<input type="text"/>	BH-M21S:	<input type="text"/>
Time:	<input type="text" value="9:33 am"/>	BH-M22D:	<input type="text" value="15.02"/>
Time:	<input type="text" value="9:34 am"/>	BH-M22S:	<input type="text" value="14.13"/>
Time:	<input type="text" value="11:24 am"/>	LPSPB04:	<input type="text" value="13.55"/>

Description of daily mining activities

FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp	Total Iron
		Units	us/cm	mV	Mg/L	Deg Celcius	Mg/L
UGM-M12D	11:54 am	6.52	55166	-203.8	0.5	24.62	3.8
UGM-M12S	12:16 pm	7.46	64752	-36.3	0.89	24.77	3
BH-21D	11:16 am	6.63	53763	-197.2	0.12	23.21	4.8
BH-21S	11:36 am	6.42	60425	105.5	0.65	25.34	0.1

FIELD pH

SPD-HM:	<input style="width: 90%;" type="text"/>	SPD-SAND:	<input style="width: 90%;" type="text"/>	Process Water Pond:	<input style="width: 90%;" type="text"/>
Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>

Totaliser readings

P2 bore:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
LPSPB04 :	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
HBF pH:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>
HBF pH:	<input style="width: 90%;" type="text"/>	Time:	<input style="width: 90%;" type="text"/>

Description:	<input style="width: 95%;" type="text"/>	Description:	<input style="width: 95%;" type="text"/>
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FIELD PARAMETERS

Well ID	Time	pH	Sp. Cond	Redox	DO	Temp
		Units	us/cm	mV	Mg/L	Deg Celcius
T2 Stockpile Sump	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Spill dam	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Description:

Description:

Description:

Description:

E.2 Plant monitoring results summary

Table E.1 Plant monitoring results summary – during mining

Parameter	pH	EC (µs/cm)	TDS (mg/L)	ORP (mV)	Temperature (°C)
Process water					
Minimum	7.35	45,488	31,572	-9	4.9
Maximum	8.05	55,929	36,354	293.9	23
Mean	7.71	51,435	33,387	100.4	14
SPD-Sand					
Minimum	7.21	43,641	28,367	-26.1	11.6
Maximum	8.06	55,550	36,108	261.9	21.4
Mean	7.72	45,264	29,236	127.5	16.3
SPD-HM					
Minimum	6.97	48,956	31,821	20.7	6.13
Maximum	7.98	56,573	36,772	290.6	21.2
Mean	7.72	52,499	33,969	131.8	14.4
HBF tank					
Minimum	6.92	42,008	28,264	42.4	9.3
Maximum	8.09	53,765	34,947	237.2	22
Mean	7.62	47,861	31,349	123.2	14.4
Fines thickener					
Minimum	7.22	52,053	33,834	14	10.5
Maximum	8.02	56,852	36,905	250.4	21.7
Mean	7.7	54,565	35,457	127.3	16.6
Stockpile sump					
Minimum	7.5	52,336	34,018	29.8	9.4
Maximum	8.04	57,444	37,339	227.6	18.4
Mean	7.79	55,095	35,921	119.9	13.6
T2 stockpile sump					
Minimum	6.84	53,760	34,944	35.6	10.5
Maximum	7.77	65,456	42,547	199.3	15.1
Mean	7.43	57,193	37,445	129.5	12.6
Spill dam					
Minimum	8.05	22,050	14,332	12.4	11.6
Maximum	8.21	55,451	36,042	118.6	19.14
Mean	8.11	43,573	28,322	64.7	16.2

1. SPD-Sand = Spiral plant discharge – Sand stream
2. SPD-HM = Spiral plant discharge – heavy mineral stream

Table E.2 Plant monitoring results summary – during backfill

Parameter	pH	EC (µs/cm)	TDS (mg/L)	ORP (mV)	Temperature (°C)
Process water					
Minimum	6.79	51,193	33,275	-70	5.74
Maximum	7.93	55,917	36,346	157	24.3
Mean	7.54	53,684	34,895	60.2	17.2
SPD-Sand¹					
Minimum	7.43	49,703	32,307	40.8	17.3
Maximum	8.16	54,014	35,109	145.8	29.1
Mean	7.69	52,009	33,806	67.4	23.3
SPD-HM²					
Minimum	7.33	49,967	32,479	33.4	16.3
Maximum	8.16	54,922	35,699	114.2	23.9
Mean	7.63	53,081	34,503	76.9	20
HBF tank					
Minimum	6.73	49,400	32,110	-211	10.1
Maximum	7.97	57,367	37,289	118	28.4
Mean	7.35	52,632	34,211	36.4	20.9
Fines thickener					
Minimum	6.82	51,504	33,478	29.6	17.8
Maximum	7.91	56,551	36,758	172.1	21.2
Mean	7.62	53,930	35,055	106.8	19.3
Stockpile sump					
Minimum	6.96	49,345	32,074	29.2	16.5
Maximum	7.92	54,147	35,196	114	24.2
Mean	7.5	52,081	33,853	83.2	19.6
T2 stockpile sump					
Minimum	7.49	63,978	41,586	61.7	16.5
Maximum	7.88	74,050	48,133	229.6	22.7
Mean	7.74	69,691	45,299	134.3	18.6
Spill dam					
Minimum	6.86	55,334	35,967	30.1	19.2
Maximum	7.93	60,480	39,312	85.4	22.5
Mean	7.4	57,910	37,642	57.8	20.8

1. SPD-Sand = Spiral plant discharge – Sand stream
2. SPD-HM = Spiral plant discharge – heavy mineral stream

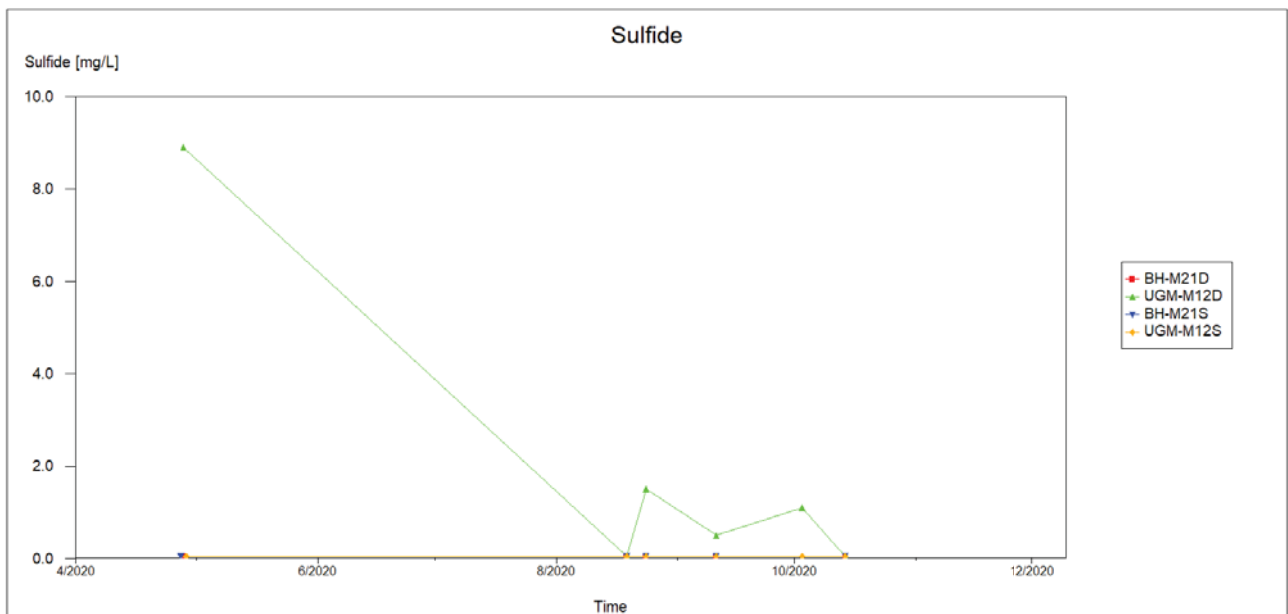
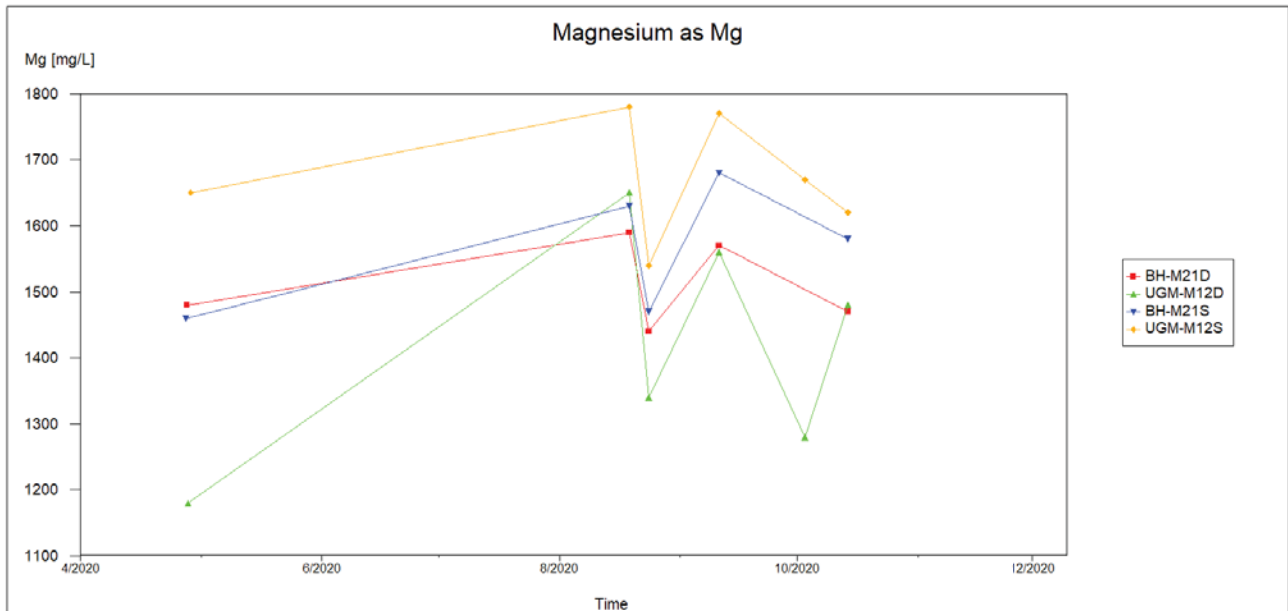


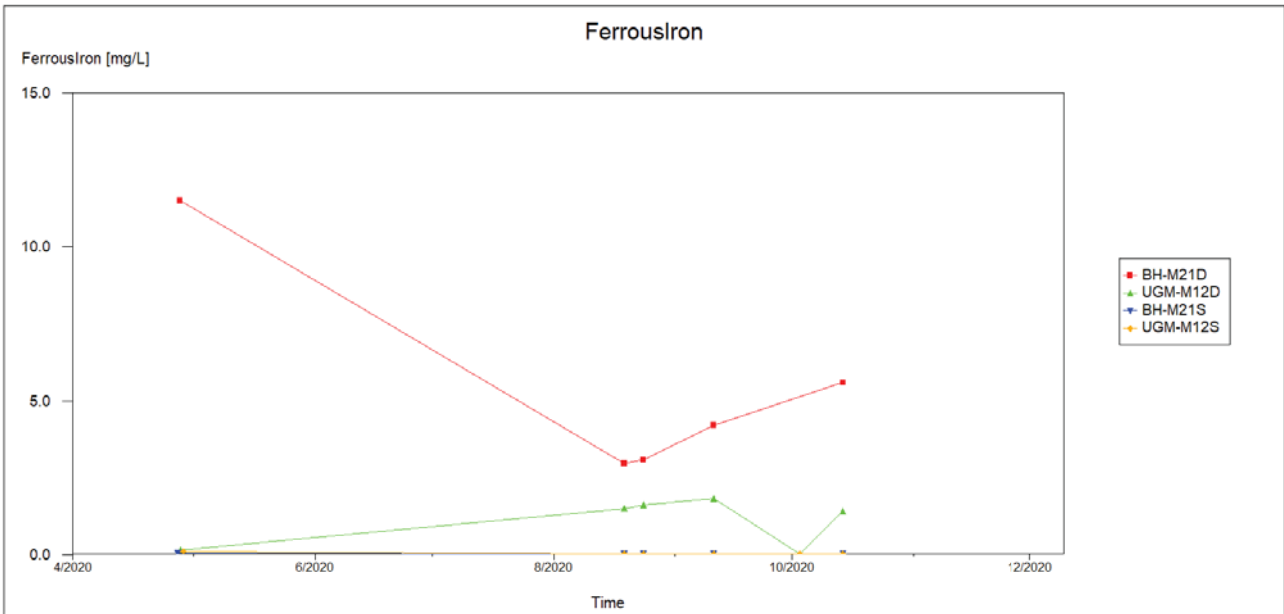
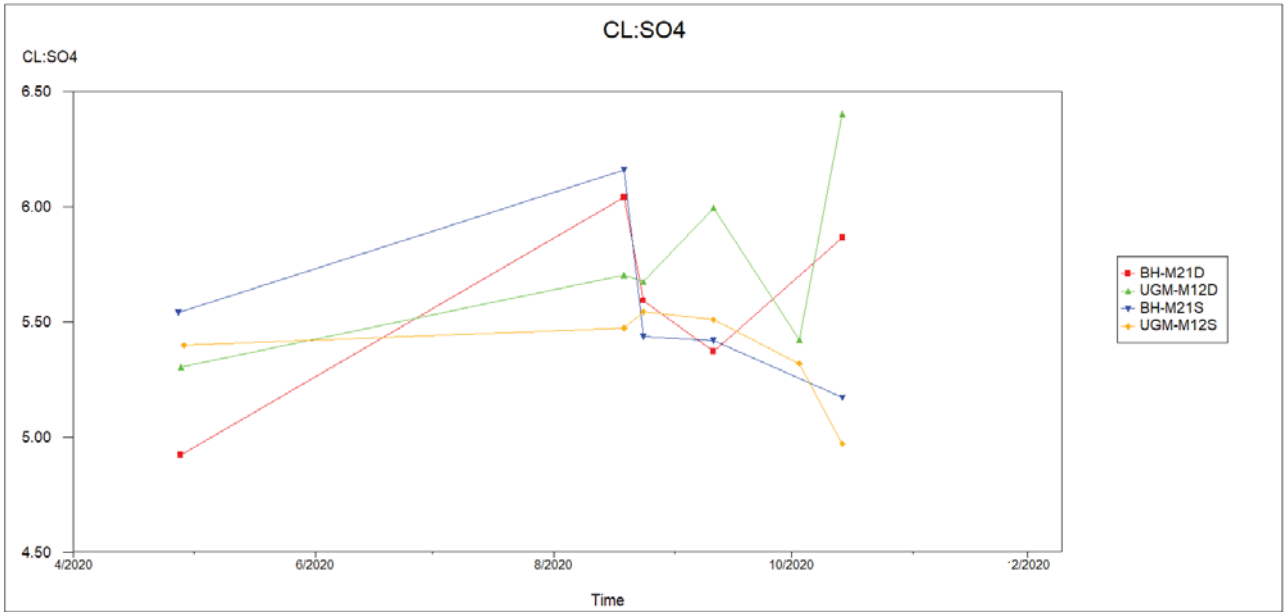
Appendix F

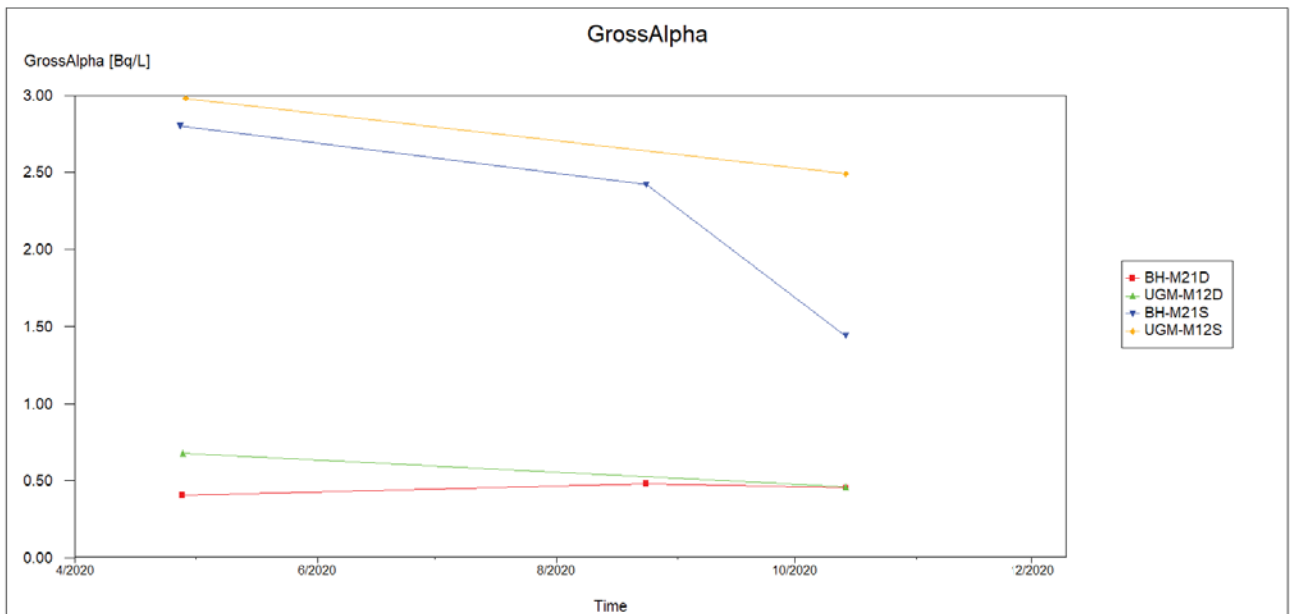
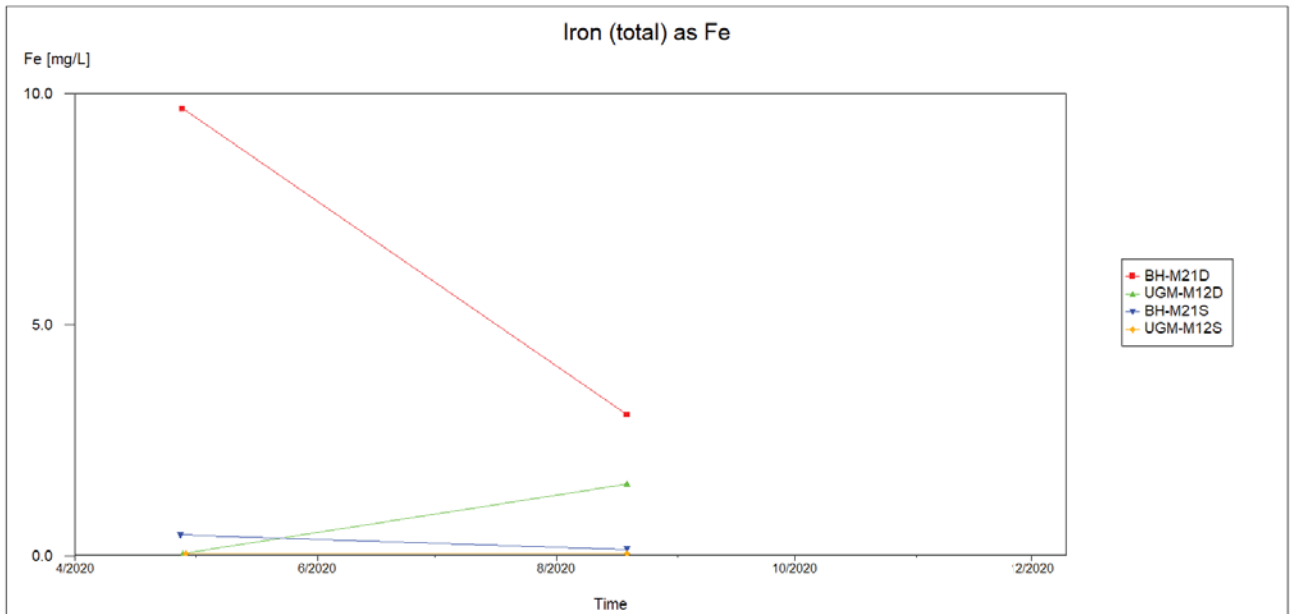
WISH database trend assessment

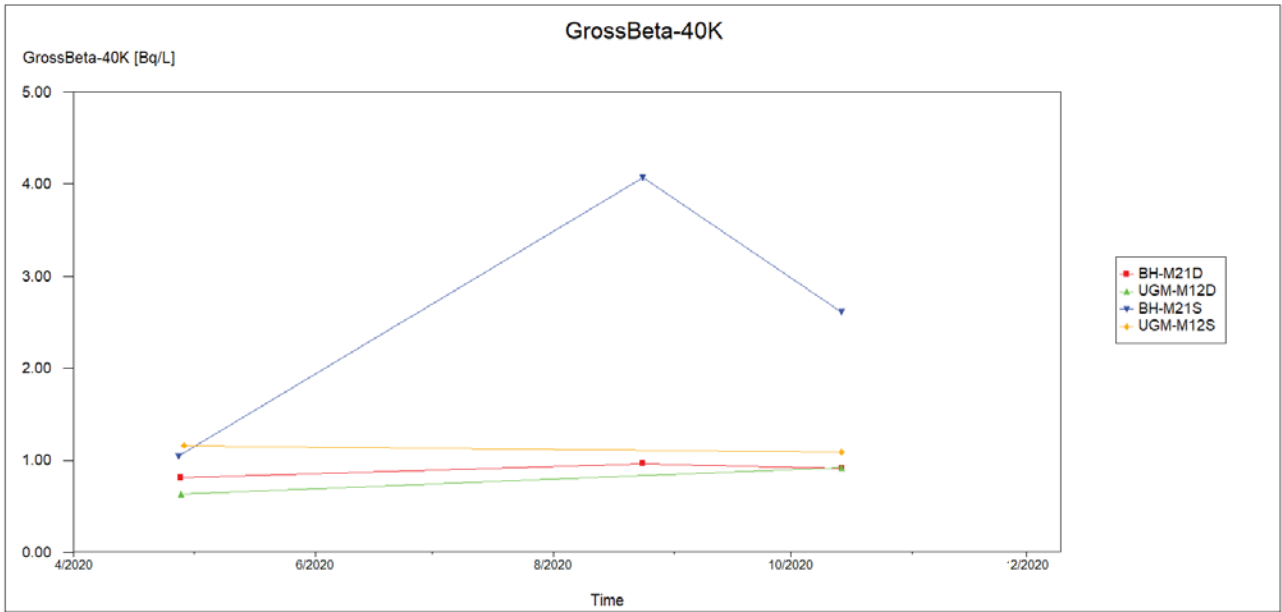


F.1 Mining bores

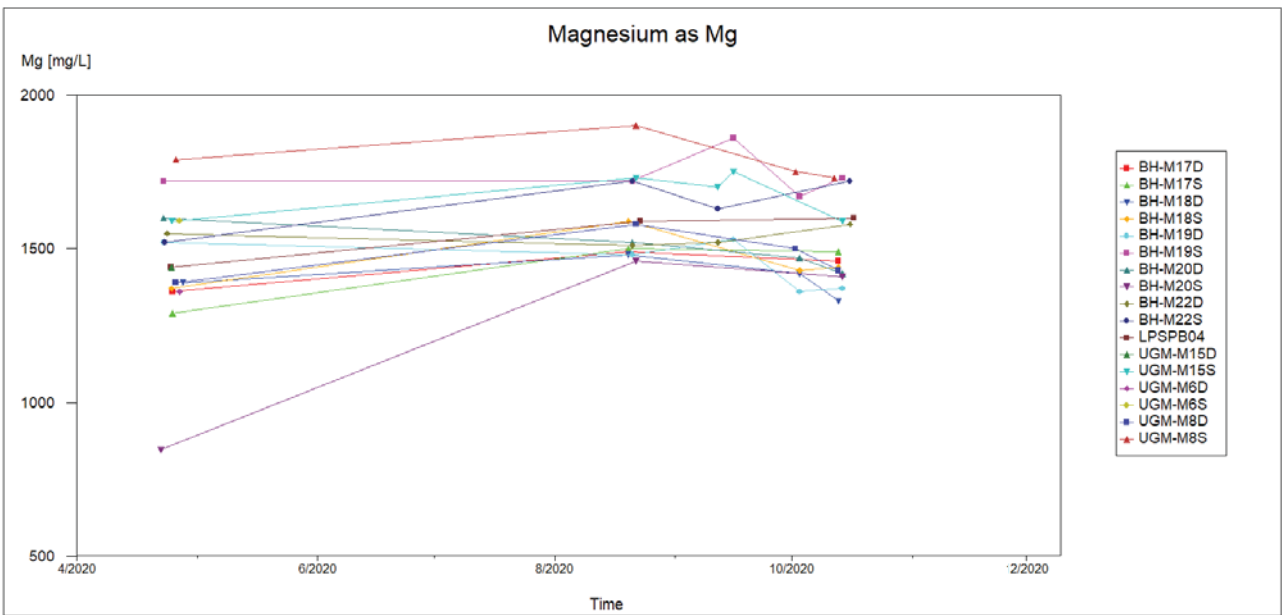


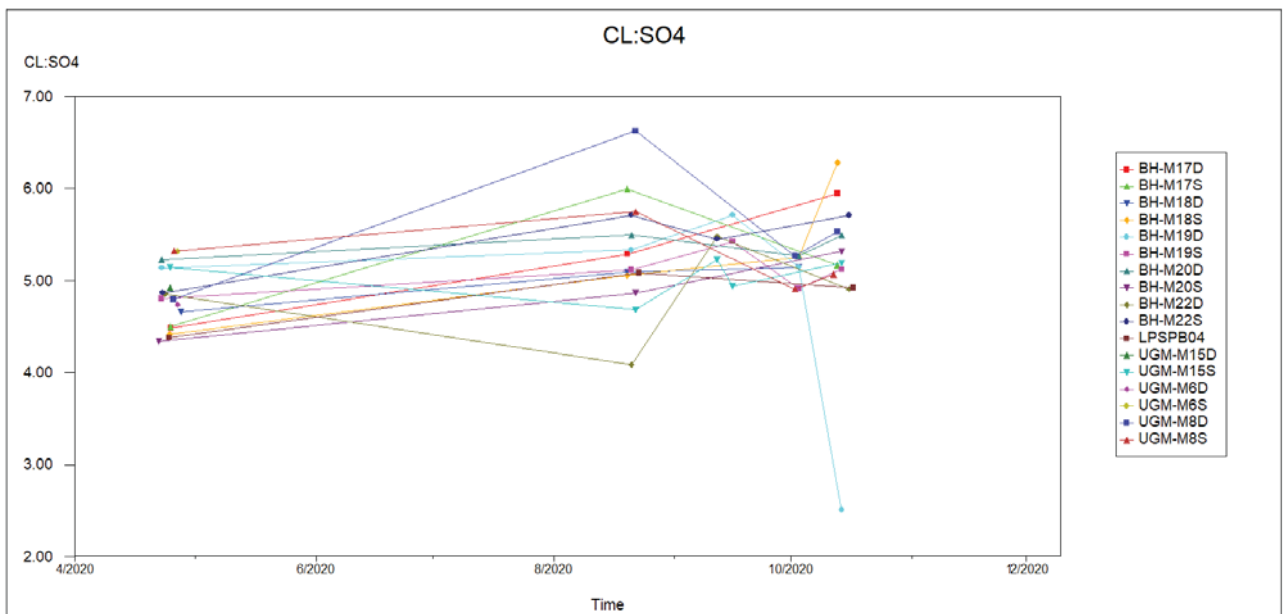
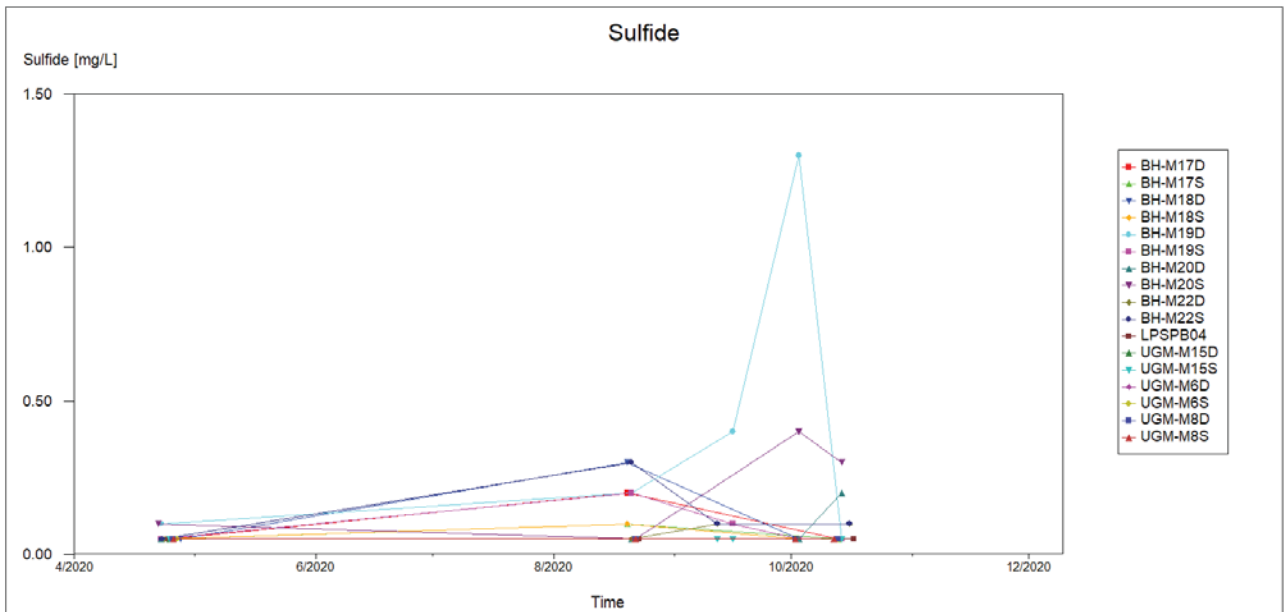


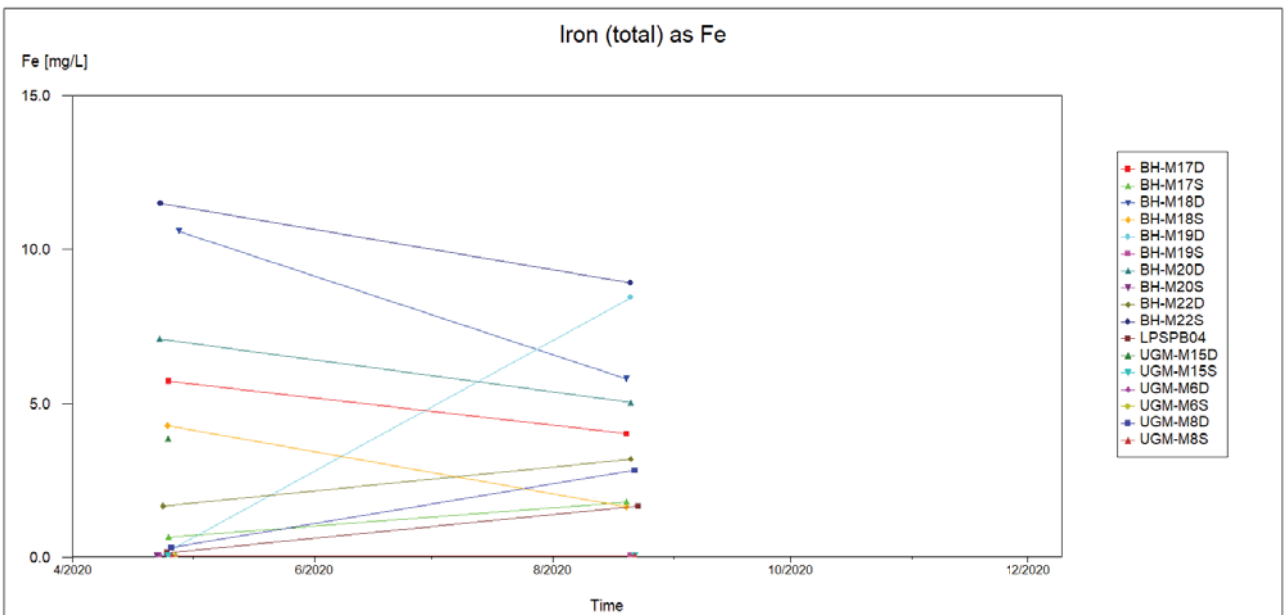
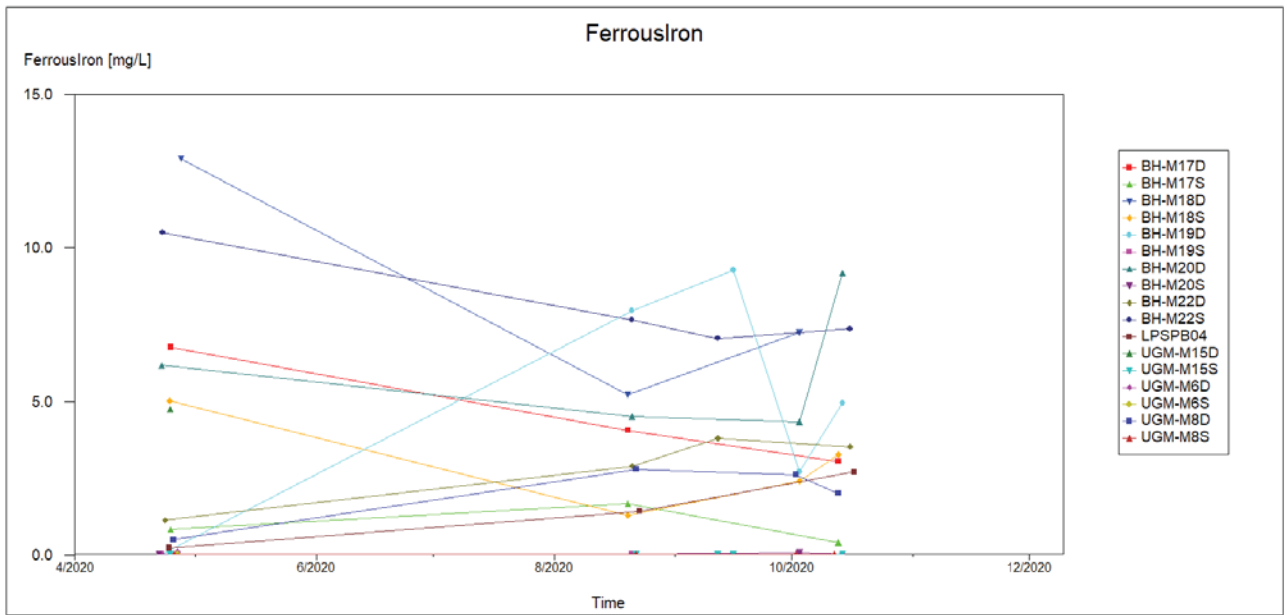


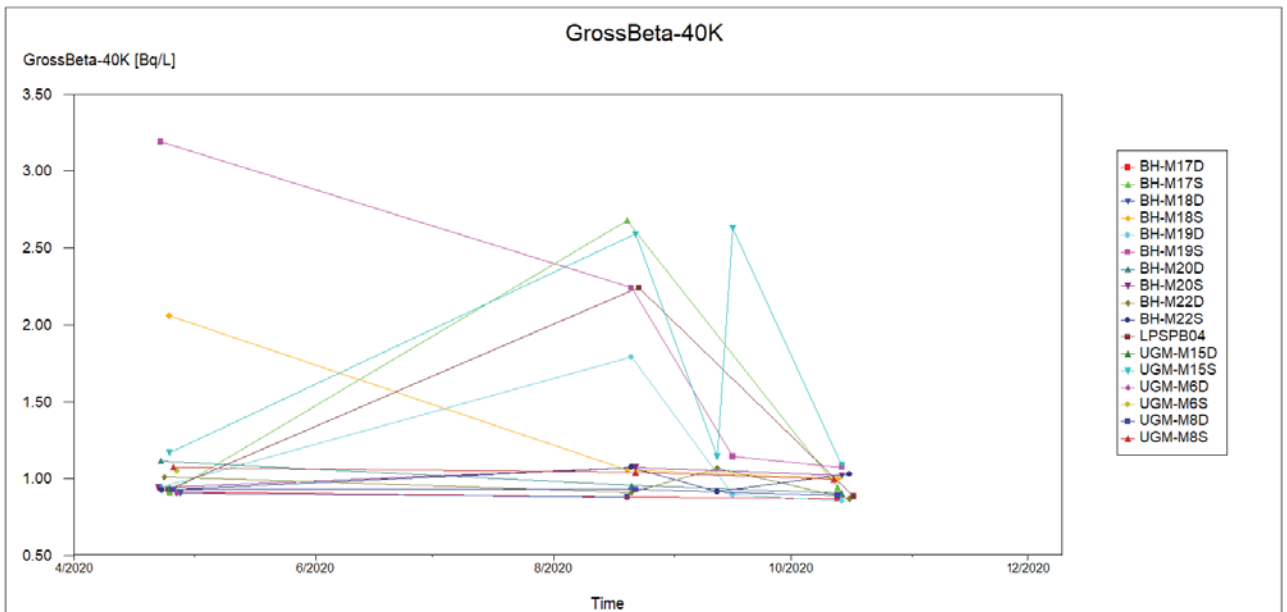
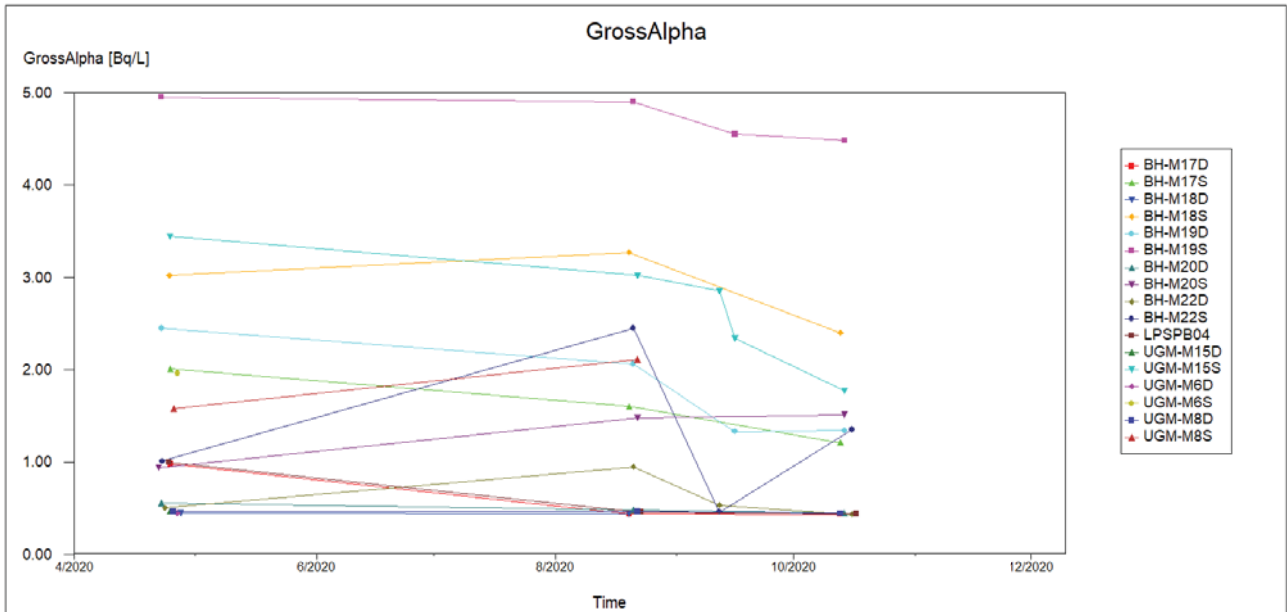


F.2 Transition bores









F.3 Background bores

