Appendix F

Materials Characterisation

Assessments

- North Kiaka
- Moora mine

Appendix F1 -
GHD 2023, North Kiaka Material Characterisation

SIMCOA
Silicon Metal Company of Australia

Simcoa Operations Pty Ltd

North Kiaka Proposal
Materials Characterisation

GHD Consultants

July 2023

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Executive Summary

GHD Pty Ltd was engaged by Simcoa Operation Pty Ltd to undertake a waste materials characterisation of the proposed North Kiaka open-pit silica mine, located 15 km north of Moora, WA.

The assessment characterised **waste materials** above the water table to identify potential risks posed by acidic metalliferous drainage (AMD) and hazardous materials, to human health and the environment.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.4 and the assumptions and qualifications contained throughout the Report.

Due to limited waste rock drill hole samples, the original proposed scope of laboratory analysis was reduced and rationalised to the following analysis:

- Acid neutralising capacity (ANC): 17 samples
- Net acid generation (NAG): 17 samples
- Sulfur speciation: 4 samples
- Tailored metals suite: 1 sample
- Leach testing (major ions, pH, EC, metals): 1 sample
- Asbestos mineral fibres: 6 samples

Although limited wase rock samples were available, the findings herein also draw upon previous waste characterisation studies completed at the Moora Silica mine, located 2.5km to the south of North Kiaka, given the analogous geological conditions (strike/bedding and silica ore body).

Based on the laboratory testing and risk assessment, the following conclusions management requirements are presented to control and monitor the risk to human health and the environment:

Acid Metalliferous Drainage (AMD)

Based on the limited sampling results (herein) and drawing on previous waste characterisation studies at the Moora open pit mine (along geological strike), there is no evidence to indicate that the waste rock, situated above the water table poses a risk to human or environmental health with respect to metals mobilisation under acid conditions. As confirmation, a waste rock management plan should be developed and include follow-up sampling and analysis for AMD during resource drilling/blasting, and/or monitoring of surface and groundwater.

Hazardous materials

The results indicate that asbestos form minerals and radioactivity, inferred from the Moora mine (analogous geological setting), should not pose a risk to human health and are unlikely to require management.

However, exposure to silica dust during mining, stockpiling and transport of ore and waste rock should be managed under a suitable management plan to protect human health from dust inhalation (etc.)

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1. Introduction

Simcoa Operations Ltd Pty (Simcoa) engaged GHD Pty Ltd (GHD) to prepare environmental approvals under Part IV and Part V of the *Environmental Protection Act (WA) 1986 (EP Act)* and the *Mining Act (WA) 1978* for the North Kiaka Project (the Project).

As per the EPA's decision (29 July 2022) and subsequent Notice (15 August 2022), the proposed North Kiaka Project will be assessed as a "significant amendment to an existing approved proposal" meaning impacts are required to be assessed in context of both the existing approved proposal and the referred proposal.

Furthermore, prior to commencing mining activities (including clearing and construction) the Project must also be assessed and approved by the Department of Mines, Industry Regulation and Safety (DMIRS) in accordance with the *Mining Act (WA) 1978*.

To ensure the combined mining proposal and mine closure plan contain the requisite information (as per DMIRS guidance), the completion of a waste characterisation assessment (WCA) was recommended. Mining will take place above the water table at North Kiaka and the silica ore will be transferred to the Moora Mine for processing. Waste material will be stored in designated locations on site.

1.1 Project location

Simcoa's operations are 15 km north of the Moora township and approximately 180 km north of Perth in the Wheatbelt region of Western Australia. The proposed North Kiaka Mine is 2.5 km north of the existing Moora mining operations (Figure 1).

1.2 Purpose of this report

The aim of this report is to test and characterise the waste rock in the proposed pit envelope (located above the water table) and develop an understanding of the environmental and human health risks associated with mining, excavating, and storing waste rock material.

1.3 Scope of work

This scope of work provides "screening level" assessment of the waste material (discussed in detail in Section 3) and covers the following:

– Collection of drill spoils from existing / historical exploration drilling completed previously by Simcoa and submission to the laboratory (ALS) for the following analysis:
  - Acid neutralising capacity (ANC)
  - Net acid generation (NAG)
  - Sulfur speciation
  - Total metals
  - Leach testing ALSP and analysis for major ions, pH, EC, metals
  - Asbestos mineral fibres

1.4 Limitations

This report: has been prepared by GHD for Simcoa Operations Pty Ltd and may only be used and relied on by Simcoa Operations Pty Ltd for the purpose agreed between GHD and Simcoa Operations Pty Ltd as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Simcoa Operations Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report GHD disclaims liability arising from any of the assumptions being incorrect.

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

GHD has prepared this report on the basis of information provided by Simcoa and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

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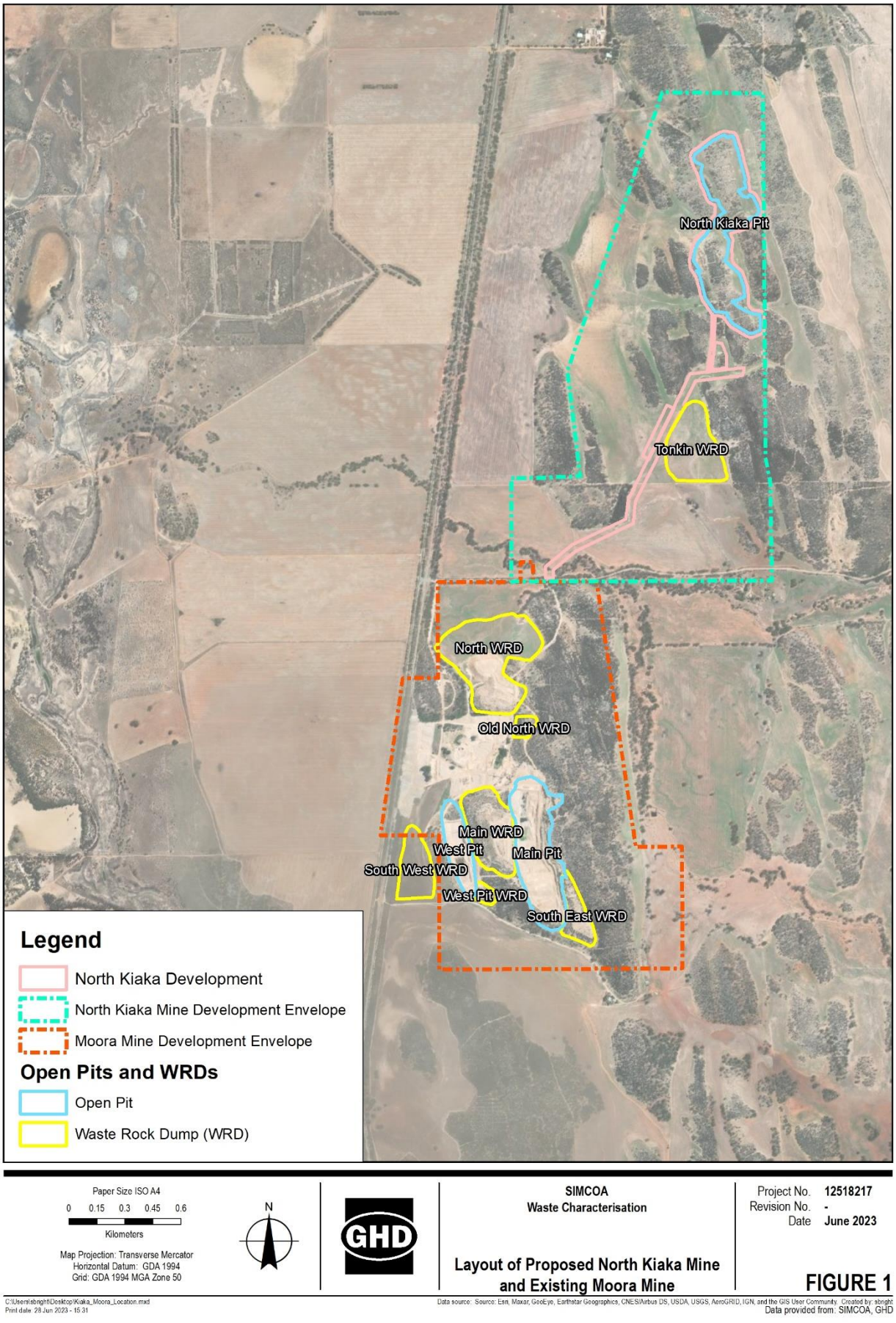

Figure 1 Location of North Kiaka and Moora

2. Site Setting and background

2.1 Previous studies

Previous material characterisation at the North Kiaka and Moora mines is included in the following relevant reports:

– ***GHD Pty Ltd, 2019 Simcoa – North Kiaka Mine Expansion Materials Characterisation Assessment Report (April 2019).***

This desktop assessment found that, although the site geological setting indicates that the risks of intersecting hazardous materials and leaching of metals under acidic conditions was considered low, confirmation is required though laboratory testing of the waste materials.

– ***GHD Pty Ltd, 2019 Simcoa – North Kiaka Mine, Hydrogeological Assessment (March 2023).***

This Report presents an initial understanding of the baseline groundwater levels and quality at the proposed North Kiaka Mine. The works included drilling and installing six groundwater monitoring bores, comprehensive analytical suite for groundwater quality and groundwater level monitoring.

– ***GHD Pty Ltd, 2020 Simcoa - Moora Mine: Waste rock materials characterisation.***

Laboratory testing, conducted on the waste-rock, included a “screening” assessment of the waste rock of samples taken from the floor and wall of the pit (by Simcoa), which were above the water table. Testing included 12 samples for Acid Metalliferous Drainage (AMD), metals leaching, radioactivity screen and asbestos.

The laboratory analysis indicated the following:

– Asbestos form minerals and radioactivity should not pose a risk to human health.
– The waste rock material is deemed not to pose an unacceptable risk through generation of acidic conditions (negligible acid production potential).
– Metals should not leach from the waste rock under acidic conditions at concentrations which may cause an impact to human health and the environment.
– The waste rock unlikely to leach readily dissolvable minerals at concentrations which will cause unacceptable increases in salinity.
– Exposure from silica should be managed to protect human health (dust during mining etc.).

– ***GHD Pty Ltd, 2022 Simcoa – Moora Quartzite Mine, Materials Characterisation Study (June 2022).***

The results indicated that asbestos form minerals and radioactivity levels are sufficiently low and should not pose a risk to human health or require management. An estimated 15-30% of the waste rock bulk from below the water table indicated the potential for acidic leaching at concentrations which could impact the receiving environment and a management plan should be developed.

2.2 Proposed waste rock landform

The North Kiaka development will consist of one mine pit, one waste dump, an easement linking to Moora Mine, internal access tracks, and associated infrastructure. A single waste dump landform is proposed to be located in areas which have been previously cleared of native vegetation, thereby minimising the disturbance to native vegetation.

2.3 Geological setting

The North Kiaka Mine is situated within the Noondine Chert stratigraphic unit, which is part of the Coomberdale Sub-Group of the Moora Group and is Middle Proterozoic in age. This Proterozoic Coomberdale Sub-Group comprises of consolidated and weakly metamorphosed sedimentary sequence of shelf carbonates and clastics (chert ie: Noondine chert (ore body), siltstones, quartzite). In addition, the Sub-Group is intruded by dolerite dykes and is broken up considerably by faulting (GSWA, 1982).

The Noondine chert (ore body) is a silicified, bedded carbonate (siliceous limestone/dolomite). The orebody appears to have been formed by the surface silicification of carbonate rocks. Silicification has been observed to a depth of 75 m. The age of the silicification is uncertain but is probably Tertiary in age (GSWA, 1982).

The chert (ore body) contains primary minerals such as chlorite, pyrite, apatite and minor remnant carbonates (calcite/dolomite). Iron oxides, titanium oxides and clays occur in the chert near the surface and are due to secondary weathering processes (Operations, 2010).

The chert strikes northerly and dips at 20 to 30 degrees to the west. Faulting is common and cavities occur which are usually filled with quartz gravel as collapse breccia (GSWA, 1982).

The geological map (not presented) indicates that the Moora and North Kiaka mining areas share an analogues geological setting, given the north-south strike of the chert bedding, and positioning of the open pits (along the strike).

2.4 Hydrogeological setting

Given the geological and topographical setting, groundwater occurrence at North Kiaka is constrained to fractured rock aquifers associated with the Proterozoic sedimentary units (The Perth Basin and associated sedimentary aquifers are located some 5 km to the east of the Moora quartzite mine (GSWA, 1982)).

There is little hydrogeological exploration at North Kiaka however, considering it is 2.5km north, along strike from the existing Moora mine site with similar geology and topography, it is expected that similar groundwater levels and groundwater quality will occur in North Kiaka.

Groundwater monitoring at the Moora mine (Saprolite Pty Ltd, 2022) indicates standing groundwater levels close to 210 to 215 mAHD (10 to 20 metres below natural ground level). Groundwater flow direction is likely to follow the regional topography and flow in a westerly direction towards the Coonderoo River (and wetlands), located some 2.5 km to the west of the western boundary of the Sites.

3. Methodology

3.1 Sample selection

Sample selection was limited to samples available in storage from previous exploration drilling completed by Simcoa. The saved samples were collected in labelled paper soil bags as 2m composites and stored in cardboard boxes in a designated storage shed. A map of sample locations selected for the WCA is presented in Figure 2

Samples were selected based on the following criteria:

– Samples available in the Simcoa storage shed
– Sampled deemed to be above the water table, taken as less than 12 meters below ground level
– Material characterised as waste; when the assay result exceeds the cut-off grades identified in section 3.3 (see Table 1)
– Within the North Kiaka pit outline
– Representative samples across the North Kiaka pit, where possible
– Representative sample from different geological formations where possible

Individual samples available in storage had a weight of approximately <50g per soil bag. In order to obtain enough sample for laboratory analysis, samples were composited up to 6m vertical depth within the same lithology.

3.2 Results analysis

Samples were selectively chosen for each individual analysis to ensure a representative analytical suite, therefore there was not enough sample to complete multiple analysis on each sample. As a result, the Net Acid Generation (NAG) tests which predicts the generation of acid rock drainage, and Acid Neutralising Capacity (ANC) which measures the overall buffering capacity, have been used as stand-alone tools to determine acid generation. The NAG analysis represents a direct measurement of the net amount of acid generated but does not estimate the neutralisation potential which would be obtained through a parallel analysis of Net Acid Production Potential (NAPP) and Sulfur Speciation. This means that a detailed classification of acid generation cannot be interpreted (Stewart W.A., 2006).

3.3 Definition of waste rock

The economic ore-grade material is based on cut-off grades for concentration of impurities as presented in Table 1. To define and categorise the waste material for the purposes of this report, Simcoa provided a database of drilling with laboratory assay results and GHD assigned waste to samples which exceeded these cut-off grades for one or more analyte.

It should be noted that ore estimates based on a three dimensional ore block model (Snowden, 2012) also include blending of materials with high impurities with materials of low impurities to achieve an average ore-grade volume. It is beyond the scope of this assessment to interrogate the ore-block model to define the distribution of ore and waste material (ore definition is subject to processing and economic considerations).

Table 1 North Kiaka Hills silica resource base cut-off grades according to SIMCOA 2012

Analyte	Cut-off grade*
Fe2O3	0.2
Al2O3	0.40
TiO2	0.05
CaO	na
MgO	na
P2O5	0.01

*Waste rock indicated when exceedance of cut-off grade

3.4 Laboratory analysis

Samples were submitted to ALS, which is a NATA (National Association of Testing Authorities) accredited laboratory, for a tailored analytical assessment.

Samples were submitted for the following analytical suites:

- Acid neutralising capacity (ANC): 17 samples
- Net acid generation (NAG): 17 samples
- Sulfur speciation: 4 samples
- Tailored metals suite: 1 sample
- Leach testing (major ions, pH, EC, metals): 1 sample
- Asbestos mineral fibres: 6 samples

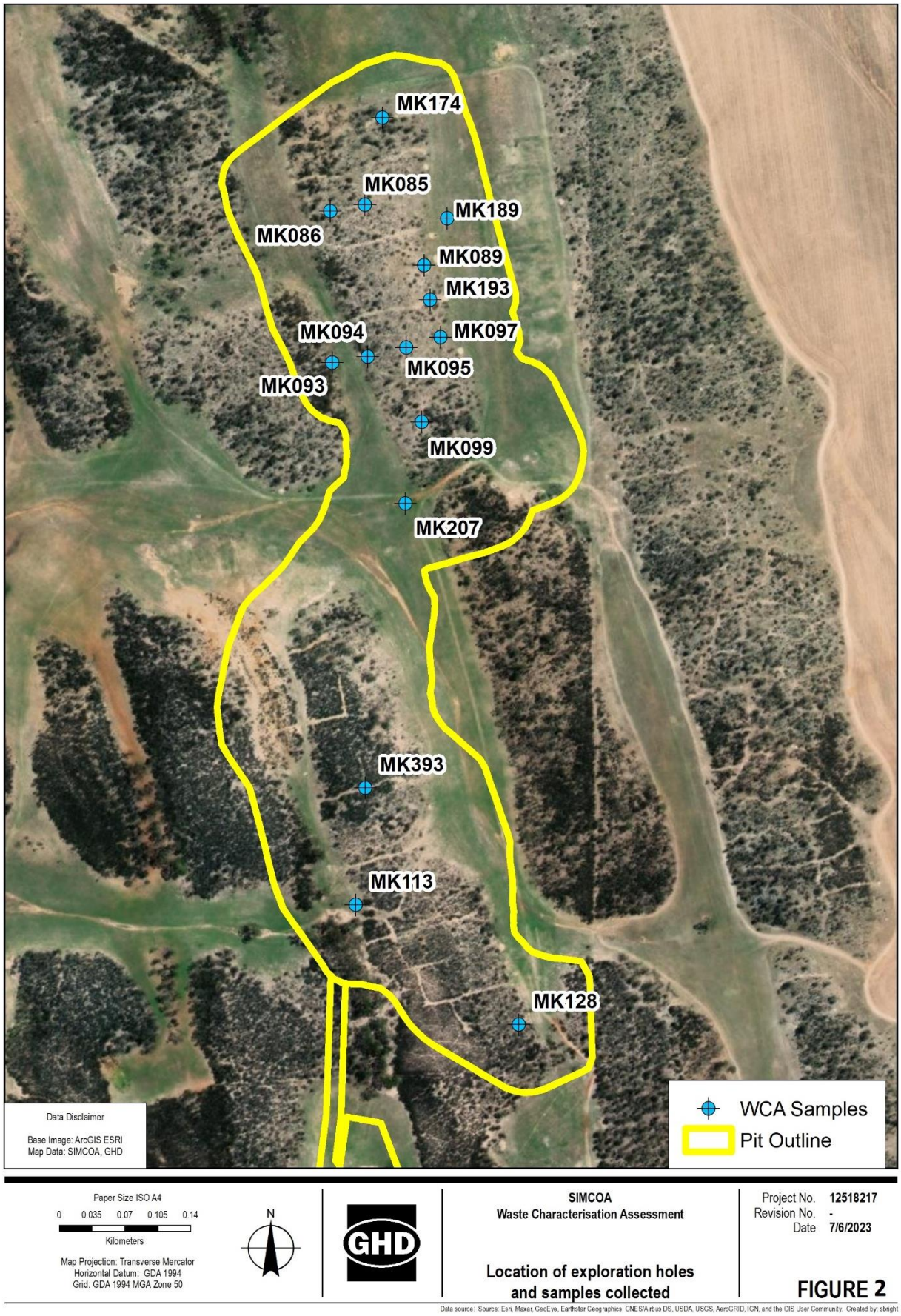

Figure 2 *Sample locations for the WCA*

4. Laboratory results

The laboratory results are discussed in the following sections and have been summarised and presented in Tables B1 to B4 in Appendix A, as follows:

– Table A1 Asbestos results
– Table A2 Total metals analysis
– Table A3 Leaching analysis results
– Table A4 Acid metalliferous drainage results

The following guidelines have been used to determine exceedances:

– Australian Drinking Water Guideline (ADWG) 2011 Health, V3.7 updated in 2022
– National Environment Protection Measures (NEPM), 2013, Guideline Investigation levels (GILs), Fresh Water
– The Geochemical Abundance Index (GAI). (INAP, 2009)

4.1.1 Hazardous materials:

The asbestos results (Appendix A, Table 1) indicate that fibrous asbestos material were not detected and supports the conclusion that exposure to the waste rock material will not result in an increased human exposure risk.

Although samples were not available for radioactivity analysis (gross beta and alpha), at the Moora Silica mine located 2.5 km to the south, previous radioactivity testing indicated negligible radiological activity (GHD, 2022). Given the similar geological conditions (strike/bedding/silica ore body) negligible concentrations are also anticipated at the North Kiaka mine, which supports the conclusion that exposure to the waste rock material will not result in an increased human radiation exposures risk

4.1.2 Total metals analysis:

The total metals analytical results (Appendix A, Table 2) have been compared to abundance of the elements in the earth's crust, as a screening tool to identify metals which may be relatively elevated and may require management if leached from the waste rock.

Table B2 indicates the metals that are elevated over the typical crustal average (TCA) and, if acidic conditions occur, these are metals that may leach from the geological profile. Any monitoring of groundwater and seepage derived from the mine site should include (but not be limited to) the following metals:

– Bismuth - Laboratory result: 0.04 ppm, TCA: 0.0085 ppm
– Molybdenum - Laboratory result: 2.97 ppm, TCA: 1.2 ppm
– Rhenium - Laboratory result: 0.002 ppm, TCA: 0.0007 ppm
– Antimony - Laboratory result: 0.26 ppm, TCA: 0.2 ppm
– Strontium - Laboratory result: 1.4 ppm, TCA: 0.037 ppm

4.1.3 Metals leaching analysis results:

The leaching results in Appendix A, Table 3 (ALSP under deionised water) indicate that no metals exceeded the drinking water guideline (ADWG 2011). The following metals leached at concentrations that exceed the fresh water guideline (NEPM, 2013):

– Aluminium – Laboratory result: 3.40 mg/L, Guideline: 0.055 mg/L
– Chromium (iii+iv) – Laboratory result:0.005 mg/L, Guideline: 0.001 mg/L
– Zinc - Laboratory result:0.054 mg/L, Guideline: 0.008 mg/L

The leaching of these metals occurs in the laboratory under neutral conditions (e.g: without the mobilisation effects of acidic conditions), and any monitoring of groundwater and seepage (under neutral conditions) derived from the mine site should include these metals.

4.1.4 Acid metalliferous drainage results:

The AMD analytical results, summarised in Appendix A, Table 4, were used to derive and calculate the net acid generation (NAG) and acid neutralising capacity (ANC) of the samples.

An average NAG and ANC is used to calculate maximum Potential Acidity (MPA) and Net Acid Producing Potential (NAPP). A positive NAPP value reflects the production of acid, while a negative value reflects the excess of buffering capacity (acid consumption).

Summary of results are displayed in Table 2 and Table 3. Notable observations are:

– The average NAG (pH 4.5) was <0.1 kg H2SO4/t (below the limit of reporting of 0.1 kg H2SO4/t) indicating negligible net acid generation in all samples.
– The average NAG (pH 7) was 10.2 H2SO4/t indicating little to no acid generation potential
– The average ANC (as H2SO4) was 0.83 kg H2SO4 equiv./t indicating weak acid neutralising capacity
– Sulfide concentrations were below the limit of reporting (<0.01%) rendering them negligible
– The calculated NAPP value is -0.64, the negative number indicating the waste rock material can be classified as non-acid forming (Amira , 2002).

Table 2 Key leachate results

Analyte Group	Unit	Limit of Reporting	Average (sample no.)
NAG (pH 4.5)	kg H2SO4/t	0.1	<0.1 (17)
NAG (pH 7.0)	kg H2SO4/t	0.1	10.2 (17)
ANC as H2SO4	kg H2SO4 equiv./t	0.5	0.83 (17)
Sulfide as S	%	0.01	<0.01 (4)

Table 3 Calculating NAPP results (average)

MPA	ANC	NAPP
0.15	0.8	-0.65

5. Interpretation of risk to human health and the environment

5.1 Understanding of source-pathway-receptor setting

A summary of the potential sources of impact, migration pathways (which may mobilise the sources) and receptors (which may be impacted by the sources) is summarised and discussed in sections 5.1.1 to 5.1.3.

5.1.1 Potential sources of impacts

The materials testing indicates the following with regard to the understanding of potential sources:

Asbestos and Radiological activity: The laboratory results indicate that asbestos fibres were not identified at North Kiaka.

Radiological activity in the Moora mine was identified as negligible (GHD, 2022) and are thus excluded from further consideration as the environmental and human health risks are considered negligible.

Silica: Although not tested, silica dust is deemed as a potential source given that silica has a potential to be mobilised during mining activities which poses a risk to human health through dust inhalation.

Metals leaching from waste rock: Waste rock was characterised to have little to no potential acid production and the potential for leaching of metals from the waste rock landform during rainfall infiltration under acid conditions is considered negligible. Three metals (Al, Cr and Zn) were identified as leaching from waste rock above freshwater aquatic guidelines (ALSP methods) and as a consequence are considered potential sources of impact.

5.1.2 Identified pathways (source mobilisation)

The potential source migration pathways are summarised as follows:

Surface water pathway: Leachate derived from the waste rock will migrate into the subsurface via rainfall infiltration, and/or discharge as seepage at the base of the waste rock dumps; expressed as surface water. Surface water flow will migrate towards and discharge into the creek lines associated with the mine area and migrate downstream to other tributaries.

Groundwater pathway: Where leachate derived from the waste rock (via rainfall infiltration) soaks into the subsurface, leachate will percolate downwards and impact groundwater quality. The impacted groundwater will migrate in the direction of the hydraulic gradient and may also discharge into creek lines and tributaries if hydraulically connected to groundwater.

Air dispersion: dust generation and migration during blasting, excavation, transportation of ore and waste material during mining and closure

5.1.3 Receptors (impacted by sources)

The potential receptors to impacts derived from the sources are as follows:

- The ecology of the creek lines and downgradient tributaries,
- Human exposure during operations and closure (drinking water, inhalation, or dermal contact).
- Stock exposure to drinking water.

Table 4 summarises the understanding of potential risks posed to human health and the environment from the waste-rock, where there is a complete linkage (source-pathway-receptors), and which will require management.

Table 4 Summary of Source Pathway Receptor linkage (environmental and human health risks for waste rock material)

Source	Pathway	Receptor	Potential Risk
Leaching metals from waste-rock above DWER fresh water guidelines (Al, Cr, Zn)	Seepage into the subsurface, mobilisation in the direction of groundwater flow, and potential discharge into receiving water bodies and creeks. Seepage and discharge to surface water environments	Ecology of creeks and receiving water bodies (where groundwater discharges into creek lines - not confirmed to occur through studies)	Yes
Silica (dust/particles generated from ore and waste rock)	Mobilisation into air/wind (generated through mining activities)	Human heath impacted through dust inhalation	Yes

5.2 Summary of risks and management requirements

Based on the scope of sampling, laboratory testing and risk assessment, the following conclusions can be drawn together with management requirements to control and monitor the risk to human health and the environment:

5.2.1 Acid Metalliferous Drainage (AMD)

Based on the limited sampling results (herein) and drawing on previous waste characterisation studies at the Moora open pit mine (along geological strike), there is no evidence to indicate that the waste rock, above the water table poses a risk to human or environmental health with respect to metals mobilisation under acid conditions. However, as confirmation, a waste rock management plan should be developed and include follow-up sampling and analysis for AMD during resource drilling/blasting, and/or monitoring of surface and groundwater.

5.2.2 Metalliferous Drainage (neutral conditions)

The preliminary leaching results (under neutral conditions, ALSP) support that the waste-rock may leach concentrations of some metals above the fresh-water guidelines (Al, Cr, Zn).

However, the leaching methods (ALSP) are recognised as likely over-estimating the leaching concentrations of metals, given that the sample media was supplied pre-prepared/ground rock, considered not reflective of the occurrence of waste-rock in the landform (samples tumbled with di-ionsied water)

Prior to understanding the management requirements, it is recommended that additional waste rock column leach tests, are undertaken with grain sizes reflective of the waste-rock landform (e.g.: gravels/clasts).

5.2.3 Hazardous materials

The results indicate that asbestos form minerals and radioactivity should not pose a risk to human health and are unlikely to require management.

However, exposure to silica dust during mining, stockpiling and transport of ore and waste rock should be managed under a suitable management plan to protect human health from dust inhalation (etc.)

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Appendix A

Laboratory summary results tables

			Hole ID	MK086	MK089	MK093	MK113	MK128	MK207
			Depth (m)	6 - 8	6 - 8	10 - 12	4 - 6	8 - 10	4 - 6
		Unit	EQL						
Asbestos									
	Asbestos Fibres (g)	g	0.1	0	0	0	0	0	0
	Asbestos (Trace)	Fibres	5	0	0	0	0	0	0
	Asbestos Type	-		1	1	1	1	1	1
	weight of sample	g	0.01	57.1	70.6	77.4	44.9	47.6	73.1
	APPROVED IDENTIFIER:	-		1	1	1	1	1	1
	Organic Fibre	g/kg		0	0	0	0	0	0
	Synthetic Mineral Fibre	g/kg		0	0	0	0	0	0
	Description	-		1	1	1	1	1	1

		Unit
Asbestos		
	Asbestos Fibres (g)	g
	Asbestos (Trace)	Fibres
	Asbestos Type	-
	weight of sample	g
	APPROVED IDENTIFIER:	-
	Organic Fibre	g/kg
	Synthetic Mineral Fibre	g/kg
	Description	-

Appendix A
Table 2
Total Metals Analytical Results

Hole ID: MK095_6-8, 8-10 & 10-12			
Sample ID: MK095_6-12			
Material Classification: Waste Rock			
Analyte	**Abundance of elements in the earth's crust**	**Units**	**Value**
Au	0.004	ppm	0.002
Ag	0.075	ppm	<0.01
Al	8.23	%	0.49
As	1.8	ppm	1.6
Ba	425	ppm	10
Be	2.8	ppm	0.08
Bi	0.0085	ppm	0.04
Ca	4.15	%	0.04
Cd	0.15	ppm	<0.02
Ce	66.5	ppm	1.9
Co	25	ppm	1.1
Cr	102	ppm	32
Cs	3	ppm	0.17
Cu	60	ppm	2.6
F	585	ppm	140
Fe	5.63	%	0.55
Ga	19	ppm	1.38
Ge	1.5	ppm	<0.05
Hf	3	ppm	0.2
Hg	0.085	ppm	0.029
In	0.25	ppm	0.016
K	2.09	%	0.04
La	39	ppm	0.8
Li	20	ppm	1.6
Mg	-	%	0.03
Mn	950	ppm	34
Mo	1.2	ppm	2.97
Na	2.36	%	0.01
Nb	20	ppm	0.8
Ni	84	ppm	3.3
P	1050	ppm	20
Pb	14	ppm	2.4
Rb	90	ppm	2.7
Re	0.0007	ppm	0.002
S	0.035	%	0.01
Sb	0.2	ppm	0.26
Sc	22	ppm	0.4
Se	0.05	ppm	<1*
Sn	2.3	ppm	2.3
Sr	0.037	ppm	1.4
Ta	2	ppm	0.05
Te	0.001	ppm	<0.05*
Th	9.6	ppm	0.85
Ti	0.56	%	0.026
Tl	0.85	ppm	0.1
U	2.7	ppm	0.2
V	120	ppm	10
W	1.25	ppm	0.3
Y	33	ppm	0.5
Zn	70	ppm	3
Zr	165	ppm	5.5

* The ME-ICP89 method was used for an analysis whose limit of reporting for Se and Te was 1 and 0.05, respectively.

				Location Code	MK095	MK099	MK113	MK174	MK189
				Depth	6 - 12	4 - 10	6 - 12	2 - 8	2 - 8
	Unit	EQL	ADWG 2011 Health (leachable; v3.7 updated 2022)	NEPM 2013 Table 1C GILs, Fresh Waters (Leached)					
Major Ions									
Calcium	mg/L	1			<1	-	-	-	-
Magnesium	mg/L	1			<1	-	-	-	-
Potassium	mg/L	1			<1	-	-	-	-
Sodium	mg/L	1			2	-	-	-	-
Chloride	mg/L	1			1	-	-	-	-
Sulfate	mg/kg	100			-	<100	<100	<100	<100
Sulfate (filtered)	mg/L	1	500		2	-	-	-	-
Metals									
Niobium	mg/L	0.001			<0.001	-	-	-	-
Rhenium	mg/L	0.001			<0.001	-	-	-	-
Tantalum	mg/L	0.001			<0.001	-	-	-	-
Aluminium	mg/L	0.01		0.055	3.40	-	-	-	-
Antimony	mg/L	0.001	0.003		<0.001	-	-	-	-
Arsenic	mg/L	0.001	0.01		<0.001	-	-	-	-
Barium	mg/L	0.001	2		0.177	-	-	-	-
Beryllium	mg/L	0.001	0.06		<0.001	-	-	-	-
Boron	mg/L	0.05	4	0.37[#1]	0.08	-	-	-	-
Cadmium	mg/L	0.0001	0.002	0.0002[#2]	0.0002	-	-	-	-
Cerium	mg/L	0.001			0.002	-	-	-	-
Caesium	mg/L	0.001			<0.001	-	-	-	-
Chromium (III+VI)	mg/L	0.001		0.001[#1]	0.005	-	-	-	-
Cobalt	mg/L	0.001			<0.001	-	-	-	-
Copper	mg/L	0.001	2	0.0014[#2]	<0.001	-	-	-	-
Gallium	mg/L	0.001			<0.001	-	-	-	-
Germanium	mg/L	0.001			<0.001	-	-	-	-
Gold	mg/L	0.001			<0.001	-	-	-	-
Hafnium	mg/L	0.01			<0.01	-	-	-	-
Iron	mg/L	0.05			1.91	-	-	-	-
Lanthanum	mg/L	0.001	0.002		<0.001	-	-	-	-
Lead	mg/L	0.001	0.01	0.0034[#2]	0.002	-	-	-	-
Lithium	mg/L	0.001			0.002	-	-	-	-
Manganese	mg/L	0.001	0.5	1.9[#1]	<0.001	-	-	-	-
Mercury	mg/L	0.0001	0.001	0.00006[#3]	<0.0001	-	-	-	-
Molybdenum	mg/L	0.001	0.05		<0.001	-	-	-	-
Nickel	mg/L	0.001	0.02	0.011[#2]	<0.001	-	-	-	-
Rubidium	mg/L	0.001			<0.001	-	-	-	-
Strontium	mg/L	0.001			0.008	-	-	-	-
Selenium	mg/L	0.01	0.01	0.005[#3]	<0.01	-	-	-	-
tellurium	mg/L	0.005			<0.005	-	-	-	-
Silver	mg/L	0.001	0.1	0.00005	<0.001	-	-	-	-
Tungsten	mg/L	0.001			<0.001	-	-	-	-
Thorium	mg/L	0.001			0.002	-	-	-	-
Titanium	mg/L	0.01			0.02	-	-	-	-
Uranium	mg/L	0.001	0.02		<0.001	-	-	-	-
Tin	mg/L	0.001			<0.001	-	-	-	-
Vanadium	mg/L	0.01			<0.01	-	-	-	-
Yttrium	mg/L	0.001			<0.001	-	-	-	-
Zirconium	mg/L	0.005			<0.005	-	-	-	-
Zinc	mg/L	0.005		0.008[#2]	0.054	-	-	-	-

Comments
#1 Figure may not protect key species from chronic toxicity, refer to ANZECC & ARMCANZ (2000) for further guidance.
#2 Values calculated using hardness of 30 mg/L CaCO3. Refer ANZECC & ARMCANZ (2000) for site specific hardness guidance
#3 Chemical for which possible bioaccumulation and secondary poisoning effects should be considered, refer to ANZECC & ARMCANZ (2000) for further guidance.

Environmental Standards
National Health and Medical Research Council, January 2022, ADWG 2011 Health (leachable; v3.7 updated 2022)

			Hole ID	MK085	MK086		MK089				MK093				MK094	MK095	MK097	MK099	MK113				MK128		MK174		MK189	MK193	MK207		MK393
			Depth (m)	8 - 10	4 - 6	6 - 8	2 - 4	4 - 6	6 - 8	8 - 10	4 - 6	6 - 8	8 - 10	10 - 12	8 - 10	6 - 12	4 - 6	4 - 10	0 - 2	2 - 4	4 - 6	6 - 12	8 - 10	10 - 12	0 - 2	2 - 8	2 - 8	2 - 4	2 - 4	4 - 6	4 - 6
		Unit	EQL																												
Inorganics																															
	pH (Lab)	pH units	0.01	-	-	-	-	-	-	-	-	-	-	-	-	6.73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Electrical conductivity (lab)	µS/cm	1	-	-	-	-	-	-	-	-	-	-	-	-	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ASS - pH																															
	pH-OX	pH units	0.1	5.2	5.3	-	5.3	5.4	-	5.4	5.4	5.4	5.1	-	5.5	-	5.6	-	5.5	5.7	-	-	-	5.3	5.4	-	-	5.8	5.7	-	5.1
ASS - ANC																															
	Acid Neutralising Capacity	% CaCO3	0.1	<0.1	<0.1	-	0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-	-	-	<0.1	<0.1	-	-	<0.1	<0.1	-	<0.1
	ANC as H2SO4	kg H2SO4/t	0.5	0.6	1.0	-	1.2	<0.5	-	<0.5	<0.5	<0.5	<0.5	-	0.6	-	0.7	-	1.0	0.7	-	-	-	1.0	0.8	-	-	<0.5	<0.5	-	0.7
	Fizz Rating	Fizz Unit	0	0	0	-	0	0	-	0	0	0	0	-	0	-	0	-	0	0	-	-	-	0	0	-	-	0	0	-	0
Minor Ions																															
	Sulfide as S	%	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	<0.01	-	-	-	<0.01	<0.01	-	-	-	-
	Sulfur as S (%)	%	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.01	-	-	-	<0.01	-	-	-	<0.01	<0.01	-	-	-	-
Net Acid Generation																															
	NAG (pH 4.5)	kg H2SO4/t	0.1	<0.1	<0.1	-	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	-	<0.1	-	<0.1	-	<0.1	<0.1	-	-	-	<0.1	<0.1	-	-	<0.1	<0.1	-	<0.1
	NAG (pH 7.0)	kg H2SO4/t	0.1	12.0	10.8	-	12.2	7.6	-	8.8	9.8	10.1	11.8	-	10.3	-	10.8	-	9.0	8.6	-	-	-	13.3	12.2	-	-	8.8	8.5	-	8.5

Appendix B

Laboratory Certificates of analysis

CERTIFICATE OF ANALYSIS

Work Order	: **EP2305573**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: Steff Bright	Contact	: Peter Ravlic
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +6138549 9645
Project	: 12518217	Date Samples Received	: 27-Apr-2023 12:00
Order number	: 12518217/036	Date Analysis Commenced	: 05-May-2023
C-O-C number	: ----	Issue Date	: 05-May-2023 12:16
Sampler	: SIMCOA		
Site	: ----		
Quote number	: EP/174/22		
No. of samples received	: 22		
No. of samples analysed	: 6		

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
- Descriptive 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*
Alana Smylie	Team Leader - Asbestos	Newcastle - Asbestos, Mayfield West, NSW

General Comments

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

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

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

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

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

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

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

- Asbestos conducted by ALS Newcastle, NATA accreditation no. 825, site no 1656.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	MK128_10	MK113_6	MK086_8	MK089_8	MK093_12
				Sampling date / time	14-Apr-2023 00:00	14-Apr-2023 00:00	14-Apr-2023 00:00	14-Apr-2023 00:00	14-Apr-2023 00:00
Compound	CAS Number	LOR	Unit		EP2305573-001	EP2305573-005	EP2305573-013	EP2305573-018	EP2305573-020
					Result	Result	Result	Result	Result
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg		**No**	**No**	**No**	**No**	**No**
Asbestos (Trace)	1332-21-4	5	Fibres		**No**	**No**	**No**	**No**	**No**
Asbestos Type	1332-21-4	-	--		**-**	**-**	**-**	**-**	**-**
Sample weight (dry)	----	0.01	g		**47.6**	**44.9**	**57.1**	**70.6**	**77.4**
APPROVED IDENTIFIER:	----	-	--		**A. SMYLIE**	**A. SMYLIE**	**A. SMYLIE**	**A. SMYLIE**	**A. SMYLIE**
Synthetic Mineral Fibre	----	-	--		**No**	**No**	**No**	**No**	**No**
Organic Fibre	----	-	--		**No**	**No**	**No**	**No**	**No**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	MK207_6	----	----	----	----
			Sampling date / time	14-Apr-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2305573-022	--------	--------	--------	--------
				Result	----	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**----**	**----**	**----**	**----**
Asbestos (Trace)	1332-21-4	5	Fibres	**No**	**----**	**----**	**----**	**----**
Asbestos Type	1332-21-4	-	--	**-**	**----**	**----**	**----**	**----**
Sample weight (dry)	----	0.01	g	**73.1**	**----**	**----**	**----**	**----**
APPROVED IDENTIFIER:	----	-	--	**A. SMYLIE**	**----**	**----**	**----**	**----**
Synthetic Mineral Fibre	----	-	--	**No**	**----**	**----**	**----**	**----**
Organic Fibre	----	-	--	**No**	**----**	**----**	**----**	**----**

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	MK128_10 - 14-Apr-2023 00:00	Soil sample.
EA200: Description	MK113_6 - 14-Apr-2023 00:00	Soil sample.
EA200: Description	MK086_8 - 14-Apr-2023 00:00	Soil sample.
EA200: Description	MK089_8 - 14-Apr-2023 00:00	Soil sample.
EA200: Description	MK093_12 - 14-Apr-2023 00:00	Soil sample.
EA200: Description	MK207_6 - 14-Apr-2023 00:00	Soil sample.

Inter-Laboratory Testing

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry) 9854 (Biology).

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

QUALITY CONTROL REPORT

Work Order	: **EP2305573**	Page	: 1 of 3
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: Steff Bright	Contact	: Peter Ravlic
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +6138549 9645
Project	: 12518217	Date Samples Received	: 27-Apr-2023
Order number	: 12518217/036	Date Analysis Commenced	: 05-May-2023
C-O-C number	: ----	Issue Date	: 05-May-2023
Sampler	: SIMCOA		
Site	: ----		
Quote number	: EP/174/22		
No. of samples received	: 22		
No. of samples analysed	: 6		

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*
Alana Smylie	Team Leader - Asbestos	Newcastle - Asbestos, Mayfield West, NSW

General Comments

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

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

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

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.**

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

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

- **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.**

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2305573**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: Steff Bright	Telephone	: +6138549 9645
Project	: 12518217	Date Samples Received	: 27-Apr-2023
Site	: ----	Issue Date	: 05-May-2023
Sampler	: SIMCOA	No. of samples received	: 22
Order number	: 12518217/036	No. of samples analysed	: 6

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **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: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Pulp Bag (EA200)							
MK128_10, MK113_6, MK086_8, MK089_8, MK093_12, MK207_6	**14-Apr-2023**	**----**	----	----	**05-May-2023**	11-Oct-2023	✓

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
Asbestos Identification in Soils	EA200	SOIL	AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

GHD
Level 10, 999 Hay Street, Perth WA 6000 — PO Box 3106, Perth WA 6832
Reception Ph: 08 6222 8222

Project ID *(as per ESdat set up; no spaces)* 12518217	**PO Number** (to be invoiced) 12518217/036
Laboratory Quote No. EP/174/22	**Turnaround Time** Standard
Project Manager (Invoice) & GHD accounts Bronwyn Neville	**Email Address (Results)** steff.bright@ghd.com, GHD.LabReports@ghd.com, paul.hamer@ghd.com

Laboratory: ALS Environmental
Address: 26 Rigali Way, Wangara WA 6065
Laboratory Contact: ALS Environmental

GHD Sample ID	Lab Sample ID	Date	Time	Container: Sample Matrix (S-Soil/SL-Sludge/W-Water/A-Air)	Container: Type (B-Bottle/H-Jar/V-Vial/Bag/G-Glass/P-Plastic)	Container: Preservative (Unpreserved/HCl/H2SO4/HNO3/Other)	Container: No	Analyses: ANC - (EA013)	NAG - (EA011)	Sulfur Speciation - (EK085T)	Sulfur Speciation - (ED042T)	Radioactivity - (EA250)	Asbestos - (EA200)	Metals Solid - (ME-MS61m) & (Au-ICP22) & (ME-ICP89) & (F-IC881)	Metals Leach - (NT-011) & (02) & (EG020W) & (EG035W) & (EA005P) & (EA010P)	Remarks
MK128_10	1	14/04/2023		S	Bag	N	1	x	x	x	x	x	x	x	x	
MK128_12	2	14/04/2023		S	Bag	N	1	x	x							
MK113_2	3	14/04/2023		S	Bag	N	1	x	x							
MK113_4	4	14/04/2023		S	Bag	N	1	x	x	x	x			x	x	
MK113_6	5	14/04/2023		S	Bag	N	1	x	x	x	x	x	x	x	x	
MK113_8	6	14/04/2023		S	Bag	N	1	x	x	x	x			x	x	
MK113_10	7	14/04/2023		S	Bag	N	1	x	x							
MK113_12	8	14/04/2023		S	Bag	N	1	x	x							
MK099_6	9	14/04/2023		S	Bag	N	1	x	x							
MK099_8	10	14/04/2023		S	Bag	N	1	x	x							
MK099_10	11	14/04/2023		S	Bag	N	1	x	x							
MK086_6	12	14/04/2023		S	Bag	N	1	x	x	x	x			x	x	
MK086_8	13	14/04/2023		S	Bag	N	1	x	x	x	x	x	x	x	x	
MK095_8	14	14/04/2023		S	Bag	N	1	x	x							
MK095_10	15	14/04/2023		S	Bag	N	1	x	x							
MK095_12	16	14/04/2023		S	Bag	N	1	x	x							
MK089_4	17	14/04/2023		S	Bag	N	1	x	x							
MK085_8	18	14/04/2023		S	Bag	N	1	x	x	x	x	x	x	x	x	
MK093_10	19	14/04/2023		S	Bag	N	1	x	x	x	x			x	x	
MK093_12	20	14/04/2023		S	Bag	N	1	x	x	x	x	x	x	x	x	
MK207_4	21	14/04/2023		S	Bag	N	1	x	x	x	x			x	x	
MK207_6	22	14/04/2023		S	Bag	N	1	x	x	x	x	x	x	x	x	

Environmental Division
Perth
Work Order Reference
EP2305573

Telephone : +61-8-9406 1301

Sampled by: SIMCOA	Date/Time: UNK	Relinquished by: S.Bright	Date/Time: 14/4/2023
Received by: CS	Date/Time: 27/4 12:00	Relinquished by:	Date/Time:

CERTIFICATE OF ANALYSIS

Work Order	: **EP2306004**	Page	: 1 of 9
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: Steff Bright	Contact	: Peter Ravlic
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +6138549 9645
Project	: 12518217	Date Samples Received	: 27-Apr-2023 12:00
Order number	: 12518217/036	Date Analysis Commenced	: 11-May-2023
C-O-C number	: ----	Issue Date	: 31-May-2023 15:34
Sampler	: SIMCOA		
Site	: ----		
Quote number	: EP/174/22		
No. of samples received	: 38		
No. of samples analysed	: 22		

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	*Position*	*Accreditation Category*
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Satishkumar Trivedi	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 Contract for details.

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

- Particular samples have been crushed prior to preparation and analysis as per client request on the Chain of Custody. Please refer to SRN for further details.
- Moisture correction for this workorder has been disabled as samples were dried prior to analysis.
- Amendment (31/05/2023): This report has been amended and re-released as a result of the incorrect matrix selected for the lechate analysis for sample EP2306004_036 [MK095_8-12] which prevented the ESDAT EDD to be be uploaded. All analysis results are as per the previous report.
- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.
- 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: DI WATER LEACHATE (Matrix: WATER)				Sample ID	MK095_8-12	----	----	----	----
				Sampling date / time	05-May-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2306004-036	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**6.73**	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**21**	----	----	----	----
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		**4**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		**4**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**2**	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**1**	----	----	----	----
ED093W: Water Leachable Major Cations									
Calcium	7440-70-2	1	mg/L		<1	----	----	----	----
Magnesium	7439-95-4	1	mg/L		<1	----	----	----	----
Sodium	7440-23-5	1	mg/L		**2**	----	----	----	----
Potassium	7440-09-7	1	mg/L		<1	----	----	----	----
EG020W: Water Leachable Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**3.40**	----	----	----	----
ø Germanium	7440-56-4	0.001	mg/L		<0.001	----	----	----	----
Antimony	7440-36-0	0.001	mg/L		<0.001	----	----	----	----
ø Niobium	7440-03-1	0.001	mg/L		<0.001	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	----	----	----	----
Barium	7440-39-3	0.001	mg/L		**0.177**	----	----	----	----
ø Rhenium	7440-15-5	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		**0.0002**	----	----	----	----
Cerium	7440-45-1	0.001	mg/L		**0.002**	----	----	----	----
Caesium	7440-46-2	0.001	mg/L		<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		**0.005**	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Gallium	7440-55-3	0.001	mg/L		<0.001	----	----	----	----
Hafnium	7440-58-6	0.01	mg/L		<0.01	----	----	----	----

Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Sample ID	MK095_8-12	----	----	----	----
				Sampling date / time	05-May-2023 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2306004-036	--------	--------	--------	--------
					Result	----	----	----	----
EG020W: Water Leachable Metals by ICP-MS - Continued									
Lanthanum	7439-91-0	0.001	mg/L		<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L		**0.002**	----	----	----	----
Lithium	7439-93-2	0.001	mg/L		**0.002**	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		<0.001	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		<0.001	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	----	----	----
Rubidium	7440-17-7	0.001	mg/L		<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Silver	7440-22-4	0.001	mg/L		<0.001	----	----	----	----
Strontium	7440-24-6	0.001	mg/L		**0.008**	----	----	----	----
Tellurium	22541-49-7	0.005	mg/L		<0.005	----	----	----	----
Thorium	7440-29-1	0.001	mg/L		**0.002**	----	----	----	----
Tin	7440-31-5	0.001	mg/L		<0.001	----	----	----	----
Titanium	7440-32-6	0.01	mg/L		**0.02**	----	----	----	----
Uranium	7440-61-1	0.001	mg/L		<0.001	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	----	----	----	----
Yttrium	7440-65-5	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.054**	----	----	----	----
Zirconium	7440-67-7	0.005	mg/L		<0.005	----	----	----	----
Boron	7440-42-8	0.05	mg/L		**0.08**	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**1.91**	----	----	----	----
Gold	7440-57-5	0.001	mg/L		<0.001	----	----	----	----
Tungsten	7440-33-7	0.001	mg/L		<0.001	----	----	----	----
Tantalum	7440-25-7	0.001	mg/L		<0.001	----	----	----	----
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	MK128_12	MK113_2	MK113_4	MK086_6	MK089_4
			Sampling date / time	05-May-2023 00:00	05-May-2023 00:00	05-May-2023 00:00	05-May-2023 00:00	05-May-2023 00:00
Compound	CAS Number	LOR	Unit	EP2306004-001	EP2306004-002	EP2306004-003	EP2306004-010	EP2306004-014
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**5.3**	**5.5**	**5.7**	**5.3**	**5.3**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**13.3**	**9.0**	**8.6**	**10.8**	**12.2**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**1.0**	**1.0**	**0.7**	**1.0**	**1.2**
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	<0.1	**0.1**
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**0**	**0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	MK089_6	MK089_10	MK085_10	MK093_6	MK093_8
			Sampling date / time	05-May-2023 00:00	05-May-2023 00:00	05-May-2023 00:00	05-May-2023 00:00	05-May-2023 00:00
Compound	CAS Number	LOR	Unit	EP2306004-015	EP2306004-016	EP2306004-017	EP2306004-018	EP2306004-019
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**5.4**	**5.4**	**5.2**	**5.4**	**5.4**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**7.6**	**8.8**	**12.0**	**9.8**	**10.1**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	**0.6**	<0.5	<0.5
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**0**	**0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	MK093_10	MK207_4	MK174_2	MK393_6	MK097_6
			Sampling date / time	05-May-2023 00:00	05-May-2023 00:00	05-May-2023 00:00	05-May-2023 00:00	05-May-2023 00:00
Compound	CAS Number	LOR	Unit	EP2306004-020	EP2306004-021	EP2306004-025	EP2306004-029	EP2306004-030
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**5.1**	**5.7**	**5.4**	**5.1**	**5.6**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**11.8**	**8.5**	**12.2**	**8.5**	**10.8**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	**0.8**	**0.7**	**0.7**
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**0**	**0**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	MK094_10	MK193_4	MK113_8-12	MK099_6-10	MK095_8-12
			Sampling date / time	05-May-2023 00:00	05-May-2023 00:00	05-May-2023 00:00	05-May-2023 00:00	05-May-2023 00:00
Compound	CAS Number	LOR	Unit	EP2306004-031	EP2306004-032	EP2306004-034	EP2306004-035	EP2306004-036
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**5.5**	**5.8**	**----**	**----**	**----**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	**----**	**----**	**----**
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**10.3**	**8.8**	**----**	**----**	**----**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**0.6**	<0.5	**----**	**----**	**----**
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	**----**	**----**	**----**
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**----**	**----**	**----**
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	**----**	**----**	<100	<100	**----**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**----**	**----**	<0.01	<0.01	**----**
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	**----**	**----**	<0.01	<0.01	**----**
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	**----**	**----**	**----**	**----**	**8.4**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	MK189_4-8	MK174_4-8	----	----	----
				Sampling date / time	05-May-2023 00:00	05-May-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP2306004-037	EP2306004-038	--------	--------	--------
					Result	Result	----	----	----
ED040T : Total Sulfate by ICPAES									
Sulfate as SO4 2-	14808-79-8	100	mg/kg		<100	<100	**----**	**----**	**----**
ED042T: Total Sulfur by LECO									
Sulfur - Total as S (LECO)	----	0.01	%		<0.01	<0.01	**----**	**----**	**----**
EK085M: Sulfide as S2-									
Sulfide as S	----	0.01	%		<0.01	<0.01	**----**	**----**	**----**

Inter-Laboratory Testing

Analysis conducted by ALS Brisbane, NATA accreditation no. 825, site no. 818 (Chemistry) 18958 (Biology).

(SOIL) EK085M: Sulfide as S2-

(SOIL) ED040T : Total Sulfate by ICPAES

(SOIL) ED042T: Total Sulfur by LECO

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology). Only applies to samples EP2306004 (036).

(WATER) EG020W: Water Leachable Metals by ICP-MS

QUALITY CONTROL REPORT

Work Order	: **EP2306004**	Page	: 1 of 7
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: Steff Bright	Contact	: Peter Ravlic
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +6138549 9645
Project	: 12518217	Date Samples Received	: 27-Apr-2023
Order number	: 12518217/036	Date Analysis Commenced	: 11-May-2023
C-O-C number	: ----	Issue Date	: 31-May-2023
Sampler	: SIMCOA		
Site	: ----		
Quote number	: EP/174/22		
No. of samples received	: 38		
No. of samples analysed	: 22		

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

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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	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Satishkumar Trivedi	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.

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA011: Net Acid Generation (QC Lot: 5066781)									
EP2306004-001	MK128_12	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.0	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	13.3	13.3	0.0	0% - 20%
EP2306004-020	MK093_10	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.0	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	11.8	11.8	0.0	0% - 20%
EA013: Acid Neutralising Capacity (QC Lot: 5066782)									
EP2306004-001	MK128_12	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	1.0	1.0	0.0	No Limit
EP2306004-020	MK093_10	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	0.0	No Limit
ED040T : Total Sulfate by ICPAES (QC Lot: 5042935)									
EB2313695-001	Anonymous	ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	700	760	8.8	No Limit
ED042T: Total Sulfur by LECO (QC Lot: 5053295)									
EM2308097-004	Anonymous	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	0.0	No Limit
EP2306004-038	MK174_4-8	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 5057204)									
EP2306150-003	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	8.02	8.02	0.0	0% - 20%
EP2305855-048	Anonymous	EA005-P: pH Value	----	0.01	pH Unit	7.68	7.69	0.1	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 5057205)									
EP2305855-048	Anonymous	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	2400	2450	1.9	0% - 20%
ED037P: Alkalinity by PC Titrator (QC Lot: 5057206)									
EP2306150-003	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 5057206) - continued									
EP2306150-003	Anonymous	ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	122	123	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	122	123	0.0	0% - 20%
EP2305855-048	Anonymous	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	302	303	0.0	0% - 20%
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	302	303	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 5061043)									
EP2306004-036	MK095_8-12	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	2	0.0	No Limit
EP2306580-017	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	6	6	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 5061042)									
EP2306004-036	MK095_8-12	ED045G: Chloride	16887-00-6	1	mg/L	1	1	0.0	No Limit
EP2306580-017	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	83	84	0.0	0% - 20%
ED093W: Water Leachable Major Cations (QC Lot: 5059482)									
EP2306004-036	MK095_8-12	ED093W: Calcium	7440-70-2	1	mg/L	<1	<1	0.0	No Limit
		ED093W: Magnesium	7439-95-4	1	mg/L	<1	<1	0.0	No Limit
		ED093W: Sodium	7440-23-5	1	mg/L	2	3	0.0	No Limit
		ED093W: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 5059478)									
EP2306004-036	MK095_8-12	EG020B-W: Cerium	7440-45-1	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020B-W: Caesium	7440-46-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Rubidium	7440-17-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Strontium	7440-24-6	0.001	mg/L	0.008	0.008	0.0	No Limit
		EG020B-W: Thorium	7440-29-1	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Tellurium	22541-49-7	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020B-W: Titanium	7440-32-6	0.01	mg/L	0.02	0.03	54.7	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 5059479)									
EP2306004-036	MK095_8-12	EG020D-W: Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020D-W: Lanthanum	7439-91-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020D-W: Yttrium	7440-65-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020D-W: Zirconium	7440-67-7	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020D-W: Hafnium	7440-58-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 5059480)									
EP2306004-036	MK095_8-12	EG020E-W: Gold	7440-57-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020E-W: Tungsten	7440-33-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020E-W: Tantalum	7440-25-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 5059481)									

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 5059481) - continued									
EP2306004-036	MK095_8-12	EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	0.0002	<0.0001	0.0	No Limit
		EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Barium	7440-39-3	0.001	mg/L	0.177	0.183	3.7	0% - 20%
		EG020A-W: Chromium	7440-47-3	0.001	mg/L	0.005	0.007	40.1	No Limit
		EG020A-W: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-W: Lithium	7439-93-2	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-W: Manganese	7439-96-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Nickel	7440-02-0	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020A-W: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Zinc	7440-66-6	0.005	mg/L	0.054	0.057	6.2	0% - 50%
		EG020A-W: Aluminium	7429-90-5	0.01	mg/L	3.40	3.45	1.5	0% - 20%
		EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Boron	7440-42-8	0.05	mg/L	0.08	0.08	0.0	No Limit
		EG020A-W: Iron	7439-89-6	0.05	mg/L	1.91	1.78	7.2	0% - 20%
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 5069545)									
ES2314317-002	Anonymous	EG020G-W: Germanium	7440-56-4	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020G-W: Niobium	7440-03-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020G-W: Rhenium	7440-15-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
ES2314317-012	Anonymous	EG020G-W: Germanium	7440-56-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020G-W: Niobium	7440-03-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020G-W: Rhenium	7440-15-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG035W: Water Leachable Mercury by FIMS (QC Lot: 5059483)									
EP2306004-036	MK095_8-12	EG035W: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA011: Net Acid Generation (QCLot: 5066781)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	24.084 kg H2SO4/t	100	87.6	110
EA013: Acid Neutralising Capacity (QCLot: 5066782)								
EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	9.8 kg H2SO4 equiv./t	99.2	96.9	104
EA013: ANC as CaCO3	----	0.1	% CaCO3	<0.1	----	----	----	----
ED040T : Total Sulfate by ICPAES (QCLot: 5042935)								
ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	579 mg/kg	92.1	79.0	121
ED042T: Total Sulfur by LECO (QCLot: 5053295)								
ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.51 %	101	70.0	130

Sub-Matrix: **WATER**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 5057204)								
EA005-P: pH Value	----	----	pH Unit	---- ----	4 pH Unit 7 pH Unit	100 99.8	98.5 98.5	102 102
EA010P: Conductivity by PC Titrator (QCLot: 5057205)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24800 µS/cm	97.8	92.1	105
ED037P: Alkalinity by PC Titrator (QCLot: 5057206)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1 <1	20 mg/L 200 mg/L	93.4 101	87.8 87.8	118 118
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5061043)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1 <1	25 mg/L 500 mg/L	98.0 98.2	89.9 89.9	112 112
ED045G: Chloride by Discrete Analyser (QCLot: 5061042)								
ED045G: Chloride	16887-00-6	1	mg/L	<1 <1	10 mg/L 1000 mg/L	100 97.8	88.6 88.6	113 113
ED093W: Water Leachable Major Cations (QCLot: 5059482)								
ED093W: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	96.4	88.7	109

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED093W: Water Leachable Major Cations (QCLot: 5059482) - continued								
ED093W: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	109	86.8	109
ED093W: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	96.5	80.4	121
ED093W: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	90.4	83.4	115
EG020W: Water Leachable Metals by ICP-MS (QCLot: 5059478)								
EG020B-W: Cerium	7440-45-1	0.001	mg/L	<0.001	0.12 mg/L	105	89.6	117
EG020B-W: Caesium	7440-46-2	0.001	mg/L	<0.001	0.1 mg/L	103	90.4	115
EG020B-W: Rubidium	7440-17-7	0.001	mg/L	<0.001	0.1 mg/L	101	93.4	116
EG020B-W: Silver	7440-22-4	0.001	mg/L	<0.001	0.02 mg/L	107	89.9	120
EG020B-W: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	99.8	90.2	116
EG020B-W: Tellurium	22541-49-7	0.005	mg/L	<0.005	0.1 mg/L	110	82.6	120
EG020B-W: Thorium	7440-29-1	0.001	mg/L	<0.001	0.1 mg/L	115	82.2	120
EG020B-W: Titanium	7440-32-6	0.01	mg/L	<0.01	0.1 mg/L	111	81.2	121
EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	106	90.5	115
EG020W: Water Leachable Metals by ICP-MS (QCLot: 5059479)								
EG020D-W: Gallium	7440-55-3	0.001	mg/L	<0.001	0.01 mg/L	103	98.1	117
EG020D-W: Hafnium	7440-58-6	0.01	mg/L	<0.01	0.01 mg/L	113	80.0	120
EG020D-W: Lanthanum	7439-91-0	0.001	mg/L	<0.001	0.01 mg/L	98.5	90.5	116
EG020D-W: Yttrium	7440-65-5	0.001	mg/L	<0.001	0.01 mg/L	100	95.3	120
EG020D-W: Zirconium	7440-67-7	0.005	mg/L	<0.005	0.01 mg/L	110	93.3	126
EG020W: Water Leachable Metals by ICP-MS (QCLot: 5059480)								
EG020E-W: Gold	7440-57-5	0.001	mg/L	<0.001	0.01 mg/L	90.8	80.0	120
EG020E-W: Tungsten	7440-33-7	0.001	mg/L	<0.001	0.01 mg/L	119	80.0	120
EG020E-W: Tantalum	7440-25-7	0.001	mg/L	<0.001	----	----	----	----
EG020W: Water Leachable Metals by ICP-MS (QCLot: 5059481)								
EG020A-W: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	105	91.8	114
EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	0.02 mg/L	132	65.7	162
EG020A-W: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	105	94.4	113
EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	109	85.8	127
EG020A-W: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	99.9	89.8	116
EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	104	91.9	112
EG020A-W: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	104	89.8	109
EG020A-W: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	101	91.0	111
EG020A-W: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	100	90.7	110
EG020A-W: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	102	90.8	110

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG020W: Water Leachable Metals by ICP-MS (QCLot: 5059481) - continued								
EG020A-W: Lithium	7439-93-2	0.001	mg/L	<0.001	0.1 mg/L	108	84.7	120
EG020A-W: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	104	88.1	111
EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	118	100	118
EG020A-W: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	103	90.6	109
EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	107	85.4	110
EG020A-W: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	108	89.5	117
EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	102	90.8	111
EG020A-W: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	104	88.8	117
EG020A-W: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	111	83.1	132
EG020A-W: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	104	80.1	117
EG020W: Water Leachable Metals by ICP-MS (QCLot: 5069545)								
EG020G-W: Germanium	7440-56-4	0.001	mg/L	<0.001	0.1 mg/L	96.2	70.0	130
EG020G-W: Niobium	7440-03-1	0.001	mg/L	<0.001	0.1 mg/L	99.0	70.0	130
EG020G-W: Rhenium	7440-15-5	0.001	mg/L	<0.001	0.1 mg/L	98.8	70.0	130
EG035W: Water Leachable Mercury by FIMS (QCLot: 5059483)								
EG035W: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.005 mg/L	99.4	85.4	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	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 5061043)							
EP2306004-036	MK095_8-12	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	104	70.4	130
ED045G: Chloride by Discrete Analyser (QCLot: 5061042)							
EP2306004-036	MK095_8-12	ED045G: Chloride	16887-00-6	1000 mg/L	101	70.0	130

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2306004**	Page	: 1 of 8
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: Steff Bright	Telephone	: +6138549 9645
Project	: 12518217	Date Samples Received	: 27-Apr-2023
Site	: ----	Issue Date	: 31-May-2023
Sampler	: SIMCOA	No. of samples received	: 38
Order number	: 12518217/036	No. of samples analysed	: 22

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

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

Outliers : Analysis Holding Time Compliance

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

Outliers : Frequency of Quality Control Samples

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

Outliers : Analysis Holding Time Compliance

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
MK095_8-12	----	----	----	18-May-2023	15-May-2023	**3**

Outliers : Frequency of Quality Control Samples

Matrix: **WATER**

Quality Control Sample Type / Method	Count		Rate (%)		Quality Control Specification
	QC	Regular	Actual	Expected	
	0				
Matrix Spikes (MS)					
Water Leachable Mercury by FIMS	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite A	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite C	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite E	0	1	0.00	5.00	NEPM 2013 B3 & ALS QC Standard

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA011: Net Acid Generation							
Pulp Bag (EA011)							
MK128_12, MK113_2, MK113_4, MK086_6, MK089_4, MK089_6, MK089_10, MK085_10, MK093_6, MK093_8, MK093_10, MK207_4, MK174_2, MK393_6, MK097_6, MK094_10, MK193_4	**05-May-2023**	**11-May-2023**	04-May-2024	✓	**16-May-2023**	07-Nov-2023	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA013: Acid Neutralising Capacity							
Pulp Bag (EA013)							
MK128_12, MK113_2, MK113_4, MK086_6, MK089_4, MK089_6, MK089_10, MK085_10, MK093_6, MK093_8, MK093_10, MK207_4, MK174_2, MK393_6, MK097_6, MK094_10, MK193_4	**05-May-2023**	**11-May-2023**	04-May-2024	✓	**23-May-2023**	07-Nov-2023	✓
ED040T : Total Sulfate by ICPAES							
Pulp Bag (ED040T)							
MK113_8-12, MK099_6-10, MK189_4-8, MK174_4-8	**05-May-2023**	**12-May-2023**	02-Jun-2023	✓	**16-May-2023**	02-Jun-2023	✓
ED042T: Total Sulfur by LECO							
Pulp Bag (ED042T)							
MK113_8-12, MK099_6-10, MK189_4-8, MK174_4-8	**05-May-2023**	**17-May-2023**	01-Nov-2023	✓	**17-May-2023**	01-Nov-2023	✓
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)							
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN60-Dla-G)							
MK095_8-12	**05-May-2023**	**15-May-2023**	19-May-2023	✓	**----**	----	----

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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
MK095_8-12	**15-May-2023**	**----**	----	----	**18-May-2023**	15-May-2023	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
MK095_8-12	**15-May-2023**	**----**	----	----	**18-May-2023**	12-Jun-2023	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
MK095_8-12	**15-May-2023**	**----**	----	----	**18-May-2023**	29-May-2023	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
MK095_8-12	**15-May-2023**	**----**	----	----	**25-May-2023**	12-Jun-2023	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
MK095_8-12	**15-May-2023**	**----**	----	----	**25-May-2023**	12-Jun-2023	✓

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
ED093W: Water Leachable Major Cations							
Clear Plastic Bottle - Nitric Acid; Unfiltered (ED093W)							
MK095_8-12	**15-May-2023**	**19-May-2023**	12-Jun-2023	✓	**22-May-2023**	12-Jun-2023	✓
EG020W: Water Leachable Metals by ICP-MS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020E-W)							
MK095_8-12	**15-May-2023**	**19-May-2023**	11-Nov-2023	✓	**19-May-2023**	11-Nov-2023	✓
Clear Plastic Bottle - Unfiltered; Lab-acidified (EG020G-W)							
MK095_8-12	**15-May-2023**	**24-May-2023**	11-Nov-2023	✓	**24-May-2023**	11-Nov-2023	✓
EG035W: Water Leachable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035W)							
MK095_8-12	**15-May-2023**	**----**	----	----	**19-May-2023**	12-Jun-2023	✓

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		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acid Neutralising Capacity (ANC)	EA013	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Net Acid Generation	EA011	2	17	11.76	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate as SO4 2- Total	ED040T	1	6	16.67	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	2	11	18.18	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acid Neutralising Capacity (ANC)	EA013	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Net Acid Generation	EA011	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate as SO4 2- Total	ED040T	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Acid Neutralising Capacity (ANC)	EA013	1	17	5.88	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate as SO4 2- Total	ED040T	1	6	16.67	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	1	11	9.09	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by Auto Titrator	ED037-P	2	14	14.29	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
Conductivity by Auto Titrator	EA010-P	1	10	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by Auto Titrator	EA005-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Major Cations	ED093W	1	1	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Mercury by FIMS	EG035W	1	1	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	1	1	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	1	1	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	1	1	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	1	1	100.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite G	EG020G-W	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by Auto Titrator	ED037-P	2	14	14.29	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
Conductivity by Auto Titrator	EA010-P	1	10	10.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by Auto Titrator	EA005-P	2	19	10.53	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	18	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Water Leachable Major Cations	ED093W	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Mercury by FIMS	EG035W	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite G	EG020G-W	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by Auto Titrator	ED037-P	1	14	**7.14**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	20	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by Auto Titrator	EA010-P	1	10	**10.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Major Cations	ED093W	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Mercury by FIMS	EG035W	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	1	1	**100.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite G	EG020G-W	1	20	**5.00**	**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
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	18	**5.56**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Mercury by FIMS	EG035W	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	0	1	**0.00**	**5.00**	×	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH by Auto Titrator	EA005-P	SOIL	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Conductivity by Auto Titrator	EA010-P	SOIL	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Net Acid Generation	EA011	SOIL	In house: Referenced to Miller (1998) Titremetric 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 semiquanititatively estimate the likely reactivity. The soil is then reacted with an known excess quanitity of an appropriate acid. Titration determines the acid remaining, and the ANC can be calculated from comparison with a blank titration.
Alkalinity by Auto Titrator	ED037-P	SOIL	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 as SO4 2- Total	ED040T	SOIL	In house: Total Sulfate is determined off a HCl digestion by ICPAES as S , and reported as SO4
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	SOIL	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)
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 SO2) is measured by infra-red detector
Chloride by Discrete Analyser	ED045G	SOIL	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 thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm.
Water Leachable Major Cations	ED093W	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010; ALS QWI-EN/EG005, QWI-EN/ED093. The ICPAES technique quickly breaks the sample down into atoms and ions under extremely hot plasma. Atoms are then ionised, emitting a characteristic spectrum. The spectrometer then separates the wavelengths, prior to comparison of intensities against matrix matched standards for quantification.
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, AS 4439.3, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite G	* EG020G-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Mercury by FIMS	EG035W	SOIL	In house: Referenced to 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 TCLP solution. 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).
Sulfide as S	EK085T	SOIL	In-house. Sulfide in a soil is determined as the difference between Total Sulfur (Leco) and Sulfate.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
HCl Digest	EN24	SOIL	1g of soil is digested in 30 ml of 30% HCl and the resultant digest bulked and filtered for analysis by ICP.
Digestion for Total Recoverable Metals in DI Water Leachate	EN25W	SOIL	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)
Deionised Water Leach - Glass Leaching Vessel	EN60-Dla-G	SOIL	In house QWI-EN/60 referenced to AS4439.3 Preparation of Leachates
Dry and Crush	* EN84	SOIL	In house
Dry and Pulverise (up to 100g)	GEO30	SOIL	#

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

GHD
Level 10, 999 Hay Street, Perth WA 6000 | PO Box 3106, Perth WA 6832 | Reception Ph: 08 6222 8222

Page 1 of 1

Project ID *(as per ESdat set up; no spaces)* 12518217	**PO Number (to be invoiced)** 12518217/036
Laboratory Quote No. EP/174/22	**Turnaround Time** Standard
Project Manager (Invoice) & GHD accounts Bronwyn Neville	**Email Address (Results)** steff.bright@ghd.com, GHD.LabReports@ghd.com paul.hamer@ghd.com

Laboratory: ALS Environmental
Address: 26 Rigali Way, Wangara WA 6065
Laboratory Contact: ALS Environmental

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air	Container: Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Container: Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	Container: No	Analyses: ANC - (EA013)	NAG - (EA011)	Sulfur Speciation - (EK085T)	Sulfur Speciation - (ED042T)	Radioactivity - (EA250)	Asbestos - (EA200)	Metals Solid - (ME-MS61m) & (Au-ICP22) & (ME-ICP89) & (Fi-IC881)	Metals Leach - (NT-001D & O2) & (EG020W) & (EG035W) & (EA005P) & (EA010P)	Remarks
MK128_10		14/04/2023		S	Bag	N	1						x			Already submitted EP2305573
MK128_12	1	5/05/2023		S	Bag	N	1	x	x							
MK113_2	2	5/05/2023		S	Bag	N	1	x	x							
MK113_4	3	5/05/2023		S	Bag	N	1	x	x							
MK113_6		14/04/2023		S	Bag	N	1						x			Already submitted EP2305573
MK113_8	4	5/05/2023		S	Bag	N	1			x						Comp into one sample as: MK113_8-12 34
MK113_10	5	5/05/2023		S	Bag	N	1									
MK113_12	6	5/05/2023		S	Bag	N	1									
MK099_6	7	5/05/2023		S	Bag	N	1			x						Comp into one sample as: MK099_6-10 35
MK099_8	8	5/05/2023		S	Bag	N	1									
MK099_10	9	5/05/2023		S	Bag	N	1									
MK086_6	10	5/05/2023		S	Bag	N	1	x	x							
MK086_8		14/04/2023		S	Bag	N	1						x			Already submitted EP2305573
MK095_8	11	5/05/2023		S	Bag	N	1							x		Comp into one sample as: MK095_8-12 36
MK095_10	12	5/05/2023		S	Bag	N	1									
MK095_12	13	5/05/2023		S	Bag	N	1									
MK089_4	14	5/05/2023		S	Bag	N	1	x	x							
MK089_6	15	5/05/2023		S	Bag	N	1	x	x							
MK089_8		14/04/2023		S	Bag	N	1						x			Already submitted EP2305573
MK089_10	16	5/05/2023		S	Bag	N	1	x	x							
MK085_10	17	5/05/2023		S	Bag	N	1	x	x							
MK093_6	18	5/05/2023		S	Bag	N	1	x	x							
MK093_8	19	5/05/2023		S	Bag	N	1	x	x							
MK093_10	20	5/05/2023		S	Bag	N	1	x	x							
MK093_12		14/04/2023		S	Bag	N	1						x			Already submitted EP2305573
MK207_4	21	5/05/2023		S	Bag	N	1	x	x							
MK207_6		14/04/2023		S	Bag	N	1						x			Already submitted EP2305573
MK189_4	22	5/05/2023		S	Bag	N	1			x						Comp into one sample as: MK189_4-8 37
MK189_6	23	5/05/2023		S	Bag	N	1									
MK189_8	24	5/05/2023		S	Bag	N	1									
MK174_2	25	5/05/2023		S	Bag	N	1	x	x							
MK174_4	26	5/05/2023		S	Bag	N	1			x						Comp into one sample as: MK174_4-8 38
MK174_6	27	5/05/2023		S	Bag	N	1									
MK174_8	28	5/05/2023		S	Bag	N	1									
MK393_6	29	5/05/2023		S	Bag	N	1	x	x							
MK097_6	30	5/05/2023		S	Bag	N	1	x	x							
MK094_10	31	5/05/2023		S	Bag	N	1	x	x							
MK193_4	32	5/05/2023		S	Bag	N	1	x	x							
MK192_8	33	5/05/2023		S	Bag	N	1									Sample submitted in error, please dispose of

Environmental Division
Perth
Work Order Reference
EP2306004

Telephone : -- 61-8-9406 1301

Sampled by: SIMCOA	Date/Time: UNK	Relinquished by: S.Bright	Date/Time: 5/5/2023
Received by: JA 8/5 1300	Date/Time:	Relinquished by:	Date/Time:

Appendix F2
GHD 2022, Moora Mine Material Characterisation Study

SIMCOA
Silicon Metal Company of Australia

Simcoa Operations Pty Ltd

Moora Mine
Materials Characterisation Study

GHD

June 2022

Project name		Moora Quartzite Mine					
Document title		Moora Quartzite Mine | Materials Characterisation Study					
Project number		12518217					
File name		12518217 Moora Silica Materials characterisation .docx					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S4	01	Paul Hamer Steff Bright	Rob Virtue		Paul Hamer		28/06/22

GHD Pty Ltd
999 Hay Street,
Perth, WA 6000, Australia
T 6222 8222

Executive Summary

GHD Pty Ltd were engaged by Simcoa Operation Pty Ltd to undertake a materials characterisation of the open-pit silica mine, located 15 km north of Moora, WA.

Previous characterisation of waste materials, located in-pit and above the water table identified that the risks posed by acidic metalliferous drainage (AMD) and hazardous materials, to human health and the environment were considered low (excluding silica), and that management to reduce risks was not required (silica dust management was required during operations).

The aim of this study was to undertake a materials characterisation of the waste rock located below the water table (below the current pit floor), to support the required approvals for expansion of the pit.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.3 and the assumptions and qualifications contained throughout the Report.

The material characterisation scope of work comprised the following:

– Drilling of 10 drill holes to the maximum mining depth (5 in-pit and 5 ex-pit locations)
– Collection of drill holes samples and submission to the laboratory (ALS) for the following analysis:
    - Acid neutralising capacity (ANC): totalling 85 samples
    - Net acid generation (NAG): 85 samples
    - Sulfur speciation: totalling 74 samples
    - Total metals: totalling 46 samples
    - ALSP leach testing and analysis for major ions, pH, EC, metals 46 samples
    - Radioactivity, comprising gross alpha / beta: totalling 10 samples
    - Asbestos mineral fibres: totalling 10 samples

The drilling and laboratory results indicate the following results and requirements for management:

Acid Metalliferous Drainage potential (AMD)

Waste-rock:

The ore is to be removed from site for processing (Kwinana), and therefore is not considered further in the waste stream and materials characterisation study.

The drilling within the waste rock (limited to five holes), indicates acidic leaching will occur at concentrations that have potential to impact the receiving environment (e.g.: seepage into creeks), from an estimate of 15% to 30% of the volume of waste rock to be excavated (ore/waste model absent). The acid producing waste rock (elevated sulfides) will require management to reduce the risk of impacts of acidic leaching (and metals) from the waste rock dumps. Although better spatial and vertical delineation is required, acidic leaching conditions are not indicated from the reminder of waste rock (estimated at 70% to 85%).

A management plan for the waste-rock could be developed, based on the limited drilling information (five holes), however, the plan should be updated to accommodate information as drilling and testing becomes available (e.g: during ore definition phases). The plan is likely to include management through segregation of acidic waste rock, addition of a buffering agent (e.g.: limestone), dedicated disposal cells, seepage collection and monitoring, and capping requirement of the waste rock dump.

Abstracted groundwater:

Based on the limited understanding of the distribution of the acidic producing material (five holes), dewatering and lowering of the groundwater table has the potential to expose acid-producing material (sulfides) in the upper saturated profile of the country rock (ex-pit material).

The best estimate of water quality, given the limited spatial and vertical definition of acidic producing material (five holes), is indicated as possibly ranging from mildly acidic to strongly acidic. Any abstracted acidic water will require

management and treatment to neutralise the waters and remove associated elevated metal concentrations, prior to discharge to the proposed receiving environment, the creeks associated with the area.

Prior to development of a management plan for the abstracted water, either additional works should be undertaken to better understand and characterise the water quality during dewatering (e.g.: drilling, hydraulic/laboratory testing, modelling), or a highly flexible groundwater management plan should be developed to accommodate uncertainty in the water quality, which is likely to include (but limited to) the following:

– establish groundwater monitoring bore network (early warning of degrading water quality);
– adaptable water treatment system to accommodate potentially changing water quality and volumes
– staged holding ponds, to accommodate increased and changing water volumes
– water balance study and groundwater abstraction modelling (site usage, abstraction volumes, and discharge volumes)

Hazardous materials

Activities related to mining and handling of waste rock have the potential exposure humans, though ingestion, inhalation, or dermal contact.

The results indicate that **asbestiform** minerals are absent, and **radioactivity levels** are sufficiently low, and should not pose a risk to human health nor require management.

Exposure to **silica dust** during mining, stockpiling and transport/handling of ore and waste rock should be managed under a suitable management plan to limit human exposure (dust inhalation, etc.)

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1. Introduction

GHD Pty Ltd (GHD) was engaged by Simcoa Operation Pty Ltd to undertake a materials characterisation of the open-pit silica mine, located 15 km north of Moora, WA (Figure 2).

The mine has been operational for a number of years, but now requires a characterisation of materials below the exiting pit base. floor to support the required approvals for expansion of the pit.

The proposed works herein are in response to DWER requests (following review of approvals documentation) that confirmation of the leaching potential of materials deeper within the geological profile beneath the water table is required.

The silica ore is removed from site for processing (transported to Kwinana for processing), and is not considered further in this materials characterisation.

The primary aim of the works is to test and characterise the rock materials as follows:

– Drilling and testing of waste rock in areas beneath the base of the pit, where mining will excavate waste rock to be stored on site.
– Drilling and testing of the flanks of the pits to characterise the leaching potential from the surrounding country rock, during pit dewatering and better understanding of water quality of the pit lakes upon closure

1.1 Purpose of this report

The purpose of this report is to present an understanding of the environmental and human health risks associated with:

– disturbance of the materials in the subsurface.
– abstraction of the groundwater

1.2 Scope of work

This material characterisation study comprised the following scope:

– Drilling of 10 drill holes to a depth of 22 to 46 meters below surface (313 m)
– Collection of drill holes samples and submission to the laboratory (ALS) for the following analysis:
    - Acid neutralising capacity (ANC): totalling 85 samples
    - Net acid generation (NAG): 85 samples
    - Sulfur speciation: totalling 74 samples
    - Total metals: totalling 46 samples
    - Leach testing ALSP and analysis for major ions, pH, EC, metals 46 samples
    - Radioactivity comprising gross alpha / beta: totalling 10 samples
    - Asbestos mineral fibres: totalling 10 samples

1.3 Limitations

This report: has been prepared by GHD for Simcoa Operations Pty Ltd and may only be used and relied on by Simcoa Operations Pty Ltd for the purpose agreed between GHD and Simcoa Operations Pty Ltd as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Simcoa Operations Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report GHD disclaims liability arising from any of the assumptions being incorrect.

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

GHD has prepared this report on the basis of information provided by Simcoa and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

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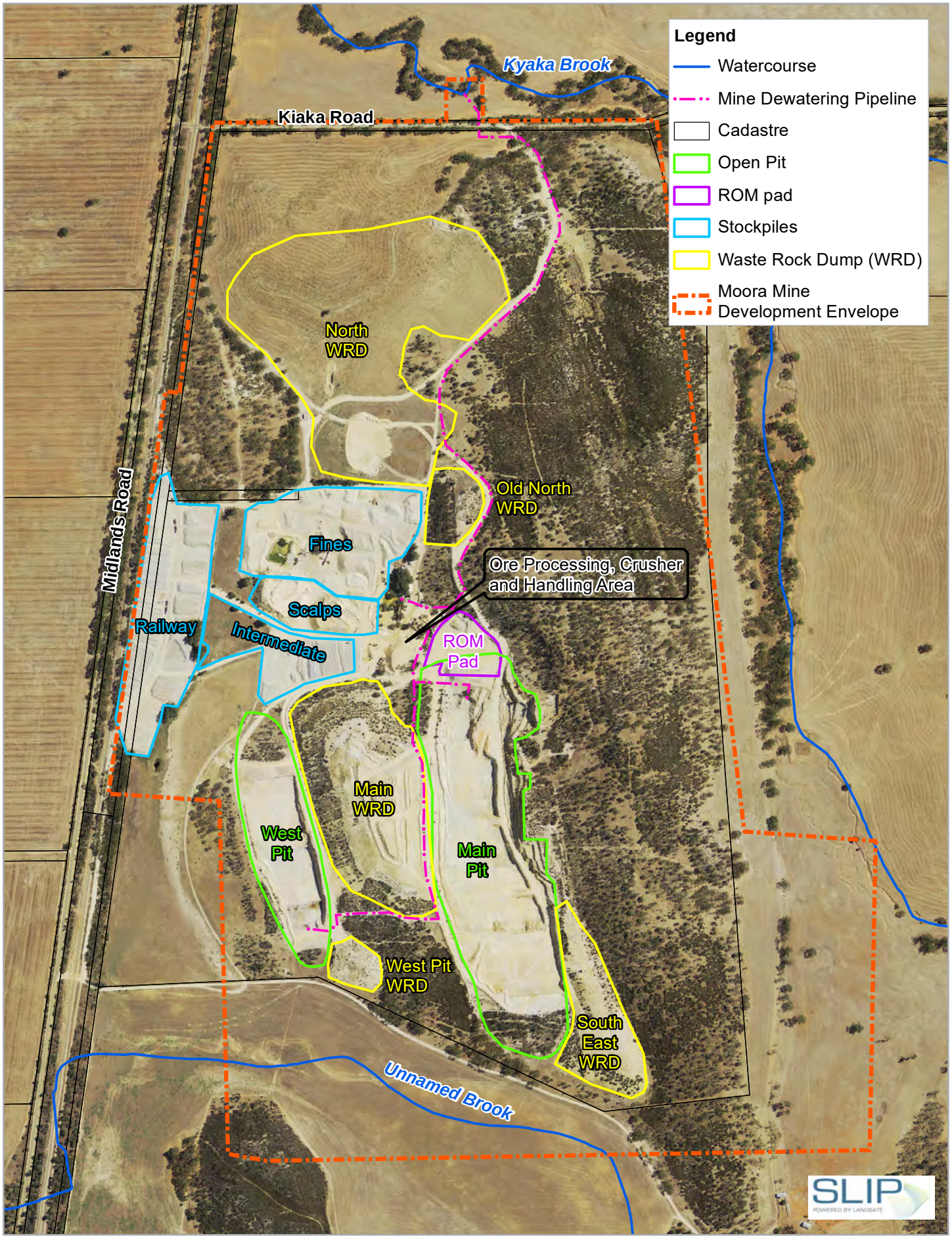


1:10,000 (at A4)

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Simcoa Operations Pty Ltd
Materials Characterisation Study

Mine Layout

Project No. 12518217
Revision No. 2
Date 22/03/2021

FIGURE 1

Data source: DWER: Watercourse - 20130902; GHD: Mine Dewatering Pipeline - 20200226; Simcoa: Open Pit - 20210311, Stockpiles - 20200715, ROM Pad - 20200715, Waste Rock Dump - 20210311, Moora Mine Development Envelope - 20210217; Landgate: Cadastre - 20180607, Moora Feb 2012 Mosaic - 201202. Created by: lhyoong

2. Site Setting and background

2.1 Geological setting

The Moora Quartzite Mine is situated within the Noondine Chert stratigraphic unit, which is part of the Coomberdale Sub Group of the Moora Group, and is Middle Proterozoic in age. This Proterozoic Coomberdale Sub Group comprises consolidated and weakly metamorphosed sedimentary sequence of shelf carbonates and clastics (chert ie: Noondine chert (ore body), siltstones, quartzite). In addition, the Sub Group is intruded by dolerite dykes and is broken up considerably by faulting (GSWA 1982).

The Noondine chert (ore body) is a silicified, bedded carbonate (siliceous limestone/dolomite). The orebody appears to have been formed by the surface silicification of carbonate rocks. Silicification has been observed to a depth of 75 m. The age of the silicification is uncertain but is probably Tertiary in age (GSWA 1982).

The chert (ore body) contains primary minerals such as chlorite, pyrite, apatite and minor remnant carbonates (calcite/dolomite). Iron oxides, titanium oxides and clays occur in the chert near the surface and are due to secondary weathering processes (Simcoa 2010).

The chert strikes northerly and dips at 20 to 30 degrees to the west. Faulting is common and cavities occur which are usually filled with quartz gravel as collapse breccia (GSWA 1982).

2.2 Hydrogeological setting

Given the geological and topographical setting, groundwater occurrence at the Site is constrained to fractured rocks aquifers associated with the Proterozoic sedimentary units.

The Perth Basin and associated sedimentary aquifers are located some 5 km to the east of the Moora quartzite mine (GWSA 1982).

During groundwater bore testing in Saprolite (2012), the pumping rates were between 15 to 33.5 L/s with a maximum drawdown of close to 0.4 metres, indicating high permeability and supporting relatively high yields. The pumping tests were conducted from 7 hours to 7 days.

Groundwater monitoring at the Moora quartzite mine (Saprolite 2022), indicates standing groundwater levels close to 210 to 215 mAHD (10 to 20 metres below natural ground level).

Groundwater flow direction at the Moora quartzite mine area is likely to follow the regional topography and flow in a westerly direction towards the Coonderoo River (and wetlands), located some 2.5 km to the west of the western boundary of the Sites, see inset in Figure 2).

Given the shallow groundwater levels and inferred westerly flow direction, the groundwater is likely to discharge and be of beneficial use to the Coonderoo River and wetlands, identified as saline/hypersaline (Saprolite 2012).

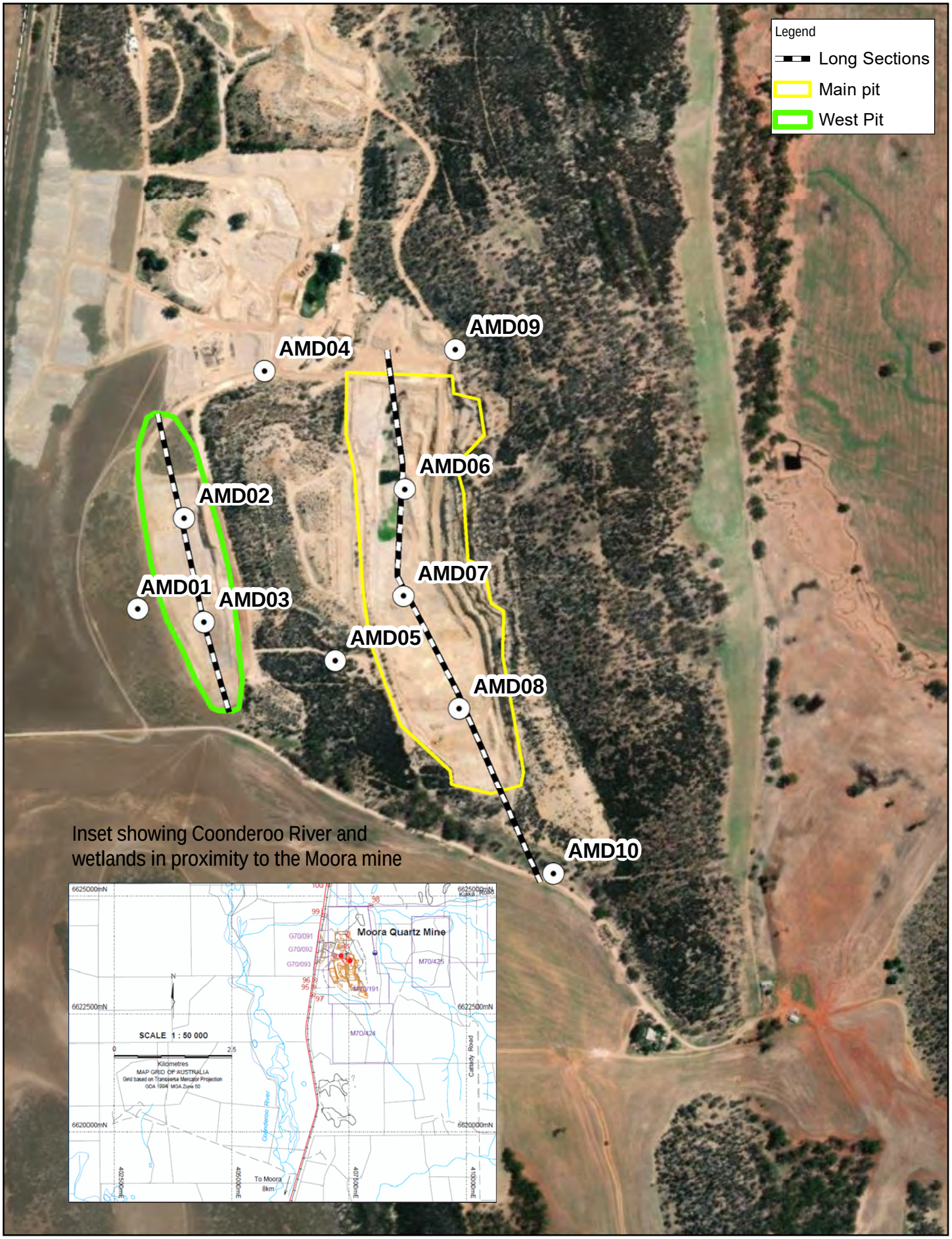
Laboratory analysis of the groundwater undertaken during monitoring (Saprolite 2022) indicates a groundwater salinity of 700 to 850 mg/L with the following major ion characteristics:

– Cations dominated by sodium with lesser magnesium and calcium
– Anions dominated equally by carbonate and chloride with relatively low Sulfate.

2.3 Mining pit areas

The area of open pit mining is presented in Figure 2, and the depth of proposed pit depth is presented as cross sections in Figure 3 and Figure 4. The figures show the following features and observations:

– The existing and proposed extent the of Main Pit and the West Pit (Figure 2)
– Depth of pits and water levels - approximately at the base of the pits (Figure 3 and Figure 4)
– The definition of ore and waste based on the GHD and Simcoa drilling (an ore and waste model is not available/not completed, see Figure 6 and Figure 7)



Paper Size ISO A4

0 0.07 0.14 0.21 0.28

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

Simcoa Operations Pty Ltd
Materials Characterisation Study

Proposed pit outline and drill hole location plan

Project No. 12518217
Revision No. -
Date 9/6/2022

FIGURE 2

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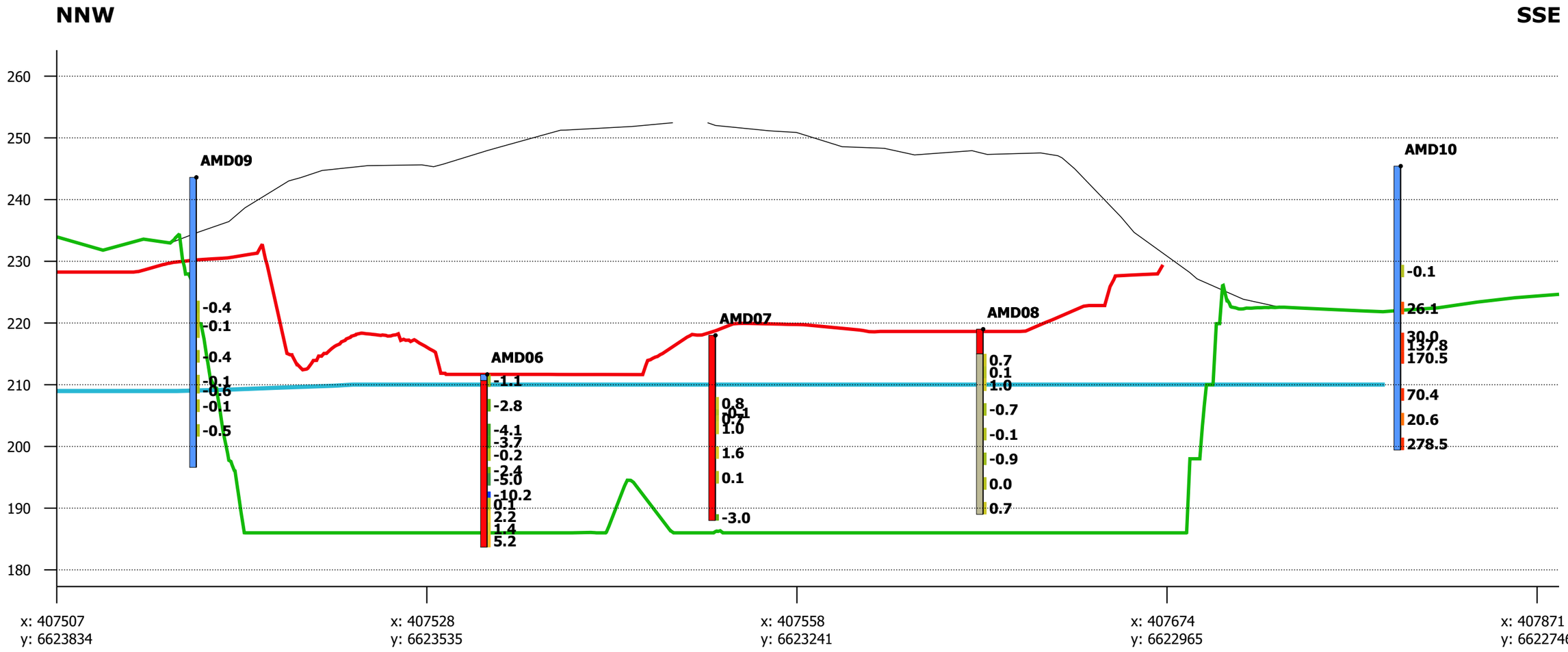
Print date: 10 Jun 2022 - 10:44

Geological Cross Section through Main Pit



Legend

Net Acid Production Potential (NAPP)

-10.2 -0.1 9.9 20 30

Material Classification

Country Ore Waste

Surfaces

- Surface Topography (pre-mining)
- Approximate Groundwater Level
- November 2021 Topography
- Final Surface Post Mining

Notes about the section

AMD09 is 100m east off-section
GHD drilling only

Location

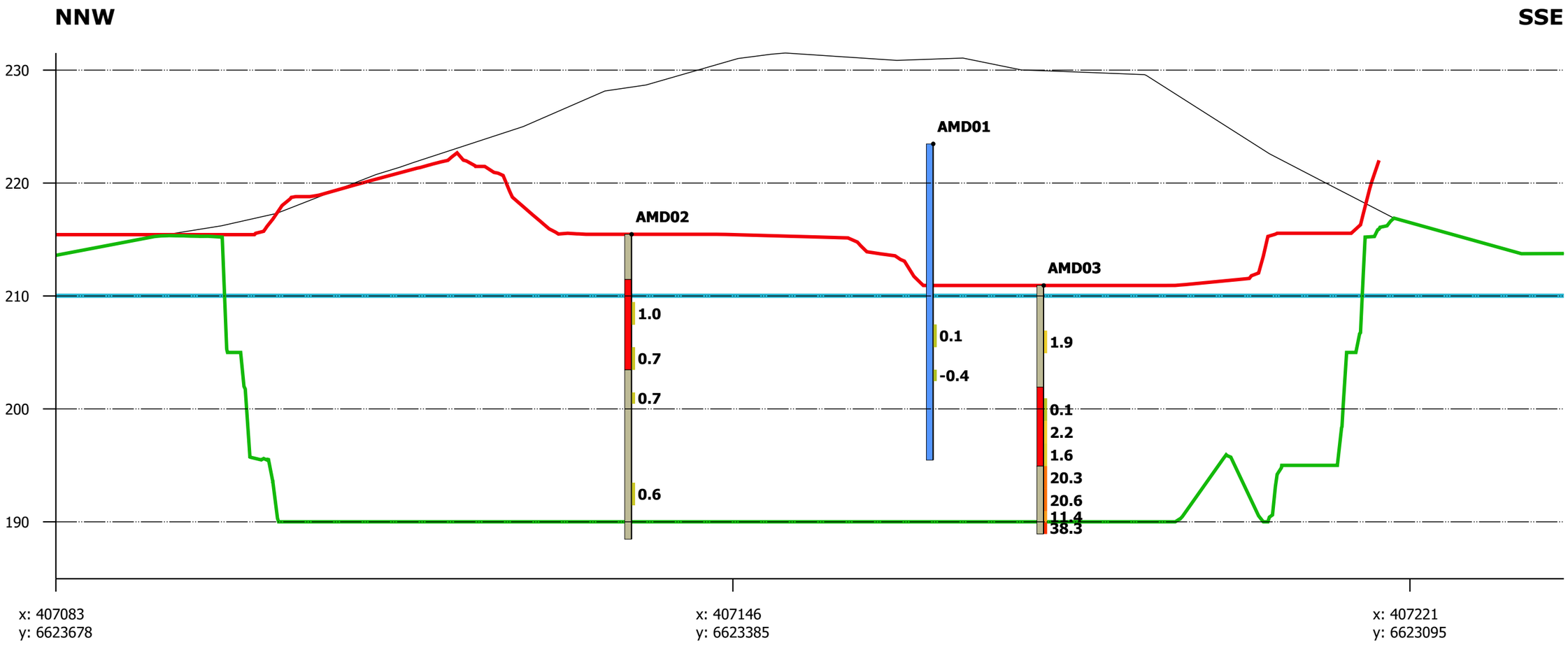
NNW: 407507, 6623834
SSE: 407884, 6622733

Scale: 1:3,400
Vertical exaggeration: 5x

0m 250m

Figure 3

Geological Cross Section through Western Pit



Legend

Net Acid Production Potential (NAPP)

-10.2 -0.1 9.9 20 30

Material Classification

Country Ore Waste

Surfaces

- Surface Topography (pre-mining)
- Approximate Water Level
- November 2021 Topography
- Final Surface Post Mining

Notes about the section

AMD01 is 100m west off-section
GHD drilling only

Location

NNW: 407083, 6623678
SSE: 407236, 6623028

Scale: 1:1,900
Vertical exaggeration: 5x

0m 250m

Figure 4

2.4 Previous studies

Previous material characterisation at the Moora Silica mine included the following relevant reports:

– ***GHD Pty Ltd, 2019 Simcoa - Moora Mine, Desk-top materials characterisation (April 2019).***

This desktop assessment summarised that, although the site geological setting indicates that the risks of intersecting hazardous materials and leaching of metals under acidic conditions was considered low, confirmation is required though laboratory testing of the waste materials.

– ***GHD Pty Ltd, 2020 Simcoa - Moora Mine: Waste rock materials characterisation.***

Laboratory testing, conducted on the waste-rock, included a “screening” assessment of the waste rock of samples taken from the floor and wall of the pit (by Simcoa), which were above the water table.
Testing included 12 samples for Acid Metalliferous Drainage (AMD), metals leaching, radioactivity screen and asbestos.

The laboratory analysis indicated the following:

- Asbestos form minerals and radioactivity should not pose a risk to human health.
- The waste rock material is deemed not to pose an unacceptable risk, through generation of acidic conditions (negligible acid production potential).
- Metals should not leach from the waste rock under acidic conditions at concentrations which may cause an impact to human health and the environment.
- The waste rock unlikely to leach readily dissolvable minerals at concentrations which will cause unacceptable increases in salinity
- Exposure from silica should be managed to protect human health (dust during mining etc.).

– ***GHD Pty Ltd 2021, Simcoa S38 Environmental Approval, Pit Lake Recovery Assessment (March 2021)***

A water and salt balance model (Goldsim) was used to simulate and predict the post mining Pit water levels and salt concentration following dewatering and mining below the water table (extension of the Main and West pits).

The results indicated the following:

- Both the Main Pit and West Pit will be largely empty after mine closure, with shallow inundation depths in winter but largely dry in summer.
- The salt balance indicates that salts will increase over time, becoming hypersaline in 30 to 50 years, (pits are considered a groundwater sink)

However, the modelling highlighted that the pit water and salt balance is highly sensitive to the groundwater recharge rates, which are yet to be validated through a detailed hydrogeological analysis.

3. Investigation methods

3.1 Site visit

The drilling program was completed and supervised by GHD in February 2022. Field staff from Simcoa and GHD inspected each drill pad and confirmed the accessibility of drilling locations. Dial before you dig (DBYD) plans were collected and cross checked with drilling locations before the field visit to ensure no underground services would be impacted during the program.

3.2 Drilling supervision

Drilling was completed by Strike Drilling, using Reverse circulation (RC) down-hole percussion methods and totalled 313 m. Drill cuttings were placed on the ground as piles of 1 m intervals, in rows of ten. Water strikes were observed by the driller during drilling and reported to GHD, to aid in determining the depth of the water table.

Drill cuttings were sampled and geologically logged by GHD. Material was classified as ore or waste, based on field observations of clay content, impurities, iron staining, and lithology. Drill hole completion logs are presented in Appendix A.

3.3 Sampling and laboratory analysis

Two rounds of sampling were completed as summarised below.

Round one – sampling in the field February 2022

Samples were collected as soon as practicable after drilling, to minimise the effect of oxidation. Samples were selected as either 1 m intervals or 2 m composites, depending on the geology and size of sample return. Samples were placed in laboratory supplied glass jars and plastic bags suitable for each analyte and labelled with a unique identifier consisting of hold ID, date, depth interval and project code. Finished samples were placed in laboratory supplied containers along with the chain of custody (COC) for safe storage and transport to the NATA approved ALS laboratory.

Samples were collected below the water table, and from waste and country rock only. A summary of downhole sampling is specified below:

- Acid neutralising capacity (ANC): two samples from each drill hole plus two duplicates totalling 22 samples
- Net acid generation (NAG): two samples from each drill hole plus two duplicates totalling 22 samples
- Sulfur speciation: one sample from each drill hole plus one duplicate totalling 11 samples
- Tailored metals suite: one sample from each drill hole plus one duplicate totalling 11 samples
- Leach testing (major ions, pH, EC, metals) one sample from each drill hole plus one duplicate totalling 11 samples
- Radioactivity screen and gross alpha / beta: one sample from each drill hole inside the existing pits plus one duplicate totalling six samples
- Asbestos mineral fibres: one sample from each drill hole inside the existing pits plus one duplicate totalling six samples

Round two – additional sample collection March 2022

The sulfide-bearing mineral pyrite was observed in drill cuttings, and laboratory analytical results identified sulfur in some samples, therefore a second round of more detailed sampling was carried out. An additional 63, 2 m sampling composite intervals were specified by GHD and collected by Simcoa. Samples were from below the watertable and from the waste and country rock. All samples were analysed for ANC, NAG and sulfur speciation, 35 samples were analysed for the tailored metals suite, and five samples for asbestos and radioactivity.

4. Results

4.1 Geological and hydrogeological setting

The location of the drill holes is presented in Figure 2 and the drilling logs are presented in Appendix A.

Figure 2 shows that 7 holes were drilled through the floor of the pit - into the proposed ore zone, and 3 holes were drilled outside the pit permitter.

In addition, north-south trending cross sections through the Main and West pits are presented in Figure 3 and Figure 4.

The drilling logs and figures indicate the following key observations:

– Water ponding, and to a lesser extent water strikes during drilling, supports that the water table is located at close to the base of the exiting pits (See Figure 3 Figure 4).
– The groundwater flow direction is inferred as towards the west, along the topographical slope (groundwater levels in pits approximated and should not be relied on for planning or mining purposes).
– Where drilled in the base of the proposed pits, the drill holes intersected a combination of material deemed as ore - observed as dense and silica rich, and material deemed waste rock - based on some clay content (this ore/waste determination is not suitable to characterise the ore for grade and mining purposes)

4.2 Laboratory Results

The laboratory results have been summarised and presented in Tables B1 to B4 in Appendix B, as follows:

– Table B1 Radiological and asbestos results
– Table B2 Total metals analysis
– Table B3 Leaching analysis results
– Table B4 Acid metalliferous drainage results

The results are discussed in the following sections.

4.2.1 Hazardous materials:

The radiological results (Table B1) indicate that the majority of the waste rock and ore material shows an activity concentration below the limit of reporting (0.5 Bq/g). Activity concentrations above the limit of reporting were identified in one of the 10 samples submitted for analysis (at 0.97 Bq/g). This activity level (0.97 Bq/g) together with the average activity associated with the waste rock across the 10 samples, is below that considered to warrant the application of IAEA Basic Safety Standards, deemed as 1 Bq/g (WA Radiological Council, 2009). As a consequence, the activity concentrations of the waste rock and ore material tested herein, supports that exposure to the material will not result in an increased human radiation exposures risk.

The asbestos results (Table B1) indicate that fibrous asbestos material was not detected and supports that that exposure to the ore and waste rock material will not result in an increased human exposure risk.

4.2.2 Total metals analysis:

The total metals analysis (Table B2) has been compared to abundance of the elements in the earth's crust, as a screening tool to identify metals which may be relatively elevated and may require management if leached from the waste rock and country rock.

The Table indicates the following metals (averaged over waste rock, ore and country rock) are elevated over the crustal average and, if acidic conditions occur, are metals that may leach from the geological profile. Any monitoring of groundwater and seepage derived from the mine site should include (but not limited to) the following metals:

– Ore material, Bi, Se, and W.

– Waste rock: As ,Bi, Co, S, Sb, Se, W and Zn.
– Country rock: As, Bi, S, Sb, Se, Th, U, W, Zn.

4.2.3 Metals leaching analysis results:

The leaching results in Table B3 (ALSP under deionised water) indicate that the following metals leach at concentrations that exceed the drinking water guidelines and/or ecological guidelines

– Ore material, Al, Cr, Cu, Zn
– Waste rock: Al, Cr, Cu, Ln, Pb, Ni, Zn
– Country rock: Al, Cd, Cr, Cu, Ln, Pb, Hg, Ni, Zn

The leaching of these metals occurs in the laboratory under neutral conditions (e.g: without the mobilisation effects of acidic conditions), and any monitoring of groundwater and seepage under neutral conditions derived from the mine site should include these metals. Acidic conditions are likely to cause an increase the number and concentration of dissolved metals.

4.2.4 Acid metalliferous drainage results:

The AMD laboratory results, summarised in Table B3, were used to derive and calculate the acid production and neutralising potentials of the of the drill hole samples, and together with other AMD parameters have been plotted as graphs on Figure 5. The graphs show the following features:

– Some of the country rock (holes drilled into areas outside the proposed pit), exhibit the increased and elevated potential for “Acid Forming” (AMD10 see Table B3).
– The ore material is deemed as “*Non Acid Forming* or *Uncertain*”
– The waste rock mostly exhibits “*Non Acid Forming* or *Uncertain*”, but has a four samples which are deemed as “*Potentially acid Forming”*

The Table B3 indicates that where elevated acid production potential exists (e.g.: positive NAPP values) the elevated values coincide with elevated Sulfides, at around 0.5% to 2 %. The Sulfides are recognised as a source Sulfuric acid production, due to exposure of Sulfides to oxygen (oxidisation).

The AMD laboratory results in Table B3 are summarised as Net Acid Production Potential (NAPP kg H_2SO_4/t), which is presented in Figure 3 and Figure 4 to show the sub-surface distribution of acid production potential. The positive NAPP values shown on the figures reflect the production of acid, while the negative values reflect the excess of buffering capacity (acid consumption). The figures show the following:

– Main Pit (Figure 3): The figure shows that, based on the three holes in-pit, the majority of the material (ore) will be mined and removed from Site for processing. Where waste rock is encountered (AMD08) the waste rock is considered as weakly acid producing (PAF-LC).
– East Pit: (Figure 3): The figure shows that, based on the two holes, the occurrence of waste rock with elevated acid production potential is present near the base of the Pit and beneath the ore (AMD03), while weak acid producing material (PAF-LC) is present in the reminder of the waste rock profile (see AMD02 and AMD03)
– Outside Pit Areas (Figure 3 and Figure 4) The figures (and Table B4) show elevated acid production potential (up to 278 kg H_2SO_4/t) (PAF-HC) is present in the saturated profile associated within two areas of the country rock (AMD04 and AMD10). Although these areas are not subject to excavation, they are likely to be subject to dewatering impacts to accommodate mining below the water table, which may expose Sulfides to oxidisation.

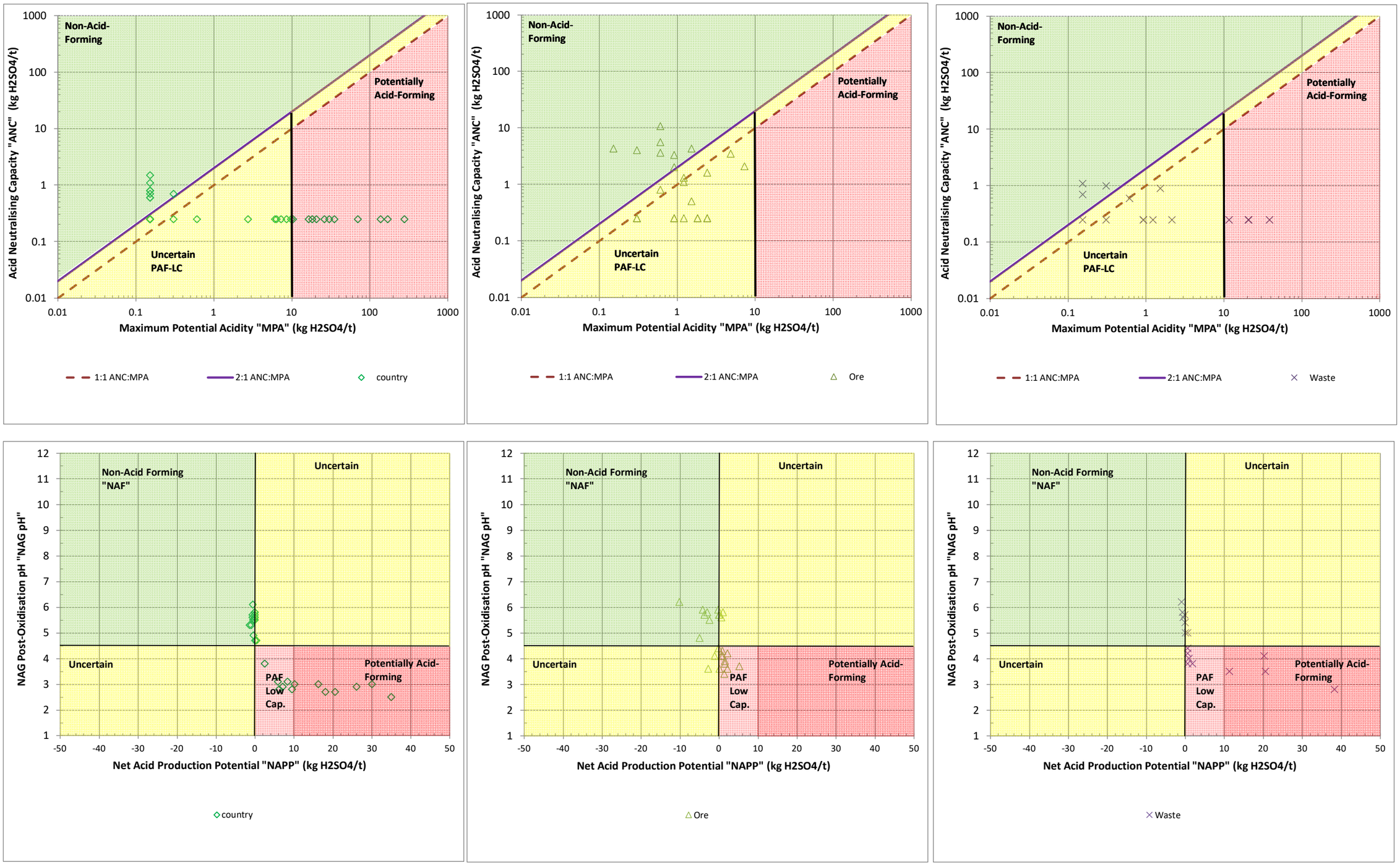


Figure 5 - Waste rock classification for acid forming potential

5. Interpretation of risk to human health and the environment

5.1 Understanding of source-pathway-receptor

The potential sources of impact, pathways - which may mobilise the sources, and receptors which may be impacted by the sources is summarised and presented in Table 1. The Table also summarises the potential risk to human health and the environment where there is a complete linkage (source pathway receptors). The source pathway receptors are discussed in further detail below (sections 5.1.1 to 5.1.3).

Table 1 Summary of Source Pathway Receptor linkage (environmental and human health risks)

Source	Pathway	Receptor	Potential Risk
Waste Rock			
Leaching metals under acidic conditions	Seepage into subsurface/groundwater table mobilisation and groundwater	Ecology of creeks and receiving water bodies	Yes
	Seepage discharge to surface water receiving bodies (creeks and tributaries)	Ecology of creeks and receiving water bodies	Yes
Country Rock			
Leaching metals under acidic conditions	Abstracted groundwater which may be impacted will be discharged to creeks	Ecology of creeks and receiving water bodies	Yes
Waste Rock and ore			
Silica dust	Airborne	Human inhalation	Yes

5.1.1 Potential sources of impacts

The potential sources of impact is summarised and presented in Table 1, and discussed as follows:

Asbestos and Radiological activity: The laboratory results indicate that asbestos fibres were not identified, and radiological activity negligible and consequently both are excluded from further consideration (environmental and human health risk considered negligible).

Silica: Although not tested herein, silica dust is recognised as a source of human exposure, through dust inhalation during mining activities.

Metals leaching from waste rock: Given that waste rock comprises some areas of potential acid production, leaching of metals from the waste rock dump during rainfall infiltration under acid conditions is deemed a potential source of impact (ore is to be removed from Site for processing).

Metals leaching from country rock: while the country rock will not be mined (ex-pit material) the dewatering of the country rock profile has potential to expose the identified Sulfides to oxygen during dewatering. This oxidation of Sulfides and rainfall infiltration may mobilise metals under acidic conditions into the groundwater.

5.1.2 Identified pathways (source mobilisation)

The source migrations pathways are summarised as follows.

Surface water pathway: Leachate derived from the waste rock, via rainfall infiltration will migrate into the subsurface and/or discharge as seepage at the base of the waste rock dumps - expressed as surface water. Surface water flow will migrate towards and discharge into the creek lines associated with the mine area and migrate downstream to other tributaries.

Groundwater pathway: Where leachate derived from the waste rock (via rainfall infiltration) soaks into the subsurface, the percolation downwards of the leachate will occur and impact on groundwater quality. The impacted groundwater will migrate in the direction of the hydraulic gradient, and may also discharge into creek lines and tributaries, where in hydraulic connection with the groundwater.

Groundwater pathways also exist where mine dewatering activities (groundwater abstraction bores and in-pit sump pumps) intersect impacted groundwater (due to oxidation of Sulfides in the country rock profile located ex-pit). This abstracted groundwater, which may be impacted, is planned for discharge into the creeks (surface water).

Air dispersion dust generation and migration during blasting, excavation, transportation of ore and waste material during mining and closure

5.1.3 Receptors (impacted by sources)

The primary receptors to impacts derived from the sources are as follows:

– The ecology of the creek lines and downgradient tributaries
– Human exposure during operations and closure (though ingestion, inhalation, or dermal contact).

6. Materials management requirements

Based on the scope of drilling, laboratory testing and risk assessment, the following materials will require management to control and monitor and the risk to human health and the environment:

6.1.1 Acid Metalliferous Drainage (AMD)

Waste-rock:

The occurrence of Sulfides in some areas within the waste rock profile indicates that leaching under acidic conditions will occur, and that the material will require management to reduce the risk of metals leaching from the waste rock dump areas discharging into the environment.

The distribution of Sulfides within the waste rock is not well defined horizontally and vertically, given that a total of five holes have been completed within the floor of the two pits (See Figure 2).

The observations, based on Figure 3 and Figure 4 indicate that, one of the five holes - AMD03 shows elevated Sulfides and increased acid potential at the base of the pit (See NAPP values in Figure 4), while the remaining four in-pit holes show relatively low Sulfides and NAPP values.

Based the limited drilling results herein, estimated percentage of waste rock that exhibits elevated Sulfide that will require management, may comprise 15 to 30% of the volume of waste rock excavated.

Subject to a more detailed understanding of the location, volumes and concentration of the Sulfides within the waste rock, management of the waste rock is likely to include some or all of the following items:

- Segregation of waste rock with elevated Sulfides from waste-rock with little or no Sulfides
- Blending of Sulfide bearing waste-rock with buffering agent (e.g.: limestone or calcrete)
- Construction of a dedicated cell to contain acidic leachate derived from waste rock (where Sulfide concentrations are elevated).
- Reburial of PAF waste rock, prior to significant acid generation, below the permanent watertable in exhausted opencut pits.
- Caping of the waste-rock dump with suitable design and materials to decrease infiltration of rainfall and generation of seepage
- Control of waste rock seepage (holding ponds, treatment, and monitoring).

In the absence of additional drilling information, a preliminary management plan for the waste-rock can be developed, based on an assumed waste rock Sulfide concentration and volume, but which will be subject to change as drilling and testing information becomes available.

Abstracted groundwater

Given that the dewatering of the pits (sumps and/or ex-pit abstraction bores) will be required to accommodate mining below the water table, the dewatering is likely to expose Sulfides which have been identified in the upper parts of the normally saturated profile of the country rock (ex-pit material).

Based on the current understanding of the occurrence of Sulfides within the country-rock (limited to five holes), the quality of water which will be intersected during dewatering may range from mildly acidic to strongly acidic. Any acidic water intersected is likely to exhibit elevated metal concentrations (as indicated in Section 4.2.2) and require treatment, prior to discharge to the creeks associated with the area, as is currently proposed.

Based on the limited available information, which precludes reliable prediction of water quality, a flexible groundwater management plan should be developed and include (but not limited to) the following measures:

– detailed monitoring program prior to and during dewatering, based on an established groundwater bore network (early warning system
– treatment system which is sufficiently flexible to accommodate changing water quality and volumes
– holding ponds which can be staged to accommodate increased and changing water volumes
– water balance study (site usage and discharge volumes)

Simcoa should be aware that dewatering, without a more detailed understanding of water quality and volumes, introduces a risk that mining may have to cease to accommodate updates, construction of the water treatment systems/infrastructure (unforeseen changes in water quality). Some or all of the following works are required to increase the reliability of water quality predictions:

– additional drilling to spatially characterise the Sulfide occurrence in areas below the water table
– additional leach and AMD testing of drill holes samples
– hydraulic testing and numerical groundwater flow modelling to indicate anticipated groundwater volumes and rates
– geochemical equilibrium modelling to predict water quality parameters (eg: mildly acidic, moderately acidic, or strongly acidic)

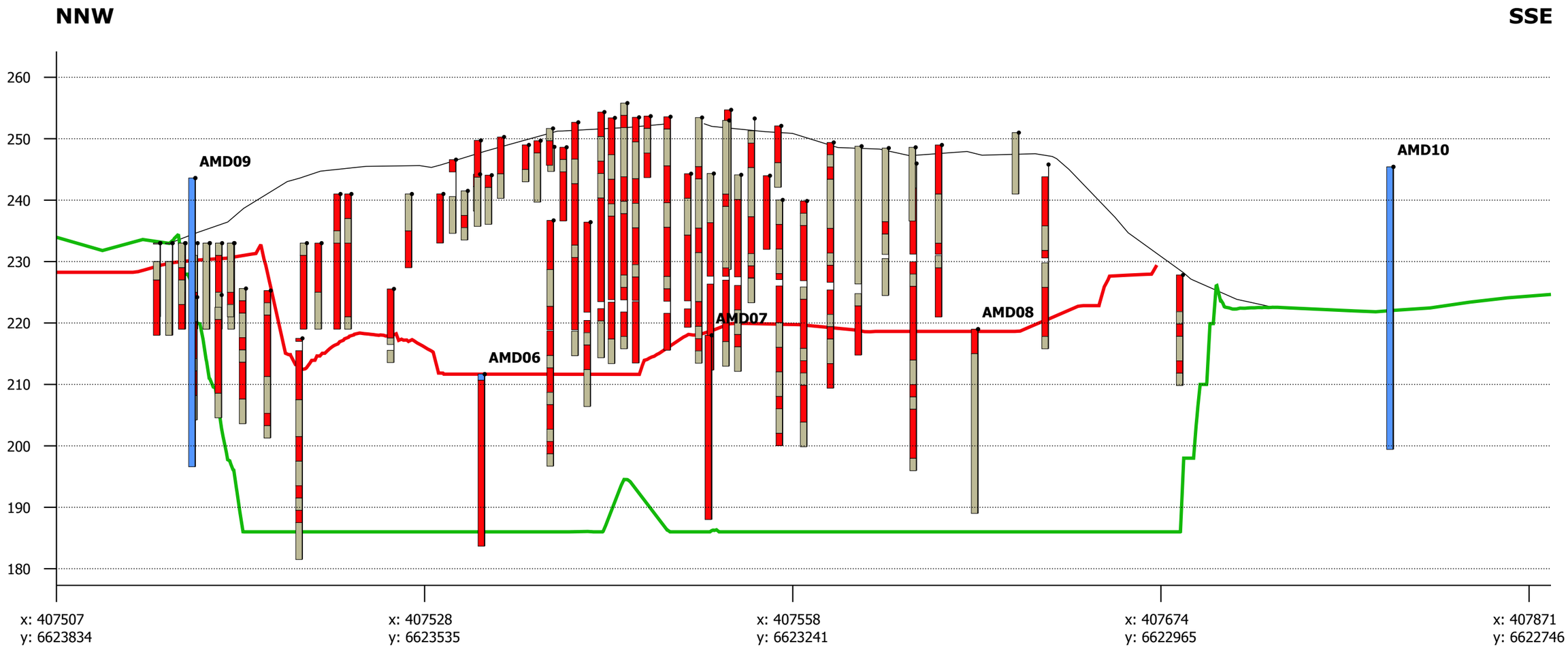
6.1.2 Hazardous materials

Activities related to mining and handling of waste rock have the potential to exposure humans, though ingestion, inhalation, or dermal contact.

The results indicate that asbestos form minerals and radioactivity should not pose a risk to human health, and are unlikely to require management.

Exposure to silica dust during mining, stockpiling and transport of ore and waste rock should be managed under a suitable management plan to protect human health from dust inhalation (etc.)

Cross Section through Main Pit with Existing Drill Holes



Legend

Material Classification

Country | Ore | Waste

Surfaces

- Surface Topography (pre-mining)
- November 2021 Topography
- Final Surface Post Mining

Notes about the section

AMD09 is 100m east off-section
Simcoa and GHD drilling

Location

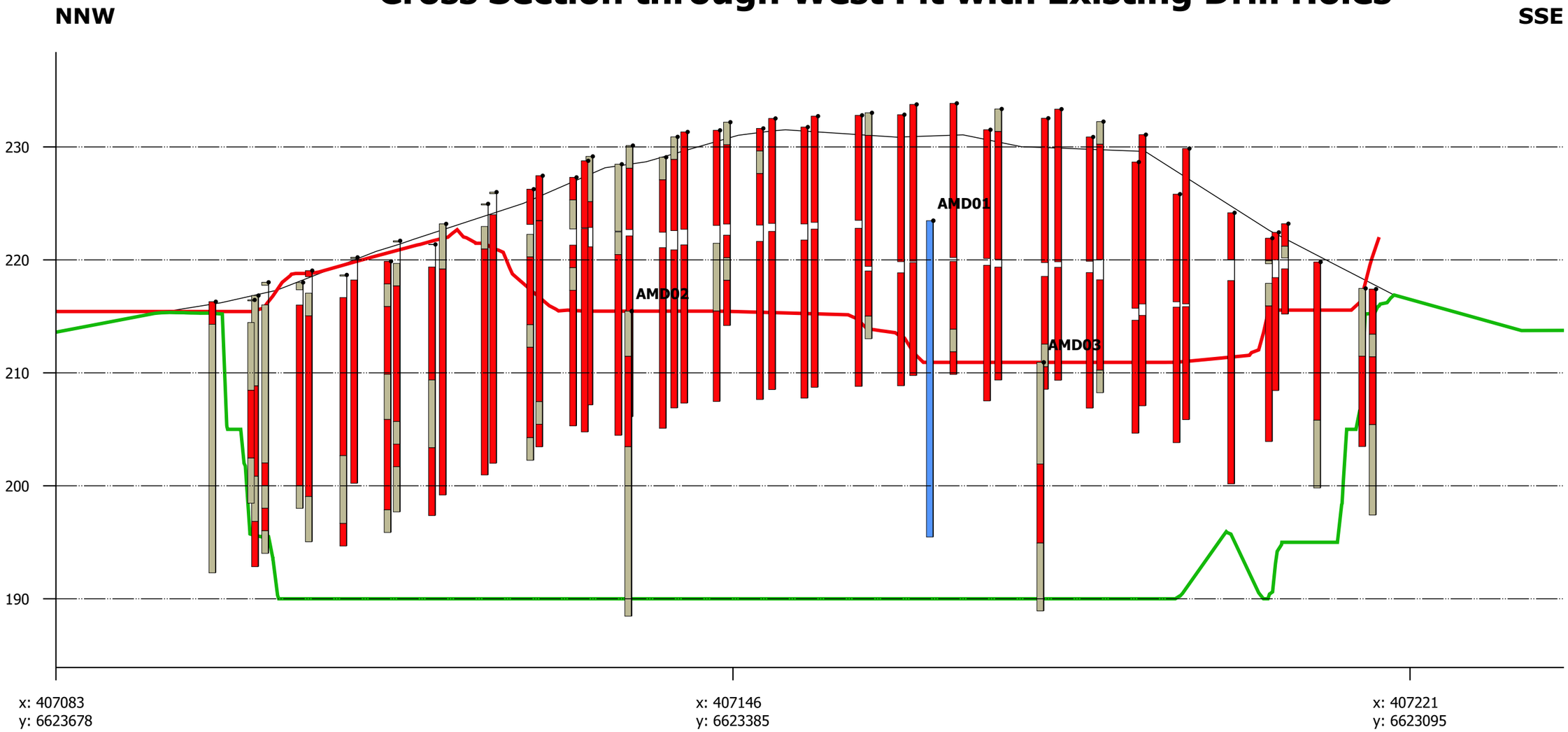
NNW: 407507, 6623834
SSE: 407884, 6622733

Scale: 1:3,400
Vertical exaggeration: 5x

0m — 250m

Figure 6

Cross Section through West Pit with Existing Drill Holes



Legend

Material Classification

Country | Ore | Waste

Surfaces

- Surface Topography (pre-mining)
- November 2021 Topography
- Final Surface Post Mining

Notes about the section

AMD01 is 100m west off-section
Simcoa and GHD drilling

Location

NNW: 407083, 6623678
SSE: 407236, 6623028

Scale: 1:1,900
Vertical exaggeration: 5x

0m 250m

Figure 7

7. Conclusions

The drilling and laboratory results indicate the following results and requirements for management:

Acid Metalliferous Drainage potential (AMD)

Waste-rock:

The analyses of samples form limited drilling within the waste rock (limited to five holes), indicate acidic leaching is likely to occur at concentrations that have potential to impact the receiving environment (e.g.: seepage into creeks), from an estimated 15% to 30% of the volume of waste rock to be excavated (ore/waste model absent). The acid producing waste rock (elevated Sulfides) will require management to reduce the risk of impacts of acidic leaching (and metals) from the waste rock dumps. Although better spatial and vertical delineation is required, acidic leaching conditions are not indicated from the reminder of waste rock (estimated at 70% to 85%).

A management plan for the waste-rock could be developed, based on the limited drilling information (five holes), however, the plan should be updated to accommodate information as drilling and testing becomes available (e.g: during ore definition phases). The plan is likely to include management through segregation of acidic waste rock, addition of a buffering agent (e.g.: limestone or calcrete), dedicated disposal cells, saturated storage, seepage collection and monitoring, and capping requirement of the waste rock dump.

Abstracted groundwater:

Based on the limited understanding of the distribution of the acidic producing material (five holes), dewatering and lowering of the groundwater table has the potential to expose acidic producing material (Sulfides) in the upper saturated profile of the country rock (ex-pit material).

The best estimate of water quality, given the minimal definition of acidic producing material, is indicated as possibly ranging from mildly acidic to strongly acidic. Any abstracted acidic water will require management and treatment to neutralise the waters and remove associated elevated metal concentrations prior to discharge to the proposed receiving environment, the creeks associated with the area.

Prior to development of a management plan for the abstracted water, either additional works should be undertaken to better understand and characterise the water quality during dewatering (e.g. drilling, hydraulic/laboratory testing, modelling), or a highly flexible groundwater management plan, should be developed to accommodate uncertainty in the water quality, which is likely to include (but not limited to) the following:

– establish groundwater monitoring bore network (early warning system);
– adaptable water treatment system to accommodate potentially changing water quality and volumes
– staged holding ponds, to accommodate increased and changing water volumes
– water balance study and groundwater abstraction modelling (site usage, abstraction volumes, and discharge volumes)

Hazardous materials

Activities related to mining and handling of waste rock have the potential exposure humans, though ingestion, inhalation, or dermal contact.

The results indicate that asbestos-form minerals are absent, and radioactivity levels are sufficiently low, and should not pose a risk to human health nor require management.

Exposure to silica dust during mining, stockpiling and transport/handling of ore and waste rock should be managed under a suitable management plan to limit human exposure (dust inhalation, etc.)

8. References

GSWA 1982, Moora, Western Australia, 1:250 000 Geological Series – Explanatory Notes, Sheet SH/50-10

GHD Pty Ltd, 2019 Simcoa - Moora Mine, Desk-top materials characterisation (April 2019).

GHD Pty Ltd, 2020 Simcoa - Moora Mine: Waste rock materials characterisation**.**

GHD Pty Ltd 2021, Simcoa S38 Environmental Approval, Pit Lake Recovery Assessment (March 2021)

Saprolite Pty Ltd.: March 2022 Annual Groundwater Monitoring Summary GWL104693 – Moora Quartzite Mine MOORA 1 January to 31 December 2021 (March 2022 Report number E0202-10 – ver A)

Simcoa Operations, 2010, Moora Project, Mineralisation Report, Application for Mining Lease, South West Mineral Field, WA. August 2010.

Saprolite Environmental, 2012, MOORA QUARTZ MINE – Phase 2 Hydrogeological Investigations, November 2011

Appendix A

Drill hole completion logs

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE AMD01

Client Simcoa
Project North Kiaka Mine
Project No. 12518217
Site Moora Quartzite Mine
Location Kiaka Road
Date Drilled 01/02/2022 - 01/02/2022

Drill Co. Strike
Driller
Rig Type RC
Total Depth (m) 28.00
Diameter (mm)

Easting 407070
Northing 6623274
Grid Ref GDA2020_MGA_zone_50
Elevation 223
Logged By S Bright
Checked By Paul Hamer

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	AR					QUARTZ, light brown/red, moderate clay , pervasive iron staining			Country Rock	222
2										
4						QUARTZ, light brown/red, low clay , pervasive iron staining, increased weathering 7-8m				220
6										218
8										216
10										214
12						QUARTZ, brown/red, low clay , iron staining				212
14				∇						210
16			AMD01_18			CHERT, light grey/cream, opaque, weak iron staining				208
18										206
20			AMD01_21			QUARTZ, light grey/pink, weak pink/black banding, weak iron staining				204
22										202
24										200
26			AMD01_26			QUARTZ, moderate red/pink/grey, opaque,				198
28										196
						Termination Depth at: 28.00 m				194

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE AMD02

Page 1 of 1

Client Simcoa
Project North Kiaka Mine
Project No. 12518217
Site Moora Quartzite Mine
Location Kiaka Road
Date Drilled 01/02/2022 - 01/02/2022

Drill Co. Strike
Driller
Rig Type RC
Total Depth (m) 27.00
Diameter (mm)

Easting 407149
Northing 6623432
Grid Ref GDA2020_MGA_zone_50
Elevation 223
Logged By S Bright
Checked By Paul Hamer

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	AR					QUARTZ, light purple/grey, weak iron staining at 2m, weak clay , red banding			Waste	222
2										
			AMD02_4			as above with opaque white/cream cherts				220
4				▽		QUARTZ, translucent grey, minor iron staining, weak chlorite veining			Ore	
										218
6			AMD02_8							
										216
8										
										214
10			AMD02_12							
										212
12						QUARTZ with weathered saprock, moderate clay , moderate iron staining increasing down hole			Waste	
										210
14			AMD02_15							
			AMD02_15			QUARTZ, moderate grey, weak iron staining on surfaces				208
16										
						as above, increased iron staining				206
18						QUARTZ, moderate grey, weak clay				
										204
20										
										202
22			AMD02_24							
										200
24						QUARTZ, moderate grey with black banding, moderate clay , weak iron staining				
										198
26										
										196
28						Termination Depth at: 27.00 m				
										194

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE AMD03

Page 1 of 1

Client Simcoa
Project North Kiaka Mine
Project No. 12518217
Site Moora Quartzite Mine
Location Kiaka Road
Date Drilled 01/02/2022 - 01/02/2022

Drill Co. Strike
Driller
Rig Type RC
Total Depth (m) 22.00
Diameter (mm)

Easting 407185
Northing 6623253
Grid Ref GDA2020_MGA_zone_50
Elevation 211
Logged By S Bright
Checked By Paul Hamer

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	AR					QUARTZ AND SANDS, light/moderate grey, moderate iron staining			Waste	211
4			AMD03_6			QUARTZ, moderate brown/grey, pervasive iron staining, moderate clay				207
6						QUARTZ AND SANDS, light/moderate grey, moderate iron staining				205
9						QUARTZ, moderate/light grey, pervasive iron staining 9-10 & 12-13m, weak clay, black minerals			Ore	202
10			AMD03_12							201
12			AMD03_14							199
13			AMD03_13							198
14			AMD03_16			as above, patchy iron staining,				197
16			AMD03_18							195
18			AMD03_20			CHERT AND WEATHERED SAPROLITE, dark brown/black, large sulphides and sulphide 'dust'			Waste	193
20			AMD03_22							191
22						Termination Depth at: 22.00 m				189

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE AMD04

Client Simcoa
Project North Kiaka Mine
Project No. 12518217
Site Moora Quartzite Mine
Location Kiaka Road
Date Drilled 02/02/2022 - 02/02/2022

Drill Co. Strike
Driller
Rig Type RC
Total Depth (m) 40.00
Diameter (mm)

Easting 407286
Northing 6623687
Grid Ref GDA2020_MGA_zone_50
Elevation 217
Logged By S Bright
Checked By Paul Hamer

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	AR					CHERT AND Quartz, light brown/grey/cream, pervasive iron staining, moderate clay,			Country Rock	216
2										214
4										212
6										210
8				▽		QUARTZ AND SAPROLITE CLAYS, light grey/brown, gravels and sands, pallid zone 13-14m, pink 8-10m, high clay,				208
10										206
12			AMD04_14							204
14										202
16										200
18			AMD04_18			CHERT AND SAPROLITE CLAYS, moderate/dark grey, high clay, opaque Quartz				198
20			AMD04_22							196
22										194
24			AMD04_24+25			CHERT AND Quartz, dark grey/black, moderate clays,				192
26			AMD04_26							190
28			AMD04_28							188
30			AMD04_30							186
32						as above reduced clay				184
34			AMD04_34							182
36			AMD04_36							180
38			AMD04_38							178
40			AMD04_40							176
						Termination Depth at: 40.00 m				

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE AMD05

Page 1 of 1

Client Simcoa
Project North Kiaka Mine
Project No. 12518217
Site Moora Quartzite Mine
Location Kiaka Road
Date Drilled 01/02/2022 - 01/02/2022

Drill Co. Strike
Driller
Rig Type RC
Total Depth (m) 32.00
Diameter (mm)

Easting 407413
Northing 6623189
Grid Ref GDA2020_MGA_zone_50
Elevation 235
Logged By S Bright
Checked By Paul Hamer

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	AR					CHERTS, light orange/grey/cream, weak clay, pervasive iron staining			Country Rock	234
2										232
4										230
6						CHERTS AND SAPROLITE CLAYS, light yellow/cream, strong clay, minor Quartz				228
8										226
10						CHERT AND Quartz, moderate grey				224
12						CHERT AND Quartz, light cream/brown, iron staining, strong iron at 19m & 21m & 24m, weak banding				222
14										220
16										218
18										216
20			AMD05_22							214
22			AMD05_24							212
24			AMD05_26	▽		as above moderate iron staining, light brown				210
26			AMD05_26 AMD05_28							208
28			AMD05_30			CHERT, dark black/cream banding, moderate clay				206
30			AMD05_31			CHERT AND Quartz, light brown/cream, strong clay				204
32						Termination Depth at: 32.00 m				202
34										

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE AMD06

Page 1 of 1

Client Simcoa
Project North Kiaka Mine
Project No. 12518217
Site Moora Quartzite Mine
Location Kiaka Road
Date Drilled 02/02/2022 - 02/02/2022

Drill Co. Strike
Driller
Rig Type RC
Total Depth (m) 28.00
Diameter (mm)

Easting 407531
Northing 6623486
Grid Ref GDA2020_MGA_zone_50
Elevation 217
Logged By S Bright
Checked By Paul Hamer

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	AR		AMD06_2			CHERT AND Quartz, light brown, weak clay			Ore	216
2						CHERT AND Quartz, light grey, weak patchy iron staining				214
4			AMD06_6							212
6										210
8			AMD06_10							208
10			AMD06_12	▽						206
12			AMD06_14							204
14			AMD06_16							202
16			AMD06_18							200
18										198
20			AMD06_20			CHERT, moderate yellow/brown, moderate clay, dark grey cherts and minor Quartz				196
22			AMD06_22			CHERT AND Quartz, moderate grey, weak clays with slight increase at 26m, sulphides at 22-24m.				194
24			AMD06_24							192
26			AMD06_26							190
28			AMD06_28			Termination Depth at: 28.00 m				188

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE AMD07

Page 1 of 1

Client Simcoa
Project North Kiaka Mine
Project No. 12518217
Site Moora Quartzite Mine
Location Kiaka Road
Date Drilled 02/02/2022 - 02/02/2022

Drill Co. Strike
Driller
Rig Type RC
Total Depth (m) 30.00
Diameter (mm)

Easting 407530
Northing 6623301
Grid Ref GDA2020_MGA_zone_50
Elevation 220
Logged By S Bright
Checked By Paul Hamer

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	AR		AMD07_2			CHERT AND Quartz, light brown/white, weak iron staining			Ore	220
2			AMD07_4							218
4			AMD07_6	▽		as above, pervasive red staining				216
6			AMD07_8							214
8			AMD07_10							212
10			AMD07_12			as above, light brown, metallic sulphides				210
12			AMD07_14							208
14			AMD07_16			as above weak red staining				206
16			AMD07_18							204
18			AMD07_20			CHERT AND Quartz, light grey/white, no impurities				202
20			AMD07_22							200
22			AMD07_24							198
24			AMD07_26							196
26			AMD07_28			as above with pervasive red staining				194
28			AMD07_30			CHERT AND Quartz, light brown/red, red staining, weak iron staining, weak clay				192
30			AMD07_29							190
			AMD07_32			Termination Depth at: 30.00 m				

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE AMD08

Client Simcoa
Project North Kiaka Mine
Project No. 12518217
Site Moora Quartzite Mine
Location Kiaka Road
Date Drilled 02/02/2022 - 02/02/2022

Drill Co. Strike
Driller
Rig Type RC
Total Depth (m) 30.00
Diameter (mm)

Easting 407628
Northing 6623107
Grid Ref GDA2020_MGA_zone_50
Elevation 219
Logged By S Bright
Checked By Paul Hamer

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	AR					CHERT AND Quartz, light brown, weak patchy iron staining			Ore	218
2										216
4			AMD08_6			CHERT AND Quartz, light brown, moderate iron staining, moderate clay			Waste	214
6			AMD08_8							212
8			AMD08_10			CHERT, light grey/white, minor Quartz, minimal impurities				210
10						BANDED CHERT, moderate grey, moderate iron staining, minor Quartz, banded dark and light greys			Waste	208
12			AMD08_14			CHERT, light grey/white, moderate clay				206
14			AMD08_15+16			CHERT AND Quartz, light grey/white, high clay			Waste	204
16			AMD08_18			CHERT, light grey/white, moderate clay				202
18										200
20			AMD08_22			CHERT, moderate grey/brown with pink hue, weak iron staining, high clay				198
22			AMD08_22							196
24			AMD08_22							194
26			AMD08_26			as above no pink hue				192
28			AMD08_30							190
30						Termination Depth at: 30.00 m				188

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE AMD09

Page 1 of 1

Client Simcoa
Project North Kiaka Mine
Project No. 12518217
Site Moora Quartzite Mine
Location Kiaka Road
Date Drilled 03/02/2022 - 03/02/2022

Drill Co. Strike
Driller
Rig Type RC
Total Depth (m) 30.00
Diameter (mm)

Easting 407616
Northing 6623727
Grid Ref GDA2020_MGA_zone_50
Elevation 253
Logged By S Bright
Checked By Paul Hamer

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	AR					CHERT Quartz, moderate brown/cream, moderate clays, pervasive iron staining			Country Rock	252
2										250
4										248
6										246
8										244
10						Quartz AND CHERT, light brown/cream, minor Quartz with dark banding, red tinge, pervasive iron staining, low clays				242
12										240
14										238
16										236
18						as above light red/brown				234
20			AMD09_22			CHERT AND Quartz, light brown/white, weak pervasive iron staining, weak clays				232
22			AMD09_24	▽						230
24			AMD09_26			as above less iron staining				228
26						CHERT, minor Quartz, light white/brown, patchy iron staining, minimal impurities				226
28			AMD09_29+30			as above moderate clay, moderate pervasive iron staining				224
30						CHERT, minor Quartz, light white/brown, patchy iron staining, minimal impurities Termination Depth at: 30.00 m				222

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

BOREHOLE LOG

ENVIRONMENTAL-SOIL BORE

SOIL BORE AMD10

Page 1 of 1

Client Simcoa
Project North Kiaka Mine
Project No. 12518217
Site Moora Quartzite Mine
Location Kiaka Road
Date Drilled 03/02/2022 - 03/02/2022

Drill Co. Strike
Driller
Rig Type RC
Total Depth (m) 46.00
Diameter (mm)

Easting 407794
Northing 6622825
Grid Ref GDA2020_MGA_zone_50
Elevation 245
Logged By S Bright
Checked By Paul Hamer

Depth (m)	Drilling Method	PID (ppm)	Sample ID	Water	Graphic Log	LITHOLOGICAL DESCRIPTION Soil Type (Classification Group Symbol); Particle Size; Colour; Secondary / Minor Components.	Moisture	Consistency	COMMENTS/ CONTAMINANT INDICATORS Odours, staining, waste materials,separate phase liquids, imported fill, ash.	Elevation (m)
0	AR					SILTY CLAY CHERTS, gravels and iron nodules, moderate red-brown, strong pervasive iron staining, strong clays			Country Rock	244
2										242
4						MOTTLED CLAYS, red-brown/cream clays with chert and Quartz, strong pervasive iron, strong clay				240
6										238
8										236
10										234
12						SAPROLITE CLAYS, red-brown, chert and Quartz,				232
14										230
16			AMD10_16-18			as above goethitic clays				228
18						as above pallid white clays				226
20				▽		SAPROLITE CLAYS, moderate grey, moderate plasticity, chert and Quartz, strong clay				224
22			AMD10_22-24							222
24										220
26										218
28			AMD10_28							216
30			AMD10_28-30			as above black high plasticity clays				214
32			AMD10_30-32							212
34						SAPROLITE CLAYS, moderate grey, Quartz aggregate, strong clay, low plasticity				210
36			AMD10_36-38							208
38			AMD10_38							206
40			AMD10_40-42			CHERT AND CLAYS, dark grey/black, high plasticity clays, strong clay				204
42										202
44			AMD10_44-46							200
46						Termination Depth at: 46.00 m				198
48										196

Notes

This log is not intended for geotechnical purposes.

Drilling Abbreviations	Moisture Abbreviations	Consistency Abbreviations	
AH-Air Hammer, AR-Air Rotary, BE-Bucket Excavation, CC-Concrete Coring, DC-Diamond Core, FH-Foam Hammer, HA-Hand Auger, HE-Hand Excavation (shovel), HFA-Hollow Flight Auger, MR-Mud Rotary, NDD-Non Destructive Drilling, PT-Pushtube, SD-Sonic Drilling, SFA-Solid Flight Auger, SS-Split Spoon, WB-Wash Bore, WS-Window Sampler	D-Dry, SM-Slightly Moist, M-Moist, VM-Very Moist, W-Wet, S-Saturated	**Granular Soils** VL-Very Loose, L-Loose, MD-Medium Dense, D-Dense,VD - Very Dense	**Cohesive Soils** VS-Very Soft, S-Soft, F-Firm, ST-Stiff, VST-Very Stiff, H-Hard

Appendix B

Laboratory summary results tables

Table B1 - Asbestos and Radionuclide Analytical Results

	Hole ID	AMD02				AMD03				AMD06				AMD07				AMD08			
	Depth (m)	8		15		13		18		14		20		20		29		14		22	
	Lab Report	EP2203533	EP2203535	EP2201472	EP2201490	EP2201472	EP2201490	EP2203533	EP2203535	EP2203533	EP2203535	EP2201472	EP2201490	EP2203533	EP2203535	EP2201472	EP2201490	EP2203533	EP2203535	EP2201472	EP2201490
	Material Classification	Ore	Ore	Waste	Waste	Ore	Ore	Waste	Waste	Ore	Ore	Ore	Ore	Ore	Ore	Ore	Ore	Ore	Ore	Waste	Waste
Analyte	**Unit**	**EQL**																			
Asbestos																					
Asbestos Fibres	g	0.1	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-
Asbestos (Trace)	Fibres	5	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-
Asbestos Type	-		Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-
Weight of sample	g	0.01	51.7	-	87.8	-	95.2	-	130	-	113	-	99.1	-	121	-	114	-	67.2	-	71.8	-
Organic Fibre	g/kg	0.1	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-
Synthetic Mineral Fibre	g/kg	0.1	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-	Nil	-
Radionuclides																					
Gross alpha	Bq/kg DW		-	<500	-	<500	-	<500	-	970	-	<500	-	<500	-	<500	-	<500	-	<500	-	<500
Gross beta	Bq/kg DW		-	<500	-	<500	-	<500	-	<500	-	<500	-	<500	-	<500	-	<500	-	<500	-	<500

Table B2: Total Metals Analytical Results

		Hole ID	AMD01		AMD02			AMD03				
		Sample ID	AMD01_18	AMD01_ 21	AMD02_8	AMD02_ 15	AMD02_24	AMD03_6	AMD03_14	AMD03_18	AMD03_ 21	AMD03_22
		Material Classification	Country	Country	Ore	Waste	Waste	Waste	Ore	Waste	Waste	Waste
Analyte	Abundance of elements in the earth's crust	Units										
Au	0.004	ppm	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002	<0.001	0.002	<0.001
Ag	0.075	ppm	0.02	0.01	0.02	0.02	0.01	0.01	0.03	0.02	0.01	0.04
Al	8.23	%	1.48	0.56	0.05	0.34	0.08	0.57	0.14	0.04	1.35	0.45
As	1.8	ppm	1.6	1.1	0.6	1.7	1.1	33.4	1.3	0.4	16.9	3.6
B	0.001	%	<0.01	-	<0.01	-	<0.01	<0.01	<0.01	<0.01	-	<0.01
Ba	425	ppm	160	70	<10	50	10	10	10	<10	10	10
Be	2.8	ppm	0.38	0.08	<0.05	0.16	0.05	0.14	0.05	<0.05	0.33	0.08
Bi	0.0085	ppm	0.09	0.12	0.03	0.13	0.05	0.02	0.04	0.02	0.09	0.04
Ca	4.15	%	0.03	0.01	0.02	0.05	0.05	0.01	0.05	0.04	0.03	0.06
Cd	0.15	ppm	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	<0.02	<0.02	0.21	0.09
Ce	66.5	ppm	17.75	5.06	0.5	4.81	0.52	5.52	1.49	0.38	14.2	5.58
Co	25	ppm	0.6	0.6	1.4	2.5	1.5	349	3.1	3.2	86.1	6.1
Cr	102	ppm	19	15	6	13	8	18	8	9	50	20
Cs	3	ppm	0.5	0.18	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cu	60	ppm	3	6.4	2.4	8.3	2.5	4.1	14.6	4.3	12.2	43.6
F	585	ppm	320	-	90	-	100	90	100	90	-	110
Fe	5.63	%	0.59	0.66	0.44	0.58	0.5	2.06	0.44	0.47	1.02	0.64
Ga	19	ppm	3.22	1.5	0.27	0.78	0.46	0.55	0.49	0.24	1.14	1.14
Ge	1.5	ppm	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05
Hf	3	ppm	0.6	0.3	<0.1	0.1	<0.1	0.2	0.1	<0.1	0.4	0.2
Hg	0.085	ppm	<0.005	<0.005	<0.005	0.006	<0.005	0.013	0.005	<0.005	0.033	0.033
In	0.25	ppm	0.013	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.005
K	2.09	%	0.58	0.14	0.01	0.03	0.02	0.01	0.02	0.01	0.01	0.01
La	39	ppm	8.6	2.6	<0.5	2.2	<0.5	2.3	0.8	<0.5	5.1	3.6
Li	20	ppm	2.6	1.5	0.6	1.5	1.2	0.9	1.1	1	1.4	1.7
Mg	-	%	0.08	0.04	0.02	0.06	0.08	0.02	0.07	0.06	0.02	0.1
Mn	950	ppm	45	62	39	56	46	50	38	45	59	60
Mo	1.2	ppm	0.83	1.28	0.32	0.71	0.5	0.64	0.49	0.51	1.2	0.75
Na	2.36	%	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01
Nb	20	ppm	2.2	1.1	0.1	0.5	0.1	0.1	0.2	0.1	0.3	0.2
Ni	84	ppm	3.8	4.8	1.9	4.8	2.8	264	2.4	2	63	5.7
P	1050	ppm	20	10	40	330	60	470	170	40	1090	450
Pb	14	ppm	1.8	1.5	0.5	16.6	0.9	2.5	2.3	0.9	8.8	4.3
Rb	90	ppm	25.6	5.9	0.3	1	0.6	0.2	0.7	0.2	0.2	0.2
Re	0.0007	ppm	0.005	<0.002	0.005	<0.002	0.003	0.004	0.003	0.003	0.004	0.002
S	0.035	%	0.01	0.01	0.04	0.04	0.05	1.87	0.08	0.07	0.75	0.12
Sb	0.2	ppm	0.17	0.12	0.13	0.27	0.14	0.19	0.12	0.1	0.46	0.27
Sc	22	ppm	2.9	1.2	0.1	0.5	0.2	5.9	0.4	0.1	14.9	3.2
Se	0.05	ppm	1	<1	<1	1	1	<1	<1	<1	1	3
Si	28.2	%	44.6	-	47.1	-	44.5	38.8	46	44.1	-	42.1
Sn	2.3	ppm	0.6	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	0.2
Sr	0.037	ppm	4.3	2.7	0.7	7.2	1	1	1.9	0.7	1	3
Ta	2	ppm	0.19	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Te	0.001	ppm	<0.05	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	0.05
Th	9.6	ppm	2.59	1.04	0.09	0.77	0.17	0.99	0.53	0.09	2.6	1.64
Ti	0.56	%	0.074	0.042	<0.005	0.007	<0.005	<0.005	0.006	<0.005	0.005	0.008
Tl	0.85	ppm	0.12	0.04	<0.02	<0.02	<0.02	2.24	<0.02	<0.02	0.65	0.04
U	2.7	ppm	0.3	0.3	0.1	0.8	0.2	0.7	0.7	0.4	2.2	1.5
V	120	ppm	12	8	1	5	2	78	3	1	207	9
W	1.25	ppm	2.6	2.9	4.6	8.1	6.2	4.5	21	22.8	6	12.4
Y	33	ppm	2.6	0.8	0.2	1.3	0.3	3	0.4	0.2	7	0.9
Zn	70	ppm	5	4	2	6	2	467	4	3	724	5
Zr	165	ppm	23.4	9.3	1.9	3.8	1.4	5.6	2.7	0.7	14.3	6.9

Table B2: Total Metals Analytical Results

		Hole ID	AMD04							AMD05			
		Sample ID	AMD04_14	AMD04_ 24+25	AMD04_ 24+25D	AMD04_26	AMD04_30	AMD04_36	AMD04_40	AMD05_22	AMD05_24-26	AMD05_ 25-26	AMD05_30
		Material Classification	Country	Country	Country	Country	Country	Country	Country	Country	Country	Country	Country
Analyte	Abundance of elements in the earth's crust	Units											
Au	0.004	ppm	<0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ag	0.075	ppm	0.02	0.09	0.1	0.12	0.03	0.04	0.04	0.02	0.01	0.01	0.02
Al	8.23	%	10.2	3.55	3.34	5.15	1.28	1.16	1.82	0.32	0.32	0.48	1.03
As	1.8	ppm	0.8	0.7	0.8	1.2	0.9	0.8	0.7	3.4	4.1	2.4	1.6
B	0.001	%	<0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01
Ba	425	ppm	60	190	180	250	40	20	30	10	20	20	50
Be	2.8	ppm	0.72	0.64	0.57	0.86	0.31	0.74	0.64	0.62	0.54	0.23	0.26
Bi	0.0085	ppm	0.22	0.32	0.25	0.22	0.05	0.08	0.12	0.02	0.02	0.05	0.03
Ca	4.15	%	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.03	0.03	0.04
Cd	0.15	ppm	<0.02	0.03	0.02	0.04	0.02	0.02	0.03	<0.02	<0.02	<0.02	<0.02
Ce	66.5	ppm	41.4	57.5	52.7	88.7	23.8	50.6	54.4	32.1	17.65	12.05	12.75
Co	25	ppm	5.3	34	34.5	32.2	22.8	45	20.7	4.2	2.1	1.2	1.3
Cr	102	ppm	66	41	43	48	18	29	21	24	21	16	15
Cs	3	ppm	0.08	1.18	1.06	1.7	0.25	0.3	0.26	0.07	0.06	0.06	0.06
Cu	60	ppm	4.5	6.4	5.6	11.2	4.3	16.8	5.7	4.2	6.3	4.6	3.9
F	585	ppm	190	-	-	350	120	100	110	80	80	-	90
Fe	5.63	%	0.4	1.2	1.21	1.09	0.82	1.23	0.86	1.48	1.28	0.87	0.76
Ga	19	ppm	24	10.55	9.4	13.3	2.58	2.6	4.14	0.72	0.9	1.64	1.58
Ge	1.5	ppm	<0.05	0.12	0.09	0.09	<0.05	0.08	0.07	0.05	<0.05	<0.05	<0.05
Hf	3	ppm	4.6	2.2	2	3.2	0.5	0.6	1	0.3	0.3	0.3	0.2
Hg	0.085	ppm	<0.005	0.01	0.009	0.014	<0.005	0.009	<0.005	0.036	0.03	0.02	0.029
In	0.25	ppm	0.015	0.036	0.024	0.03	0.008	0.017	0.011	<0.005	0.006	0.005	<0.005
K	2.09	%	0.02	1.19	1.12	1.66	0.24	0.12	0.11	0.01	0.02	0.03	0.03
La	39	ppm	21.8	35.9	32.1	56	17.5	46.7	40.9	11.8	7.8	4.5	7.5
Li	20	ppm	18.8	4.5	4.1	6.8	3.5	3.9	6	1.8	1.4	1.7	2.8
Mg	-	%	0.04	0.14	0.13	0.24	0.07	0.06	0.12	0.02	0.02	0.02	0.03
Mn	950	ppm	20	45	45	45	44	67	45	47	36	41	36
Mo	1.2	ppm	0.27	1.11	0.67	0.32	0.5	0.59	0.81	1.32	0.64	0.96	0.56
Na	2.36	%	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Nb	20	ppm	11.8	5.6	5.2	7.6	1.4	1.5	2.8	0.8	1	1.2	1
Ni	84	ppm	31.4	78	71.1	71.9	33.7	54.4	35.2	6.2	4	4	4.9
P	1050	ppm	50	60	60	90	30	50	50	160	150	130	90
Pb	14	ppm	4.5	9.4	8.2	8.2	2.8	13.5	8.4	1.5	1.6	2.1	4.1
Rb	90	ppm	0.7	42.7	38.5	56.9	7.5	4.8	3.9	0.6	0.8	1.2	1.1
Re	0.0007	ppm	0.003	<0.002	0.002	0.002	0.002	0.002	0.002	<0.002	0.002	<0.002	0.002
S	0.035	%	0.01	0.43	0.46	0.3	0.36	0.63	0.38	0.02	0.02	0.01	0.01
Sb	0.2	ppm	0.38	0.37	0.34	0.34	0.09	0.21	0.17	0.16	0.12	0.13	0.11
Sc	22	ppm	9.1	12	10.8	14.4	5.2	8.8	6.6	4.2	4.4	2.5	2.8
Se	0.05	ppm	1	<1	<1	<1	<1	<1	1	<1	1	1	<1
Si	28.2	%	32.2	-	-	37.9	43.5	42.3	42.9	43.4	43.2	-	41.8
Sn	2.3	ppm	2.9	1.5	1.3	2.2	0.4	0.4	0.5	0.2	0.2	0.2	0.2
Sr	0.037	ppm	2.8	4.3	4.1	6.3	1.2	1.7	1.6	1.2	2.2	2.4	11.6
Ta	2	ppm	0.99	0.52	0.45	0.69	0.14	0.13	0.25	0.06	0.1	0.08	0.08
Te	0.001	ppm	<0.05	0.15	0.12	0.15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Th	9.6	ppm	15.6	10.4	9.41	13.3	2.81	3.45	5.1	1.44	1.33	1.52	1.43
Ti	0.56	%	0.429	0.169	0.16	0.243	0.046	0.045	0.084	0.034	0.046	0.042	0.041
Tl	0.85	ppm	<0.02	0.21	0.16	0.24	0.06	0.04	0.03	0.02	<0.02	<0.02	<0.02
U	2.7	ppm	2	3.8	3.3	2.3	0.6	1.1	1.2	1.7	1.1	0.7	0.5
V	120	ppm	43	60	55	67	26	44	37	14	24	17	13
W	1.25	ppm	2.6	1.9	1.7	3.4	2.5	2.9	2.9	2.5	2.5	1.9	0.9
Y	33	ppm	25.5	17.6	16.2	26.8	11	35.5	25.3	6.6	5.1	2.6	3.9
Zn	70	ppm	5	54	47	70	86	70	80	4	3	4	3
Zr	165	ppm	175.5	79.1	74.1	121	17.4	23	36.3	9.5	11.4	10.4	8.3

Table B2: Total Metals Analytical Results

	Hole ID	AMD06							AMD07			
	Sample ID	AMD06_26	AMD06_10	AMD06_ 20	AMD06_22	AMD06_14	AMD06_18	AMD06_28	AMD07_ 13	AMD07_14	AMD07_20	AMD07_30
	Material Classification	Ore	Ore	Ore	Ore	Ore	Ore	Ore	Ore	Ore	Ore	Ore
Analyte	Abundance of elements in the earth's crust	Units										
Au	0.004	ppm	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ag	0.075	ppm	0.01	0.02	0.01	0.01	0.02	0.01	0.01	<0.01	0.02	0.02	0.03
Al	8.23	%	0.13	0.11	0.29	0.08	0.08	0.06	0.13	0.1	0.15	0.05	0.18
As	1.8	ppm	0.9	0.3	2.1	1.3	0.5	0.4	1.3	0.6	0.5	0.6	0.6
B	0.001	%	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01
Ba	425	ppm	10	10	60	10	10	10	10	30	40	10	70
Be	2.8	ppm	0.05	0.07	0.23	0.09	0.07	0.07	0.07	0.06	0.07	0.05	0.1
Bi	0.0085	ppm	0.04	0.03	0.08	0.03	0.02	0.01	0.06	0.04	0.04	0.03	0.04
Ca	4.15	%	0.02	0.05	0.76	0.05	0.08	0.04	0.2	0.04	0.07	0.04	0.24
Cd	0.15	ppm	<0.02	<0.02	0.04	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ce	66.5	ppm	1.75	0.84	5.23	1.02	0.66	0.54	1.21	0.98	1.45	0.28	2.06
Co	25	ppm	0.8	0.5	2	1	1	0.9	1.9	0.9	0.7	1.5	1.4
Cr	102	ppm	6	7	14	8	7	7	12	8	5	7	6
Cs	3	ppm	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	0.05
Cu	60	ppm	3.1	2.6	5.7	2.1	2.2	1.9	2.5	2.6	2.2	1.9	2.1
F	585	ppm	100	90	-	90	100	90	220	-	110	90	260
Fe	5.63	%	0.46	0.52	0.92	0.56	0.48	0.47	0.64	0.5	0.4	0.56	0.39
Ga	19	ppm	0.46	0.37	0.93	0.33	0.36	0.3	0.48	0.37	0.48	0.23	0.53
Ge	1.5	ppm	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05
Hf	3	ppm	0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1
Hg	0.085	ppm	<0.005	<0.005	0.01	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
In	0.25	ppm	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
K	2.09	%	0.01	0.02	0.07	0.01	0.01	0.01	0.01	0.02	0.04	0.01	0.04
La	39	ppm	0.8	<0.5	2.2	0.6	<0.5	<0.5	0.5	<0.5	0.7	<0.5	1
Li	20	ppm	2.4	1.7	3.3	0.9	1.5	1	2.7	1.1	1.3	0.9	2.9
Mg	-	%	0.12	0.08	0.16	0.04	0.09	0.05	0.14	0.05	0.06	0.04	0.16
Mn	950	ppm	44	52	138	52	50	53	56	47	35	51	35
Mo	1.2	ppm	0.52	0.4	0.75	0.42	0.29	0.4	0.8	0.62	0.2	0.35	0.27
Na	2.36	%	0.01	0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.01
Nb	20	ppm	0.2	0.1	0.4	0.1	0.1	0.1	0.2	0.4	0.2	0.1	0.3
Ni	84	ppm	2.4	1.7	3.8	2.5	1.5	1.4	3.2	1.9	1.3	1.5	2.3
P	1050	ppm	20	20	3440	160	90	90	680	130	200	90	900
Pb	14	ppm	0.8	1.7	10	4.7	0.9	1.1	2.2	1.4	1.8	5.2	5.6
Rb	90	ppm	0.4	0.5	2.3	0.2	0.3	0.2	0.4	0.8	1.3	0.3	1.3
Re	0.0007	ppm	0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	0.002	<0.002
S	0.035	%	0.04	0.01	0.02	0.01	0.02	0.02	0.08	0.03	0.03	0.06	0.02
Sb	0.2	ppm	0.1	0.1	0.21	0.13	0.09	0.1	0.17	0.14	0.14	0.12	0.13
Sc	22	ppm	0.2	0.1	1	0.2	0.1	0.1	0.2	0.2	0.3	0.1	0.3
Se	0.05	ppm	1	<1	1	1	<1	<1	<1	<1	<1	<1	<1
Si	28.2	%	45.4	45.2	-	46.1	43.4	45.4	43.5	-	45	45	44.9
Sn	2.3	ppm	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Sr	0.037	ppm	0.7	1	10.8	1.5	0.9	0.6	1.5	0.8	1.2	0.6	2.9
Ta	2	ppm	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Te	0.001	ppm	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Th	9.6	ppm	0.43	0.22	0.65	0.14	0.15	0.11	0.3	0.21	0.27	0.08	0.32
Ti	0.56	%	0.008	0.005	0.012	<0.005	<0.005	<0.005	0.007	<0.005	0.006	<0.005	0.009
Tl	0.85	ppm	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02
U	2.7	ppm	0.1	0.1	1.6	0.2	0.2	0.1	1.3	0.3	0.3	0.2	1
V	120	ppm	2	1	7	2	1	<1	3	2	3	1	3
W	1.25	ppm	2	2.8	3.1	3.1	4.7	4.6	8.2	5.4	4.7	7.4	5
Y	33	ppm	0.4	0.4	5.2	0.8	0.4	0.3	1.2	0.4	0.6	0.2	1.6
Zn	70	ppm	3	2	12	5	4	3	6	3	2	2	5
Zr	165	ppm	2.7	1.6	2.2	1.2	1.3	1.1	2.1	1.5	2	0.7	1.7

Table B2: Total Metals Analytical Results

	Hole ID	AMD08					AMD09				
	Sample ID	AMD08_8	AMD08_14	AMD08_20-22	AMD08_ 21-22	AMD08_30	AMD09_24	AMD09_ 29+30	AMD09_ 35	AMD09_38	AMD09_34
	Material Classification	Waste	Ore	Waste	Waste	Ore	Country	Country	Country	Country	Country
Analyte	Abundance of elements in the earth's crust	Units									
Au	0.004	ppm	0.001	0.001	0.001	<0.001	0.002	0.002	0.001	<0.001	0.002	0.002
Ag	0.075	ppm	0.02	0.01	0.01	<0.01	0.04	0.01	0.01	0.01	0.01	0.01
Al	8.23	%	1.13	2.23	0.93	2.42	0.44	1.09	0.98	0.5	0.12	0.3
As	1.8	ppm	0.9	0.4	<0.2	0.4	0.7	0.2	0.4	<0.2	<0.2	<0.2
B	0.001	%	<0.01	<0.01	<0.01	-	<0.01	<0.01	-	-	<0.01	<0.01
Ba	425	ppm	90	160	70	100	180	20	20	30	10	20
Be	2.8	ppm	0.17	0.22	0.21	0.3	0.15	0.11	0.11	0.11	<0.05	0.09
Bi	0.0085	ppm	0.07	0.15	0.07	0.21	0.03	0.05	0.05	0.05	0.01	0.02
Ca	4.15	%	0.03	0.04	0.07	0.04	0.03	0.02	0.02	0.03	0.02	0.02
Cd	0.15	ppm	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ce	66.5	ppm	8.91	16.7	9.95	19.8	3.49	8.55	10.7	7.64	1.13	2.69
Co	25	ppm	1.8	2.5	0.8	2.8	0.7	0.7	0.9	0.8	0.6	0.6
Cr	102	ppm	14	17	11	25	9	15	16	10	6	6
Cs	3	ppm	0.16	0.17	0.09	0.19	0.1	0.28	0.23	0.09	0.05	0.05
Cu	60	ppm	1.9	2.2	3.5	8.7	3.1	2.6	3.6	4.5	1.3	1.4
F	585	ppm	90	140	110	-	140	90	-	-	80	80
Fe	5.63	%	0.56	0.35	0.45	0.43	0.4	0.58	0.47	0.43	0.32	0.36
Ga	19	ppm	3.6	4.39	2.24	7.05	0.88	2.36	2.53	1.15	0.48	0.69
Ge	1.5	ppm	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hf	3	ppm	0.3	0.9	0.4	1.2	0.1	0.6	0.5	0.2	0.1	0.1
Hg	0.085	ppm	0.201	0.013	<0.005	0.007	0.062	0.007	0.007	0.005	<0.005	<0.005
In	0.25	ppm	0.006	0.015	0.006	0.016	<0.005	0.007	0.006	<0.005	<0.005	<0.005
K	2.09	%	0.04	0.16	0.08	0.14	0.11	0.06	0.04	0.04	0.01	0.01
La	39	ppm	6.2	9.7	4.8	10.8	2.1	6.1	6	4.2	0.7	1.6
Li	20	ppm	6.6	7.7	5.8	10.5	3.7	3.9	5.3	3.6	0.9	1.9
Mg	-	%	0.02	0.05	0.05	0.05	0.06	0.03	0.02	0.02	0.01	0.01
Mn	950	ppm	36	29	42	28	33	47	40	37	26	31
Mo	1.2	ppm	1.03	0.75	0.69	0.94	0.23	0.87	1.32	0.99	0.34	0.31
Na	2.36	%	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	<0.01	0.01
Nb	20	ppm	0.8	2.8	1.1	3.6	0.5	2.2	2.1	0.9	0.4	0.4
Ni	84	ppm	8.6	5.4	6.3	9	3.7	5.6	8.1	5.5	1.2	2.7
P	1050	ppm	60	100	120	90	20	40	40	80	10	20
Pb	14	ppm	4.3	5.7	4.6	8.2	7.1	3.9	2.5	1.5	0.7	1.1
Rb	90	ppm	2.2	6	3	5.3	4.1	3.1	2.3	1.5	0.3	0.5
Re	0.0007	ppm	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
S	0.035	%	0.03	0.01	0.01	0.02	0.03	0.01	0.01	<0.01	<0.01	<0.01
Sb	0.2	ppm	0.15	0.17	0.09	0.23	0.11	0.14	0.15	0.1	0.07	0.08
Sc	22	ppm	1.7	3.2	1.8	4.7	0.5	1.1	1.3	0.6	0.2	0.4
Se	0.05	ppm	<1	<1	<1	1	<1	<1	<1	<1	<1	1
Si	28.2	%	43.3	43.1	44.5	-	42.7	40.7	-	-	43.6	46.2
Sn	2.3	ppm	0.4	0.8	0.3	0.9	0.2	0.5	0.5	0.2	0.2	<0.2
Sr	0.037	ppm	5.1	8.7	4.7	8.2	1.3	5.7	5.7	10.2	1.7	3.7
Ta	2	ppm	0.07	0.23	0.09	0.28	<0.05	0.19	0.16	0.06	<0.05	<0.05
Te	0.001	ppm	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Th	9.6	ppm	1.72	4.89	1.86	5.37	0.5	2.31	1.72	0.71	0.24	0.43
Ti	0.56	%	0.033	0.097	0.039	0.123	0.015	0.092	0.082	0.029	0.018	0.014
Tl	0.85	ppm	0.02	0.04	0.02	0.03	0.06	0.02	<0.02	<0.02	<0.02	<0.02
U	2.7	ppm	0.4	0.9	0.4	0.8	0.6	0.4	0.4	0.2	0.1	0.1
V	120	ppm	7	7	3	13	6	6	6	2	1	2
W	1.25	ppm	2.5	1.5	0.7	1.9	0.6	2.5	3.2	4.4	6	3.3
Y	33	ppm	3.9	4.5	3.8	8.2	0.8	1.5	2.2	1	0.4	0.5
Zn	70	ppm	4	2	<2	5	<2	2	2	4	2	2
Zr	165	ppm	10.3	33.7	12.1	42.4	4.8	19.9	15.1	5.9	3.1	4

Table B2: Total Metals Analytical Results

		Hole ID	AMD10				
		Sample ID	AMD10_16-18	AMD10_28-30	AMD10_ 28	AMD10_36-38	AMD10_44-46
		Material Classification	Country	Country	Country	Country	Country
Analyte	Abundance of elements in the earth's crust	Units					
Au	0.004	ppm	0.006	<0.001	0.001	<0.001	0.001
Ag	0.075	ppm	0.05	0.03	0.02	0.04	0.03
Al	8.23	%	7.56	6.1	5.22	4.68	3.16
As	1.8	ppm	3.9	22.7	14.4	4.6	32
B	0.001	%	<0.01	<0.01	-	<0.01	<0.01
Ba	425	ppm	140	30	100	190	30
Be	2.8	ppm	0.8	0.33	0.52	0.8	0.94
Bi	0.0085	ppm	0.86	0.23	0.29	0.07	0.22
Ca	4.15	%	0.01	0.05	0.03	0.02	0.16
Cd	0.15	ppm	<0.02	0.27	0.21	0.19	0.09
Ce	66.5	ppm	8.79	62.1	30.7	55.9	50.1
Co	25	ppm	3.8	60	34.6	25.5	48.7
Cr	102	ppm	61	39	48	37	37
Cs	3	ppm	1.56	0.27	1.06	1.35	0.2
Cu	60	ppm	31.9	13.4	16.2	7.7	10.3
F	585	ppm	1020	200	-	490	160
Fe	5.63	%	0.76	5.68	1.95	1.34	6.58
Ga	19	ppm	22.5	7.4	11.75	10.4	2.75
Ge	1.5	ppm	<0.05	0.06	0.06	0.05	0.12
Hf	3	ppm	4.3	5.1	2.9	2.1	0.8
Hg	0.085	ppm	0.406	0.015	0.03	0.018	0.036
In	0.25	ppm	0.122	0.044	0.045	0.017	0.042
K	2.09	%	1.22	0.24	0.73	1.18	0.12
La	39	ppm	7.3	40.6	16.4	29.9	28.2
Li	20	ppm	21.4	11.6	14.6	8.4	13
Mg	-	%	0.35	0.11	0.22	0.24	0.13
Mn	950	ppm	18	24	32	23	57
Mo	1.2	ppm	2.95	0.78	1.6	0.32	0.75
Na	2.36	%	0.04	0.03	0.03	0.03	0.03
Nb	20	ppm	11.6	4.8	7.1	5.6	0.9
Ni	84	ppm	33.2	82.4	47.4	30.7	60.2
P	1050	ppm	70	70	100	40	50
Pb	14	ppm	8.5	17.1	9.4	32.4	6
Rb	90	ppm	48.7	10.2	33.4	51.2	5.4
Re	0.0007	ppm	0.002	0.002	0.002	<0.002	<0.002
S	0.035	%	0.01	6.05	0.97	1.19	7.12
Sb	0.2	ppm	1.55	0.26	0.59	0.46	0.23
Sc	22	ppm	4.2	3.8	4.6	7.8	7.1
Se	0.05	ppm	4	1	<1	1	1
Si	28.2	%	34.3	30.8	-	36.5	31.2
Sn	2.3	ppm	3.1	1.1	1.6	1.8	0.3
Sr	0.037	ppm	2.9	4.5	4	2.5	3.9
Ta	2	ppm	0.93	0.46	0.62	0.53	0.08
Te	0.001	ppm	0.16	0.09	0.05	0.07	0.07
Th	9.6	ppm	20.9	12.65	10.55	9.4	4.81
Ti	0.56	%	0.441	0.184	0.272	0.197	0.029
Tl	0.85	ppm	0.31	0.06	0.29	0.23	0.11
U	2.7	ppm	4	6	4.4	1.7	4.4
V	120	ppm	60	44	57	43	43
W	1.25	ppm	2.2	1.2	2.8	2.1	4.3
Y	33	ppm	6.3	16.9	9.2	11.7	21.4
Zn	70	ppm	8	240	127	142	12
Zr	165	ppm	151	184	107.5	77.5	29.1

Table B3: Leachate Metals Analytical Results

Analyte	Unit	EQL	ADWG 2011 Health (leachable; v3.7 updated 2022)	NEPM 2013 Table 1C GILs, Fresh Waters (Leached)										
Hole ID					AMD01		AMD02			AMD03				
Depth (m)					16	21	8	15	24	6	14	18	21	22
Lab Report Number					EP2203533	EP2201472	EP2203533	EP2201472	EP2203533	EP2203533	EP2203533	EP2203533	EP2201472	EP2203533
Material Classification					**Country**	**Country**	**Ore**	**Waste**	**Waste**	**Waste**	**Ore**	**Waste**	**Waste**	**Waste**
Major Ions														
Calcium	mg/L	1			<1	<1	<1	<1	3	<1	2	2	<1	<1
Magnesium	mg/L	1			<1	<1	<1	<1	<1	<1	2	1	<1	<1
Potassium	mg/L	1			1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sodium	mg/L	1			<1	1	<1	<1	<1	<1	4	1	1	2
Chloride	mg/L	1			<1	<1	<1	1	<1	<1	6	2	2	3
Sulfate (filtered)	mg/L	1	**500**		<1	<1	<1	1	<1	<1	9	49	21	46
Cations Total	meq/L	0.01			<0.01	-	<0.01	-	0.19	0.04	0.43	0.27	-	0.09
Anions Total	meq/L	0.01			0.02	-	<0.01	-	0.14	0.02	0.36	1.08	-	1.04
Ionic Balance	%	0.01			-	-	<0.01	-	16.0	37.0	9.56	60.0	-	84.6
Metals														
Niobium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Rhenium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tantalum	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Aluminium	mg/L	0.01		0.055	1.94	-	0.26	-	0.77	0.85	3.94	6.66	-	5.02
Antimony	mg/L	0.001	**0.003**		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**0.006**	<0.001	<0.001
Arsenic	mg/L	0.001	**0.01**		<0.001	<0.001	<0.001	0.001	0.001	0.001	0.009	0.005	0.002	0.003
Barium	mg/L	0.001	**2**		0.018	0.005	0.002	0.005	0.004	0.002	0.005	0.017	0.007	0.012
Beryllium	mg/L	0.001	**0.06**		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	mg/L	0.05	**4**	0.37[#1]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.0001	**0.002**	0.0002[#2]	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0003	**0.0264**	0.0001	<0.0001
Cerium	mg/L	0.001			0.008	<0.001	<0.001	0.001	0.001	<0.001	0.002	0.004	0.002	0.006
Caesium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (III+VI)	mg/L	0.001		0.001[#1]	0.004	0.002	0.001	0.004	0.004	0.004	0.016	0.003	<0.001	0.002
Cobalt	mg/L	0.001			<0.001	0.002	0.011	0.005	0.004	0.011	0.064	1.25	0.785	2.28
Copper	mg/L	0.001	**2**	0.0014[#2]	0.002	0.002	0.004	0.009	0.007	0.017	0.060	0.650	<0.001	<0.001
Gallium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Germanium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.005	<0.001	0.002
Gold	mg/L	0.001			<0.001	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	-	<0.001
Hafnium	mg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	mg/L	0.05			0.77	0.67	0.43	0.32	2.15	0.57	0.80	1.84	0.89	4.99
Lanthanum	mg/L	0.001	**0.002**		**0.004**	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002	<0.001	**0.004**
Lead	mg/L	0.001	**0.01**	0.0034[#2]	<0.001	<0.001	<0.001	0.004	0.002	<0.001	0.005	0.004	<0.001	<0.001
Lithium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.001	<0.001	<0.001	<0.001
Manganese	mg/L	0.001	**0.5**	1.9[#1]	0.004	0.004	0.010	0.011	0.017	0.012	0.060	0.035	0.033	0.091
Mercury	mg/L	0.0001	**0.001**	0.00006[#3]	<0.0001	<0.0001	**0.0023**	<0.0001	<0.0001	**0.0021**	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	0.001	**0.05**		<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.001	**0.02**	0.011[#2]	<0.001	<0.001	0.003	0.003	0.002	0.002	**0.030**	**0.629**	**0.462**	**1.43**
Rubidium	mg/L	0.001			0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Strontium	mg/L	0.001			0.001	<0.001	0.001	0.002	0.003	<0.001	0.004	0.011	0.004	0.006
Selenium	mg/L	0.01	**0.01**	0.005[#3]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
tellurium	mg/L	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.001	**0.1**	0.00005	<0.001	-	<0.001	-	<0.001	<0.001	<0.001	<0.001	-	<0.001
Tungsten	mg/L	0.001			0.002	<0.001	0.016	0.006	0.017	0.045	0.011	<0.001	<0.001	<0.001
Thorium	mg/L	0.001			0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001
Titanium	mg/L	0.01			0.06	0.09	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01
Uranium	mg/L	0.001	**0.02**		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001
Tin	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	mg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.10	0.04	0.06
Yttrium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.004
Zirconium	mg/L	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005
Zinc	mg/L	0.005		0.008[#2]	0.010	0.011	0.011	<0.005	0.013	0.007	0.023	1.41	0.532	0.547

Table B3: Leachate Metals Analytical Results

Analyte	Unit	EQL	ADWG 2011 Health (leachable; v3.7 updated 2022)	NEPM 2013 Table 1C GILs, Fresh Waters (Leached)	AMD04						AMD05			
Hole ID					AMD04						AMD05			
Depth (m)					14	25	26	30	36	40	22	25-26	24-26	30
Lab Report Number					EP2203533	EP2201472	EP2203533	EP2203533	EP2203533	EP2203533	EP2203533	EP2201472	EP2203533	EP2203533
Material Classification					Country	Country	Country	Country	Country	Country	Country	Country	Country	Country
Major Ions														
Calcium	mg/L	1			<1	5	10	7	3	12	<1	<1	<1	<1
Magnesium	mg/L	1			<1	3	6	4	2	7	<1	<1	<1	<1
Potassium	mg/L	1			<1	2	<1	<1	<1	<1	<1	<1	<1	<1
Sodium	mg/L	1			2	<1	1	<1	2	4	<1	<1	2	2
Chloride	mg/L	1			3	1	<1	<1	1	5	<1	1	2	2
Sulfate (filtered)	mg/L	1	**500**		<1	43	99	47	9	69	<1	<1	<1	2
Cations Total	meq/L	0.01			0.09	-	1.09	0.73	0.35	1.35	<0.01	-	0.09	0.09
Anions Total	meq/L	0.01			0.08	-	2.06	0.98	0.28	1.58	0.02	-	0.10	0.16
Ionic Balance	%	0.01			1.38	-	31.0	14.6	12.1	7.82	100	-	5.12	29.0
Metals														
Niobium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Rhenium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tantalum	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Aluminium	mg/L	0.01		0.055	0.95	-	1.64	1.62	2.70	1.27	5.88	-	5.96	3.22
Antimony	mg/L	0.001	**0.003**		<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/L	0.001	**0.01**		<0.001	<0.001	<0.001	<0.001	0.004	<0.001	0.005	0.002	0.006	0.001
Barium	mg/L	0.001	**2**		0.003	0.020	0.040	0.031	0.011	0.041	0.012	0.014	0.026	0.045
Beryllium	mg/L	0.001	**0.06**		<0.001	0.002	0.006	0.005	0.002	0.010	0.001	<0.001	<0.001	<0.001
Boron	mg/L	0.05	**4**	0.37[#1]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.0001	**0.002**	0.0002[#2]	<0.0001	0.0005	0.0013	0.0004	<0.0001	0.0005	<0.0001	<0.0001	<0.0001	<0.0001
Cerium	mg/L	0.001			<0.001	0.012	0.012	0.008	0.060	0.005	0.239	0.151	0.334	0.042
Caesium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (III+VI)	mg/L	0.001		0.001[#1]	0.002	0.006	0.040	0.010	0.075	0.008	0.087	0.035	0.055	0.011
Cobalt	mg/L	0.001			<0.001	0.558	0.879	0.511	0.035	0.369	0.012	0.004	0.008	<0.001
Copper	mg/L	0.001	**2**	0.0014[#2]	<0.001	0.003	0.032	0.009	0.035	0.010	0.008	0.011	0.026	0.006
Gallium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.003	0.004	0.004	<0.001
Germanium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	0.003	<0.001	0.005	0.001	0.005	0.002
Gold	mg/L	0.001			<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001
Hafnium	mg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	mg/L	0.05			<0.05	5.07	11.6	3.00	1.51	4.54	8.09	3.90	6.35	1.83
Lanthanum	mg/L	0.001	**0.002**		<0.001	**0.008**	**0.010**	**0.006**	**0.050**	**0.005**	**0.092**	**0.057**	**0.135**	**0.016**
Lead	mg/L	0.001	**0.01**	0.0034[#2]	<0.001	0.003	0.002	0.002	**0.016**	0.007	0.008	0.003	0.006	0.008
Lithium	mg/L	0.001			<0.001	<0.001	0.002	0.001	<0.001	0.002	0.003	<0.001	0.002	0.001
Manganese	mg/L	0.001	**0.5**	1.9[#1]	0.001	0.101	0.184	0.205	0.038	0.241	0.031	0.012	0.030	0.030
Mercury	mg/L	0.0001	**0.001**	0.00006[#3]	**0.0023**	<0.0001	<0.0001	<0.0001	**0.0182**	<0.0001	0.0001	<0.0001	0.0001	<0.0001
Molybdenum	mg/L	0.001	**0.05**		<0.001	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	0.001	0.001
Nickel	mg/L	0.001	**0.02**	0.011[#2]	<0.001	**0.849**	**1.64**	**0.653**	**0.035**	**0.505**	0.006	0.006	0.008	0.004
Rubidium	mg/L	0.001			<0.001	0.002	0.002	0.001	0.002	0.002	0.001	<0.001	0.001	<0.001
Strontium	mg/L	0.001			<0.001	0.008	0.018	0.011	0.004	0.016	0.004	0.002	0.007	0.020
Selenium	mg/L	0.01	**0.01**	0.005[#3]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
tellurium	mg/L	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.001	**0.1**	0.00005	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001
Tungsten	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	0.003	<0.001	<0.001
Thorium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	0.006	0.001	0.010	0.008	0.018	0.008
Titanium	mg/L	0.01			<0.01	0.02	0.01	0.04	0.09	0.01	0.10	0.28	0.06	0.04
Uranium	mg/L	0.001	**0.02**		<0.001	0.002	0.003	<0.001	0.002	<0.001	0.005	0.002	0.005	<0.001
Tin	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	mg/L	0.01			<0.01	0.01	0.18	0.02	0.51	0.04	0.02	0.01	0.02	0.02
Yttrium	mg/L	0.001			<0.001	0.022	0.044	0.020	0.072	0.028	0.027	0.012	0.030	0.008
Zirconium	mg/L	0.005			<0.005	<0.005	<0.005	<0.005	0.020	<0.005	0.014	0.015	0.013	0.006
Zinc	mg/L	0.005		0.008[#2]	<0.005	0.402	1.28	1.63	0.015	0.828	0.008	0.008	0.016	<0.005

Table B3: Leachate Metals Analytical Results

Analyte	Unit	EQL	ADWG 2011 Health (leachable; v3.7 updated 2022)	NEPM 2013 Table 1C GILs, Fresh Waters (Leached)	AMD06							AMD07			
Hole ID					AMD06							AMD07			
Depth (m)					20	2	10	14	18	22	28	14	20	30	13
Lab Report Number					EP2201472	EP2203533	EP2203533	EP2203533	EP2203533	EP2203533	EP2203533	EP2203533	EP2203533	EP2203533	EP2201472
Material Classification					Ore	Ore	Ore	Ore	Ore	Ore	Ore	Ore	Ore	Ore	Ore
Major Ions															
Calcium	mg/L	1			<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1
Magnesium	mg/L	1			<1	<1	1	<1	<1	<1	1	<1	<1	1	<1
Potassium	mg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sodium	mg/L	1			<1	<1	4	<1	<1	<1	<1	<1	<1	<1	<1
Chloride	mg/L	1			1	<1	8	<1	<1	<1	<1	<1	<1	<1	<1
Sulfate (filtered)	mg/L	1	**500**		<1	<1	1	<1	<1	<1	1	<1	<1	<1	<1
Cations Total	meq/L	0.01			-	<0.01	0.17	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Anions Total	meq/L	0.01			-	0.02	0.31	0.06	0.04	0.06	0.08	0.04	0.04	0.04	-
Ionic Balance	%	0.01			-	100	27.6	100	100	100	100	100	100	100	-
Metals															
Niobium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Rhenium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tantalum	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Aluminium	mg/L	0.01		0.055	-	0.45	0.30	0.20	0.25	1.10	0.43	0.39	0.16	0.72	-
Antimony	mg/L	0.001	**0.003**		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/L	0.001	**0.01**		0.004	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/L	0.001	**2**		0.012	0.007	0.004	0.003	0.004	0.014	0.003	0.010	0.003	0.011	0.001
Beryllium	mg/L	0.001	**0.06**		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	mg/L	0.05	**4**	0.37[#1]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.0001	**0.002**	0.0002[#2]	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cerium	mg/L	0.001			0.001	<0.001	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Caesium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium (III+VI)	mg/L	0.001		0.001[#1]	0.004	0.002	0.002	0.001	0.001	0.009	0.002	<0.001	<0.001	0.001	<0.001
Cobalt	mg/L	0.001			0.004	0.003	<0.001	0.001	0.004	0.005	0.004	0.001	0.002	0.003	0.001
Copper	mg/L	0.001	**2**	0.0014[#2]	0.003	0.006	0.001	0.001	0.002	0.007	0.002	0.001	0.001	0.002	<0.001
Gallium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Germanium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Gold	mg/L	0.001			-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-
Hafnium	mg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	mg/L	0.05			6.79	0.70	0.44	0.44	0.81	9.81	0.99	0.26	0.30	0.50	<0.05
Lanthanum	mg/L	0.001	**0.002**		<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	mg/L	0.001	**0.01**	0.0034[#2]	0.002	<0.001	<0.001	<0.001	<0.001	0.006	0.002	<0.001	0.003	0.009	<0.001
Lithium	mg/L	0.001			<0.001	0.001	<0.001	<0.001	<0.001	0.001	0.001	<0.001	<0.001	0.002	<0.001
Manganese	mg/L	0.001	**0.5**	1.9[#1]	0.132	0.034	0.012	0.019	0.039	0.141	0.015	0.002	0.002	0.003	0.002
Mercury	mg/L	0.0001	**0.001**	0.00006[#3]	<0.0001	0.0004	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0005	0.0003	<0.0001	<0.0001
Molybdenum	mg/L	0.001	**0.05**		0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.001	**0.02**	0.011[#2]	0.004	0.003	0.003	<0.001	0.002	0.006	0.002	<0.001	<0.001	0.002	<0.001
Rubidium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Strontium	mg/L	0.001			0.001	0.001	0.002	0.001	<0.001	0.004	0.001	0.002	0.001	0.002	<0.001
Selenium	mg/L	0.01	**0.01**	0.005[#3]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
tellurium	mg/L	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005
Silver	mg/L	0.001	**0.1**	0.00005	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-
Tungsten	mg/L	0.001			0.007	0.006	0.006	0.014	0.010	0.002	0.015	0.017	0.024	0.018	0.010
Thorium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	0.002	<0.001
Titanium	mg/L	0.01			0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Uranium	mg/L	0.001	**0.02**		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tin	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	mg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Yttrium	mg/L	0.001			0.002	<0.001	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Zirconium	mg/L	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.005		0.008[#2]	0.013	0.010	<0.005	0.008	0.010	0.028	0.011	<0.005	0.010	0.007	<0.005

Table B3: Leachate Metals Analytical Results

Analyte	Unit	EQL	ADWG 2011 Health (leachable; v3.7 updated 2022)	NEPM 2013 Table 1C GILs, Fresh Waters (Leached)										
Hole ID					AMD08					AMD09				
Depth (m)					8	14	20-22	30	21-22	24	34	38		35
Lab Report Number					EP2203533	EP2203533	EP2203533	EP2203533	EP2201472	EP2203533	EP2203533	EP2203533	EP2201472	EP2201472
Material Classification					**Ore**	**Ore**	**Waste**	**Ore**	**Waste**	**Country**	**Country**	**Country**	**Country**	**Country**
Major Ions														
Calcium	mg/L	1			<1	<1	<1	1	<1	<1	<1	<1	<1	<1
Magnesium	mg/L	1			<1	<1	<1	<1	<1	1	<1	<1	<1	<1
Potassium	mg/L	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Sodium	mg/L	1			1	2	2	1	1	3	1	<1	<1	<1
Chloride	mg/L	1			<1	1	2	1	2	2	<1	<1	<1	<1
Sulfate (filtered)	mg/L	1	**500**		5	2	<1	<1	<1	1	<1	<1	<1	<1
Cations Total	meq/L	0.01			0.04	0.09	0.09	0.09	-	0.13	0.04	<0.01	-	-
Anions Total	meq/L	0.01			0.10	0.11	0.12	0.15	-	0.12	0.04	0.06	-	-
Ionic Balance	%	0.01			41.1	11.6	14.4	26.0	-	5.37	4.24	100	-	-
Metals														
Niobium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	<0.001
Rhenium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tantalum	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Aluminium	mg/L	0.01		0.055	5.78	30.6	13.5	3.32	-	17.4	6.44	1.98	-	-
Antimony	mg/L	0.001	**0.003**		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	mg/L	0.001	**0.01**		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	mg/L	0.001	**2**		0.041	0.092	0.153	0.021	0.112	0.036	0.075	0.028	0.007	0.014
Beryllium	mg/L	0.001	**0.06**		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Boron	mg/L	0.05	**4**	0.37[#1]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cadmium	mg/L	0.0001	**0.002**	0.0002[#2]	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cerium	mg/L	0.001			0.005	0.018	0.038	0.004	0.027	0.035	0.015	0.005	0.003	0.007
Caesium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
Chromium (III+VI)	mg/L	0.001		0.001[#1]	0.010	0.039	0.026	0.011	0.025	0.044	0.011	0.003	<0.001	0.001
Cobalt	mg/L	0.001			0.007	0.012	0.003	<0.001	0.005	0.007	0.003	0.002	0.003	<0.001
Copper	mg/L	0.001	**2**	0.0014[#2]	0.001	0.005	0.011	0.006	0.010	0.025	0.004	0.001	0.003	0.002
Gallium	mg/L	0.001			0.002	0.006	0.003	<0.001	0.005	0.008	0.002	<0.001	<0.001	<0.001
Germanium	mg/L	0.001			<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Gold	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	-
Hafnium	mg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	mg/L	0.05			0.86	1.42	0.91	0.61	1.00	5.75	1.47	0.58	0.24	0.39
Lanthanum	mg/L	0.001	**0.002**		**0.003**	**0.005**	**0.019**	0.002	**0.013**	**0.015**	**0.006**	**0.003**	0.001	**0.003**
Lead	mg/L	0.001	**0.01**	0.0034[#2]	0.001	0.003	**0.015**	0.007	**0.011**	0.008	0.004	0.001	<0.001	<0.001
Lithium	mg/L	0.001			0.003	0.007	0.006	0.005	0.001	0.006	0.003	0.001	<0.001	<0.001
Manganese	mg/L	0.001	**0.5**	1.9[#1]	0.026	0.009	0.005	0.003	0.006	0.025	0.008	0.003	0.004	0.003
Mercury	mg/L	0.0001	**0.001**	0.00006[#3]	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	mg/L	0.001	**0.05**		<0.001	0.002	0.001	<0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Nickel	mg/L	0.001	**0.02**	0.011[#2]	0.011	0.013	0.006	0.004	0.008	**0.021**	0.008	0.001	0.002	0.001
Rubidium	mg/L	0.001			0.001	0.001	0.001	<0.001	0.001	0.007	<0.001	0.001	<0.001	<0.001
Strontium	mg/L	0.001			0.009	0.020	0.022	0.002	0.016	0.007	0.019	0.011	<0.001	0.008
Selenium	mg/L	0.01	**0.01**	0.005[#3]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
tellurium	mg/L	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.001	**0.1**	0.00005	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	-
Tungsten	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.007	0.012	0.002	0.002
Thorium	mg/L	0.001			0.003	0.024	0.012	0.003	0.009	0.015	0.004	0.002	0.001	0.001
Titanium	mg/L	0.01			0.05	0.09	0.08	0.02	0.50	0.09	0.06	0.09	0.03	0.02
Uranium	mg/L	0.001	**0.02**		<0.001	0.002	0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
Tin	mg/L	0.001			<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	mg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Yttrium	mg/L	0.001			0.005	0.014	0.028	0.002	0.013	0.006	0.003	<0.001	<0.001	<0.001
Zirconium	mg/L	0.005			<0.005	0.029	0.017	<0.005	0.035	0.020	0.006	<0.005	<0.005	<0.005
Zinc	mg/L	0.005		0.008[#2]	0.007	0.012	0.007	<0.005	0.008	0.017	0.012	0.009	0.008	0.005

Table B3: Leachate Metals Analytical Results

				Hole ID	**AMD10**					
				Depth (m)	16	28	36	44	28	
				Lab Report Number	EP2203533	EP2203533	EP2203533	EP2203533	EP2201472	
				Material Classification	**Country**	**Country**	**Country**	**Country**	**Country**	
Analyte	**Unit**	**EQL**	**ADWG 2011 Health (leachable; v3.7 updated 2022)**	NEPM 2013 Table 1C GILs, Fresh Waters (Leached)						
Major Ions										
Calcium	mg/L	1			<1	5	3	23	4	
Magnesium	mg/L	1			2	12	4	30	9	
Potassium	mg/L	1			5	<1	3	<1	<1	
Sodium	mg/L	1			4	7	2	6	4	
Chloride	mg/L	1			4	6	3	7	4	
Sulfate (filtered)	mg/L	1	**500**		<1	62	25	167	55	
Cations Total	meq/L	0.01			0.17	1.75	0.62	4.05	-	
Anions Total	meq/L	0.01			0.15	1.46	0.60	3.67	-	
Ionic Balance	%	0.01			6.48	9.02	0.98	4.90	-	
Metals										
Niobium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	
Rhenium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	
Tantalum	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	
Aluminium	mg/L	0.01		0.055	16.1	6.40	3.20	3.70	-	
Antimony	mg/L	0.001	**0.003**		<0.001	<0.001	<0.001	<0.001	<0.001	
Arsenic	mg/L	0.001	**0.01**		0.006	**0.024**	0.002	**0.013**	0.005	
Barium	mg/L	0.001	**2**		0.035	0.018	0.021	0.060	0.010	
Beryllium	mg/L	0.001	**0.06**		<0.001	<0.001	<0.001	<0.001	<0.001	
Boron	mg/L	0.05	**4**	0.37[#1]	<0.05	<0.05	<0.05	0.05	<0.05	
Cadmium	mg/L	0.0001	**0.002**	0.0002[#2]	0.0002	0.0004	0.0008	<0.0001	0.0009	
Cerium	mg/L	0.001			0.024	0.027	0.017	0.034	0.003	
Caesium	mg/L	0.001			0.002	<0.001	<0.001	<0.001	<0.001	
Chromium (III+VI)	mg/L	0.001		0.001[#1]	0.081	0.050	0.021	0.020	0.003	
Cobalt	mg/L	0.001			0.001	0.363	0.163	0.099	0.246	
Copper	mg/L	0.001	**2**	0.0014[#2]	0.063	0.012	0.002	0.008	0.002	
Gallium	mg/L	0.001			0.014	0.003	0.001	<0.001	<0.001	
Germanium	mg/L	0.001			<0.001	<0.001	<0.001	0.002	<0.001	
Gold	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	-	
Hafnium	mg/L	0.01			<0.01	<0.01	<0.01	<0.01	<0.01	
Iron	mg/L	0.05			2.99	1.69	0.78	3.77	0.58	
Lanthanum	mg/L	0.001	**0.002**		**0.012**	**0.013**	**0.008**	**0.019**	0.001	
Lead	mg/L	0.001	**0.01**	0.0034[#2]	**0.035**	**0.013**	**0.014**	0.002	0.002	
Lithium	mg/L	0.001			0.004	0.003	<0.001	0.002	<0.001	
Manganese	mg/L	0.001	**0.5**	1.9[#1]	0.013	0.039	0.045	0.147	0.090	
Mercury	mg/L	0.0001	**0.001**	0.00006[#3]	0.0008	<0.0001	<0.0001	<0.0001	<0.0001	
Molybdenum	mg/L	0.001	**0.05**		0.003	<0.001	<0.001	<0.001	<0.001	
Nickel	mg/L	0.001	**0.02**	0.011[#2]	0.014	**0.247**	**0.150**	**0.060**	**0.128**	
Rubidium	mg/L	0.001			0.010	0.001	0.003	<0.001	0.001	
Strontium	mg/L	0.001			0.005	0.015	0.007	0.041	0.013	
Selenium	mg/L	0.01	**0.01**	0.005[#3]	<0.01	<0.01	<0.01	<0.01	<0.01	
tellurium	mg/L	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	
Silver	mg/L	0.001	**0.1**	0.00005	<0.001	<0.001	<0.001	<0.001	-	
Tungsten	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	
Thorium	mg/L	0.001			0.167	0.008	0.005	0.005	0.002	
Titanium	mg/L	0.01			0.44	0.04	0.06	0.02	0.11	
Uranium	mg/L	0.001	**0.02**		0.013	0.004	0.002	0.003	<0.001	
Tin	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	
Vanadium	mg/L	0.01			0.07	0.09	0.02	0.04	0.02	
Yttrium	mg/L	0.001			0.011	0.008	0.004	0.015	<0.001	
Zirconium	mg/L	0.005			0.067	0.021	0.009	0.012	0.006	
Zinc	mg/L	0.005		0.008[#2]	<0.005	0.069	0.206	0.009	0.336	

Table B4: Acid Metalliferous Drainage Results

Sample ID	Depth From (m)	Depth To (m)	Material Classification	Lab Report Number	pH-OX	NAG pH 4.5 (kg H2SO4/t)	NAG pH 7.0 (kg H2SO4/t)	ANC as H2SO4 (kg H2SO4/t)	Sulfur as S (%)	Sulfate (mg/kg)	Sulphate Calc (%)	Sulfide as S (%)	MPA (kgH2SO4/t)	NAPP (kgH2SO4/t)
AMD01_18	16	18	Country	EP2203533	4.7	0.05	14	0.25	0.01	50	0.005	0.01	0.306	0.056
AMD01_21	20	21	Country	EP2201472	4.9	0.05	9.8	0.7	0.01	50	0.005	0.01	0.306	-0.394
AMD01_26	25	26	Country	EP2201472	4.4	0.2	7.9	1.1	-	-	-	-	-	-
AMD02_3	3	4	Waste	EP2201472	4.6	0.05	7.3	1.4	-	-	-	-	-	-
AMD02_8	6	8	Ore	EP2203533	4.1	0.4	1.9	0.25	0.04	50	0.005	0.04	1.224	0.974
AMD02_12	10	12	Ore	EP2203533	4.1	0.3	10.7	0.25	0.03	50	0.005	0.03	0.918	0.668
AMD02_15	14	15	Waste	EP2201472	5	0.05	2.5	0.25	0.04	210	0.021	0.03	0.918	0.668
AMD02_24	22	24	Waste	EP2203533	3.8	0.7	10.6	0.9	0.05	50	0.005	0.05	1.53	0.63
AMD03_6	4	6	Waste	EP2203533	3.8	1	5.4	0.25	0.07	110	0.011	0.07	2.142	1.892
AMD03_12	10	12	Ore	EP2203533	3.6	1	7.9	1.1	0.05	290	0.029	0.04	1.224	0.124
AMD03_13	12	13	Ore	EP2201472	4.6	0.05	5.2	0.25	-	-	-	-	-	-
AMD03_14	12	14	Ore	EP2203533	4.2	1	12.5	0.25	0.12	1220	0.122	0.08	2.448	2.198
AMD03_16	14	16	Ore	EP2203533	3.8	0.8	3.2	0.25	0.07	410	0.041	0.06	1.836	1.586
AMD03_18	16	18	Waste	EP2203533	4.1	6.1	50.1	0.25	0.73	1680	0.168	0.67	20.502	20.252
AMD03_20	18	20	Waste	EP2203533	3.5	7.6	35.3	0.25	0.77	2700	0.27	0.68	20.808	20.558
AMD03_21	20	21	Waste	EP2201472	3.5	9.4	48.8	0.25	0.44	1680	0.168	0.38	11.628	11.378
AMD03_22	20	22	Waste	EP2203533	2.8	40.2	60.3	0.25	1.3	1340	0.134	1.26	38.556	38.306
AMD04_14	12	14	Country	EP2203533	4.7	0.05	8.8	0.25	0.02	50	0.005	0.02	0.612	0.362
AMD04_18	17	18	Country	EP2201472	5.5	0.05	9.9	0.7	-	-	-	-	-	-
AMD04_22	20	22	Country	EP2203533	3.8	1.7	4.5	0.25	0.15	1800	0.18	0.09	2.754	2.504
AMD04_24+25	24	25	Country	EP2201472	3	7.5	9.4	0.25	0.38	1240	0.124	0.34	10.404	10.154
AMD04_24+25D	24	25	Country	EP2201472	3	8.3	11.3	0.25	0.59	1640	0.164	0.54	16.524	16.274
AMD04_26	24	26	Country	EP2203533	3.1	5.9	8.2	0.25	0.28	2480	0.248	0.2	6.12	5.87
AMD04_28	26	28	Country	EP2203533	3.1	5.6	9.8	0.25	0.36	2540	0.254	0.28	8.568	8.318
AMD04_30	28	30	Country	EP2203533	2.8	10.7	13	0.25	0.26	1490	0.149	0.21	6.426	6.176
AMD04_34	32	34	Country	EP2203533	2.5	50	61.1	0.25	1.37	6670	0.667	1.15	35.19	34.94
AMD04_36	34	36	Country	EP2203533	2.7	9.1	12.7	0.25	0.6	150	0.015	0.6	18.36	18.11
AMD04_38	36	38	Country	EP2203533	2.8	9.1	12.2	0.25	0.41	2610	0.261	0.32	9.792	9.542
AMD04_40	38	40	Country	EP2203533	2.9	9	11.9	0.25	0.3	1750	0.175	0.24	7.344	7.094
AMD05_22	20	22	Country	EP2203533	5.3	0.05	10	1.5	0.005	50	0.005	0.005	0.153	-1.347
AMD05_24	22	24	Country	EP2203533	5.3	0.05	9	1.1	0.005	50	0.005	0.005	0.153	-0.947
AMD05_26	24	26	Country	EP2201472	5.6	0.05	5.8	0.8	0.005	50	0.005	0.005	0.153	-0.647
AMD05_28	26	28	Country	EP2203533	5.8	0.05	10.9	0.25	0.005	50	0.005	0.005	0.153	-0.097
AMD05_30	28	30	Country	EP2203533	5.6	0.05	12.4	0.25	0.005	50	0.005	0.005	0.153	-0.097
AMD05_31	30	31	Country	EP2201472	5.6	0.05	9.3	1.1	-	-	-	-	-	-
AMD06_15	14	15	Ore	EP2201472	5.4	0.05	7.7	2.5	-	-	-	-	-	-
AMD06_20	19	20	Ore	EP2201472	6.2	0.05	3.1	10.8	0.02	50	0.005	0.02	0.612	-10.188
AMD06_2	0	2	Ore	EP2203533	4.1	0.2	8.8	2	0.03	50	0.005	0.03	0.918	-1.082
AMD06_6	4	6	Ore	EP2203533	3.6	2.9	10.1	4.3	0.05	50	0.005	0.05	1.53	-2.77
AMD06_10	8	10	Ore	EP2203533	5.9	0.05	10.1	4.3	0.005	50	0.005	0.005	0.153	-4.147
AMD06_12	10	12	Ore	EP2203533	5.7	0.05	11.8	4	0.01	50	0.005	0.01	0.306	-3.694

Table B4: Acid Metalliferous Drainage Results

Sample ID	Depth From (m)	Depth To (m)	Material Classification	Lab Report Number	pH-OX	NAG pH 4.5 (kg H2SO4/t)	NAG pH 7.0 (kg H2SO4/t)	ANC as H2SO4 (kg H2SO4/t)	Sulfur as S (%)	Sulfate (mg/kg)	Sulphate Calc (%)	Sulfide as S (%)	MPA (kgH2SO4/t)	NAPP (kgH2SO4/t)
AMD06_14	14	15	Ore	EP2203533	5.9	0.05	10.9	0.8	0.02	50	0.005	0.02	0.612	-0.188
AMD06_16	14	16	Ore	EP2203533	5.5	0.05	7.1	3.3	0.03	50	0.005	0.03	0.918	-2.382
AMD06_18	16	18	Ore	EP2203533	4.8	0.05	9	5.6	0.02	50	0.005	0.02	0.612	-4.988
AMD06_22	20	22	Ore	EP2203533	5.7	0.05	8.6	0.25	0.01	50	0.005	0.01	0.306	0.056
AMD06_24	22	24	Ore	EP2203533	3.6	1.1	10.5	0.25	0.08	50	0.005	0.08	2.448	2.198
AMD06_26	24	26	Ore	EP2203533	3.4	1.8	3.4	3.5	0.16	50	0.005	0.16	4.896	1.396
AMD06_28	26	28	Ore	EP2203533	3.7	1	2.8	2.1	0.24	50	0.005	0.24	7.344	5.244
AMD07_12	10	12	Ore	EP2203533	4.3	0.2	1.8	1.6	0.08	50	0.005	0.08	2.448	0.848
AMD07_14	12	14	Ore	EP2203533	5.6	0.05	7.2	0.25	0.03	50	0.005	0.03	0.918	0.668
AMD07_16	14	16	Ore	EP2203533	5.8	0.05	2.5	0.5	0.05	50	0.005	0.05	1.53	1.03
AMD07_20	18	20	Ore	EP2203533	3.9	0.6	2.9	0.25	0.06	50	0.005	0.06	1.836	1.586
AMD07_24	22	24	Ore	EP2203533	5.7	0.05	9.8	0.25	0.01	50	0.005	0.01	0.306	0.056
AMD07_30	28	30	Ore	EP2203533	5.8	0.05	10.2	3.6	0.02	50	0.005	0.02	0.612	-2.988
AMD07_13	12	13	Ore	EP2201472	4.4	0.2	7.9	1.3	0.04	50	0.005	0.04	1.224	-0.076
AMD07_29	28	29	Ore	EP2201472	3.8	0.8	6.1	0.8	-	-	-	-	-	-
AMD08_6	4	6	Waste	EP2203533	4.4	0.4	10.6	0.25	0.04	230	0.023	0.03	0.918	0.668
AMD08_8	6	8	Waste	EP2203533	5	0.05	10.8	0.25	0.02	230	0.023	0.01	0.306	0.056
AMD08_10	8	10	Waste	EP2203533	4	0.5	5.7	0.25	0.06	600	0.06	0.04	1.224	0.974
AMD08_14	12	14	Waste	EP2203533	5.8	0.05	11.6	1	0.01	50	0.005	0.01	0.306	-0.694
AMD08_18	16	18	Waste	EP2203533	5.7	0.05	11	0.25	0.005	50	0.005	0.005	0.153	-0.097
AMD08_22	20	22	Waste	EP2203533	6.2	0.05	9.2	1.1	0.005	50	0.005	0.005	0.153	-0.947
AMD08_26	24	26	Waste	EP2203533	5.4	0.05	6.4	0.6	0.02	50	0.005	0.02	0.612	0.012
AMD08_30	28	30	Waste	EP2203533	4.2	0.2	4.4	0.25	0.03	50	0.005	0.03	0.918	0.668
AMD08_15+16	15	16	Waste	EP2201472	5.2	0.05	7.9	1.2	-	-	-	-	-	-
AMD08_22	21	22	Waste	EP2201472	5.6	0.05	6	0.7	0.005	50	0.005	0.005	0.153	-0.547
AMD09_22	20	22	Country	EP2203533	5.5	0.05	10.8	0.6	0.005	50	0.005	0.005	0.153	-0.447
AMD09_24	22	24	Country	EP2203533	5.5	0.05	9.8	0.25	0.005	50	0.005	0.005	0.153	-0.097
AMD09_26	24	26	Country	EP2203533	5.5	0.05	12.9	0.25	0.005	50	0.005	0.005	0.153	-0.097
AMD09_29+30	29	30	Country	EP2201472	5.5	0.05	9.2	0.6	0.005	50	0.005	0.005	0.153	-0.447
AMD09_34	32	34	Country	EP2203533	5.8	0.05	8.2	0.25	0.005	50	0.005	0.005	0.153	-0.097
AMD09_35	34	35	Country	EP2201472	5.7	0.05	6.6	0.8	0.005	50	0.005	0.005	0.153	-0.647
AMD09_38	36	38	Country	EP2203533	5.6	0.05	11.9	0.25	0.005	50	0.005	0.005	0.153	-0.097
AMD09_42	40	42	Country	EP2203533	6.1	0.05	8.3	0.7	0.005	110	0.011	0.005	0.153	-0.547
AMD10_16_18	16	18	Country	EP2203533	5.7	0.05	7.7	0.25	0.005	50	0.005	0.005	0.153	-0.097
AMD10_22_24	22	24	Country	EP2203533	2.9	22.1	32.9	0.25	1.04	5500	0.55	0.86	26.316	26.066
AMD10_28	27	28	Country	EP2201472	3	10.5	18	0.25	1.04	1430	0.143	0.99	30.294	30.044
AMD10_28_30	28	30	Country	EP2203533	2.3	106	120	0.25	4.54	990	0.099	4.51	138.006	137.756
AMD10_30_32	30	32	Country	EP2203533	2.2	155	172	0.25	5.61	960	0.096	5.58	170.748	170.498
AMD10_36_38	36	38	Country	EP2203533	2.8	29.5	33.7	0.25	2.33	600	0.06	2.31	70.686	70.436
AMD10_38	37	38	Country	EP2201472	2.6	39.8	45.7	0.25	-	-	-	-	-	-
AMD10_40_42	40	42	Country	EP2203533	2.7	31.8	35.4	0.25	0.71	870	0.087	0.68	20.808	20.558
AMD10_44_46	44	46	Country	EP2203533	2.1	188	219	0.25	9.23	3650	0.365	9.11	278.766	278.516

Appendix C

Laboratory Certificates of analysis

CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST

GHD
Level 10, 999 Hay Street
Perth WA 6000
PO Box 3106
Perth WA 6832
Reception Ph: 08 6222 8222

Project ID 12518217	**PO Number** (to be invoiced) 12518217
Laboratory Quote No. NA	**Turnaround Time** Standard
Project Manager (Invoice) & GHD accounts Paul Hamer	**Email Address (Results)** paul.hamer@ghd.com

Laboratory:	Eurofins | mgt
Address:	46 - 48 Banksia Rd, Welshpool WA 6106
Laboratory Contact:	

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air	Container: Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Container: Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	Container: No	Analyses: Sulfide as S	Analyses: Sulfur as total S	Analyses: Metals	Analyses: Leach	Remarks
AMD06_20T		2/02/2022		S	2G!	NO		x	x	x	x	861624

8/2/22 15:55
24.8
24.8
24.8
Final 24.8°C

Sampled by: S.Bright	Date/Time:	Relinquished by: S.Bright	Date/Time: 8/2/2022
Received by: Rob Johnston Eurofins	Date/Time: 8/2/22 15:55	Relinquished by:	Date/Time:

Tailored Analytical Services & Charges: Soil Analysis

Parameter	ALS Code	Technique/ Method Reference	Limit Of Reporting (LOR)	No.	Price per Sample	Total ($)
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	In house	0.1 g	30	2.55	76.50
Acid Neutralising Capacity (ANC)	EA013	USEPA 600/2-78-054 & Miller 2000	0.1 % CaCO3, 0.5 kg H2SO4 equiv./t, 0 Fizz Unit	30	22.00	660.00
Net Acid Generation (NAG)	EA011	Miller 1998	0.1 kg H2SO4/t, 0.1 pH Unit	30	17.00	510.00
Sulfide as S (Includes Total Sulfur & Total Sulfate)	EK085T	In house (APHA 3120), In house	100 mg/kg, 0.01 %	15	26.00	390.00
Sulfur - Total as S (high temperature furnace method incl. prep charges)	ED042T	In house	0.01 %	15	21.00	315.00
Gross beta/alpha activity in Soils	EA250	ISO 9697 / CSN 757611	500 Bq/kg DW	10	170.00	1700.00
Asbestos Identification in Soils - Presence/Absence in 500 mL bags	EA200	AS 4964 - 2004	5 Fibres, 0.1 g/kg, 0.01 g	10	35.00	350.00
Total cost per sample (Excluding GST)					257.46	
Total cost for this table based on sample numbers provided (Excluding GST)						4 001.50

Tailored Analytical Services & Charges: Solid Samples – Metals

Parameter	Method	Unit	No.	Unit rate ($/sample)	TOTAL ($)
Sort and barcode label samples	LOG-22			1.65	39.6
Waste disposal levy	LEV-01			0.03	158.3
Ag, Be, Ce, Cd, Co, Cr, Cu, Hf, Hg, Ga, Ge, La, Mo, Re, Sc, Se, Th, Te, U, V, W, Y, Al, As, Ba, Ca, Cs, Fe, K, Mg, Mn, Na, Nb, Ni, P, Pb, Rb, S, Sb, Sn, Sr, Ta, Tl, Zn, Zr, Li*	ME-MS61m	Four acid digestion with ICP-AES and ICP-MS for 48 elements, Hg by aqua regia with ICP-MS		478.1	8616.98
Au	Au-ICP22	50g fire assay with ICP-AES finish		151.5	2724.46
B	ME-ICP89	Sodium peroxide fusion with ICP-AES finish for B and Si		211.37	3793.66
F	F-IC881	KOH fusion with IC finish for F	16	234.1	3674.88
Total cost per sample (Excluding GST)				1078	
Total cost for this table based on sample numbers provided (Excluding GST)					22100.00

Tailored Analytical Services & Charges: Leach

Parameter	ALS Code	Technique/ Method Reference	Limit Of Reporting (LOR)	No.	Price per Sample	Total ($)
Deionised Water Leach	EN60-Dia		0.1 pH Unit		28.80	142.80
Major Cations & Anions (Ca, Mg, Na, K, Cl, SO4, Alkalinity) + Hardness	NT-01D & 02	APHA 2320 B, APHA 4500-Cl G, APHA 1030 F, USEPA 6010, APHA 4500-SO4	1 mg/L, 0.01 %, 0.01 meq/L		34.00	204.00
Water Leachable Metals by ICPMS: Sb, As, Ba, Be, B, Cd, Ce, Cs, Cr, Co, Cu, Ga, Ge, Hf, Fe, La, Pb, Li, Mn, Mo, Ni, Nb, Re, Rb, Se, Sr, Ta, Th, Te, Sn, Tl, W, U, V, Y, Zn, Zr	EG020W	USEPA 6020	0.0001 - 0.05 mg/L		73.10	438.60
Water Leachable Mercury	EG035W	APHA 3112- Hg B	0.0001 mg/L		8.50	51.00
pH (PCT)	EA005P	APHA 4500-H+ B	0.01 pH Unit		4.25	25.50
Electrical Conductivity (PCT)	EA010P	APHA 2510 B	1 µS/cm	15	4.25	25.50
Total cost per sample (Excluding GST)					150.90	-
Total cost for this table based on sample numbers provided (Excluding GST)						2700.00

Tailored Analytical Services & Charges: Prep Charges – Asbestos Detected

Parameter	ALS Code	Technique/ Method Reference	Limit Of Reporting (LOR)	No.	Price per Sample ($)	Total ($)
Dry and Crush to 6mm and pulverised to 85% passing 75 microns	MIS-SOL	NA	NA	30	34	1020
Total cost for this table based on sample numbers provided (Excluding GST)						0

Parameter	ALS Code	Technique/ Method Reference	Limit Of Reporting (LOR)	No.	Price per Sample ($)	Total ($)
Handling/Administration Fees (per batch)				1		195
Total cost for this table based on sample numbers provided (Excluding GST)						250

#########

Sample Containers for: Soil Analysis

No.	Label Colour	Container Type (Preservation noted if required)	Test Parameter(s)
	Orange	1 x 150mL Soil Glass Jar - Unpreserved	Sulfide as S (Includes Total Sulfur & Total Sulfate) & Metals
	Orange	3 x 250mL Soil Glass Jar - Unpreserved	Radionuclides
	Green	1 x 1Medium Snap Lock Bag	ANC/NAG
	White	1 x 50mL Snap Lock Bag - ACM/Asbestos Grab Bag	Asbestos Identification in Soils - Presence/Absence in 500 mL bags

Sample Containers for: Leach

No.	Label Colour	Container Type (Preservation noted if required)	Test Parameter(s)
	Orange	1 x 150mL Soil Glass Jar - Unpreserved	Leach

Administration Charges

An administration fee of $40.00 (excl. GST) is charged per analytical report produced (ie. per ALS work order). Additional administrative charges may apply for subsequent report generation.

eurofins | ARL

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NATA # 2377 Site # 2370

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IANZ # 1327

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43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name:
Project ID: 12518217

Order No.: 12518217
Report #: 861624
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Feb 8, 2022 3:55 PM
Due: Feb 15, 2022
Priority: 5 Day
Contact Name: Paul Hamer

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail	Aluminium	Antimony	Barium	Beryllium	Boron	Caesium*	Cerium*	Cobalt	Conductivity (at 25°C)	Fluoride (Total)	Gallium*	Gold	Hafnium	Iron	Lanthanum	Lithium	Manganese	Molybdenum	Niobium	Phosphorus	Rubidium*	Selenium	Silver	Strontium	Sulphate (as SO4)	Sulphur	Tantalum	Tellurium*	Thorium*	Tin	Titanium	Tungsten*	Uranium	Vanadium	Yttrium	Zirconium*	AUS Leaching Procedure	Metals M8	Moisture Set	Eurofins Suite B11D: Na/K/Ca/Mg and	Eurofins Suite B11E: Cl/SO4/Alkalinity	Eurofins Suite B11C: Na/K/Ca/Mg
Perth Laboratory - NATA # 2377 Site # 2370																																									
Melbourne Laboratory - NATA # 1261 Site # 1254	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA # 1261 Site # 18217																																									
Brisbane Laboratory - NATA # 1261 Site # 20794																																									
Mayfield Laboratory - NATA # 1261 Site # 25079																																									
External Laboratory																																									

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																																							
1	AMD06_20T	Feb 02, 2022		Soil	L22-Fe14658	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X			X
2	AMD06_20T	Feb 02, 2022		AUS Leachate	L22-Fe14659		X	X	X		X	X		X		X		X	X	X	X	X	X		X	X		X			X	X	X	X	X	X	X	X	X	X	X	X	X	
Test Counts						1	2	2	2	1	2	2	1	1	1	2	1	2	2	2	2	2	2	2	2	1	2	1	1	2	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1

GHD Pty Ltd WA
999 Hay Street Perth
Perth
WA 6004

Attention: **Paul Hamer**

Report **861624-L**
Project name
Project ID 12518217
Received Date Feb 08, 2022

Client Sample ID			**AMD06_20T**
Sample Matrix			**AUS Leachate**
Eurofins Sample No.			**L22-Fe14659**
Date Sampled			**Feb 02, 2022**
Test/Reference	LOR	Unit	
Chloride	5	mg/L	< 5
Sulphate (as SO4)	5	mg/L	< 5
Hardness mg equivalent CaCO3/L	5	mg/L	22
Zirconium*	0.05	mg/L	< 0.05
Heavy Metals			
Antimony	0.05	mg/L	< 0.05
Arsenic	0.01	mg/L	< 0.01
Barium	0.5	mg/L	< 0.5
Beryllium	0.01	mg/L	< 0.01
Cadmium	0.005	mg/L	< 0.005
Caesium*	1	mg/L	< 1
Cerium*	0.05	mg/L	< 0.05
Chromium	0.01	mg/L	< 0.01
Copper	0.01	mg/L	< 0.01
Gallium*	0.05	mg/L	< 0.05
Iron	0.05	mg/L	2.0
Lead	0.01	mg/L	< 0.01
Lithium	0.005	mg/L	< 0.005
Manganese	0.01	mg/L	2.1
Mercury	0.001	mg/L	< 0.001
Molybdenum	0.01	mg/L	0.02
Nickel	0.01	mg/L	0.05
Rubidium*	0.5	mg/L	< 0.5
Selenium	0.05	mg/L	< 0.05
Strontium	0.05	mg/L	< 0.05
Tellurium*	0.5	mg/L	< 0.5
Thorium*	0.05	mg/L	< 0.05
Tin	0.5	mg/L	< 0.5
Titanium	0.005	mg/L	< 0.005
Uranium	0.005	mg/L	< 0.005
Vanadium	0.05	mg/L	< 0.05
Zinc	0.01	mg/L	0.18

Client Sample ID			AMD06_20T
Sample Matrix			**AUS Leachate**
Eurofins Sample No.			**L22-Fe14659**
Date Sampled			**Feb 02, 2022**
Test/Reference	LOR	Unit	
Alkali Metals			
Calcium	0.5	mg/L	5.6
Magnesium	0.5	mg/L	2.0
Potassium	0.5	mg/L	< 1
Sodium	0.5	mg/L	640
AUS Leaching Procedure			
Leachate Fluid[C01]		comment	1.0
pH (initial)	0.1	pH Units	7.5
pH (Leachate fluid)	0.1	pH Units	5.0
pH (off)	0.1	pH Units	5.1

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Chloride	Melbourne	Feb 10, 2022	28 Days
- Method: LTM-INO-4090 Chloride by Discrete Analyser			
Sulphate (as SO4)	Melbourne	Feb 10, 2022	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Zirconium*	Melbourne	Feb 10, 2022	6 Months
- Method: LTM-MET-3030 by ICP-OES			
Heavy Metals	Melbourne	Feb 10, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Metals M8	Melbourne	Feb 10, 2022	28 Days
- Method:			
Thorium*	Melbourne	Feb 10, 2022	6 Months
- Method: LTM-MET-3030 by ICP-OES			
AUS Leaching Procedure			
pH (initial)	Melbourne	Feb 10, 2022	0 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			
pH (Leachate fluid)	Melbourne	Feb 10, 2022	0 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			
pH (off)	Melbourne	Feb 10, 2022	0 Days
- Method: LTM-GEN-7010 Leaching Procedure for Soils & Solid Wastes			
Eurofins Suite B11D: Na/K/Ca/Mg and Hardness			
Hardness mg equivalent CaCO3/L	Melbourne	Feb 10, 2022	28 Days
- Method: APHA 2340B Hardness by Calculation			
Alkali Metals	Melbourne	Feb 10, 2022	180 Days
- Method: LTM-MET-3010 Alkali Metals Sulfur Silicon Phosphorus by ICP-AES			

eurofins | ARL

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Perth
WA 6004

Project Name:
Project ID: 12518217

Order No.: 12518217
Report #: 861624
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Feb 8, 2022 3:55 PM
Due: Feb 15, 2022
Priority: 5 Day
Contact Name: Paul Hamer

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail	Aluminium	Antimony	Barium	Beryllium	Boron	Caesium*	Cerium*	Cobalt	Conductivity (at 25°C)	Fluoride (Total)	Gallium*	Gold	Hafnium	Iron	Lanthanum	Lithium	Manganese	Molybdenum	Niobium	Phosphorus	Rubidium*	Selenium	Silver	Strontium	Sulphate (as SO4)	Sulphur	Tantalum	Tellurium*	Thorium*	Tin	Titanium	Tungsten*	Uranium	Vanadium	Yttrium	Zirconium*	AUS Leaching Procedure	Metals M8	Moisture Set	Eurofins Suite B11D: Na/K/Ca/Mg and	Eurofins Suite B11E: Cl/SO4/Alkalinity	Eurofins Suite B11C: Na/K/Ca/Mg
Perth Laboratory - NATA # 2377 Site # 2370																																									
Melbourne Laboratory - NATA # 1261 Site # 1254	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA # 1261 Site # 18217																																									
Brisbane Laboratory - NATA # 1261 Site # 20794																																									
Mayfield Laboratory - NATA # 1261 Site # 25079																																									
External Laboratory																																									

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																																						
1	AMD06_20T	Feb 02, 2022		Soil	L22-Fe14658	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X			X
2	AMD06_20T	Feb 02, 2022		AUS Leachate	L22-Fe14659		X	X	X		X	X		X		X		X	X	X	X	X	X		X	X		X			X	X	X	X	X	X	X	X	X	X	X	X	
Test Counts						1	2	2	2	1	2	2	1	1	1	2	1	2	2	2	2	2	2	2	1	2	2	1	2	1	1	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

Units

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

Terms

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

QC - Acceptance Criteria

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

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

Results <10 times the LOR: No Limit

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

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

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

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

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

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QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Heavy Metals							
Antimony	mg/L	< 0.05			0.05	Pass	
Arsenic	mg/L	< 0.01			0.01	Pass	
Barium	mg/L	< 0.5			0.5	Pass	
Beryllium	mg/L	< 0.01			0.01	Pass	
Cadmium	mg/L	< 0.005			0.005	Pass	
Chromium	mg/L	< 0.01			0.01	Pass	
Copper	mg/L	< 0.01			0.01	Pass	
Iron	mg/L	< 0.05			0.05	Pass	
Lead	mg/L	< 0.01			0.01	Pass	
Lithium	mg/L	< 0.005			0.005	Pass	
Manganese	mg/L	< 0.01			0.01	Pass	
Mercury	mg/L	< 0.001			0.001	Pass	
Molybdenum	mg/L	< 0.01			0.01	Pass	
Nickel	mg/L	< 0.01			0.01	Pass	
Selenium	mg/L	< 0.05			0.05	Pass	
Strontium	mg/L	< 0.05			0.05	Pass	
Tin	mg/L	< 0.5			0.5	Pass	
Titanium	mg/L	< 0.005			0.005	Pass	
Uranium	mg/L	< 0.005			0.005	Pass	
Vanadium	mg/L	< 0.05			0.05	Pass	
Zinc	mg/L	< 0.01			0.01	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Heavy Metals				Result 1					
Antimony	M22-Fe17299	NCP	%	99			75-125	Pass	
Arsenic	M22-Fe17299	NCP	%	98			75-125	Pass	
Barium	M22-Fe17299	NCP	%	97			75-125	Pass	
Beryllium	M22-Fe17299	NCP	%	102			75-125	Pass	
Cadmium	M22-Fe17299	NCP	%	100			75-125	Pass	
Chromium	M22-Fe17299	NCP	%	98			75-125	Pass	
Copper	M22-Fe17299	NCP	%	101			75-125	Pass	
Iron	M22-Fe17299	NCP	%	98			75-125	Pass	
Lead	M22-Fe17299	NCP	%	105			75-125	Pass	
Lithium	M22-Fe17299	NCP	%	105			75-125	Pass	
Manganese	M22-Fe17299	NCP	%	96			75-125	Pass	
Mercury	M22-Fe17299	NCP	%	93			75-125	Pass	
Molybdenum	M22-Fe17299	NCP	%	96			75-125	Pass	
Nickel	M22-Fe17299	NCP	%	98			75-125	Pass	
Selenium	M22-Fe17299	NCP	%	96			75-125	Pass	
Strontium	M22-Fe17299	NCP	%	98			75-125	Pass	
Tin	M22-Fe17299	NCP	%	96			75-125	Pass	
Titanium	M22-Fe17299	NCP	%	98			75-125	Pass	
Uranium	M22-Fe17299	NCP	%	106			75-125	Pass	
Vanadium	M22-Fe17299	NCP	%	93			75-125	Pass	
Zinc	M22-Fe17299	NCP	%	103			75-125	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
				Result 1	Result 2	RPD			
Chloride	L22-Fe14659	CP	mg/L	< 5	< 5	<1	30%	Pass	
Sulphate (as SO4)	L22-Fe14659	CP	mg/L	< 5	< 5	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Antimony	M22-Fe17299	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Arsenic	M22-Fe17299	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Barium	M22-Fe17299	NCP	mg/L	< 0.5	< 0.5	<1	30%	Pass	
Beryllium	M22-Fe17299	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Cadmium	M22-Fe17299	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Chromium	M22-Fe17299	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Copper	M22-Fe17299	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Iron	M22-Fe17299	NCP	mg/L	1.2	1.3	3.0	30%	Pass	
Lead	M22-Fe17299	NCP	mg/L	0.02	0.02	2.0	30%	Pass	
Lithium	M22-Fe17299	NCP	mg/L	0.008	0.009	12	30%	Pass	
Manganese	M22-Fe17299	NCP	mg/L	0.08	0.08	2.0	30%	Pass	
Mercury	M22-Fe17299	NCP	mg/L	< 0.001	< 0.001	<1	30%	Pass	
Molybdenum	M22-Fe17299	NCP	mg/L	< 0.01	< 0.01	<1	30%	Pass	
Nickel	M22-Fe17299	NCP	mg/L	0.02	0.02	3.0	30%	Pass	
Selenium	M22-Fe17299	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Strontium	M22-Fe17299	NCP	mg/L	0.36	0.37	1.0	30%	Pass	
Tin	M22-Fe17299	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Titanium	M22-Fe17299	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Uranium	M22-Fe17299	NCP	mg/L	< 0.005	< 0.005	<1	30%	Pass	
Vanadium	M22-Fe17299	NCP	mg/L	< 0.05	< 0.05	<1	30%	Pass	
Zinc	M22-Fe17299	NCP	mg/L	0.32	0.34	7.0	30%	Pass	

Comments

Eurofins | Environment Testing accreditation number 1261, site 18217 is currently in progress of a controlled transition to a new custom built location at 179 Magowar Road, Girraween, NSW 2145. All results on this report denoted as being performed by Eurofins | Environment Testing Unit F3, Building F, 16 Mars road, Lane Cove West, NSW 2066, corporate site 18217, will have been performed on either Lane Cove or new Girraween site

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
C01	Leachate Fluid Key: 1 - pH 5.0; 2 - pH 2.9; 3 - pH 9.2; 4 - Reagent (DI) water; 5 - Client sample, 6 - other

Authorised by:

Robert Johnston	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Scott Beddoes	Senior Analyst-Inorganic (VIC)

Kim Rodgers
Business Unit Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request

GHD Pty Ltd WA
999 Hay Street Perth
Perth
WA 6004

Attention: **Paul Hamer**

Report **861624-S**
Project name
Project ID 12518217
Received Date Feb 08, 2022

Client Sample ID			**AMD06_20T**
Sample Matrix			**Soil**
Eurofins Sample No.			**L22-Fe14658**
Date Sampled			**Feb 02, 2022**
Test/Reference	LOR	Unit	
Fluoride (Total)	100	mg/kg	< 100
Sulphate (as SO4)	30	mg/kg	< 30
Phosphorus	5	mg/kg	2100
Sulphur	5	mg/kg	200
Zirconium*	5	mg/kg	< 5
% Moisture	1	%	2.0
Heavy Metals			
Aluminium	20	mg/kg	900
Antimony	10	mg/kg	< 10
Arsenic	2	mg/kg	2.4
Barium	10	mg/kg	13
Beryllium	2	mg/kg	< 2
Boron	10	mg/kg	< 10
Cadmium	0.4	mg/kg	< 0.4
Caesium*	20	mg/kg	< 20
Cerium*	5	mg/kg	< 5
Chromium	5	mg/kg	6.7
Cobalt	5	mg/kg	< 5
Copper	5	mg/kg	< 5
Gallium*	10	mg/kg	< 10
Gold	5	mg/kg	< 5
Iron	20	mg/kg	5800
Lead	5	mg/kg	8.7
Lithium	5	mg/kg	< 5
Manganese	5	mg/kg	120
Mercury	0.1	mg/kg	< 0.1
Molybdenum	5	mg/kg	< 5
Nickel	5	mg/kg	< 5
Rubidium*	10	mg/kg	< 10
Selenium	2	mg/kg	< 2
Silver	2	mg/kg	< 2
Strontium	10	mg/kg	< 10
Tellurium*	10	mg/kg	< 10
Thorium*	5	mg/kg	< 5
Tin	10	mg/kg	< 10

Client Sample ID			AMD06_20T
Sample Matrix			**Soil**
Eurofins Sample No.			**L22-Fe14658**
Date Sampled			**Feb 02, 2022**
Test/Reference	LOR	Unit	
Heavy Metals			
Titanium	10	mg/kg	< 10
Uranium	10	mg/kg	< 10
Vanadium	10	mg/kg	< 10
Zinc	5	mg/kg	13
Eurofins Suite B11C: Na/K/Ca/Mg			
Calcium	5	mg/kg	4400
Magnesium	5	mg/kg	1100
Potassium	5	mg/kg	< 20
Sodium	5	mg/kg	66

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Fluoride (Total)	Melbourne	Feb 11, 2022	28 Days
- Method: LTM-INO-4150 Determination of Total Fluoride PART A – CIC			
Sulphate (as SO4)	Melbourne	Feb 10, 2022	28 Days
- Method: LTM-INO-4110 Sulfate by Discrete Analyser			
Phosphorus	Melbourne	Feb 10, 2022	180 Days
- Method: LTM-MET-3010 Alkali Metals Sulfur Silicon and Phosphorus by ICP-AES			
Sulphur	Melbourne	Feb 10, 2022	7 Days
- Method: LTM-MET-3010 Alkali Metals Sulfur Silicon and Phosphorus by ICP-AES			
Zirconium*	Melbourne	Feb 10, 2022	6 Months
- Method: LTM-MET-3030 by ICP-OES			
Heavy Metals	Melbourne	Feb 10, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Metals M8	Melbourne	Feb 10, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
Gold	Melbourne	Feb 10, 2022	6 Months
- Method: LTM-MET-3030 Metals in Soils by ICP-OES			
Thorium*	Melbourne	Feb 10, 2022	6 Months
- Method: LTM-MET-3030 by ICP-OES			
Eurofins Suite B11C: Na/K/Ca/Mg	Melbourne	Feb 10, 2022	180 Days
- Method: LTM-MET-3010 Alkali Metals by ICP-AES			
% Moisture	Melbourne	Feb 09, 2022	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | ARL

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NATA # 1261 Site # 25079

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IANZ # 1290

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name:
Project ID: 12518217

Order No.: 12518217
Report #: 861624
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Feb 8, 2022 3:55 PM
Due: Feb 15, 2022
Priority: 5 Day
Contact Name: Paul Hamer

Eurofins Analytical Services Manager : Robert Johnston

Sample Detail	Aluminium	Antimony	Barium	Beryllium	Boron	Caesium*	Cerium*	Cobalt	Conductivity (at 25°C)	Fluoride (Total)	Gallium*	Gold	Hafnium	Iron	Lanthanum	Lithium	Manganese	Molybdenum	Niobium	Phosphorus	Rubidium*	Selenium	Silver	Strontium	Sulphate (as SO4)	Sulphur	Tantalum	Tellurium*	Thorium*	Tin	Titanium	Tungsten*	Uranium	Vanadium	Yttrium	Zirconium*	AUS Leaching Procedure	Metals M8	Moisture Set	Eurofins Suite B11D: Na/K/Ca/Mg and	Eurofins Suite B11E: Cl/SO4/Alkalinity	Eurofins Suite B11C: Na/K/Ca/Mg
Perth Laboratory - NATA # 2377 Site # 2370																																									
Melbourne Laboratory - NATA # 1261 Site # 1254	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sydney Laboratory - NATA # 1261 Site # 18217																																									
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External Laboratory																																									

No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID																																						
1	AMD06_20T	Feb 02, 2022		Soil	L22-Fe14658	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X			X
2	AMD06_20T	Feb 02, 2022		AUS Leachate	L22-Fe14659		X	X	X		X	X		X		X		X	X	X	X	X	X		X	X		X			X	X	X	X	X	X	X	X	X	X	X	X	
Test Counts						1	2	2	2	1	2	2	1	1	1	2	1	2	2	2	2	2	2	2	1	2	2	1	2	1	1	2	2	2	2	2	2	2	2	2	1	2	1	1	1	1

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3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

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

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

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

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

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

Units

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

Terms

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

QC - Acceptance Criteria

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

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

Results <10 times the LOR: No Limit

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

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

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

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

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

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QC Data General Comments

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

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Fluoride (Total)	mg/kg	< 100			100	Pass	
Sulphate (as SO4)	mg/kg	< 30			30	Pass	
Method Blank							
Heavy Metals							
Aluminium	mg/kg	< 20			20	Pass	
Antimony	mg/kg	< 10			10	Pass	
Arsenic	mg/kg	< 2			2	Pass	
Barium	mg/kg	< 10			10	Pass	
Beryllium	mg/kg	< 2			2	Pass	
Boron	mg/kg	< 10			10	Pass	
Cadmium	mg/kg	< 0.4			0.4	Pass	
Chromium	mg/kg	< 5			5	Pass	
Cobalt	mg/kg	< 5			5	Pass	
Copper	mg/kg	< 5			5	Pass	
Iron	mg/kg	< 20			20	Pass	
Lead	mg/kg	< 5			5	Pass	
Lithium	mg/kg	< 5			5	Pass	
Manganese	mg/kg	< 5			5	Pass	
Mercury	mg/kg	< 0.1			0.1	Pass	
Molybdenum	mg/kg	< 5			5	Pass	
Nickel	mg/kg	< 5			5	Pass	
Selenium	mg/kg	< 2			2	Pass	
Silver	mg/kg	< 2			2	Pass	
Strontium	mg/kg	< 10			10	Pass	
Tin	mg/kg	< 10			10	Pass	
Titanium	mg/kg	< 10			10	Pass	
Uranium	mg/kg	< 10			10	Pass	
Vanadium	mg/kg	< 10			10	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Fluoride (Total)	%	120			70-130	Pass	
Sulphate (as SO4)	%	105			70-130	Pass	
LCS - % Recovery							
Heavy Metals							
Aluminium	%	106			80-120	Pass	
Antimony	%	103			80-120	Pass	
Arsenic	%	104			80-120	Pass	
Barium	%	105			80-120	Pass	
Beryllium	%	94			80-120	Pass	
Boron	%	88			80-120	Pass	
Cadmium	%	93			80-120	Pass	
Chromium	%	106			80-120	Pass	
Cobalt	%	108			80-120	Pass	
Copper	%	107			80-120	Pass	
Iron	%	113			80-120	Pass	
Lead	%	109			80-120	Pass	
Lithium	%	93			80-120	Pass	
Manganese	%	104			80-120	Pass	
Mercury	%	114			80-120	Pass	
Molybdenum	%	104			80-120	Pass	
Nickel	%	105			80-120	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Selenium			%	102			80-120	Pass	
Silver			%	91			80-120	Pass	
Strontium			%	103			80-120	Pass	
Tin			%	102			80-120	Pass	
Titanium			%	112			80-120	Pass	
Uranium			%	112			80-120	Pass	
Vanadium			%	105			80-120	Pass	
Zinc			%	106			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
				Result 1					
Fluoride (Total)	M22-Fe18402	NCP	%	109			70-130	Pass	
Spike - % Recovery									
Heavy Metals				Result 1					
Aluminium	M22-Fe16841	NCP	%	90			75-125	Pass	
Antimony	M22-Fe16899	NCP	%	86			75-125	Pass	
Arsenic	M22-Fe16899	NCP	%	86			75-125	Pass	
Barium	M22-Fe16899	NCP	%	83			75-125	Pass	
Beryllium	M22-Fe16899	NCP	%	78			75-125	Pass	
Boron	M22-Fe16899	NCP	%	101			75-125	Pass	
Cadmium	M22-Fe16841	NCP	%	105			75-125	Pass	
Chromium	M22-Fe16899	NCP	%	84			75-125	Pass	
Cobalt	M22-Fe16899	NCP	%	84			75-125	Pass	
Copper	M22-Fe16899	NCP	%	83			75-125	Pass	
Iron	M22-Fe13033	NCP	%	92			75-125	Pass	
Lead	M22-Fe16841	NCP	%	101			75-125	Pass	
Lithium	M22-Fe16899	NCP	%	78			75-125	Pass	
Mercury	M22-Fe16899	NCP	%	90			75-125	Pass	
Molybdenum	M22-Fe16899	NCP	%	95			75-125	Pass	
Nickel	M22-Fe16899	NCP	%	83			75-125	Pass	
Selenium	M22-Fe16899	NCP	%	86			75-125	Pass	
Silver	M22-Fe16841	NCP	%	100			75-125	Pass	
Strontium	M22-Fe16841	NCP	%	98			75-125	Pass	
Tin	M22-Fe16899	NCP	%	91			75-125	Pass	
Titanium	M22-Fe16841	NCP	%	94			75-125	Pass	
Uranium	M22-Fe16899	NCP	%	93			75-125	Pass	
Vanadium	M22-Fe16899	NCP	%	86			75-125	Pass	
Zinc	M22-Fe16841	NCP	%	96			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
				Result 1	Result 2	RPD			
Fluoride (Total)	L22-Fe14658	CP	mg/kg	< 100	< 100	<1	30%	Pass	
Sulphate (as SO4)	M22-Fe19402	NCP	mg/kg	34	51	40	30%	Fail	Q15
Zirconium*	L22-Fe14658	CP	mg/kg	< 5	< 5	<1	30%	Pass	
% Moisture	S22-Fe13068	NCP	%	90	90	<1	30%	Pass	
Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Aluminium	M22-Fe13191	NCP	mg/kg	3400	3300	2.0	30%	Pass	
Antimony	M22-Fe13191	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Arsenic	M22-Fe13191	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Barium	M22-Fe13191	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Beryllium	M22-Fe13191	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Boron	M22-Fe13191	NCP	mg/kg	< 10	< 10	<1	30%	Pass	

Duplicate									
Heavy Metals				Result 1	Result 2	RPD			
Cadmium	M22-Fe13191	NCP	mg/kg	< 0.4	< 0.4	<1	30%	Pass	
Caesium*	L22-Fe14658	CP	mg/kg	< 20	< 20	<1	30%	Pass	
Cerium*	L22-Fe14658	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Chromium	M22-Fe13191	NCP	mg/kg	5.5	5.4	2.0	30%	Pass	
Cobalt	M22-Fe13191	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Copper	M22-Fe13191	NCP	mg/kg	17	17	1.0	30%	Pass	
Gallium*	L22-Fe14658	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Gold	L22-Fe14658	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Iron	M22-Fe13191	NCP	mg/kg	2600	2500	3.0	30%	Pass	
Lead	M22-Fe13191	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Lithium	M22-Fe13191	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Manganese	M22-Fe13191	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Mercury	M22-Fe13191	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Molybdenum	M22-Fe13191	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Nickel	M22-Fe13191	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
Rubidium*	L22-Fe14658	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Selenium	M22-Fe13191	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Silver	M22-Fe13191	NCP	mg/kg	< 2	< 2	<1	30%	Pass	
Strontium	M22-Fe13191	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Tellurium*	L22-Fe14658	CP	mg/kg	< 10	< 10	<1	30%	Pass	
Thorium*	L22-Fe14658	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Tin	M22-Fe13191	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Titanium	M22-Fe13191	NCP	mg/kg	32	33	2.0	30%	Pass	
Uranium	M22-Fe13191	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Vanadium	M22-Fe13191	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
Zinc	M22-Fe13191	NCP	mg/kg	50	49	2.0	30%	Pass	

Comments

Eurofins | Environment Testing accreditation number 1261, site 18217 is currently in progress of a controlled transition to a new custom built location at 179 Magowar Road, Girraween, NSW 2145. All results on this report denoted as being performed by Eurofins | Environment Testing Unit F3, Building F, 16 Mars road, Lane Cove West, NSW 2066, corporate site 18217, will have been performed on either Lane Cove or new Girraween site

Sample Integrity

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

Qualifier Codes/Comments

Code	Description
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Robert Johnston	Analytical Services Manager
Emily Rosenberg	Senior Analyst-Metal (VIC)
Scott Beddoes	Senior Analyst-Inorganic (VIC)

Kim Rodgers
Business Unit Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201472**	Page	: 1 of 14
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MR PAUL HAMER	Contact	: Nick Courts
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: +61 08 6222 8583	Telephone	: +61-8-9406 1301
Project	: 12518217	Date Samples Received	: 08-Feb-2022 17:00
Order number	: 12518217	Date Analysis Commenced	: 11-Feb-2022
C-O-C number	: ----	Issue Date	: 28-Feb-2022 21:04
Sampler	: Steff Bright		
Site	:		
Quote number	: EN/005		
No. of samples received	: 23		
No. of samples analysed	: 23		

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
- Descriptive 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*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Uyen Dalkin	Approved Asbestos Identifier	Melbourne Asbestos, 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.

- Asbestos conducted by ALS Melbourne, NATA accreditation no. 825, site no 13778
- Metals and Sulfide as S (Includes Total Sulphur) conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED040T: Positive Sulfate as SO4 2- results for samples EP2201472-003, -006, -007, -009 and -021 have been confirmed by re-digestion and re-analysis.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.
- 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: DI WATER (Matrix: WATER)			Sample ID	AMD01_21	AMD02_15	AMD03_21	AMD04_24+25	AMD04_24+25D
			Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201472-001	EP2201472-003	EP2201472-006	EP2201472-007	EP2201472-009
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	**5.97**	**5.62**	**4.20**	**4.03**	**3.85**
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	**4**	**9**	**74**	**140**	**197**
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	<1	<1	<1	**25**	**31**
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	<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	**1**	**21**	**43**	**67**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	<1	**1**	**2**	**1**	**1**
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	<1	**5**	**7**
Magnesium	7439-95-4	1	mg/L	<1	<1	<1	**3**	**4**
Sodium	7440-23-5	1	mg/L	**1**	<1	**1**	<1	<1
Potassium	7440-09-7	1	mg/L	<1	<1	<1	**2**	**2**
EG020W: Water Leachable Metals by ICP-MS								
Germanium	7440-56-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Niobium	7440-03-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L	<0.001	**0.001**	**0.002**	<0.001	<0.001
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	**0.002**	**0.003**
Barium	7440-39-3	0.001	mg/L	**0.005**	**0.005**	**0.007**	**0.020**	**0.021**
Rhenium	7440-15-5	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**	**0.0005**	**0.0006**
Cerium	7440-45-1	0.001	mg/L	<0.001	**0.001**	**0.002**	**0.012**	**0.016**
Caesium	7440-46-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L	**0.002**	**0.004**	<0.001	**0.006**	**0.010**
Cobalt	7440-48-4	0.001	mg/L	**0.002**	**0.005**	**0.785**	**0.558**	**0.720**
Copper	7440-50-8	0.001	mg/L	**0.002**	**0.009**	<0.001	**0.003**	**0.002**
Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001

Analytical Results

Sub-Matrix: DI WATER (Matrix: WATER)				Sample ID	AMD01_21	AMD02_15	AMD03_21	AMD04_24+25	AMD04_24+25D
				Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00
Compound	CAS Number	LOR	Unit		EP2201472-001	EP2201472-003	EP2201472-006	EP2201472-007	EP2201472-009
					Result	Result	Result	Result	Result
EG020W: Water Leachable Metals by ICP-MS - Continued									
Hafnium	7440-58-6	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Lanthanum	7439-91-0	0.001	mg/L		<0.001	<0.001	<0.001	**0.008**	**0.011**
Lead	7439-92-1	0.001	mg/L		<0.001	**0.004**	<0.001	**0.003**	**0.003**
Lithium	7439-93-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.004**	**0.011**	**0.033**	**0.101**	**0.141**
Molybdenum	7439-98-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.003**	**0.462**	**0.849**	**1.07**
Rubidium	7440-17-7	0.001	mg/L		**0.001**	<0.001	<0.001	**0.002**	**0.003**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	7440-24-6	0.001	mg/L		<0.001	**0.002**	**0.004**	**0.008**	**0.011**
Tellurium	22541-49-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Thorium	7440-29-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Tin	7440-31-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L		**0.09**	<0.01	<0.01	**0.02**	**0.01**
Uranium	7440-61-1	0.001	mg/L		<0.001	<0.001	<0.001	**0.002**	**0.003**
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	**0.04**	**0.01**	**0.03**
Yttrium	7440-65-5	0.001	mg/L		<0.001	<0.001	<0.001	**0.022**	**0.037**
Zinc	7440-66-6	0.005	mg/L		**0.011**	<0.005	**0.532**	**0.402**	**0.679**
Zirconium	7440-67-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		**0.67**	**0.32**	**0.89**	**5.07**	**8.71**
Tungsten	7440-33-7	0.001	mg/L		<0.001	**0.006**	<0.001	<0.001	<0.001
Tantalum	7440-25-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	AMD05_26	AMD06_20	AMD07_13	AMD08_22	AMD09_29+30
				Sampling date / time	01-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	03-Feb-2022 00:00
					EP2201472-010	EP2201472-012	EP2201472-015	EP2201472-018	EP2201472-019
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**5.79**	**6.27**	**6.16**	**6.23**	**6.03**
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**5**	**8**	**2**	**10**	**6**
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		<1	<1	<1	<1	<1
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		<1	**2**	**1**	**1**	<1
Total Alkalinity as CaCO3	----	1	mg/L		<1	**2**	**1**	**1**	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	<1	<1	<1	<1
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**1**	**1**	<1	**2**	<1
ED093W: Water Leachable Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	<1	<1	<1
Magnesium	7439-95-4	1	mg/L		<1	<1	<1	<1	<1
Sodium	7440-23-5	1	mg/L		<1	<1	<1	**1**	<1
Potassium	7440-09-7	1	mg/L		<1	<1	<1	<1	<1
EG020W: Water Leachable Metals by ICP-MS									
Germanium	7440-56-4	0.001	mg/L		**0.001**	<0.001	<0.001	<0.001	<0.001
Antimony	7440-36-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Niobium	7440-03-1	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	<0.001
Arsenic	7440-38-2	0.001	mg/L		**0.002**	**0.004**	<0.001	<0.001	<0.001
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L		**0.014**	**0.012**	**0.001**	**0.112**	**0.007**
Rhenium	7440-15-5	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
Cerium	7440-45-1	0.001	mg/L		**0.151**	**0.001**	<0.001	**0.027**	**0.003**
Caesium	7440-46-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		**0.035**	**0.004**	<0.001	**0.025**	<0.001
Cobalt	7440-48-4	0.001	mg/L		**0.004**	**0.004**	**0.001**	**0.005**	**0.003**
Copper	7440-50-8	0.001	mg/L		**0.011**	**0.003**	<0.001	**0.010**	**0.003**
Gallium	7440-55-3	0.001	mg/L		**0.004**	<0.001	<0.001	**0.005**	<0.001

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	AMD05_26	AMD06_20	AMD07_13	AMD08_22	AMD09_29+30
				Sampling date / time	01-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	03-Feb-2022 00:00
					EP2201472-010	EP2201472-012	EP2201472-015	EP2201472-018	EP2201472-019
					Result	Result	Result	Result	Result
EG020W: Water Leachable Metals by ICP-MS - Continued									
Hafnium	7440-58-6	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Lanthanum	7439-91-0	0.001	mg/L		**0.057**	<0.001	<0.001	**0.013**	**0.001**
Lead	7439-92-1	0.001	mg/L		**0.003**	**0.002**	<0.001	**0.011**	<0.001
Lithium	7439-93-2	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.012**	**0.132**	**0.002**	**0.006**	**0.004**
Molybdenum	7439-98-7	0.001	mg/L		<0.001	**0.001**	<0.001	**0.001**	<0.001
Nickel	7440-02-0	0.001	mg/L		**0.006**	**0.004**	<0.001	**0.008**	**0.002**
Rubidium	7440-17-7	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	7440-24-6	0.001	mg/L		**0.002**	**0.001**	<0.001	**0.016**	<0.001
Tellurium	22541-49-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Thorium	7440-29-1	0.001	mg/L		**0.008**	<0.001	<0.001	**0.009**	**0.001**
Tin	7440-31-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L		**0.28**	**0.01**	<0.01	**0.50**	**0.03**
Uranium	7440-61-1	0.001	mg/L		**0.002**	<0.001	<0.001	<0.001	<0.001
Vanadium	7440-62-2	0.01	mg/L		**0.01**	<0.01	<0.01	<0.01	<0.01
Yttrium	7440-65-5	0.001	mg/L		**0.012**	**0.002**	<0.001	**0.013**	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.008**	**0.013**	<0.005	**0.008**	**0.008**
Zirconium	7440-67-7	0.005	mg/L		**0.015**	<0.005	<0.005	**0.035**	<0.005
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		**3.90**	**6.79**	<0.05	**1.00**	**0.24**
Tungsten	7440-33-7	0.001	mg/L		**0.003**	**0.007**	**0.010**	<0.001	**0.002**
Tantalum	7440-25-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Analytical Results

Sub-Matrix: DI WATER (Matrix: WATER)				Sample ID	AMD09_35	AMD10_28	----	----	----
				Sampling date / time	03-Feb-2022 00:00	03-Feb-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP2201472-020	EP2201472-021	--------	--------	--------
					Result	Result	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**6.08**	**4.93**	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**4**	**136**	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		<1	**44**	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L		<1	<1	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L		<1	<1	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L		<1	<1	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		<1	<1	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	**55**	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		<1	**4**	----	----	----
ED093W: Water Leachable Major Cations									
Calcium	7440-70-2	1	mg/L		<1	**4**	----	----	----
Magnesium	7439-95-4	1	mg/L		<1	**9**	----	----	----
Sodium	7440-23-5	1	mg/L		<1	**4**	----	----	----
Potassium	7440-09-7	1	mg/L		<1	<1	----	----	----
EG020W: Water Leachable Metals by ICP-MS									
Germanium	7440-56-4	0.001	mg/L		<0.001	<0.001	----	----	----
Antimony	7440-36-0	0.001	mg/L		<0.001	<0.001	----	----	----
Niobium	7440-03-1	0.001	mg/L		<0.001	<0.001	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.005**	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	----	----	----
Barium	7440-39-3	0.001	mg/L		**0.014**	**0.010**	----	----	----
Rhenium	7440-15-5	0.001	mg/L		<0.001	<0.001	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	**0.0009**	----	----	----
Cerium	7440-45-1	0.001	mg/L		**0.007**	**0.003**	----	----	----
Caesium	7440-46-2	0.001	mg/L		<0.001	<0.001	----	----	----
Chromium	7440-47-3	0.001	mg/L		**0.001**	**0.003**	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	**0.246**	----	----	----
Copper	7440-50-8	0.001	mg/L		**0.002**	**0.002**	----	----	----
Gallium	7440-55-3	0.001	mg/L		<0.001	<0.001	----	----	----

Analytical Results

Sub-Matrix: DI WATER (Matrix: WATER)				Sample ID	AMD09_35	AMD10_28	----	----	----
				Sampling date / time	03-Feb-2022 00:00	03-Feb-2022 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EP2201472-020	EP2201472-021	--------	--------	--------
					Result	Result	----	----	----
EG020W: Water Leachable Metals by ICP-MS - Continued									
Hafnium	7440-58-6	0.01	mg/L		<0.01	<0.01	----	----	----
Lanthanum	7439-91-0	0.001	mg/L		**0.003**	**0.001**	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	**0.002**	----	----	----
Lithium	7439-93-2	0.001	mg/L		<0.001	<0.001	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.003**	**0.090**	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		<0.001	<0.001	----	----	----
Nickel	7440-02-0	0.001	mg/L		**0.001**	**0.128**	----	----	----
Rubidium	7440-17-7	0.001	mg/L		<0.001	**0.001**	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	----	----	----
Strontium	7440-24-6	0.001	mg/L		**0.008**	**0.013**	----	----	----
Tellurium	22541-49-7	0.005	mg/L		<0.005	<0.005	----	----	----
Thorium	7440-29-1	0.001	mg/L		**0.001**	**0.002**	----	----	----
Tin	7440-31-5	0.001	mg/L		<0.001	<0.001	----	----	----
Titanium	7440-32-6	0.01	mg/L		**0.02**	**0.11**	----	----	----
Uranium	7440-61-1	0.001	mg/L		<0.001	<0.001	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	**0.02**	----	----	----
Yttrium	7440-65-5	0.001	mg/L		<0.001	<0.001	----	----	----
Zinc	7440-66-6	0.005	mg/L		**0.005**	**0.336**	----	----	----
Zirconium	7440-67-7	0.005	mg/L		<0.005	**0.006**	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.39**	**0.58**	----	----	----
Tungsten	7440-33-7	0.001	mg/L		**0.002**	<0.001	----	----	----
Tantalum	7440-25-7	0.001	mg/L		<0.001	<0.001	----	----	----
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD01_21	AMD01_26	AMD02_15	AMD02_3	AMD03_13
			Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201472-001	EP2201472-002	EP2201472-003	EP2201472-004	EP2201472-005
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	4.9	4.4	5.0	4.6	4.6
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	0.2	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	9.8	7.9	2.5	7.3	5.2
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	0.7	1.1	<0.5	1.4	<0.5
ANC as CaCO3	----	0.1	% CaCO3	<0.1	0.1	<0.1	0.1	<0.1
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	<0.1	----	2.1	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	----	----	No	----	No
Asbestos (Trace)	1332-21-4	5	Fibres	----	----	No	----	No
Asbestos Type	1332-21-4	-	--	----	----	-	----	-
Sample weight (dry)	----	0.01	g	----	----	87.8	----	95.2
APPROVED IDENTIFIER:	----	-	--	----	----	U.DALKIN	----	U.DALKIN
Synthetic Mineral Fibre	----	0.1	g/kg	----	----	No	----	No
Organic Fibre	----	0.1	g/kg	----	----	No	----	No
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	----	210	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.01	----	0.04	----	----
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	0.01	----	0.03	----	----
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	6.3	----	6.1	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD03_21	AMD04_24+25	AMD04_18	AMD04_24+25D	AMD05_26
			Sampling date / time	01-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	01-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201472-006	EP2201472-007	EP2201472-008	EP2201472-009	EP2201472-010
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**3.5**	**3.0**	**5.5**	**3.0**	**5.6**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	**9.4**	**7.5**	<0.1	**8.3**	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**48.8**	**9.4**	**9.9**	**11.3**	**5.8**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	**0.7**	<0.5	**0.8**
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**0**	**0**
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**4.2**	**3.0**	**----**	**5.3**	**3.5**
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	**1680**	**1240**	**----**	**1640**	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.44**	**0.38**	**----**	**0.59**	<0.01
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	**0.38**	**0.34**	**----**	**0.54**	<0.01
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	**4.2**	**3.9**	**----**	**3.7**	**6.2**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD05_31	AMD06_20	AMD06_15	AMD06_20D	AMD07_13
			Sampling date / time	01-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201472-011	EP2201472-012	EP2201472-013	EP2201472-014	EP2201472-015
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**5.6**	**6.2**	**5.4**	**----**	**4.4**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	**----**	**0.2**
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**9.3**	**3.1**	**7.7**	**----**	**7.9**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**1.1**	**10.8**	**2.5**	**----**	**1.3**
ANC as CaCO3	----	0.1	% CaCO3	**0.1**	**1.1**	**0.2**	**----**	**0.1**
Fizz Rating	----	0	Fizz Unit	**0**	**1**	**0**	**----**	**0**
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**----**	**1.7**	**----**	**----**	<0.1
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**----**	**No**	**----**	**No**	**----**
Asbestos (Trace)	1332-21-4	5	Fibres	**----**	**No**	**----**	**No**	**----**
Asbestos Type	1332-21-4	-	--	**----**	**-**	**----**	**-**	**----**
Sample weight (dry)	----	0.01	g	**----**	**99.1**	**----**	**85.2**	**----**
APPROVED IDENTIFIER:	----	-	--	**----**	**U.DALKIN**	**----**	**U.DALKIN**	**----**
Synthetic Mineral Fibre	----	0.1	g/kg	**----**	**No**	**----**	**No**	**----**
Organic Fibre	----	0.1	g/kg	**----**	**No**	**----**	**No**	**----**
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	**----**	<100	**----**	**----**	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**----**	**0.02**	**----**	**----**	**0.04**
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	**----**	**0.02**	**----**	**----**	**0.04**
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	**----**	**6.4**	**----**	**----**	**6.4**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD07_29	AMD08_15+16	AMD08_22	AMD09_29+30	AMD09_35
			Sampling date / time	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	03-Feb-2022 00:00	03-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201472-016	EP2201472-017	EP2201472-018	EP2201472-019	EP2201472-020
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	3.8	5.2	5.6	5.5	5.7
NAG (pH 4.5)	----	0.1	kg H2SO4/t	0.8	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	6.1	7.9	6.0	9.2	6.6
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	0.8	1.2	0.7	0.6	0.8
ANC as CaCO3	----	0.1	% CaCO3	<0.1	0.1	<0.1	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	----	----	12.5	0.5	2.2
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	----	No	----	----
Asbestos (Trace)	1332-21-4	5	Fibres	No	----	No	----	----
Asbestos Type	1332-21-4	-	--	-	----	-	----	----
Sample weight (dry)	----	0.01	g	114	----	71.8	----	----
APPROVED IDENTIFIER:	----	-	--	U.DALKIN	----	U.DALKIN	----	----
Synthetic Mineral Fibre	----	0.1	g/kg	No	----	No	----	----
Organic Fibre	----	0.1	g/kg	No	----	No	----	----
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	----	----	<100	<100	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	----	----	<0.01	<0.01	<0.01
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	----	----	<0.01	<0.01	<0.01
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	----	----	6.6	6.4	6.6

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD10_28	AMD10_38	AMD10_28D	----	----
			Sampling date / time	03-Feb-2022 00:00	03-Feb-2022 00:00	03-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2201472-021	EP2201472-022	EP2201472-023	--------	--------
				Result	Result	Result	----	----
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**3.0**	**2.6**	**3.0**	**----**	**----**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	**10.5**	**39.8**	**8.1**	**----**	**----**
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**18.0**	**45.7**	**14.3**	**----**	**----**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	<0.5	**----**	**----**
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	**----**	**----**
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**----**	**----**
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**22.3**	**----**	**----**	**----**	**----**
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	**1430**	**----**	**----**	**----**	**----**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**1.04**	**----**	**----**	**----**	**----**
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	**0.99**	**----**	**----**	**----**	**----**
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	**5.0**	**----**	**----**	**----**	**----**

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	AMD02_15 - 01-Feb-2022 00:00	Beige rocky soil.
EA200: Description	AMD03_13 - 01-Feb-2022 00:00	Beige rocky soil.
EA200: Description	AMD06_20 - 02-Feb-2022 00:00	Yellow rocky soil.
EA200: Description	AMD06_20D - 02-Feb-2022 00:00	Yellow rocky soil.
EA200: Description	AMD07_29 - 02-Feb-2022 00:00	White rocky soil.
EA200: Description	AMD08_22 - 02-Feb-2022 00:00	Beige rocky soil.

Inter-Laboratory Testing

Analysis conducted by ALS Brisbane, NATA accreditation no. 825, site no. 818 (Chemistry) 18958 (Biology).

(WATER) EG020W: Water Leachable Metals by ICP-MS

(SOIL) EK085M: Sulfide as S2-

(SOIL) ED042T: Total Sulfur by LECO

(WATER) EG035W: Water Leachable Mercury by FIMS

(WATER) ED093W: Water Leachable Major Cations

Analysis conducted by ALS Melbourne, NATA accreditation no. 825, site no. 13778 (Chemistry).

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2201472**	Page	: 1 of 9
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MR PAUL HAMER	Contact	: Nick Courts
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: +61 08 6222 8583	Telephone	: +61-8-9406 1301
Project	: 12518217	Date Samples Received	: 08-Feb-2022
Order number	: 12518217	Date Analysis Commenced	: 11-Feb-2022
C-O-C number	: ----	Issue Date	: 28-Feb-2022
Sampler	: Steff Bright		
Site	:		
Quote number	: EN/005		
No. of samples received	: 23		
No. of samples analysed	: 23		

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

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Accreditation Category*
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
Efua Wilson	Metals Chemist	Perth Inorganics, Wangara, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Mark Hallas	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Uyen Dalkin	Approved Asbestos Identifier	Melbourne Asbestos, 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.

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA011: Net Acid Generation (QC Lot: 4188617)									
EP2201472-001	AMD01_21	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.0	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	9.8	9.8	0.0	0% - 20%
EP2201472-011	AMD05_31	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.0	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	9.3	9.3	0.0	0% - 20%
EA011: Net Acid Generation (QC Lot: 4188619)									
EP2201472-022	AMD10_38	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	39.8	39.8	0.0	0% - 20%
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	45.7	45.7	0.0	0% - 20%
EA013: Acid Neutralising Capacity (QC Lot: 4188616)									
EP2201472-001	AMD01_21	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	0.7	0.7	0.0	No Limit
EP2201472-011	AMD05_31	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	1.1	1.1	0.0	No Limit
EA013: Acid Neutralising Capacity (QC Lot: 4188618)									
EP2201472-022	AMD10_38	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	0.0	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4168590)									
EP2201472-001	AMD01_21	EA055: Moisture Content	----	0.1	%	<0.1	<0.1	0.0	No Limit
EP2201472-019	AMD09_29+30	EA055: Moisture Content	----	0.1	%	0.5	0.5	0.0	No Limit
ED040T : Total Sulfate by ICPAES (QC Lot: 4168587)									
EP2201472-001	AMD01_21	ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	0.0	No Limit
EP2201472-019	AMD09_29+30	ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	0.0	No Limit
ED042T: Total Sulfur by LECO (QC Lot: 4197748)									
EB2204425-001	Anonymous	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	0.38	0.39	0.0	0% - 20%

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED042T: Total Sulfur by LECO (QC Lot: 4197748) - continued									
EP2201472-007	AMD04_24+25	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	0.38	0.38	0.0	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 4176357)									
EP2201472-003	AMD02_15	EA005-P: pH Value	----	0.01	pH Unit	5.62	5.51	2.0	0% - 20%
EP2201472-020	AMD09_35	EA005-P: pH Value	----	0.01	pH Unit	6.08	6.06	0.3	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4176358)									
EP2201472-003	AMD02_15	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	9	9	0.0	No Limit
EP2201472-020	AMD09_35	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	4	4	0.0	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 4176359)									
EP2201472-003	AMD02_15	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.0	No Limit
EP2201472-020	AMD09_35	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4176129)									
EP2201472-001	AMD01_21	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
EP2201472-020	AMD09_35	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 4176130)									
EP2201472-001	AMD01_21	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.0	No Limit
EP2201472-020	AMD09_35	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.0	No Limit
ED093W: Water Leachable Major Cations (QC Lot: 4183157)									
EP2201472-015	AMD07_13	ED093W: Calcium	7440-70-2	1	mg/L	<1	<1	0.0	No Limit
		ED093W: Magnesium	7439-95-4	1	mg/L	<1	<1	0.0	No Limit
		ED093W: Sodium	7440-23-5	1	mg/L	<1	<1	0.0	No Limit
		ED093W: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EB2202426-006	Anonymous	ED093W: Calcium	7440-70-2	1	mg/L	22	22	0.0	0% - 20%
		ED093W: Magnesium	7439-95-4	1	mg/L	12	12	0.0	0% - 50%
		ED093W: Sodium	7440-23-5	1	mg/L	818	827	1.1	0% - 20%
		ED093W: Potassium	7440-09-7	1	mg/L	7	7	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4183159)									
EP2201472-015	AMD07_13	EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Barium	7440-39-3	0.001	mg/L	0.001	0.001	0.0	No Limit

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4183159) - continued									
EP2201472-015	AMD07_13	EG020A-W: Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Cobalt	7440-48-4	0.001	mg/L	0.001	0.002	0.0	No Limit
		EG020A-W: Copper	7440-50-8	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Lithium	7439-93-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Manganese	7439-96-5	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-W: Iron	7439-89-6	0.05	mg/L	<0.05	0.06	0.0	No Limit
EB2202426-006	Anonymous	EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020A-W: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Barium	7440-39-3	0.001	mg/L	0.770	0.793	2.9	0% - 20%
		EG020A-W: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-W: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Copper	7440-50-8	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020A-W: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Lithium	7439-93-2	0.001	mg/L	0.026	0.029	8.2	0% - 20%
		EG020A-W: Manganese	7439-96-5	0.001	mg/L	0.011	0.011	0.0	0% - 50%
		EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	0.026	0.026	0.0	0% - 20%
		EG020A-W: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Zinc	7440-66-6	0.005	mg/L	0.036	0.037	4.0	No Limit
		EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Boron	7440-42-8	0.05	mg/L	0.94	1.02	7.2	0% - 20%
		EG020A-W: Iron	7439-89-6	0.05	mg/L	<0.05	<0.05	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4183160)									
EP2201472-015	AMD07_13	EG020B-W: Cerium	7440-45-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Caesium	7440-46-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Rubidium	7440-17-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Strontium	7440-24-6	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4183160) - continued									
EP2201472-015	AMD07_13	EG020B-W: Tellurium	22541-49-7	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020B-W: Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2202426-006	Anonymous	EG020B-W: Cerium	7440-45-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Caesium	7440-46-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Rubidium	7440-17-7	0.001	mg/L	0.006	0.006	0.0	No Limit
		EG020B-W: Strontium	7440-24-6	0.001	mg/L	1.15	1.16	0.6	0% - 20%
		EG020B-W: Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Tellurium	22541-49-7	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020B-W: Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4183161)									
EP2201472-015	AMD07_13	EG020D-W: Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020D-W: Lanthanum	7439-91-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020D-W: Yttrium	7440-65-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020D-W: Zirconium	7440-67-7	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020D-W: Hafnium	7440-58-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EB2202426-006	Anonymous	EG020D-W: Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020D-W: Lanthanum	7439-91-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020D-W: Yttrium	7440-65-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020D-W: Zirconium	7440-67-7	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020D-W: Hafnium	7440-58-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4183162)									
EP2201472-015	AMD07_13	EG020E-W: Tungsten	7440-33-7	0.001	mg/L	0.010	0.010	0.0	No Limit
		EG020E-W: Tantalum	7440-25-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EB2202426-006	Anonymous	EG020E-W: Tungsten	7440-33-7	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020E-W: Tantalum	7440-25-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4183163)									
EP2201472-020	AMD09_35	EG020G-W: Germanium	7440-56-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020G-W: Niobium	7440-03-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020G-W: Rhenium	7440-15-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EP2201472-015	AMD07_13	EG020G-W: Germanium	7440-56-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020G-W: Niobium	7440-03-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020G-W: Rhenium	7440-15-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG035W: Water Leachable Mercury by FIMS (QC Lot: 4183199)									
EB2202426-006	Anonymous	EG035W: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EP2201472-012	AMD06_20	EG035W: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit

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

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

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EA011: Net Acid Generation (QCLot: 4188617)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	24.084 kg H2SO4/t	93.7	85.1	112
EA011: Net Acid Generation (QCLot: 4188619)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	24.084 kg H2SO4/t	94.2	85.1	112
EA013: Acid Neutralising Capacity (QCLot: 4188616)								
EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	9.8 kg H2SO4 equiv./t	101	94.6	106
EA013: ANC as CaCO3	----	0.1	% CaCO3	<0.1	----	----	----	----
EA013: Acid Neutralising Capacity (QCLot: 4188618)								
EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	9.8 kg H2SO4 equiv./t	101	94.6	106
EA013: ANC as CaCO3	----	0.1	% CaCO3	<0.1	----	----	----	----
ED040T : Total Sulfate by ICPAES (QCLot: 4168587)								
ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	1452 mg/kg	96.3	80.0	120
ED042T: Total Sulfur by LECO (QCLot: 4197748)								
ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.16 %	94.6	70.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EA005P: pH by PC Titrator (QCLot: 4176357)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	101	98.5	102
				----	7 pH Unit	100	98.5	102
EA010P: Conductivity by PC Titrator (QCLot: 4176358)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24800 µS/cm	95.9	92.1	105
ED037P: Alkalinity by PC Titrator (QCLot: 4176359)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	114	81.2	126
				<1	200 mg/L	103	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4176129)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	107	87.7	113
				<1	500 mg/L	101	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 4176130)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED045G: Chloride by Discrete Analyser (QCLot: 4176130) - continued								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	106	87.9	114
				<1	1000 mg/L	105	87.9	114
ED093W: Water Leachable Major Cations (QCLot: 4183157)								
ED093W: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	113	70.0	130
ED093W: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	104	70.0	130
ED093W: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	103	70.0	130
ED093W: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	102	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4183159)								
EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	0.1 mg/L	101	91.0	107
EG020A-W: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	105	86.0	111
EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	104	84.0	115
EG020A-W: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	106	70.0	130
EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	102	88.0	108
EG020A-W: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	103	88.0	112
EG020A-W: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	103	90.0	115
EG020A-W: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	102	86.0	115
EG020A-W: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	99.9	89.0	113
EG020A-W: Lithium	7439-93-2	0.001	mg/L	<0.001	0.1 mg/L	105	70.0	130
EG020A-W: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	100	90.0	115
EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	106	92.0	112
EG020A-W: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	102	88.0	112
EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	101	80.0	117
EG020A-W: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	105	87.0	115
EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	107	84.0	113
EG020A-W: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	101	86.0	113
EG020A-W: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	115	84.0	123
EG020A-W: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	108	85.0	113
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4183160)								
EG020B-W: Cerium	7440-45-1	0.001	mg/L	<0.001	----	----	----	----
EG020B-W: Caesium	7440-46-2	0.001	mg/L	<0.001	0.1 mg/L	106	70.0	130
EG020B-W: Rubidium	7440-17-7	0.001	mg/L	<0.001	0.1 mg/L	104	70.0	130
EG020B-W: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	107	85.0	111
EG020B-W: Tellurium	22541-49-7	0.005	mg/L	<0.005	0.1 mg/L	108	70.0	130
EG020B-W: Thorium	7440-29-1	0.001	mg/L	<0.001	0.1 mg/L	106	70.0	130
EG020B-W: Titanium	7440-32-6	0.01	mg/L	<0.01	0.1 mg/L	106	88.0	108
EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	101	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4183161)								
EG020D-W: Gallium	7440-55-3	0.001	mg/L	<0.001	0.1 mg/L	90.8	70.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4183161) - continued								
EG020D-W: Hafnium	7440-58-6	0.01	mg/L	<0.01	0.1 mg/L	102	70.0	130
EG020D-W: Lanthanum	7439-91-0	0.001	mg/L	<0.001	0.1 mg/L	96.0	70.0	130
EG020D-W: Yttrium	7440-65-5	0.001	mg/L	<0.001	0.1 mg/L	93.6	70.0	130
EG020D-W: Zirconium	7440-67-7	0.005	mg/L	<0.005	0.1 mg/L	95.4	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4183162)								
EG020E-W: Tungsten	7440-33-7	0.001	mg/L	<0.001	0.1 mg/L	98.2	70.0	130
EG020E-W: Tantalum	7440-25-7	0.001	mg/L	<0.001	0.1 mg/L	123	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4183163)								
EG020G-W: Germanium	7440-56-4	0.001	mg/L	<0.001	0.1 mg/L	92.1	70.0	130
EG020G-W: Niobium	7440-03-1	0.001	mg/L	<0.001	0.1 mg/L	93.9	70.0	130
EG020G-W: Rhenium	7440-15-5	0.001	mg/L	<0.001	0.1 mg/L	93.8	70.0	130
EG035W: Water Leachable Mercury by FIMS (QCLot: 4183199)								
EG035W: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	99.3	83.0	117

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4176129)							
EP2201472-001	AMD01_21	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	101	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4176130)							
EP2201472-001	AMD01_21	ED045G: Chloride	16887-00-6	1000 mg/L	107	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4183159)							
EB2202426-007	Anonymous	EG020A-W: Arsenic	7440-38-2	1 mg/L	108	70.0	130
		EG020A-W: Beryllium	7440-41-7	1 mg/L	113	70.0	130
		EG020A-W: Barium	7440-39-3	1 mg/L	113	70.0	130
		EG020A-W: Cadmium	7440-43-9	0.25 mg/L	105	70.0	130
		EG020A-W: Chromium	7440-47-3	1 mg/L	102	70.0	130
		EG020A-W: Cobalt	7440-48-4	1 mg/L	103	70.0	130
		EG020A-W: Copper	7440-50-8	1 mg/L	105	70.0	130
		EG020A-W: Lead	7439-92-1	1 mg/L	103	70.0	130
		EG020A-W: Manganese	7439-96-5	1 mg/L	103	70.0	130
		EG020A-W: Nickel	7440-02-0	1 mg/L	104	70.0	130
		EG020A-W: Vanadium	7440-62-2	1 mg/L	106	70.0	130
		EG020A-W: Zinc	7440-66-6	1 mg/L	105	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*Concentration*	*MS*	*Low*	*High*
EG035W: Water Leachable Mercury by FIMS (QCLot: 4183199)							
EB2202426-007	Anonymous	EG035W: Mercury	7439-97-6	0.01 mg/L	95.4	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2201472**	Page	: 1 of 11
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MR PAUL HAMER	Telephone	: +61-8-9406 1301
Project	: 12518217	Date Samples Received	: 08-Feb-2022
Site	:	Issue Date	: 28-Feb-2022
Sampler	: Steff Bright	No. of samples received	: 23
Order number	: 12518217	No. of samples analysed	: 23

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 / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED040T : Total Sulfate by ICPAES						
Soil Glass Jar - Unpreserved						
AMD01_21, AMD02_15, AMD03_21, AMD05_26	11-Feb-2022	08-Feb-2022	**3**	----	----	----
Soil Glass Jar - Unpreserved						
AMD04_24+25, AMD04_24+25D, AMD06_20, AMD07_13, AMD08_22	11-Feb-2022	09-Feb-2022	**2**	----	----	----
Soil Glass Jar - Unpreserved						
AMD09_29+30, AMD09_35, AMD10_28	11-Feb-2022	10-Feb-2022	**1**	----	----	----
ED042T: Total Sulfur by LECO						
Soil Glass Jar - Unpreserved						
AMD01_21, AMD02_15, AMD03_21, AMD05_26	28-Feb-2022	08-Feb-2022	**20**	----	----	----
Soil Glass Jar - Unpreserved						
AMD04_24+25, AMD04_24+25D, AMD06_20, AMD07_13, AMD08_22	28-Feb-2022	09-Feb-2022	**19**	----	----	----
Soil Glass Jar - Unpreserved						
AMD09_29+30, AMD09_35, AMD10_28	28-Feb-2022	10-Feb-2022	**18**	----	----	----

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
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
AMD01_21, AMD02_15, AMD03_21, AMD04_24+25, AMD04_24+25D, AMD05_26, AMD06_20, AMD07_13, AMD08_22, AMD09_29+30, AMD09_35, AMD10_28	----	----	----	16-Feb-2022	14-Feb-2022	**2**
ED093W: Water Leachable Major Cations						

Matrix: **WATER**

Method / Container / Client Sample ID(s)	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Days overdue	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Days overdue
ED093W: Water Leachable Major Cations - Analysis Holding Time Compliance						
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified						
AMD01_21, AMD02_15, AMD03_21, AMD04_24+25, AMD04_24+25D, AMD05_26, AMD06_20, AMD07_13, AMD08_22, AMD09_29+30, AMD09_35, AMD10_28	24-Feb-2022	21-Feb-2022	**3**	24-Feb-2022	21-Feb-2022	**3**

Analysis Holding Time Compliance

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

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

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

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

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation: Date extracted	Extraction / Preparation: Due for extraction	Extraction / Preparation: Evaluation	Analysis: Date analysed	Analysis: Due for analysis	Analysis: Evaluation
EA011: Net Acid Generation							
Pulp Bag (EA011)							
AMD01_21, AMD01_26, AMD02_15, AMD02_3, AMD03_13, AMD03_21, AMD05_26, AMD05_31	**01-Feb-2022**	**21-Feb-2022**	01-Feb-2023	✓	**28-Feb-2022**	20-Aug-2022	✓
Pulp Bag (EA011)							
AMD04_24+25, AMD04_18, AMD04_24+25D, AMD06_20, AMD06_15, AMD07_13, AMD07_29, AMD08_15+16, AMD08_22	**02-Feb-2022**	**21-Feb-2022**	02-Feb-2023	✓	**28-Feb-2022**	20-Aug-2022	✓
Pulp Bag (EA011)							
AMD09_29+30, AMD09_35, AMD10_28, AMD10_38, AMD10_28D	**03-Feb-2022**	**21-Feb-2022**	03-Feb-2023	✓	**28-Feb-2022**	20-Aug-2022	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA013: Acid Neutralising Capacity							
Pulp Bag (EA013) AMD01_21, AMD01_26, AMD02_15, AMD02_3, AMD03_13, AMD03_21, AMD05_26, AMD05_31	**01-Feb-2022**	**21-Feb-2022**	01-Feb-2023	✓	**28-Feb-2022**	20-Aug-2022	✓
Pulp Bag (EA013) AMD04_24+25, AMD04_18, AMD04_24+25D, AMD06_20, AMD06_15, AMD07_13, AMD07_29, AMD08_15+16, AMD08_22	**02-Feb-2022**	**21-Feb-2022**	02-Feb-2023	✓	**28-Feb-2022**	20-Aug-2022	✓
Pulp Bag (EA013) AMD09_29+30, AMD09_35, AMD10_28, AMD10_38, AMD10_28D	**03-Feb-2022**	**21-Feb-2022**	03-Feb-2023	✓	**28-Feb-2022**	20-Aug-2022	✓
EA055: Moisture Content (Dried @ 105-110°C)							
Soil Glass Jar - Unpreserved (EA055) AMD01_21, AMD02_15, AMD03_21, AMD05_26	**01-Feb-2022**	**----**	----	----	**11-Feb-2022**	15-Feb-2022	✓
Soil Glass Jar - Unpreserved (EA055) AMD04_24+25, AMD04_24+25D, AMD06_20, AMD07_13, AMD08_22	**02-Feb-2022**	**----**	----	----	**11-Feb-2022**	16-Feb-2022	✓
Soil Glass Jar - Unpreserved (EA055) AMD09_29+30, AMD09_35, AMD10_28	**03-Feb-2022**	**----**	----	----	**11-Feb-2022**	17-Feb-2022	✓
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag - ACM/Asbestos Grab Bag (EA200) AMD02_15, AMD03_13	**01-Feb-2022**	**----**	----	----	**11-Feb-2022**	31-Jul-2022	✓
Snap Lock Bag - ACM/Asbestos Grab Bag (EA200) AMD06_20, AMD06_20D, AMD07_29, AMD08_22	**02-Feb-2022**	**----**	----	----	**11-Feb-2022**	01-Aug-2022	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED040T : Total Sulfate by ICPAES							
Soil Glass Jar - Unpreserved (ED040T) AMD01_21, AMD02_15, AMD03_21, AMD05_26	**01-Feb-2022**	**11-Feb-2022**	08-Feb-2022	×	**11-Feb-2022**	11-Mar-2022	✓
Soil Glass Jar - Unpreserved (ED040T) AMD04_24+25, AMD04_24+25D, AMD06_20, AMD07_13, AMD08_22	**02-Feb-2022**	**11-Feb-2022**	09-Feb-2022	×	**11-Feb-2022**	11-Mar-2022	✓
Soil Glass Jar - Unpreserved (ED040T) AMD09_29+30, AMD09_35, AMD10_28	**03-Feb-2022**	**11-Feb-2022**	10-Feb-2022	×	**11-Feb-2022**	11-Mar-2022	✓
ED042T: Total Sulfur by LECO							
Soil Glass Jar - Unpreserved (ED042T) AMD01_21, AMD02_15, AMD03_21, AMD05_26	**01-Feb-2022**	**28-Feb-2022**	08-Feb-2022	×	**28-Feb-2022**	27-Aug-2022	✓
Soil Glass Jar - Unpreserved (ED042T) AMD04_24+25, AMD04_24+25D, AMD06_20, AMD07_13, AMD08_22	**02-Feb-2022**	**28-Feb-2022**	09-Feb-2022	×	**28-Feb-2022**	27-Aug-2022	✓
Soil Glass Jar - Unpreserved (ED042T) AMD09_29+30, AMD09_35, AMD10_28	**03-Feb-2022**	**28-Feb-2022**	10-Feb-2022	×	**28-Feb-2022**	27-Aug-2022	✓
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)							
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN60-DIa-G) AMD01_21, AMD02_15, AMD03_21, AMD05_26	**01-Feb-2022**	**14-Feb-2022**	15-Feb-2022	✓	**----**	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN60-DIa-G) AMD04_24+25, AMD04_24+25D, AMD06_20, AMD07_13, AMD08_22	**02-Feb-2022**	**14-Feb-2022**	16-Feb-2022	✓	**----**	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN60-DIa-G) AMD09_29+30, AMD09_35, AMD10_28	**03-Feb-2022**	**14-Feb-2022**	17-Feb-2022	✓	**----**	----	----

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

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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
AMD01_21, AMD02_15, AMD03_21, AMD04_24+25, AMD04_24+25D, AMD05_26, AMD06_20, AMD07_13, AMD08_22, AMD09_29+30, AMD09_35, AMD10_28	**14-Feb-2022**	**----**	----	----	**16-Feb-2022**	14-Feb-2022	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
AMD01_21, AMD02_15, AMD03_21, AMD04_24+25, AMD04_24+25D, AMD05_26, AMD06_20, AMD07_13, AMD08_22, AMD09_29+30, AMD09_35, AMD10_28	**14-Feb-2022**	**----**	----	----	**16-Feb-2022**	14-Mar-2022	✓
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
AMD01_21, AMD02_15, AMD03_21, AMD04_24+25, AMD04_24+25D, AMD05_26, AMD06_20, AMD07_13, AMD08_22, AMD09_29+30, AMD09_35, AMD10_28	**14-Feb-2022**	**----**	----	----	**16-Feb-2022**	28-Feb-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
AMD01_21, AMD02_15, AMD03_21, AMD04_24+25, AMD04_24+25D, AMD05_26, AMD06_20, AMD07_13, AMD08_22, AMD09_29+30, AMD09_35, AMD10_28	**14-Feb-2022**	**----**	----	----	**16-Feb-2022**	14-Mar-2022	✓
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
AMD01_21, AMD02_15, AMD03_21, AMD04_24+25, AMD04_24+25D, AMD05_26, AMD06_20, AMD07_13, AMD08_22, AMD09_29+30, AMD09_35, AMD10_28	**14-Feb-2022**	**----**	----	----	**16-Feb-2022**	14-Mar-2022	✓

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
ED093W: Water Leachable Major Cations							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (ED093W)							
AMD01_21, AMD02_15, AMD03_21, AMD04_24+25, AMD04_24+25D, AMD05_26, AMD06_20, AMD07_13, AMD08_22, AMD09_29+30, AMD09_35, AMD10_28	**14-Feb-2022**	**24-Feb-2022**	21-Feb-2022	×	**24-Feb-2022**	21-Feb-2022	×
EG020W: Water Leachable Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020E-W)							
AMD01_21, AMD02_15, AMD03_21, AMD04_24+25, AMD04_24+25D, AMD05_26, AMD06_20, AMD07_13, AMD08_22, AMD09_29+30, AMD09_35, AMD10_28	**14-Feb-2022**	**24-Feb-2022**	13-Aug-2022	✓	**24-Feb-2022**	13-Aug-2022	✓
EG035W: Water Leachable Mercury by FIMS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG035W)							
AMD01_21, AMD02_15, AMD03_21, AMD04_24+25, AMD04_24+25D, AMD05_26, AMD06_20, AMD07_13, AMD08_22, AMD09_29+30, AMD09_35, AMD10_28	**14-Feb-2022**	**----**	----	----	**18-Feb-2022**	14-Mar-2022	✓

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		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acid Neutralising Capacity (ANC)	EA013	3	22	**13.64**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Net Acid Generation	EA011	3	22	**13.64**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate as SO4 2- Total	ED040T	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	2	19	**10.53**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acid Neutralising Capacity (ANC)	EA013	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Net Acid Generation	EA011	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate as SO4 2- Total	ED040T	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Acid Neutralising Capacity (ANC)	EA013	2	22	**9.09**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate as SO4 2- Total	ED040T	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	1	19	**5.26**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Alkalinity by PC Titrator	ED037-P	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Major Cations	ED093W	2	17	**11.76**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Mercury by FIMS	EG035W	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	2	16	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite G	EG020G-W	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	2	12	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Major Cations	ED093W	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Mercury by FIMS	EG035W	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite G	EG020G-W	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Major Cations	ED093W	1	17	**5.88**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Mercury by FIMS	EG035W	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite G	EG020G-W	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	1	12	**8.33**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Mercury by FIMS	EG035W	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	1	16	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

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

Analytical Methods	Method	Matrix	Method Descriptions
pH by PC Titrator	EA005-P	SOIL	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	SOIL	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Net Acid Generation	EA011	SOIL	In house: Referenced to Miller (1998) Titremetric 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 semiquanititatively estimate the likely reactivity. The soil is then reacted with an known excess quanitity of an appropriate acid. Titration determines the acid remaining, and the ANC can be calculated from comparison with a blank titration.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Hardness as CaCO3	EA065	SOIL	In house: Referenced to APHA 2340 B. This method is compliant with NEPM Schedule B(3)
Asbestos Identification in Soils	EA200	SOIL	AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Alkalinity by PC Titrator	ED037-P	SOIL	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 as SO4 2- Total	ED040T	SOIL	In house: Total Sulfate is determined off a HCl digestion by ICPAES as S , and reported as SO4
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	SOIL	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)
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 SO2) is measured by infra-red detector
Chloride by Discrete Analyser	ED045G	SOIL	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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Water Leachable Major Cations	ED093W	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010; ALS QWI-EN/EG005, QWI-EN/ED093. The ICPAES technique quickly breaks the sample down into atoms and ions under extremely hot plasma. Atoms are then ionised, emitting a characteristic spectrum. The spectrometer then separates the wavelengths, prior to comparison of intensities against matrix matched standards for quantification.
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, AS 4439.3, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite G	EG020G-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Mercury by FIMS	EG035W	SOIL	In house: Referenced to 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 TCLP solution. 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).
Sulfide as S	EK085T	SOIL	In-house. Sulfide in a soil is determined as the difference between Total Sulfur (Leco) and Sulfate.

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
HCl Digest	EN24	SOIL	1g of soil is digested in 30 ml of 30% HCl and the resultant digest bulked and filtered for analysis by ICP.
Digestion for Total Recoverable Metals in DI Water Leachate	EN25W	SOIL	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)
Deionised Water Leach - Glass Leaching Vessel	EN60-Dla-G	SOIL	In house QWI-EN/60 referenced to AS4439.3 Preparation of Leachates
Dry and Pulverise (up to 100g)	GEO30	SOIL	#

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

GHD
Level 10, 999 Hay Street, Perth WA 6000
PO Box 3106, Perth WA 6832
Reception Ph: 08 6222 8222

Project ID 12518217	**PO Number** (to be invoiced) 12518217
Laboratory Quote No. NA	**Turnaround Time** Standard
Project Manager (Invoice) & GHD accounts Paul Hamer	**Email Address (Results)** paul.hamer@ghd.com

Laboratory: ALS Environmental
Address: 26 Rigali Way, Wangara WA 6065
Laboratory Contact: ALS Environmental.

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air	Container: Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Container: Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	Container: No	EA013 (ANC)	EA011 (NAG)	EA200 (Asbestos)	EA250 (Radionuclides)	EK085T (Sulfide as S)	ED042T (Sulfur total S)	Metals *	Leach *	Remarks
AMD01_21	1	1/02/2022		S	2GJ, 1PB		No	x	x			x	x	x	x	
AMD01_26	2	1/02/2022		S	1PB		No	X	X							
AMD02_15	3	1/02/2022		S	5GJ,2PB		No	X	X	X	X	X	x	X	X	
AMD02_3	4	1/02/2022		S	1PB		No	X	X							
AMD03_13	5	1/02/2022		S	3GJ,2PB		No	X	X	X	X					
AMD03_21	6	1/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD04_24+25	7	2/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD04_18	8	2/02/2022		S	1PB		No	X	X							
AMD04_24+25D	9	2/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD05_26	10	1/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD05_31	11	1/02/2022		S	1PB		No	X	X							
AMD06_20	12	2/02/2022		S	5GJ,2PB		No	X	X	X	X	X	x	X	X	
AMD06_15	13	2/02/2022		S	1PB		No	X	X							
AMD06_20D	14	2/02/2022		S	3GJ, 1PB		No			X	X					
AMD07_13	15	2/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD07_29	16	2/02/2022		S	3GJ, 2PB		No	X	X	X	X					
AMD08_15+16	17	2/02/2022		S	1PB		No	X	X							
AMD08_22	18	2/02/2022		S	5GJ,2PB		No	X	X	X	X	X	x	X	X	
AMD09_29+30	19	3/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD09_35	20	3/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD10_28	21	3/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD10_38	22	3/02/2022		S	1PB		No	X	X							
AMD10_28D	23	3/02/2022		S	2GJ, 1PB		No	X	X							

* as per analysis suite in quote provided for metals and leach analysis

Environmental Division Perth
Work Order Reference
EP2201472

Telephone : -- 61-8-9406 1301

Sampled by: S.Bright	Date/Time:	Relinquished by: S.Bright	Date/Time: 8/2/2022
Received by: SP	Date/Time: 1700	Relinquished by:	Date/Time:

8/2/22

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2201490**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MR PAUL HAMER	Contact	: Nick Courts
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: +61 08 6222 8583	Telephone	: +61-8-9406 1301
Project	: 12518217	Date Samples Received	: 08-Feb-2022 17:00
Order number	: 12518217	Date Analysis Commenced	: 01-Mar-2022
C-O-C number	: ----	Issue Date	: 04-Apr-2022 12:48
Sampler	: Steff Bright		
Site	:		
Quote number	: EN/005		
No. of samples received	: 15		
No. of samples analysed	: 6		

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	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Brisbane External Subcontracting, 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.

- Radionuclides conducted by ALS Brisbane, NATA Site No. 818.
- Radiological work undertaken by ALS Laboratory Group (Ceska Lipa) under CAI accreditation No. L1163. Report No. PR2212946. NATA and CAI accreditations' are both recognised under ILAC.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD02_15	AMD03_13	AMD06_20	AMD06_20D	AMD07_29
			Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2201490-001	EP2201490-002	EP2201490-003	EP2201490-004	EP2201490-005
				Result	Result	Result	Result	Result
Radionuclides / Activity								
Gross alpha	----	500	Bq/kg DW	<500	<500	<500	<500	<500
Gross beta	----	500	Bq/kg DW	<500	<500	<500	<500	<500

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD08_22	----	----	----	----
			Sampling date / time	02-Feb-2022 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2201490-006	--------	--------	--------	--------
				Result	----	----	----	----
Radionuclides / Activity								
Gross alpha	----	500	Bq/kg DW	<500	----	----	----	----
Gross beta	----	500	Bq/kg DW	<500	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Brisbane, NATA accreditation no. 825, site no. 818 (Chemistry) 18958 (Biology).

(SOIL) Radionuclides / Activity

QUALITY CONTROL REPORT

Work Order	: **EP2201490**	Page	: 1 of 3
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MR PAUL HAMER	Contact	: Nick Courts
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: +61 08 6222 8583	Telephone	: +61-8-9406 1301
Project	: 12518217	Date Samples Received	: 08-Feb-2022
Order number	: 12518217	Date Analysis Commenced	: 01-Mar-2022
C-O-C number	: ----	Issue Date	: 04-Apr-2022
Sampler	: Steff Bright		
Site	:		
Quote number	: EN/005		
No. of samples received	: 15		
No. of samples analysed	: 6		

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*
Kim McCabe	Senior Inorganic Chemist	Brisbane External Subcontracting, 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.

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.**

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

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

- **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	: **EP2201490**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MR PAUL HAMER	Telephone	: +61-8-9406 1301
Project	: 12518217	Date Samples Received	: 08-Feb-2022
Site	:	Issue Date	: 04-Apr-2022
Sampler	: Steff Bright	No. of samples received	: 15
Order number	: 12518217	No. of samples analysed	: 6

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

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

Summary of Outliers

Outliers : Quality Control Samples

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

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **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:

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*

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
Gross Alpha and Beta activity in solids	EA250	SOIL	In house: Referenced to ISO 9697 / CSN 757611. Determination of Gross Alpha and Beta activity in soil and sediment by Thick Source method. An appropriate mass of sample is dried and pulverised prior to direct activity counting. (If required, Potassium may be determined separately and results corrected accordingly for 40K.) Analysis is performed by ALS (Czech Republic) who hold technical accreditation #1163 for Gross alpha and beta activity under CAI. CAI are a European accreditation body, equivalent to NATA in Australila and recognised internationally by NATA under ILAC.

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project ID 12518217	**PO Number** (to be invoiced) 12518217
Laboratory Quote No. NA	**Turnaround Time** Standard
Project Manager (Invoice) & GHD accounts Paul Hamer	**Email Address (Results)** paul.hamer@ghd.com

Laboratory: ALS Environmental
Address: 26 Rigali Way, Wangara WA 6065
Laboratory Contact: ALS Environmental

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air	Container Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Container Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	Container No	Analyses EA013 (ANC)	EA011 (NAG)	EA200 (Asbestos)	EA250 (Radionuclides)	EK085T (Sulfide as S)	ED042T (Sulfur total S)	Metals *	Leach *	Remarks
AMD01_21	~~17~~	1/02/2022		S	2GJ, 1PB		No	x	x			x	x	x	x	
AMD01_26	—	1/02/2022		S	1PB		No	X	X							
AMD02_15	1	1/02/2022		S	5GJ,2PB		No	X	X	X	X	X	x	X	X	
AMD02_3	—	1/02/2022		S	1PB		No	X	X							
AMD03_13	2	1/02/2022		S	3GJ,2PB		No	X	X	X	X					
AMD03_21	8—	1/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD04_24+25	~~9~~	2/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD04_18	—	2/02/2022		S	1PB		No	X	X							
AMD04_24+25D	~~9~~ 10	2/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD05_26	~~10~~ 11	1/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD05_31	—	1/02/2022		S	1PB		No	X	X							
AMD06_20	3	2/02/2022		S	5GJ,2PB		No	X	X	X	X	X	x	X	X	
AMD06_15	—	2/02/2022		S	1PB		No	X	X							
AMD06_20D	4	2/02/2022		S	3GJ, 1PB		No			X	X					
AMD07_13	~~11~~ 12	2/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD07_29	5	2/02/2022		S	3GJ, 2PB		No	X	X	X	X					
AMD08_15+16	—	2/02/2022		S	1PB		No	X	X							
AMD08_22	6	2/02/2022		S	5GJ,2PB		No	X	X	X	X	X	x	X	X	
AMD09_29+30	~~12~~ 13	3/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD09_35	— 14	3/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD10_28	— 15	3/02/2022		S	2GJ, 1PB		No	X	X			X	x	X	X	
AMD10_38	—	3/02/2022		S	1PB		No	X	X							
AMD10_28D	—	3/02/2022		S	2GJ, 1PB		No	X	X							

Environmental Division Perth
Work Order Reference
EP2201490

Telephone : -- 61-8-9406 1301

* as per analysis suite in quote provided for metals and leach analysis

Sampled by: S.Bright		Relinquished by: S.Bright	Date/Time: 8/2/2022
Received by: SP	Date/Time: 1700	Relinquished by:	Date/Time:

8/2/22

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2203533**	Page	: 1 of 30
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MR PAUL HAMER	Contact	: REBECCA OWEN
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: +61 08 6222 8583	Telephone	: +61-8-9406 1301
Project	: 12518217	Date Samples Received	: 01-Mar-2022 11:30
Order number	: 12518217	Date Analysis Commenced	: 29-Mar-2022
C-O-C number	: ----	Issue Date	: 29-Apr-2022 12:19
Sampler	: Steff Bright		
Site	: ----		
Quote number	: EP/174/22		
No. of samples received	: 73		
No. of samples analysed	: 63		

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
- Descriptive 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*
Alana Smylie	Team Leader - Asbestos	Newcastle - Asbestos, Mayfield West, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, 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.

- ED040T, ED042T and EK085T conducted by ALS Brisbane, NATA Site No. 818.
- Asbestos conducted by ALS Newcastle, NATA accreditation no. 825, site no 1656.
- Metals conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- EG035W: Positive Hg for various samples confirmed by re-analysis.
- Ionic Balance out of acceptable limits for various samples due to analytes not quantified in this report.
- Amendment (29/04/2022): This report has been amended as a result of a request to change sample identification numbers (IDs), for samples 67-73. All analysis results are as per the previous report.
- Ionic balances were calculated using: major anions - chloride, alkalinity and sulfate; and major cations - calcium, magnesium, potassium and sodium.
- ED040T (Total Major Anions by ICP-AES): AMD03_20 (EP2203533-010) shows poor duplicate results. However, insufficient sample volume remains to perform visual inspection.
- ED040T (Total Major Anions by ICP-AES): EB2208182-001 shows poor duplicate results due to sample heterogeneity. This has been confirmed by visual inspection.
- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.
- 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: **DI WATER LEACHATE** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Sample ID	AMD01_16	AMD02_8	AMD02_24	AMD03_6	AMD03_14
				Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
					EP2203533-001	EP2203533-002	EP2203533-004	EP2203533-005	EP2203533-007
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**6.48**	**6.03**	**8.09**	**6.20**	**5.04**
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**4**	**4**	**18**	**9**	**57**
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		**1**	<1	**7**	**1**	<1
Total Alkalinity as CaCO3	----	1	mg/L		**1**	<1	**7**	**1**	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	<1	<1	<1	**9**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		<1	<1	<1	<1	**6**
ED093W: Water Leachable Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	**3**	<1	**2**
Magnesium	7439-95-4	1	mg/L		<1	<1	<1	<1	**2**
Sodium	7440-23-5	1	mg/L		<1	<1	<1	<1	**4**
Potassium	7440-09-7	1	mg/L		**1**	<1	<1	<1	<1
EG020W: Water Leachable Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**1.94**	**0.26**	**0.77**	**0.85**	**3.94**
ø **Germanium**	7440-56-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Antimony	7440-36-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
ø **Niobium**	7440-03-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	**0.001**	**0.001**	**0.009**
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L		**0.018**	**0.002**	**0.004**	**0.002**	**0.005**
ø **Rhenium**	7440-15-5	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	**0.0003**
Cerium	7440-45-1	0.001	mg/L		**0.008**	<0.001	**0.001**	<0.001	**0.002**
Caesium	7440-46-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		**0.004**	**0.001**	**0.004**	**0.004**	**0.016**
Cobalt	7440-48-4	0.001	mg/L		<0.001	**0.011**	**0.004**	**0.011**	**0.064**
Copper	7440-50-8	0.001	mg/L		**0.002**	**0.004**	**0.007**	**0.017**	**0.060**
Gallium	7440-55-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Hafnium	7440-58-6	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	AMD01_16	AMD02_8	AMD02_24	AMD03_6	AMD03_14
				Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
					EP2203533-001	EP2203533-002	EP2203533-004	EP2203533-005	EP2203533-007
					Result	Result	Result	Result	Result
EG020W: Water Leachable Metals by ICP-MS - Continued									
Lanthanum	7439-91-0	0.001	mg/L		**0.004**	<0.001	<0.001	<0.001	**0.001**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	**0.002**	<0.001	**0.005**
Lithium	7439-93-2	0.001	mg/L		<0.001	<0.001	**0.002**	<0.001	**0.001**
Manganese	7439-96-5	0.001	mg/L		**0.004**	**0.010**	**0.017**	**0.012**	**0.060**
Molybdenum	7439-98-7	0.001	mg/L		<0.001	<0.001	<0.001	**0.002**	<0.001
Nickel	7440-02-0	0.001	mg/L		<0.001	**0.003**	**0.002**	**0.002**	**0.030**
Rubidium	7440-17-7	0.001	mg/L		**0.002**	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Silver	7440-22-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Strontium	7440-24-6	0.001	mg/L		**0.001**	**0.001**	**0.003**	<0.001	**0.004**
Tellurium	22541-49-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Thorium	7440-29-1	0.001	mg/L		**0.002**	<0.001	<0.001	<0.001	**0.001**
Tin	7440-31-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L		**0.06**	<0.01	<0.01	**0.01**	**0.01**
Uranium	7440-61-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.001**
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	**0.02**
Yttrium	7440-65-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.010**	**0.011**	**0.013**	**0.007**	**0.023**
Zirconium	7440-67-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	**0.007**
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		**0.77**	**0.43**	**2.15**	**0.57**	**0.80**
Gold	7440-57-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Tungsten	7440-33-7	0.001	mg/L		**0.002**	**0.016**	**0.017**	**0.045**	**0.011**
Tantalum	7440-25-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	**0.0023**	<0.0001	**0.0021**	<0.0001
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**0.02**	<0.01	**0.14**	**0.02**	**0.36**
ø Total Cations	----	0.01	meq/L		<0.01	<0.01	**0.19**	**0.04**	**0.43**
ø Ionic Balance	----	0.01	%		**----**	<0.01	**----**	**----**	**----**
ø Ionic Balance	----	0.01	%		**----**	**----**	**16.0**	**37.0**	**9.56**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	AMD03_18	AMD03_22	AMD04_14	AMD04_26	AMD04_30
				Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00
					EP2203533-009	EP2203533-011	EP2203533-012	EP2203533-014	EP2203533-016
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**4.00**	**4.12**	**6.11**	**3.51**	**4.00**
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**146**	**138**	**13**	**324**	**149**
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		<1	<1	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		<1	<1	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**49**	**46**	<1	**99**	**47**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**2**	**3**	**3**	<1	<1
ED093W: Water Leachable Major Cations									
Calcium	7440-70-2	1	mg/L		**2**	<1	<1	**10**	**7**
Magnesium	7439-95-4	1	mg/L		**1**	<1	<1	**6**	**4**
Sodium	7440-23-5	1	mg/L		**1**	**2**	**2**	**1**	<1
Potassium	7440-09-7	1	mg/L		<1	<1	<1	<1	<1
EG020W: Water Leachable Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**6.66**	**5.02**	**0.95**	**1.64**	**1.62**
ø **Germanium**	7440-56-4	0.001	mg/L		**0.005**	**0.002**	<0.001	<0.001	<0.001
Antimony	7440-36-0	0.001	mg/L		**0.006**	<0.001	<0.001	<0.001	<0.001
ø **Niobium**	7440-03-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L		**0.005**	**0.003**	<0.001	<0.001	<0.001
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	**0.006**	**0.005**
Barium	7440-39-3	0.001	mg/L		**0.017**	**0.012**	**0.003**	**0.040**	**0.031**
ø **Rhenium**	7440-15-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		**0.0264**	<0.0001	<0.0001	**0.0013**	**0.0004**
Cerium	7440-45-1	0.001	mg/L		**0.004**	**0.006**	<0.001	**0.012**	**0.008**
Caesium	7440-46-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		**0.003**	**0.002**	**0.002**	**0.040**	**0.010**
Cobalt	7440-48-4	0.001	mg/L		**1.25**	**2.28**	<0.001	**0.879**	**0.511**
Copper	7440-50-8	0.001	mg/L		**0.650**	<0.001	<0.001	**0.032**	**0.009**
Gallium	7440-55-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Hafnium	7440-58-6	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	AMD03_18	AMD03_22	AMD04_14	AMD04_26	AMD04_30
				Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00
					EP2203533-009	EP2203533-011	EP2203533-012	EP2203533-014	EP2203533-016
					Result	Result	Result	Result	Result
EG020W: Water Leachable Metals by ICP-MS - Continued									
Lanthanum	7439-91-0	0.001	mg/L		**0.002**	**0.004**	<0.001	**0.010**	**0.006**
Lead	7439-92-1	0.001	mg/L		**0.004**	<0.001	<0.001	**0.002**	**0.002**
Lithium	7439-93-2	0.001	mg/L		<0.001	<0.001	<0.001	**0.002**	**0.001**
Manganese	7439-96-5	0.001	mg/L		**0.035**	**0.091**	**0.001**	**0.184**	**0.205**
Molybdenum	7439-98-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L		**0.629**	**1.43**	<0.001	**1.64**	**0.653**
Rubidium	7440-17-7	0.001	mg/L		<0.001	<0.001	<0.001	**0.002**	**0.001**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Silver	7440-22-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Strontium	7440-24-6	0.001	mg/L		**0.011**	**0.006**	<0.001	**0.018**	**0.011**
Tellurium	22541-49-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Thorium	7440-29-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Tin	7440-31-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L		<0.01	<0.01	<0.01	**0.01**	**0.04**
Uranium	7440-61-1	0.001	mg/L		<0.001	<0.001	<0.001	**0.003**	<0.001
Vanadium	7440-62-2	0.01	mg/L		**0.10**	**0.06**	<0.01	**0.18**	**0.02**
Yttrium	7440-65-5	0.001	mg/L		**0.002**	**0.004**	<0.001	**0.044**	**0.020**
Zinc	7440-66-6	0.005	mg/L		**1.41**	**0.547**	<0.005	**1.28**	**1.63**
Zirconium	7440-67-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		**1.84**	**4.99**	<0.05	**11.6**	**3.00**
Gold	7440-57-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Tungsten	7440-33-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Tantalum	7440-25-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	**0.0023**	<0.0001	<0.0001
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**1.08**	**1.04**	**0.08**	**2.06**	**0.98**
ø Total Cations	----	0.01	meq/L		**0.27**	**0.09**	**0.09**	**1.09**	**0.73**
ø Ionic Balance	----	0.01	%		**60.0**	**84.6**	**1.38**	**31.0**	**14.6**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	AMD04_36	AMD04_40	AMD05_22	AMD05_26	AMD05_30
				Sampling date / time	02-Feb-2022 00:00	02-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
					EP2203533-018	EP2203533-020	EP2203533-021	EP2203533-023	EP2203533-025
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**6.06**	**3.91**	**6.40**	**6.43**	**6.74**
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**32**	**223**	**6**	**10**	**15**
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		**3**	<1	**1**	**2**	**3**
Total Alkalinity as CaCO3	----	1	mg/L		**3**	<1	**1**	**2**	**3**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**9**	**69**	<1	<1	**2**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**1**	**5**	<1	**2**	**2**
ED093W: Water Leachable Major Cations									
Calcium	7440-70-2	1	mg/L		**3**	**12**	<1	<1	<1
Magnesium	7439-95-4	1	mg/L		**2**	**7**	<1	<1	<1
Sodium	7440-23-5	1	mg/L		**2**	**4**	<1	**2**	**2**
Potassium	7440-09-7	1	mg/L		<1	<1	<1	<1	<1
EG020W: Water Leachable Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**2.70**	**1.27**	**5.88**	**5.96**	**3.22**
ø **Germanium**	7440-56-4	0.001	mg/L		**0.003**	<0.001	**0.005**	**0.005**	**0.002**
Antimony	7440-36-0	0.001	mg/L		**0.002**	<0.001	<0.001	<0.001	<0.001
ø **Niobium**	7440-03-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L		**0.004**	<0.001	**0.005**	**0.006**	**0.001**
Beryllium	7440-41-7	0.001	mg/L		**0.002**	**0.010**	**0.001**	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L		**0.011**	**0.041**	**0.012**	**0.026**	**0.045**
ø **Rhenium**	7440-15-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	**0.0005**	<0.0001	<0.0001	<0.0001
Cerium	7440-45-1	0.001	mg/L		**0.060**	**0.005**	**0.239**	**0.334**	**0.042**
Caesium	7440-46-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		**0.075**	**0.008**	**0.087**	**0.055**	**0.011**
Cobalt	7440-48-4	0.001	mg/L		**0.035**	**0.369**	**0.012**	**0.008**	<0.001
Copper	7440-50-8	0.001	mg/L		**0.035**	**0.010**	**0.008**	**0.026**	**0.006**
Gallium	7440-55-3	0.001	mg/L		**0.001**	<0.001	**0.003**	**0.004**	<0.001
Hafnium	7440-58-6	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	AMD04_36	AMD04_40	AMD05_22	AMD05_26	AMD05_30
				Sampling date / time	02-Feb-2022 00:00	02-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
					EP2203533-018	EP2203533-020	EP2203533-021	EP2203533-023	EP2203533-025
					Result	Result	Result	Result	Result
EG020W: Water Leachable Metals by ICP-MS - Continued									
Lanthanum	7439-91-0	0.001	mg/L		**0.050**	**0.005**	**0.092**	**0.135**	**0.016**
Lead	7439-92-1	0.001	mg/L		**0.016**	**0.007**	**0.008**	**0.006**	**0.008**
Lithium	7439-93-2	0.001	mg/L		<0.001	**0.002**	**0.003**	**0.002**	**0.001**
Manganese	7439-96-5	0.001	mg/L		**0.038**	**0.241**	**0.031**	**0.030**	**0.030**
Molybdenum	7439-98-7	0.001	mg/L		**0.004**	<0.001	<0.001	**0.001**	**0.001**
Nickel	7440-02-0	0.001	mg/L		**0.035**	**0.505**	**0.006**	**0.008**	**0.004**
Rubidium	7440-17-7	0.001	mg/L		**0.002**	**0.002**	**0.001**	**0.001**	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Silver	7440-22-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Strontium	7440-24-6	0.001	mg/L		**0.004**	**0.016**	**0.004**	**0.007**	**0.020**
Tellurium	22541-49-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Thorium	7440-29-1	0.001	mg/L		**0.006**	**0.001**	**0.010**	**0.018**	**0.008**
Tin	7440-31-5	0.001	mg/L		**0.001**	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L		**0.09**	**0.01**	**0.10**	**0.06**	**0.04**
Uranium	7440-61-1	0.001	mg/L		**0.002**	<0.001	**0.005**	**0.005**	<0.001
Vanadium	7440-62-2	0.01	mg/L		**0.51**	**0.04**	**0.02**	**0.02**	**0.02**
Yttrium	7440-65-5	0.001	mg/L		**0.072**	**0.028**	**0.027**	**0.030**	**0.008**
Zinc	7440-66-6	0.005	mg/L		**0.015**	**0.828**	**0.008**	**0.016**	<0.005
Zirconium	7440-67-7	0.005	mg/L		**0.020**	<0.005	**0.014**	**0.013**	**0.006**
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		**1.51**	**4.54**	**8.09**	**6.35**	**1.83**
Gold	7440-57-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Tungsten	7440-33-7	0.001	mg/L		**0.003**	<0.001	<0.001	<0.001	<0.001
Tantalum	7440-25-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		**0.0182**	<0.0001	**0.0001**	**0.0001**	<0.0001
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**0.28**	**1.58**	**0.02**	**0.10**	**0.16**
ø Total Cations	----	0.01	meq/L		**0.35**	**1.35**	<0.01	**0.09**	**0.09**
ø Ionic Balance	----	0.01	%		**12.1**	**7.82**	**100**	**5.12**	**29.0**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	AMD06_2	AMD06_10	AMD06_22	AMD06_14	AMD06_18
				Sampling date / time	02-Mar-2022 00:00	02-Mar-2022 00:00	02-Mar-2022 00:00	02-Mar-2022 00:00	02-Mar-2022 00:00
					EP2203533-026	EP2203533-028	EP2203533-030	EP2203533-032	EP2203533-034
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**6.57**	**6.96**	**6.90**	**7.00**	**6.68**
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**5**	**31**	**8**	**6**	**5**
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		**1**	**3**	**3**	**3**	**2**
Total Alkalinity as CaCO3	----	1	mg/L		**1**	**3**	**3**	**3**	**2**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	**1**	<1	<1	<1
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		<1	**8**	<1	<1	<1
ED093W: Water Leachable Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	<1	<1	<1
Magnesium	7439-95-4	1	mg/L		<1	**1**	<1	<1	<1
Sodium	7440-23-5	1	mg/L		<1	**4**	<1	<1	<1
Potassium	7440-09-7	1	mg/L		<1	<1	<1	<1	<1
EG020W: Water Leachable Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.45**	**0.30**	**1.10**	**0.20**	**0.25**
ø **Germanium**	7440-56-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Antimony	7440-36-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
ø **Niobium**	7440-03-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	**0.003**	<0.001	<0.001
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L		**0.007**	**0.004**	**0.014**	**0.003**	**0.004**
ø **Rhenium**	7440-15-5	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
Cerium	7440-45-1	0.001	mg/L		<0.001	<0.001	**0.004**	<0.001	<0.001
Caesium	7440-46-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		**0.002**	**0.002**	**0.009**	**0.001**	**0.001**
Cobalt	7440-48-4	0.001	mg/L		**0.003**	<0.001	**0.005**	**0.001**	**0.004**
Copper	7440-50-8	0.001	mg/L		**0.006**	**0.001**	**0.007**	**0.001**	**0.002**
Gallium	7440-55-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Hafnium	7440-58-6	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Sample ID	AMD06_2	AMD06_10	AMD06_22	AMD06_14	AMD06_18
				Sampling date / time	02-Mar-2022 00:00	02-Mar-2022 00:00	02-Mar-2022 00:00	02-Mar-2022 00:00	02-Mar-2022 00:00
Compound	CAS Number	LOR	Unit		EP2203533-026	EP2203533-028	EP2203533-030	EP2203533-032	EP2203533-034
					Result	Result	Result	Result	Result
EG020W: Water Leachable Metals by ICP-MS - Continued									
Lanthanum	7439-91-0	0.001	mg/L		<0.001	<0.001	**0.002**	<0.001	<0.001
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	**0.006**	<0.001	<0.001
Lithium	7439-93-2	0.001	mg/L		**0.001**	<0.001	**0.001**	<0.001	<0.001
Manganese	7439-96-5	0.001	mg/L		**0.034**	**0.012**	**0.141**	**0.019**	**0.039**
Molybdenum	7439-98-7	0.001	mg/L		<0.001	**0.004**	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L		**0.003**	**0.003**	**0.006**	<0.001	**0.002**
Rubidium	7440-17-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Silver	7440-22-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Strontium	7440-24-6	0.001	mg/L		**0.001**	**0.002**	**0.004**	**0.001**	<0.001
Tellurium	22541-49-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Thorium	7440-29-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Tin	7440-31-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Uranium	7440-61-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Yttrium	7440-65-5	0.001	mg/L		<0.001	<0.001	**0.004**	<0.001	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.010**	<0.005	**0.028**	**0.008**	**0.010**
Zirconium	7440-67-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		**0.70**	**0.44**	**9.81**	**0.44**	**0.81**
Gold	7440-57-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Tungsten	7440-33-7	0.001	mg/L		**0.006**	**0.006**	**0.002**	**0.014**	**0.010**
Tantalum	7440-25-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		**0.0004**	<0.0001	<0.0001	<0.0001	<0.0001
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**0.02**	**0.31**	**0.06**	**0.06**	**0.04**
ø Total Cations	----	0.01	meq/L		<0.01	**0.17**	<0.01	<0.01	<0.01
ø Ionic Balance	----	0.01	%		**100**	**27.6**	**100**	**100**	**100**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	AMD06_28	AMD07_14	AMD07_20	AMD07_30	AMD08_8
				Sampling date / time	02-Mar-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
					EP2203533-036	EP2203533-038	EP2203533-040	EP2203533-042	EP2203533-054
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**7.12**	**6.92**	**6.85**	**6.87**	**5.66**
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**10**	**6**	**6**	**6**	**14**
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		**3**	**2**	**2**	**2**	<1
Total Alkalinity as CaCO3	----	1	mg/L		**3**	**2**	**2**	**2**	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**1**	<1	<1	<1	**5**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		<1	<1	<1	<1	<1
ED093W: Water Leachable Major Cations									
Calcium	7440-70-2	1	mg/L		**1**	<1	<1	<1	<1
Magnesium	7439-95-4	1	mg/L		**1**	<1	<1	**1**	<1
Sodium	7440-23-5	1	mg/L		<1	<1	<1	<1	**1**
Potassium	7440-09-7	1	mg/L		<1	<1	<1	<1	<1
EG020W: Water Leachable Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**0.43**	**0.39**	**0.16**	**0.72**	**5.78**
ø **Germanium**	7440-56-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Antimony	7440-36-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
ø **Niobium**	7440-03-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L		**0.003**	**0.010**	**0.003**	**0.011**	**0.041**
ø **Rhenium**	7440-15-5	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
Cerium	7440-45-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.005**
Caesium	7440-46-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		**0.002**	<0.001	<0.001	**0.001**	**0.010**
Cobalt	7440-48-4	0.001	mg/L		**0.004**	**0.001**	**0.002**	**0.003**	**0.007**
Copper	7440-50-8	0.001	mg/L		**0.002**	**0.001**	**0.001**	**0.002**	**0.001**
Gallium	7440-55-3	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.002**
Hafnium	7440-58-6	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	AMD06_28	AMD07_14	AMD07_20	AMD07_30	AMD08_8
				Sampling date / time	02-Mar-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
					EP2203533-036	EP2203533-038	EP2203533-040	EP2203533-042	EP2203533-054
					Result	Result	Result	Result	Result
EG020W: Water Leachable Metals by ICP-MS - Continued									
Lanthanum	7439-91-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.003**
Lead	7439-92-1	0.001	mg/L		**0.002**	<0.001	**0.003**	**0.009**	**0.001**
Lithium	7439-93-2	0.001	mg/L		**0.001**	<0.001	<0.001	**0.002**	**0.003**
Manganese	7439-96-5	0.001	mg/L		**0.015**	**0.002**	**0.002**	**0.003**	**0.026**
Molybdenum	7439-98-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L		**0.002**	<0.001	<0.001	**0.002**	**0.011**
Rubidium	7440-17-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.001**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Silver	7440-22-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Strontium	7440-24-6	0.001	mg/L		**0.001**	**0.002**	**0.001**	**0.002**	**0.009**
Tellurium	22541-49-7	0.005	mg/L		<0.005	<0.005	**0.006**	<0.005	<0.005
Thorium	7440-29-1	0.001	mg/L		<0.001	<0.001	**0.004**	**0.002**	**0.003**
Tin	7440-31-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	**0.05**
Uranium	7440-61-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Yttrium	7440-65-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.005**
Zinc	7440-66-6	0.005	mg/L		**0.011**	<0.005	**0.010**	**0.007**	**0.007**
Zirconium	7440-67-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		**0.99**	**0.26**	**0.30**	**0.50**	**0.86**
Gold	7440-57-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Tungsten	7440-33-7	0.001	mg/L		**0.015**	**0.017**	**0.024**	**0.018**	<0.001
Tantalum	7440-25-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	**0.0005**	**0.0003**	<0.0001	<0.0001
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**0.08**	**0.04**	**0.04**	**0.04**	**0.10**
ø Total Cations	----	0.01	meq/L		<0.01	<0.01	<0.01	<0.01	**0.04**
ø Ionic Balance	----	0.01	%		**100**	**100**	**100**	**100**	**41.1**

Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)			Sample ID	AMD08_14	AMD08_22	AMD08_30	AMD09_24	AMD09_38
			Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2203533-056	EP2203533-058	EP2203533-060	EP2203533-062	EP2203533-064
				Result	Result	Result	Result	Result
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	6.46	6.91	7.75	6.83	7.00
EA010P: Conductivity by PC Titrator								
Electrical Conductivity @ 25°C	----	1	µS/cm	11	12	14	14	7
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	2	3	6	2	3
Total Alkalinity as CaCO3	----	1	mg/L	2	3	6	2	3
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	2	<1	<1	1	<1
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	1	2	1	2	<1
ED093W: Water Leachable Major Cations								
Calcium	7440-70-2	1	mg/L	<1	<1	1	<1	<1
Magnesium	7439-95-4	1	mg/L	<1	<1	<1	1	<1
Sodium	7440-23-5	1	mg/L	2	2	1	3	<1
Potassium	7440-09-7	1	mg/L	<1	<1	<1	<1	<1
EG020W: Water Leachable Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	30.6	13.5	3.32	17.4	1.98
ø Germanium	7440-56-4	0.001	mg/L	<0.001	0.001	<0.001	<0.001	<0.001
Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
ø Niobium	7440-03-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L	0.092	0.153	0.021	0.036	0.028
ø Rhenium	7440-15-5	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
Cerium	7440-45-1	0.001	mg/L	0.018	0.038	0.004	0.035	0.005
Caesium	7440-46-2	0.001	mg/L	<0.001	<0.001	<0.001	0.001	<0.001
Chromium	7440-47-3	0.001	mg/L	0.039	0.026	0.011	0.044	0.003
Cobalt	7440-48-4	0.001	mg/L	0.012	0.003	<0.001	0.007	0.002
Copper	7440-50-8	0.001	mg/L	0.005	0.011	0.006	0.025	0.001
Gallium	7440-55-3	0.001	mg/L	0.006	0.003	<0.001	0.008	<0.001
Hafnium	7440-58-6	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	AMD08_14	AMD08_22	AMD08_30	AMD09_24	AMD09_38
				Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
					EP2203533-056	EP2203533-058	EP2203533-060	EP2203533-062	EP2203533-064
					Result	Result	Result	Result	Result
EG020W: Water Leachable Metals by ICP-MS - Continued									
Lanthanum	7439-91-0	0.001	mg/L		**0.005**	**0.019**	**0.002**	**0.015**	**0.003**
Lead	7439-92-1	0.001	mg/L		**0.003**	**0.015**	**0.007**	**0.008**	**0.001**
Lithium	7439-93-2	0.001	mg/L		**0.007**	**0.006**	**0.005**	**0.006**	**0.001**
Manganese	7439-96-5	0.001	mg/L		**0.009**	**0.005**	**0.003**	**0.025**	**0.003**
Molybdenum	7439-98-7	0.001	mg/L		**0.002**	**0.001**	<0.001	**0.001**	<0.001
Nickel	7440-02-0	0.001	mg/L		**0.013**	**0.006**	**0.004**	**0.021**	**0.001**
Rubidium	7440-17-7	0.001	mg/L		**0.001**	**0.001**	<0.001	**0.007**	**0.001**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Silver	7440-22-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Strontium	7440-24-6	0.001	mg/L		**0.020**	**0.022**	**0.002**	**0.007**	**0.011**
Tellurium	22541-49-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Thorium	7440-29-1	0.001	mg/L		**0.024**	**0.012**	**0.003**	**0.015**	**0.002**
Tin	7440-31-5	0.001	mg/L		<0.001	<0.001	**0.002**	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L		**0.09**	**0.08**	**0.02**	**0.09**	**0.09**
Uranium	7440-61-1	0.001	mg/L		**0.002**	**0.001**	<0.001	**0.001**	<0.001
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	**0.01**	<0.01
Yttrium	7440-65-5	0.001	mg/L		**0.014**	**0.028**	**0.002**	**0.006**	<0.001
Zinc	7440-66-6	0.005	mg/L		**0.012**	**0.007**	<0.005	**0.017**	**0.009**
Zirconium	7440-67-7	0.005	mg/L		**0.029**	**0.017**	<0.005	**0.020**	<0.005
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		**1.42**	**0.91**	**0.61**	**5.75**	**0.58**
Gold	7440-57-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Tungsten	7440-33-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.012**
Tantalum	7440-25-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		**0.0002**	<0.0001	<0.0001	**0.0002**	<0.0001
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**0.11**	**0.12**	**0.15**	**0.12**	**0.06**
ø Total Cations	----	0.01	meq/L		**0.09**	**0.09**	**0.09**	**0.13**	<0.01
ø Ionic Balance	----	0.01	%		**11.6**	**14.4**	**26.0**	**5.37**	**100**

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	AMD09_34	AMD10_16_18	AMD10_28_30	AMD10_36_38	AMD10_44_46
				Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
					EP2203533-066	EP2203533-067	EP2203533-069	EP2203533-071	EP2203533-073
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**6.97**	**6.35**	**4.66**	**4.74**	**4.82**
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**8**	**19**	**177**	**76**	**382**
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		**2**	**2**	<1	<1	<1
Total Alkalinity as CaCO3	----	1	mg/L		**2**	**2**	<1	<1	<1
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		<1	<1	**62**	**25**	**167**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		<1	**4**	**6**	**3**	**7**
ED093W: Water Leachable Major Cations									
Calcium	7440-70-2	1	mg/L		<1	<1	**5**	**3**	**23**
Magnesium	7439-95-4	1	mg/L		<1	**2**	**12**	**4**	**30**
Sodium	7440-23-5	1	mg/L		**1**	**4**	**7**	**2**	**6**
Potassium	7440-09-7	1	mg/L		<1	**5**	<1	**3**	<1
EG020W: Water Leachable Metals by ICP-MS									
Aluminium	7429-90-5	0.01	mg/L		**6.44**	**16.1**	**6.40**	**3.20**	**3.70**
ø **Germanium**	7440-56-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.002**
Antimony	7440-36-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
ø **Niobium**	7440-03-1	0.001	mg/L		**0.001**	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L		<0.001	**0.006**	**0.024**	**0.002**	**0.013**
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L		**0.075**	**0.035**	**0.018**	**0.021**	**0.060**
ø **Rhenium**	7440-15-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	**0.0002**	**0.0004**	**0.0008**	<0.0001
Cerium	7440-45-1	0.001	mg/L		**0.015**	**0.024**	**0.027**	**0.017**	**0.034**
Caesium	7440-46-2	0.001	mg/L		<0.001	**0.002**	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		**0.011**	**0.081**	**0.050**	**0.021**	**0.020**
Cobalt	7440-48-4	0.001	mg/L		**0.003**	**0.001**	**0.363**	**0.163**	**0.099**
Copper	7440-50-8	0.001	mg/L		**0.004**	**0.063**	**0.012**	**0.002**	**0.008**
Gallium	7440-55-3	0.001	mg/L		**0.002**	**0.014**	**0.003**	**0.001**	<0.001
Hafnium	7440-58-6	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01

Analytical Results

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

Compound	CAS Number	LOR	Unit	Sample ID	AMD09_34	AMD10_16_18	AMD10_28_30	AMD10_36_38	AMD10_44_46
				Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
					EP2203533-066	EP2203533-067	EP2203533-069	EP2203533-071	EP2203533-073
					Result	Result	Result	Result	Result
EG020W: Water Leachable Metals by ICP-MS - Continued									
Lanthanum	7439-91-0	0.001	mg/L		**0.006**	**0.012**	**0.013**	**0.008**	**0.019**
Lead	7439-92-1	0.001	mg/L		**0.004**	**0.035**	**0.013**	**0.014**	**0.002**
Lithium	7439-93-2	0.001	mg/L		**0.003**	**0.004**	**0.003**	<0.001	**0.002**
Manganese	7439-96-5	0.001	mg/L		**0.008**	**0.013**	**0.039**	**0.045**	**0.147**
Molybdenum	7439-98-7	0.001	mg/L		<0.001	**0.003**	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L		**0.008**	**0.014**	**0.247**	**0.150**	**0.060**
Rubidium	7440-17-7	0.001	mg/L		<0.001	**0.010**	**0.001**	**0.003**	<0.001
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Silver	7440-22-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Strontium	7440-24-6	0.001	mg/L		**0.019**	**0.005**	**0.015**	**0.007**	**0.041**
Tellurium	22541-49-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Thorium	7440-29-1	0.001	mg/L		**0.004**	**0.167**	**0.008**	**0.005**	**0.005**
Tin	7440-31-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L		**0.06**	**0.44**	**0.04**	**0.06**	**0.02**
Uranium	7440-61-1	0.001	mg/L		<0.001	**0.013**	**0.004**	**0.002**	**0.003**
Vanadium	7440-62-2	0.01	mg/L		<0.01	**0.07**	**0.09**	**0.02**	**0.04**
Yttrium	7440-65-5	0.001	mg/L		**0.003**	**0.011**	**0.008**	**0.004**	**0.015**
Zinc	7440-66-6	0.005	mg/L		**0.012**	<0.005	**0.069**	**0.206**	**0.009**
Zirconium	7440-67-7	0.005	mg/L		**0.006**	**0.067**	**0.021**	**0.009**	**0.012**
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	**0.05**
Iron	7439-89-6	0.05	mg/L		**1.47**	**2.99**	**1.69**	**0.78**	**3.77**
Gold	7440-57-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Tungsten	7440-33-7	0.001	mg/L		**0.007**	<0.001	<0.001	<0.001	<0.001
Tantalum	7440-25-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	**0.0008**	<0.0001	<0.0001	<0.0001
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**0.04**	**0.15**	**1.46**	**0.60**	**3.67**
ø Total Cations	----	0.01	meq/L		**0.04**	**0.17**	**1.75**	**0.62**	**4.05**
ø Ionic Balance	----	0.01	%		**4.24**	**6.48**	**9.02**	**0.98**	**4.90**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD01_16	AMD02_8	AMD02_12	AMD02_24	AMD03_6
			Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2203533-001	EP2203533-002	EP2203533-003	EP2203533-004	EP2203533-005
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**4.7**	**4.1**	**4.1**	**3.8**	**3.8**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	**0.4**	**0.3**	**0.7**	**1.0**
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**14.0**	**1.9**	**10.7**	**10.6**	**5.4**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	<0.5	**0.9**	<0.5
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**0**	**0**
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	<0.1	<0.1	<0.1	<0.1	<0.1
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**----**	**No**	**----**	**----**	**----**
Asbestos (Trace)	1332-21-4	5	Fibres	**----**	**No**	**----**	**----**	**----**
Asbestos Type	1332-21-4	-	--	**----**	**-**	**----**	**----**	**----**
Synthetic Mineral Fibre	----	0.1	g/kg	**----**	**No**	**----**	**----**	**----**
Organic Fibre	----	0.1	g/kg	**----**	**No**	**----**	**----**	**----**
Sample weight (dry)	----	0.01	g	**----**	**51.7**	**----**	**----**	**----**
APPROVED IDENTIFIER:	----	-	--	**----**	**A. SMYLIE**	**----**	**----**	**----**
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	<100	<100	**110**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.01**	**0.04**	**0.03**	**0.05**	**0.07**
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	**0.01**	**0.04**	**0.03**	**0.05**	**0.07**
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	**6.4**	**6.6**	**----**	**9.0**	**6.5**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD03_12	AMD03_14	AMD03_16	AMD03_18	AMD03_20
			Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2203533-006	EP2203533-007	EP2203533-008	EP2203533-009	EP2203533-010
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	3.6	4.2	3.8	4.1	3.5
NAG (pH 4.5)	----	0.1	kg H2SO4/t	1.0	1.0	0.8	6.1	7.6
NAG (pH 7.0)	----	0.1	kg H2SO4/t	7.9	12.5	3.2	50.1	35.3
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	1.1	<0.5	<0.5	<0.5	<0.5
ANC as CaCO3	----	0.1	% CaCO3	0.1	<0.1	<0.1	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	0.5	2.6	1.4	5.8	3.1
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	----	----	----	No	----
Asbestos (Trace)	1332-21-4	5	Fibres	----	----	----	No	----
Asbestos Type	1332-21-4	-	--	----	----	----	-	----
Synthetic Mineral Fibre	----	0.1	g/kg	----	----	----	No	----
Organic Fibre	----	0.1	g/kg	----	----	----	No	----
Sample weight (dry)	----	0.01	g	----	----	----	130	----
APPROVED IDENTIFIER:	----	-	--	----	----	----	A. SMYLIE	----
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	290	1220	410	1680	2700
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.05	0.12	0.07	0.73	0.77
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	0.04	0.08	0.06	0.67	0.68
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	----	5.1	----	3.9	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD03_22	AMD04_14	AMD04_22	AMD04_26	AMD04_28
			Sampling date / time	01-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2203533-011	EP2203533-012	EP2203533-013	EP2203533-014	EP2203533-015
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.8	4.7	3.8	3.1	3.1
NAG (pH 4.5)	----	0.1	kg H2SO4/t	40.2	<0.1	1.7	5.9	5.6
NAG (pH 7.0)	----	0.1	kg H2SO4/t	60.3	8.8	4.5	8.2	9.8
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	<0.5	<0.5	<0.5
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	0.9	6.4	3.2	3.1	2.8
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	1340	<100	1800	2480	2540
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	1.30	0.02	0.15	0.28	0.36
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	1.26	0.02	0.09	0.20	0.28
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	4.0	5.7	----	3.5	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD04_30	AMD04_34	AMD04_36	AMD04_38	AMD04_40
			Sampling date / time	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2203533-016	EP2203533-017	EP2203533-018	EP2203533-019	EP2203533-020
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.8	2.5	2.7	2.8	2.9
NAG (pH 4.5)	----	0.1	kg H2SO4/t	10.7	50.0	9.1	9.1	9.0
NAG (pH 7.0)	----	0.1	kg H2SO4/t	13.0	61.1	12.7	12.2	11.9
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	<0.5	<0.5	<0.5
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	0.8	2.1	0.4	1.3	1.0
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	1490	6670	150	2610	1750
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.26	1.37	0.60	0.41	0.30
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	0.21	1.15	0.60	0.32	0.24
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	3.9	----	6.0	----	3.8

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD05_22	AMD05_24	AMD05_26	AMD05_28	AMD05_30
			Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2203533-021	EP2203533-022	EP2203533-023	EP2203533-024	EP2203533-025
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**5.3**	**5.3**	**5.2**	**5.8**	**5.6**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**10.0**	**9.0**	**9.8**	**10.9**	**12.4**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**1.5**	**1.1**	<0.5	<0.5	<0.5
ANC as CaCO3	----	0.1	% CaCO3	**0.2**	**0.1**	<0.1	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**0**	**0**
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	<0.1	<0.1	<0.1	**0.7**	<0.1
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	<100	<100	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	<0.01	<0.01	<0.01
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	<0.01	<0.01	<0.01	<0.01	<0.01
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	**6.2**	**----**	**6.3**	**----**	**6.5**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD06_2	AMD06_6	AMD06_10	AMD06_12	AMD06_22
			Sampling date / time	02-Mar-2022 00:00	02-Mar-2022 00:00	02-Mar-2022 00:00	02-Mar-2022 00:00	02-Mar-2022 00:00
Compound	CAS Number	LOR	Unit	EP2203533-026	EP2203533-027	EP2203533-028	EP2203533-029	EP2203533-030
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	4.1	3.6	5.9	5.7	5.7
NAG (pH 4.5)	----	0.1	kg H2SO4/t	0.2	2.9	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	8.8	10.1	10.1	11.8	8.6
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.0	4.3	4.3	4.0	<0.5
ANC as CaCO3	----	0.1	% CaCO3	0.2	0.4	0.4	0.4	<0.1
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	<0.1	0.3	4.0	2.1	0.5
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	<100	<100	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.03	0.05	<0.01	0.01	0.01
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	0.03	0.05	<0.01	0.01	0.01
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	6.4	----	7.4	----	7.2

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD06_24	AMD06_14	AMD06_16	AMD06_18	AMD06_26
			Sampling date / time	02-Mar-2022 00:00	02-Mar-2022 00:00	02-Mar-2022 00:00	02-Mar-2022 00:00	02-Mar-2022 00:00
Compound	CAS Number	LOR	Unit	EP2203533-031	EP2203533-032	EP2203533-033	EP2203533-034	EP2203533-035
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	3.6	5.9	5.5	4.8	3.4
NAG (pH 4.5)	----	0.1	kg H2SO4/t	1.1	<0.1	<0.1	<0.1	1.8
NAG (pH 7.0)	----	0.1	kg H2SO4/t	10.5	10.9	7.1	9.0	3.4
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	0.8	3.3	5.6	3.5
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	0.3	0.6	0.4
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	0.8	<0.1	0.1	<0.1	<0.1
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	----	No	----	----	----
Asbestos (Trace)	1332-21-4	5	Fibres	----	No	----	----	----
Asbestos Type	1332-21-4	-	--	----	-	----	----	----
Synthetic Mineral Fibre	----	0.1	g/kg	----	No	----	----	----
Organic Fibre	----	0.1	g/kg	----	No	----	----	----
Sample weight (dry)	----	0.01	g	----	113	----	----	----
APPROVED IDENTIFIER:	----	-	--	----	A. SMYLIE	----	----	----
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	<100	<100	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.08	0.02	0.03	0.02	0.16
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	0.08	0.02	0.03	0.02	0.16
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	----	7.6	----	7.2	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD06_28	AMD07_12	AMD07_14	AMD07_16	AMD07_20
			Sampling date / time	02-Mar-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2203533-036	EP2203533-037	EP2203533-038	EP2203533-039	EP2203533-040
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	3.7	4.3	5.6	5.8	3.9
NAG (pH 4.5)	----	0.1	kg H2SO4/t	1.0	0.2	<0.1	<0.1	0.6
NAG (pH 7.0)	----	0.1	kg H2SO4/t	2.8	1.8	7.2	2.5	2.9
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	2.1	1.6	<0.5	0.5	<0.5
ANC as CaCO3	----	0.1	% CaCO3	0.2	0.2	<0.1	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	<0.1	0.2	0.4	<0.1	<0.1
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	----	----	----	----	No
Asbestos (Trace)	1332-21-4	5	Fibres	----	----	----	----	No
Asbestos Type	1332-21-4	-	--	----	----	----	----	-
Synthetic Mineral Fibre	----	0.1	g/kg	----	----	----	----	No
Organic Fibre	----	0.1	g/kg	----	----	----	----	No
Sample weight (dry)	----	0.01	g	----	----	----	----	121
APPROVED IDENTIFIER:	----	-	--	----	----	----	----	A. SMYLIE
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	<100	<100	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.24	0.08	0.03	0.05	0.06
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	0.24	0.08	0.03	0.05	0.06
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	7.2	----	7.3	----	7.1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD07_24	AMD07_30	AMD08_6	AMD08_8	AMD08_10
			Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2203533-041	EP2203533-042	EP2203533-053	EP2203533-054	EP2203533-055
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	5.7	5.8	4.4	5.0	4.0
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.4	<0.1	0.5
NAG (pH 7.0)	----	0.1	kg H2SO4/t	9.8	10.2	10.6	10.8	5.7
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	3.6	<0.5	<0.5	<0.5
ANC as CaCO3	----	0.1	% CaCO3	<0.1	0.4	<0.1	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	<0.1	<0.1	3.4	2.3	3.3
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	230	230	600
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.01	0.02	0.04	0.02	0.06
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	0.01	0.02	0.03	0.01	0.04
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	----	6.8	----	5.8	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD08_14	AMD08_18	AMD08_22	AMD08_26	AMD08_30
			Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2203533-056	EP2203533-057	EP2203533-058	EP2203533-059	EP2203533-060
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	5.8	5.7	6.2	5.4	4.2
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	0.2
NAG (pH 7.0)	----	0.1	kg H2SO4/t	11.6	11.0	9.2	6.4	4.4
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	1.0	<0.5	1.1	0.6	<0.5
ANC as CaCO3	----	0.1	% CaCO3	0.1	<0.1	0.1	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	0	0	0	0	0
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	3.7	2.9	0.2	3.7	<0.1
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	No	----	----	----	----
Asbestos (Trace)	1332-21-4	5	Fibres	No	----	----	----	----
Asbestos Type	1332-21-4	-	--	-	----	----	----	----
Synthetic Mineral Fibre	----	0.1	g/kg	No	----	----	----	----
Organic Fibre	----	0.1	g/kg	No	----	----	----	----
Sample weight (dry)	----	0.01	g	67.2	----	----	----	----
APPROVED IDENTIFIER:	----	-	--	A. SMYLIE	----	----	----	----
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	<100	<100	<100
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	0.01	<0.01	<0.01	0.02	0.03
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	0.01	<0.01	<0.01	0.02	0.03
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	6.4	----	7.0	----	7.0

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD09_22	AMD09_24	AMD09_26	AMD09_38	AMD09_42
			Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2203533-061	EP2203533-062	EP2203533-063	EP2203533-064	EP2203533-065
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**5.5**	**5.5**	**5.5**	**5.6**	**6.1**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**10.8**	**9.8**	**12.9**	**11.9**	**8.3**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	**0.6**	<0.5	<0.5	<0.5	**0.7**
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**0**	**0**
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**0.6**	**1.7**	<0.1	<0.1	<0.1
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	<100	<100	**110**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	<0.01	<0.01	<0.01
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	<0.01	<0.01	<0.01	<0.01	<0.01
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	**----**	**6.8**	**----**	**7.4**	**----**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD09_34	AMD10_16_18	AMD10_22_24	AMD10_28_30	AMD10_30_32
			Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00
Compound	CAS Number	LOR	Unit	EP2203533-066	EP2203533-067	EP2203533-068	EP2203533-069	EP2203533-070
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**5.8**	**5.7**	**2.9**	**2.3**	**2.2**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	**22.1**	**106**	**155**
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**8.2**	**7.7**	**32.9**	**120**	**172**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	<0.5	<0.5	<0.5
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**0**	**0**
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	**0.4**	**0.5**	**5.4**	**0.5**	**0.4**
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	**5500**	**990**	**960**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	**1.04**	**4.54**	**5.61**
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	<0.01	<0.01	**0.86**	**4.51**	**5.58**
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	**6.4**	**6.9**	**----**	**4.7**	**----**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	AMD10_36_38	AMD10_40_42	AMD10_44_46	----	----
			Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	01-Feb-2022 00:00	----	----
Compound	CAS Number	LOR	Unit	EP2203533-071	EP2203533-072	EP2203533-073	--------	--------
				Result	Result	Result	----	----
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	2.8	2.7	2.1	----	----
NAG (pH 4.5)	----	0.1	kg H2SO4/t	29.5	31.8	188	----	----
NAG (pH 7.0)	----	0.1	kg H2SO4/t	33.7	35.4	219	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	<0.5	----	----
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	----	----
Fizz Rating	----	0	Fizz Unit	0	0	0	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	0.1	%	0.1	0.2	0.8	----	----
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	600	870	3650	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	2.33	0.71	9.23	----	----
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	2.31	0.68	9.11	----	----
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)								
Final pH	----	0.1	pH Unit	4.7	----	4.8	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Sample ID - Sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	AMD02_8 - 01-Feb-2022 00:00	Soil sample.
EA200: Description	AMD03_18 - 01-Feb-2022 00:00	Soil sample.
EA200: Description	AMD06_14 - 02-Mar-2022 00:00	Soil sample.
EA200: Description	AMD07_20 - 01-Feb-2022 00:00	Soil sample.
EA200: Description	AMD08_14 - 01-Feb-2022 00:00	Soil sample.

Inter-Laboratory Testing

Analysis conducted by ALS Brisbane, NATA accreditation no. 825, site no. 818 (Chemistry) 18958 (Biology).

(SOIL) EK085M: Sulfide as S2-

(SOIL) ED040T : Total Sulfate by ICPAES

(SOIL) ED042T: Total Sulfur by LECO

Analysis conducted by ALS Newcastle, NATA accreditation no. 825, site no. 1656 (Chemistry) 9854 (Biology).

(SOIL) EA200: AS 4964 - 2004 Identification of Asbestos in Soils

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology). Only applies to samples EP2203533 (001, 002, 004, 005, 007, 009, 011, 012, 014, 016, 018, 020, 021, 023, 025, 026, 028, 030, 032, 034, 036, 038, 040, 042, 054, 056, 058, 060, 062, 064, 066, 067, 069, 071, 073).

(WATER) EG020W: Water Leachable Metals by ICP-MS

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2203533**	Page	: 1 of 19
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MR PAUL HAMER	Contact	: REBECCA OWEN
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: +61 08 6222 8583	Telephone	: +61-8-9406 1301
Project	: 12518217	Date Samples Received	: 01-Mar-2022
Order number	: 12518217	Date Analysis Commenced	: 29-Mar-2022
C-O-C number	: ----	Issue Date	: 29-Apr-2022
Sampler	: Steff Bright		
Site	: ----		
Quote number	: EP/174/22		
No. of samples received	: 73		
No. of samples analysed	: 63		

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*
Alana Smylie	Team Leader - Asbestos	Newcastle - Asbestos, Mayfield West, NSW
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, 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.

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA011: Net Acid Generation (QC Lot: 4271008)									
EP2203533-001	AMD01_16	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.0	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	14.0	14.0	0.0	0% - 20%
EP2203533-011	AMD03_22	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	40.2	40.2	0.0	0% - 20%
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	60.3	60.2	0.0	0% - 20%
EA011: Net Acid Generation (QC Lot: 4271012)									
EP2203533-021	AMD05_22	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.0	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	10.0	10.0	0.0	0% - 20%
EP2203533-031	AMD06_24	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	1.1	1.1	0.0	0% - 50%
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	10.5	10.4	0.0	0% - 20%
EA011: Net Acid Generation (QC Lot: 4271014)									
EP2203533-041	AMD07_24	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.0	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	9.8	9.8	0.0	0% - 20%
EP2203533-061	AMD09_22	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	0.0	No Limit
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	10.8	10.8	0.0	0% - 20%
EA011: Net Acid Generation (QC Lot: 4271016)									
EP2203533-071	AMD10_36_38	EA011: NAG (pH 4.5)	----	0.1	kg H2SO4/t	29.5	29.5	0.0	0% - 20%
		EA011: NAG (pH 7.0)	----	0.1	kg H2SO4/t	33.7	33.8	0.0	0% - 20%
EA013: Acid Neutralising Capacity (QC Lot: 4271010)									
EP2203533-001	AMD01_16	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	0.0	No Limit
EP2203533-011	AMD03_22	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	0.0	No Limit
EA013: Acid Neutralising Capacity (QC Lot: 4271011)									

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA013: Acid Neutralising Capacity (QC Lot: 4271011) - continued									
EP2203533-021	AMD05_22	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	1.5	1.5	0.0	No Limit
EP2203533-031	AMD06_24	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	0.0	No Limit
EA013: Acid Neutralising Capacity (QC Lot: 4271013)									
EP2203533-041	AMD07_24	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	0.0	No Limit
EP2203533-061	AMD09_22	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	0.6	0.6	0.0	No Limit
EA013: Acid Neutralising Capacity (QC Lot: 4271015)									
EP2203533-071	AMD10_36_38	EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	0.0	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4255703)									
EP2203533-001	AMD01_16	EA055: Moisture Content	----	0.1	%	<0.1	<0.1	0.0	No Limit
EP2203533-010	AMD03_20	EA055: Moisture Content	----	0.1	%	3.1	2.9	5.3	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4257642)									
EP2203533-021	AMD05_22	EA055: Moisture Content	----	0.1	%	<0.1	<0.1	0.0	No Limit
EP2203533-030	AMD06_22	EA055: Moisture Content	----	0.1	%	0.5	0.5	0.0	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4257644)									
EP2203533-041	AMD07_24	EA055: Moisture Content	----	0.1	%	<0.1	<0.1	0.0	No Limit
EP2203533-060	AMD08_30	EA055: Moisture Content	----	0.1	%	<0.1	<0.1	0.0	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 4257645)									
EP2203533-071	AMD10_36_38	EA055: Moisture Content	----	0.1	%	0.1	<0.1	0.0	No Limit
ED040T : Total Sulfate by ICPAES (QC Lot: 4260158)									
EP2203533-001	AMD01_16	ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	0.0	No Limit
EP2203533-010	AMD03_20	ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	2700	# 2040	27.8	0% - 20%
ED040T : Total Sulfate by ICPAES (QC Lot: 4260159)									
EP2203533-021	AMD05_22	ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	0.0	No Limit
EP2203533-030	AMD06_22	ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	0.0	No Limit
ED040T : Total Sulfate by ICPAES (QC Lot: 4260160)									
EP2203533-041	AMD07_24	ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	0.0	No Limit
EP2203533-060	AMD08_30	ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	<100	0.0	No Limit
ED040T : Total Sulfate by ICPAES (QC Lot: 4260161)									
EP2203533-071	AMD10_36_38	ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	600	610	0.0	No Limit
ED042T: Total Sulfur by LECO (QC Lot: 4275717)									
EP2203533-001	AMD01_16	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	0.01	0.01	0.0	No Limit
EP2203533-011	AMD03_22	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	1.30	1.32	0.8	0% - 20%
ED042T: Total Sulfur by LECO (QC Lot: 4275718)									

Sub-Matrix: **SOIL**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
ED042T: Total Sulfur by LECO (QC Lot: 4275718) - continued									
EP2203533-021	AMD05_22	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	0.0	No Limit
EP2203533-031	AMD06_24	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	0.08	0.07	0.0	No Limit
ED042T: Total Sulfur by LECO (QC Lot: 4275719)									
EP2203533-041	AMD07_24	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	0.01	<0.01	0.0	No Limit
EP2203533-061	AMD09_22	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	<0.01	0.0	No Limit
ED042T: Total Sulfur by LECO (QC Lot: 4275720)									
EP2203533-071	AMD10_36_38	ED042T: Sulfur - Total as S (LECO)	----	0.01	%	2.33	2.38	2.1	0% - 20%

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Laboratory Duplicate (DUP) Report					
				LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EA005P: pH by PC Titrator (QC Lot: 4273929)									
EP2203533-002	AMD02_8	EA005-P: pH Value	----	0.01	pH Unit	6.03	5.96	1.2	0% - 20%
EP2203533-018	AMD04_36	EA005-P: pH Value	----	0.01	pH Unit	6.06	6.10	0.7	0% - 20%
EA005P: pH by PC Titrator (QC Lot: 4273930)									
EP2203533-036	AMD06_28	EA005-P: pH Value	----	0.01	pH Unit	7.12	6.99	1.8	0% - 20%
EP2203533-066	AMD09_34	EA005-P: pH Value	----	0.01	pH Unit	6.97	6.97	0.0	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4273927)									
EP2203533-002	AMD02_8	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	4	3	0.0	No Limit
EP2203533-018	AMD04_36	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	32	32	0.0	0% - 20%
EA010P: Conductivity by PC Titrator (QC Lot: 4273931)									
EP2203533-036	AMD06_28	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	10	9	11.9	0% - 50%
EP2203533-066	AMD09_34	EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	8	8	0.0	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 4273928)									
EP2203533-002	AMD02_8	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	<1	0.0	No Limit
EP2203533-018	AMD04_36	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	3	3	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	3	3	0.0	No Limit
ED037P: Alkalinity by PC Titrator (QC Lot: 4273932)									
EP2203533-036	AMD06_28	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	3	3	0.0	No Limit
		ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	3	3	0.0	No Limit
EP2203533-066	AMD09_34	ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	0.0	No Limit
		ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	2	3	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
ED037P: Alkalinity by PC Titrator (QC Lot: 4273932) - continued									
EP2203533-066	AMD09_34	ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	2	3	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4263764)									
EP2203533-066	AMD09_34	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
EP2203793-011	Anonymous	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	101	100	0.0	0% - 20%
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4263770)									
EP2203533-001	AMD01_16	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
EP2203533-018	AMD04_36	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	9	8	0.0	No Limit
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QC Lot: 4269639)									
EP2203533-038	AMD07_14	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	<1	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 4263765)									
EP2203533-066	AMD09_34	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.0	No Limit
EP2203793-011	Anonymous	ED045G: Chloride	16887-00-6	1	mg/L	170	169	0.8	0% - 20%
ED045G: Chloride by Discrete Analyser (QC Lot: 4263769)									
EP2203533-001	AMD01_16	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.0	No Limit
EP2203533-018	AMD04_36	ED045G: Chloride	16887-00-6	1	mg/L	1	1	0.0	No Limit
ED045G: Chloride by Discrete Analyser (QC Lot: 4269640)									
EP2203533-038	AMD07_14	ED045G: Chloride	16887-00-6	1	mg/L	<1	<1	0.0	No Limit
ED093W: Water Leachable Major Cations (QC Lot: 4262783)									
EP2203533-001	AMD01_16	ED093W: Calcium	7440-70-2	1	mg/L	<1	<1	0.0	No Limit
		ED093W: Magnesium	7439-95-4	1	mg/L	<1	<1	0.0	No Limit
		ED093W: Sodium	7440-23-5	1	mg/L	<1	<1	0.0	No Limit
		ED093W: Potassium	7440-09-7	1	mg/L	1	1	0.0	No Limit
ED093W: Water Leachable Major Cations (QC Lot: 4265722)									
EP2203533-034	AMD06_18	ED093W: Calcium	7440-70-2	1	mg/L	<1	<1	0.0	No Limit
		ED093W: Magnesium	7439-95-4	1	mg/L	<1	<1	0.0	No Limit
		ED093W: Sodium	7440-23-5	1	mg/L	<1	<1	0.0	No Limit
		ED093W: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EP2203533-018	AMD04_36	ED093W: Calcium	7440-70-2	1	mg/L	3	3	0.0	No Limit
		ED093W: Magnesium	7439-95-4	1	mg/L	2	2	0.0	No Limit
		ED093W: Sodium	7440-23-5	1	mg/L	2	2	0.0	No Limit
		ED093W: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
ED093W: Water Leachable Major Cations (QC Lot: 4265726)									
EP2203533-066	AMD09_34	ED093W: Calcium	7440-70-2	1	mg/L	<1	<1	0.0	No Limit
		ED093W: Magnesium	7439-95-4	1	mg/L	<1	<1	0.0	No Limit
		ED093W: Sodium	7440-23-5	1	mg/L	1	<1	0.0	No Limit
		ED093W: Potassium	7440-09-7	1	mg/L	<1	<1	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4262780)									
EP2203533-001	AMD01_16	EG020B-W: Cerium	7440-45-1	0.001	mg/L	0.008	0.009	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4262780) - continued									
EP2203533-001	AMD01_16	EG020B-W: Caesium	7440-46-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Rubidium	7440-17-7	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020B-W: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Strontium	7440-24-6	0.001	mg/L	0.001	0.002	0.0	No Limit
		EG020B-W: Thorium	7440-29-1	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Tellurium	22541-49-7	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020B-W: Titanium	7440-32-6	0.01	mg/L	0.06	0.06	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4262781)									
EP2203533-001	AMD01_16	EG020D-W: Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020D-W: Lanthanum	7439-91-0	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020D-W: Yttrium	7440-65-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020D-W: Zirconium	7440-67-7	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020D-W: Hafnium	7440-58-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4262782)									
EP2203533-001	AMD01_16	EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020A-W: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Barium	7440-39-3	0.001	mg/L	0.018	0.019	0.0	0% - 50%
		EG020A-W: Chromium	7440-47-3	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-W: Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Copper	7440-50-8	0.001	mg/L	0.002	0.001	0.0	No Limit
		EG020A-W: Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Lithium	7439-93-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Manganese	7439-96-5	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Nickel	7440-02-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Zinc	7440-66-6	0.005	mg/L	0.010	0.011	0.0	No Limit
		EG020A-W: Aluminium	7429-90-5	0.01	mg/L	1.94	1.96	1.0	0% - 20%
		EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-W: Iron	7439-89-6	0.05	mg/L	0.77	0.80	4.1	0% - 50%
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4265719)									
EP2203533-018	AMD04_36	EG020A-W: Aluminium	7429-90-5	0.01	mg/L	2.70	2.21	20.0	0% - 20%
EP2203533-036	AMD06_28	EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4265719) - continued									
EP2203533-036	AMD06_28	EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Barium	7440-39-3	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-W: Chromium	7440-47-3	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-W: Cobalt	7440-48-4	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-W: Copper	7440-50-8	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-W: Lead	7439-92-1	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-W: Lithium	7439-93-2	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020A-W: Manganese	7439-96-5	0.001	mg/L	0.015	0.016	0.0	0% - 50%
		EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Nickel	7440-02-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-W: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Zinc	7440-66-6	0.005	mg/L	0.011	0.011	0.0	No Limit
		EG020A-W: Aluminium	7429-90-5	0.01	mg/L	0.43	0.40	9.3	0% - 20%
		EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-W: Iron	7439-89-6	0.05	mg/L	0.99	0.97	1.3	0% - 50%
EP2203533-018	AMD04_36	EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-W: Antimony	7440-36-0	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-W: Arsenic	7440-38-2	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-W: Beryllium	7440-41-7	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020A-W: Barium	7440-39-3	0.001	mg/L	0.011	0.011	0.0	0% - 50%
		EG020A-W: Chromium	7440-47-3	0.001	mg/L	0.075	0.065	14.9	0% - 20%
		EG020A-W: Cobalt	7440-48-4	0.001	mg/L	0.035	0.034	0.0	0% - 20%
		EG020A-W: Copper	7440-50-8	0.001	mg/L	0.035	0.035	0.0	0% - 20%
		EG020A-W: Lead	7439-92-1	0.001	mg/L	0.016	0.016	0.0	0% - 50%
		EG020A-W: Lithium	7439-93-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Manganese	7439-96-5	0.001	mg/L	0.038	0.037	3.1	0% - 20%
		EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-W: Nickel	7440-02-0	0.001	mg/L	0.035	0.035	0.0	0% - 20%
		EG020A-W: Tin	7440-31-5	0.001	mg/L	0.001	<0.001	0.0	No Limit
		EG020A-W: Zinc	7440-66-6	0.005	mg/L	0.015	0.015	0.0	No Limit
		EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Vanadium	7440-62-2	0.01	mg/L	0.51	0.50	0.0	0% - 20%
		EG020A-W: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-W: Iron	7439-89-6	0.05	mg/L	1.51	1.43	5.4	0% - 20%
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4265720)									
EP2203533-036	AMD06_28	EG020B-W: Cerium	7440-45-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Caesium	7440-46-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Rubidium	7440-17-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4265720) - continued									
EP2203533-036	AMD06_28	EG020B-W: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Strontium	7440-24-6	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020B-W: Thorium	7440-29-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Tellurium	22541-49-7	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020B-W: Titanium	7440-32-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP2203533-018	AMD04_36	EG020B-W: Cerium	7440-45-1	0.001	mg/L	0.060	0.059	0.0	0% - 20%
		EG020B-W: Caesium	7440-46-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Rubidium	7440-17-7	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020B-W: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Strontium	7440-24-6	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020B-W: Thorium	7440-29-1	0.001	mg/L	0.006	0.007	0.0	No Limit
		EG020B-W: Uranium	7440-61-1	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020B-W: Tellurium	22541-49-7	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020B-W: Titanium	7440-32-6	0.01	mg/L	0.09	0.10	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4265721)									
EP2203533-036	AMD06_28	EG020D-W: Gallium	7440-55-3	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020D-W: Lanthanum	7439-91-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020D-W: Yttrium	7440-65-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020D-W: Zirconium	7440-67-7	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020D-W: Hafnium	7440-58-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EP2203533-018	AMD04_36	EG020D-W: Gallium	7440-55-3	0.001	mg/L	0.001	0.001	0.0	No Limit
		EG020D-W: Lanthanum	7439-91-0	0.001	mg/L	0.050	0.050	0.0	0% - 20%
		EG020D-W: Yttrium	7440-65-5	0.001	mg/L	0.072	0.071	0.0	0% - 20%
		EG020D-W: Zirconium	7440-67-7	0.005	mg/L	0.020	0.016	18.8	No Limit
		EG020D-W: Hafnium	7440-58-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4265723)									
EP2203533-066	AMD09_34	EG020A-W: Aluminium	7429-90-5	0.01	mg/L	6.44	5.98	7.4	0% - 20%
EP2203533-066	AMD09_34	EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
		EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Arsenic	7440-38-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Barium	7440-39-3	0.001	mg/L	0.075	0.073	3.0	0% - 20%
		EG020A-W: Chromium	7440-47-3	0.001	mg/L	0.011	0.008	21.4	0% - 50%
		EG020A-W: Cobalt	7440-48-4	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-W: Copper	7440-50-8	0.001	mg/L	0.004	0.004	0.0	No Limit
		EG020A-W: Lead	7439-92-1	0.001	mg/L	0.004	0.003	0.0	No Limit
		EG020A-W: Lithium	7439-93-2	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020A-W: Manganese	7439-96-5	0.001	mg/L	0.008	0.007	0.0	No Limit
		EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4265723) - continued									
EP2203533-066	AMD09_34	EG020A-W: Nickel	7440-02-0	0.001	mg/L	0.008	0.006	26.1	No Limit
		EG020A-W: Tin	7440-31-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020A-W: Zinc	7440-66-6	0.005	mg/L	0.012	0.011	9.3	No Limit
		EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	0.0	No Limit
		EG020A-W: Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	0.0	No Limit
		EG020A-W: Iron	7439-89-6	0.05	mg/L	1.47	1.23	17.6	0% - 20%
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4265724)									
EP2203533-066	AMD09_34	EG020B-W: Cerium	7440-45-1	0.001	mg/L	0.015	0.012	18.5	0% - 50%
		EG020B-W: Caesium	7440-46-2	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Rubidium	7440-17-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Silver	7440-22-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Strontium	7440-24-6	0.001	mg/L	0.019	0.017	10.2	0% - 50%
		EG020B-W: Thorium	7440-29-1	0.001	mg/L	0.004	0.003	0.0	No Limit
		EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020B-W: Tellurium	22541-49-7	0.005	mg/L	<0.005	<0.005	0.0	No Limit
		EG020B-W: Titanium	7440-32-6	0.01	mg/L	0.06	0.05	31.4	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4265725)									
EP2203533-066	AMD09_34	EG020D-W: Gallium	7440-55-3	0.001	mg/L	0.002	0.002	0.0	No Limit
		EG020D-W: Lanthanum	7439-91-0	0.001	mg/L	0.006	0.005	22.8	No Limit
		EG020D-W: Yttrium	7440-65-5	0.001	mg/L	0.003	0.003	0.0	No Limit
		EG020D-W: Zirconium	7440-67-7	0.005	mg/L	0.006	<0.005	0.0	No Limit
		EG020D-W: Hafnium	7440-58-6	0.01	mg/L	<0.01	<0.01	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4266890)									
EP2203533-014	AMD04_26	EG020G-W: Germanium	7440-56-4	0.001	mg/L	<0.001	0.001	0.0	No Limit
		EG020G-W: Niobium	7440-03-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020G-W: Rhenium	7440-15-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EP2203533-001	AMD01_16	EG020G-W: Germanium	7440-56-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020G-W: Niobium	7440-03-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020G-W: Rhenium	7440-15-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4266891)									
EP2203533-016	AMD04_30	EG020E-W: Gold	7440-57-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020E-W: Tungsten	7440-33-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020E-W: Tantalum	7440-25-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EP2203533-001	AMD01_16	EG020E-W: Gold	7440-57-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020E-W: Tungsten	7440-33-7	0.001	mg/L	0.002	0.003	39.4	No Limit
		EG020E-W: Tantalum	7440-25-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4276507)									
EP2203533-018	AMD04_36	EG020G-W: Germanium	7440-56-4	0.001	mg/L	0.003	0.004	0.0	No Limit

Sub-Matrix: **WATER**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4276507) - continued									
EP2203533-018	AMD04_36	EG020G-W: Niobium	7440-03-1	0.001	mg/L	<0.001	0.004	109	No Limit
		EG020G-W: Rhenium	7440-15-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EP2203533-034	AMD06_18	EG020G-W: Germanium	7440-56-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020G-W: Niobium	7440-03-1	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020G-W: Rhenium	7440-15-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4276508)									
EP2203533-018	AMD04_36	EG020E-W: Gold	7440-57-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020E-W: Tungsten	7440-33-7	0.001	mg/L	0.003	0.002	0.0	No Limit
		EG020E-W: Tantalum	7440-25-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EP2203533-034	AMD06_18	EG020E-W: Gold	7440-57-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020E-W: Tungsten	7440-33-7	0.001	mg/L	0.010	0.011	0.0	0% - 50%
		EG020E-W: Tantalum	7440-25-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4276509)									
EP2203533-066	AMD09_34	EG020G-W: Germanium	7440-56-4	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020G-W: Niobium	7440-03-1	0.001	mg/L	0.001	<0.001	0.0	No Limit
		EG020G-W: Rhenium	7440-15-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG020W: Water Leachable Metals by ICP-MS (QC Lot: 4276510)									
EP2203533-066	AMD09_34	EG020E-W: Gold	7440-57-5	0.001	mg/L	<0.001	<0.001	0.0	No Limit
		EG020E-W: Tungsten	7440-33-7	0.001	mg/L	0.007	0.006	18.2	No Limit
		EG020E-W: Tantalum	7440-25-7	0.001	mg/L	<0.001	<0.001	0.0	No Limit
EG035W: Water Leachable Mercury by FIMS (QC Lot: 4262894)									
EP2203533-004	AMD02_24	EG035W: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit
EG035W: Water Leachable Mercury by FIMS (QC Lot: 4265780)									
EP2203533-021	AMD05_22	EG035W: Mercury	7439-97-6	0.0001	mg/L	0.0001	0.0001	0.0	No Limit
EP2203533-038	AMD07_14	EG035W: Mercury	7439-97-6	0.0001	mg/L	0.0005	0.0005	0.0	No Limit
EG035W: Water Leachable Mercury by FIMS (QC Lot: 4265781)									
EP2203533-069	AMD10_28_30	EG035W: Mercury	7439-97-6	0.0001	mg/L	<0.0001	<0.0001	0.0	No Limit

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

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

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA011: Net Acid Generation (QCLot: 4271008)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	24.084 kg H2SO4/t	97.1	85.1	112
EA011: Net Acid Generation (QCLot: 4271012)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	24.084 kg H2SO4/t	97.4	85.1	112
EA011: Net Acid Generation (QCLot: 4271014)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	24.084 kg H2SO4/t	96.4	85.1	112
EA011: Net Acid Generation (QCLot: 4271016)								
EA011: NAG (pH 7.0)	----	----	kg H2SO4/t	----	24.084 kg H2SO4/t	95.4	85.1	112
EA013: Acid Neutralising Capacity (QCLot: 4271010)								
EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	9.8 kg H2SO4 equiv./t	99.1	94.6	106
EA013: ANC as CaCO3	----	0.1	% CaCO3	<0.1	----	----	----	----
EA013: Acid Neutralising Capacity (QCLot: 4271011)								
EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	9.8 kg H2SO4 equiv./t	101	94.6	106
EA013: ANC as CaCO3	----	0.1	% CaCO3	<0.1	----	----	----	----
EA013: Acid Neutralising Capacity (QCLot: 4271013)								
EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	9.8 kg H2SO4 equiv./t	102	94.6	106
EA013: ANC as CaCO3	----	0.1	% CaCO3	<0.1	----	----	----	----
EA013: Acid Neutralising Capacity (QCLot: 4271015)								
EA013: ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	9.8 kg H2SO4 equiv./t	101	94.6	106
EA013: ANC as CaCO3	----	0.1	% CaCO3	<0.1	----	----	----	----
ED040T : Total Sulfate by ICPAES (QCLot: 4260158)								
ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	579 mg/kg	118	79.0	121
ED040T : Total Sulfate by ICPAES (QCLot: 4260159)								
ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	579 mg/kg	110	79.0	121
ED040T : Total Sulfate by ICPAES (QCLot: 4260160)								
ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	579 mg/kg	104	79.0	121
ED040T : Total Sulfate by ICPAES (QCLot: 4260161)								
ED040T: Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	579 mg/kg	105	79.0	121
ED042T: Total Sulfur by LECO (QCLot: 4275717)								
ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.51 %	103	70.0	130
ED042T: Total Sulfur by LECO (QCLot: 4275718)								
ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.51 %	104	70.0	130
ED042T: Total Sulfur by LECO (QCLot: 4275719)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED042T: Total Sulfur by LECO (QCLot: 4275719) - continued								
ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	0.51 %	103	70.0	130
ED042T: Total Sulfur by LECO (QCLot: 4275720)								
ED042T: Sulfur - Total as S (LECO)	----	0.01	%	<0.01	4.59 %	99.8	70.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EA005P: pH by PC Titrator (QCLot: 4273929)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA005P: pH by PC Titrator (QCLot: 4273930)								
EA005-P: pH Value	----	----	pH Unit	----	4 pH Unit	100	98.5	102
				----	7 pH Unit	100	98.5	102
EA010P: Conductivity by PC Titrator (QCLot: 4273927)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24800 µS/cm	96.2	92.1	105
EA010P: Conductivity by PC Titrator (QCLot: 4273931)								
EA010-P: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	24800 µS/cm	96.2	92.1	105
ED037P: Alkalinity by PC Titrator (QCLot: 4273928)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	106	81.2	126
				<1	200 mg/L	101	90.0	110
ED037P: Alkalinity by PC Titrator (QCLot: 4273932)								
ED037-P: Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
ED037-P: Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
ED037-P: Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	<1	----	----	----	----
ED037-P: Total Alkalinity as CaCO3	----	1	mg/L	<1	20 mg/L	105	81.2	126
				<1	200 mg/L	102	90.0	110
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4263764)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	105	87.7	113
				<1	500 mg/L	103	87.7	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4263770)								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	102	87.7	113
				<1	500 mg/L	99.5	87.7	113
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4269639)								

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4269639) - continued								
ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	<1	25 mg/L	104	87.7	113
				<1	500 mg/L	100	87.7	113
ED045G: Chloride by Discrete Analyser (QCLot: 4263765)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	103	87.9	114
				<1	1000 mg/L	104	87.9	114
ED045G: Chloride by Discrete Analyser (QCLot: 4263769)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	103	87.9	114
				<1	1000 mg/L	102	87.9	114
ED045G: Chloride by Discrete Analyser (QCLot: 4269640)								
ED045G: Chloride	16887-00-6	1	mg/L	<1	10 mg/L	104	87.9	114
				<1	1000 mg/L	99.8	87.9	114
ED093W: Water Leachable Major Cations (QCLot: 4262783)								
ED093W: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	103	85.0	115
ED093W: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	103	85.0	115
ED093W: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	110	85.0	115
ED093W: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.3	85.0	115
ED093W: Water Leachable Major Cations (QCLot: 4265722)								
ED093W: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	101	85.0	115
ED093W: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	108	85.0	115
ED093W: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	105	85.0	115
ED093W: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	95.2	85.0	115
ED093W: Water Leachable Major Cations (QCLot: 4265726)								
ED093W: Calcium	7440-70-2	1	mg/L	<1	50 mg/L	97.3	85.0	115
ED093W: Magnesium	7439-95-4	1	mg/L	<1	50 mg/L	102	85.0	115
ED093W: Sodium	7440-23-5	1	mg/L	<1	50 mg/L	94.3	85.0	115
ED093W: Potassium	7440-09-7	1	mg/L	<1	50 mg/L	89.5	85.0	115
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4262780)								
EG020B-W: Cerium	7440-45-1	0.001	mg/L	<0.001	0.12 mg/L	108	80.0	120
EG020B-W: Caesium	7440-46-2	0.001	mg/L	<0.001	0.1 mg/L	101	80.0	120
EG020B-W: Rubidium	7440-17-7	0.001	mg/L	<0.001	0.1 mg/L	103	80.0	120
EG020B-W: Silver	7440-22-4	0.001	mg/L	<0.001	0.02 mg/L	106	70.0	120
EG020B-W: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	105	91.1	115
EG020B-W: Tellurium	22541-49-7	0.005	mg/L	<0.005	0.1 mg/L	104	87.2	120
EG020B-W: Thorium	7440-29-1	0.001	mg/L	<0.001	0.1 mg/L	102	80.0	120
EG020B-W: Titanium	7440-32-6	0.01	mg/L	<0.01	0.1 mg/L	97.4	82.0	120
EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	104	80.0	120
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4262781)								
EG020D-W: Gallium	7440-55-3	0.001	mg/L	<0.001	0.01 mg/L	110	80.0	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4262781) - continued								
EG020D-W: Hafnium	7440-58-6	0.01	mg/L	<0.01	0.01 mg/L	107	80.0	120
EG020D-W: Lanthanum	7439-91-0	0.001	mg/L	<0.001	0.01 mg/L	105	80.0	120
EG020D-W: Yttrium	7440-65-5	0.001	mg/L	<0.001	0.01 mg/L	112	80.0	120
EG020D-W: Zirconium	7440-67-7	0.005	mg/L	<0.005	0.01 mg/L	107	80.0	120
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4262782)								
EG020A-W: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	104	90.0	115
EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	0.02 mg/L	104	78.0	120
EG020A-W: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	105	88.8	117
EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	110	83.6	120
EG020A-W: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	104	88.4	116
EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	104	89.5	114
EG020A-W: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	103	88.4	111
EG020A-W: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	102	87.1	115
EG020A-W: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	101	84.4	113
EG020A-W: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	103	86.7	111
EG020A-W: Lithium	7439-93-2	0.001	mg/L	<0.001	0.1 mg/L	105	80.5	120
EG020A-W: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	102	88.4	114
EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	114	88.6	120
EG020A-W: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	101	86.5	114
EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	105	87.8	120
EG020A-W: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	98.8	86.7	117
EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	106	88.5	114
EG020A-W: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	103	83.5	120
EG020A-W: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	112	79.6	120
EG020A-W: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	114	87.9	117
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4265719)								
EG020A-W: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	102	90.0	115
EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	0.02 mg/L	100	78.0	120
EG020A-W: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	102	88.8	117
EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	107	83.6	120
EG020A-W: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	102	88.4	116
EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	101	89.5	114
EG020A-W: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	100	88.4	111
EG020A-W: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	100	87.1	115
EG020A-W: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	99.4	84.4	113
EG020A-W: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.5	86.7	111
EG020A-W: Lithium	7439-93-2	0.001	mg/L	<0.001	0.1 mg/L	108	80.5	120
EG020A-W: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	99.6	88.4	114
EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	114	88.6	120

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4265719) - continued								
EG020A-W: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	98.6	86.5	114
EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	102	87.8	120
EG020A-W: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	114	86.7	117
EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	102	88.5	114
EG020A-W: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	99.1	83.5	120
EG020A-W: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	109	79.6	120
EG020A-W: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	114	87.9	117
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4265720)								
EG020B-W: Cerium	7440-45-1	0.001	mg/L	<0.001	0.12 mg/L	109	80.0	120
EG020B-W: Caesium	7440-46-2	0.001	mg/L	<0.001	0.1 mg/L	102	80.0	120
EG020B-W: Rubidium	7440-17-7	0.001	mg/L	<0.001	0.1 mg/L	103	80.0	120
EG020B-W: Silver	7440-22-4	0.001	mg/L	<0.001	0.02 mg/L	101	70.0	120
EG020B-W: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	100	91.1	115
EG020B-W: Tellurium	22541-49-7	0.005	mg/L	<0.005	0.1 mg/L	106	87.2	120
EG020B-W: Thorium	7440-29-1	0.001	mg/L	<0.001	0.1 mg/L	120	80.0	120
EG020B-W: Titanium	7440-32-6	0.01	mg/L	<0.01	0.1 mg/L	105	82.0	120
EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	102	80.0	120
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4265721)								
EG020D-W: Gallium	7440-55-3	0.001	mg/L	<0.001	0.01 mg/L	108	80.0	120
EG020D-W: Hafnium	7440-58-6	0.01	mg/L	<0.01	0.01 mg/L	106	80.0	120
EG020D-W: Lanthanum	7439-91-0	0.001	mg/L	<0.001	0.01 mg/L	107	80.0	120
EG020D-W: Yttrium	7440-65-5	0.001	mg/L	<0.001	0.01 mg/L	110	80.0	120
EG020D-W: Zirconium	7440-67-7	0.005	mg/L	<0.005	0.01 mg/L	106	80.0	120
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4265723)								
EG020A-W: Aluminium	7429-90-5	0.01	mg/L	<0.01	0.5 mg/L	104	90.0	115
EG020A-W: Antimony	7440-36-0	0.001	mg/L	<0.001	0.02 mg/L	114	78.0	120
EG020A-W: Arsenic	7440-38-2	0.001	mg/L	<0.001	0.1 mg/L	101	88.8	117
EG020A-W: Beryllium	7440-41-7	0.001	mg/L	<0.001	0.1 mg/L	108	83.6	120
EG020A-W: Barium	7440-39-3	0.001	mg/L	<0.001	0.1 mg/L	102	88.4	116
EG020A-W: Cadmium	7440-43-9	0.0001	mg/L	<0.0001	0.1 mg/L	100	89.5	114
EG020A-W: Chromium	7440-47-3	0.001	mg/L	<0.001	0.1 mg/L	101	88.4	111
EG020A-W: Cobalt	7440-48-4	0.001	mg/L	<0.001	0.1 mg/L	99.3	87.1	115
EG020A-W: Copper	7440-50-8	0.001	mg/L	<0.001	0.1 mg/L	98.9	84.4	113
EG020A-W: Lead	7439-92-1	0.001	mg/L	<0.001	0.1 mg/L	98.7	86.7	111
EG020A-W: Lithium	7439-93-2	0.001	mg/L	<0.001	0.1 mg/L	108	80.5	120
EG020A-W: Manganese	7439-96-5	0.001	mg/L	<0.001	0.1 mg/L	101	88.4	114
EG020A-W: Molybdenum	7439-98-7	0.001	mg/L	<0.001	0.1 mg/L	112	88.6	120
EG020A-W: Nickel	7440-02-0	0.001	mg/L	<0.001	0.1 mg/L	96.4	86.5	114

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
				Result	Concentration	LCS	Low	High
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4265723) - continued								
EG020A-W: Selenium	7782-49-2	0.01	mg/L	<0.01	0.1 mg/L	101	87.8	120
EG020A-W: Tin	7440-31-5	0.001	mg/L	<0.001	0.1 mg/L	112	86.7	117
EG020A-W: Vanadium	7440-62-2	0.01	mg/L	<0.01	0.1 mg/L	102	88.5	114
EG020A-W: Zinc	7440-66-6	0.005	mg/L	<0.005	0.1 mg/L	100	83.5	120
EG020A-W: Boron	7440-42-8	0.05	mg/L	<0.05	0.5 mg/L	107	79.6	120
EG020A-W: Iron	7439-89-6	0.05	mg/L	<0.05	0.5 mg/L	113	87.9	117
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4265724)								
EG020B-W: Cerium	7440-45-1	0.001	mg/L	<0.001	0.12 mg/L	107	80.0	120
EG020B-W: Caesium	7440-46-2	0.001	mg/L	<0.001	0.1 mg/L	104	80.0	120
EG020B-W: Rubidium	7440-17-7	0.001	mg/L	<0.001	0.1 mg/L	103	80.0	120
EG020B-W: Silver	7440-22-4	0.001	mg/L	<0.001	0.02 mg/L	98.1	70.0	120
EG020B-W: Strontium	7440-24-6	0.001	mg/L	<0.001	0.1 mg/L	101	91.1	115
EG020B-W: Tellurium	22541-49-7	0.005	mg/L	<0.005	0.1 mg/L	91.0	87.2	120
EG020B-W: Thorium	7440-29-1	0.001	mg/L	<0.001	0.1 mg/L	115	80.0	120
EG020B-W: Titanium	7440-32-6	0.01	mg/L	<0.01	0.1 mg/L	98.2	82.0	120
EG020B-W: Uranium	7440-61-1	0.001	mg/L	<0.001	0.1 mg/L	101	80.0	120
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4265725)								
EG020D-W: Gallium	7440-55-3	0.001	mg/L	<0.001	0.01 mg/L	107	80.0	120
EG020D-W: Hafnium	7440-58-6	0.01	mg/L	<0.01	0.01 mg/L	108	80.0	120
EG020D-W: Lanthanum	7439-91-0	0.001	mg/L	<0.001	0.01 mg/L	107	80.0	120
EG020D-W: Yttrium	7440-65-5	0.001	mg/L	<0.001	0.01 mg/L	109	80.0	120
EG020D-W: Zirconium	7440-67-7	0.005	mg/L	<0.005	0.01 mg/L	106	80.0	120
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4266890)								
EG020G-W: Germanium	7440-56-4	0.001	mg/L	<0.001	0.1 mg/L	101	70.0	130
EG020G-W: Niobium	7440-03-1	0.001	mg/L	<0.001	0.1 mg/L	93.8	70.0	130
EG020G-W: Rhenium	7440-15-5	0.001	mg/L	<0.001	0.1 mg/L	102	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4266891)								
EG020E-W: Gold	7440-57-5	0.001	mg/L	<0.001	0.1 mg/L	105	70.0	130
EG020E-W: Tungsten	7440-33-7	0.001	mg/L	<0.001	0.1 mg/L	102	70.0	130
EG020E-W: Tantalum	7440-25-7	0.001	mg/L	<0.001	0.1 mg/L	77.8	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4276507)								
EG020G-W: Germanium	7440-56-4	0.001	mg/L	<0.001	0.1 mg/L	99.2	70.0	130
EG020G-W: Niobium	7440-03-1	0.001	mg/L	<0.001	0.1 mg/L	93.6	70.0	130
EG020G-W: Rhenium	7440-15-5	0.001	mg/L	<0.001	0.1 mg/L	103	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4276508)								
EG020E-W: Gold	7440-57-5	0.001	mg/L	<0.001	0.1 mg/L	103	70.0	130
EG020E-W: Tungsten	7440-33-7	0.001	mg/L	<0.001	0.1 mg/L	102	70.0	130
EG020E-W: Tantalum	7440-25-7	0.001	mg/L	<0.001	0.1 mg/L	74.0	70.0	130

Sub-Matrix: **WATER**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Acceptable Limits (%): Low	Acceptable Limits (%): High
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4276509)								
EG020G-W: Germanium	7440-56-4	0.001	mg/L	<0.001	0.1 mg/L	96.7	70.0	130
EG020G-W: Niobium	7440-03-1	0.001	mg/L	<0.001	0.1 mg/L	91.6	70.0	130
EG020G-W: Rhenium	7440-15-5	0.001	mg/L	<0.001	0.1 mg/L	103	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4276510)								
EG020E-W: Gold	7440-57-5	0.001	mg/L	<0.001	0.1 mg/L	108	70.0	130
EG020E-W: Tungsten	7440-33-7	0.001	mg/L	<0.001	0.1 mg/L	107	70.0	130
EG020E-W: Tantalum	7440-25-7	0.001	mg/L	<0.001	0.1 mg/L	78.5	70.0	130
EG035W: Water Leachable Mercury by FIMS (QCLot: 4262894)								
EG035W: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	111	88.7	113
EG035W: Water Leachable Mercury by FIMS (QCLot: 4265780)								
EG035W: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	104	88.7	113
EG035W: Water Leachable Mercury by FIMS (QCLot: 4265781)								
EG035W: Mercury	7439-97-6	0.0001	mg/L	<0.0001	0.01 mg/L	107	88.7	113

Matrix Spike (MS) Report

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

Sub-Matrix: **WATER**

Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Acceptable Limits (%): Low	Acceptable Limits (%): High
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4263764)							
EP2203533-066	AMD09_34	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	99.7	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4263770)							
EP2203533-001	AMD01_16	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	101	70.0	130
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA (QCLot: 4269639)							
EP2203533-036	AMD06_28	ED041G: Sulfate as SO4 - Turbidimetric	14808-79-8	100 mg/L	91.1	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4263765)							
EP2203533-066	AMD09_34	ED045G: Chloride	16887-00-6	1000 mg/L	102	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4263769)							
EP2203533-001	AMD01_16	ED045G: Chloride	16887-00-6	1000 mg/L	103	70.0	130
ED045G: Chloride by Discrete Analyser (QCLot: 4269640)							
EP2203533-036	AMD06_28	ED045G: Chloride	16887-00-6	1000 mg/L	102	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4262781)							
EP2203533-002	AMD02_8	EG020D-W: Gallium	7440-55-3	0.05 mg/L	104	70.0	130
		EG020D-W: Hafnium	7440-58-6	0.05 mg/L	109	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4262781) - continued							
EP2203533-002	AMD02_8	EG020D-W: Lanthanum	7439-91-0	0.05 mg/L	82.1	70.0	130
		EG020D-W: Yttrium	7440-65-5	0.05 mg/L	98.9	70.0	130
		EG020D-W: Zirconium	7440-67-7	0.05 mg/L	103	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4262782)							
EP2203533-002	AMD02_8	EG020A-W: Arsenic	7440-38-2	1 mg/L	92.1	70.0	130
		EG020A-W: Beryllium	7440-41-7	1 mg/L	105	70.0	130
		EG020A-W: Barium	7440-39-3	1 mg/L	94.8	70.0	130
		EG020A-W: Cadmium	7440-43-9	0.25 mg/L	94.3	70.0	130
		EG020A-W: Chromium	7440-47-3	1 mg/L	89.4	70.0	130
		EG020A-W: Cobalt	7440-48-4	1 mg/L	91.6	70.0	130
		EG020A-W: Copper	7440-50-8	1 mg/L	94.3	70.0	130
		EG020A-W: Lead	7439-92-1	1 mg/L	98.4	70.0	130
		EG020A-W: Manganese	7439-96-5	1 mg/L	94.4	70.0	130
		EG020A-W: Nickel	7440-02-0	1 mg/L	94.4	70.0	130
		EG020A-W: Vanadium	7440-62-2	1 mg/L	89.4	70.0	130
		EG020A-W: Zinc	7440-66-6	1 mg/L	94.1	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4265719)							
EP2203533-020	AMD04_40	EG020A-W: Arsenic	7440-38-2	1 mg/L	95.2	70.0	130
		EG020A-W: Beryllium	7440-41-7	1 mg/L	98.6	70.0	130
		EG020A-W: Barium	7440-39-3	1 mg/L	99.8	70.0	130
		EG020A-W: Cadmium	7440-43-9	0.25 mg/L	99.4	70.0	130
		EG020A-W: Chromium	7440-47-3	1 mg/L	93.3	70.0	130
		EG020A-W: Cobalt	7440-48-4	1 mg/L	93.6	70.0	130
		EG020A-W: Copper	7440-50-8	1 mg/L	99.0	70.0	130
		EG020A-W: Lead	7439-92-1	1 mg/L	103	70.0	130
		EG020A-W: Manganese	7439-96-5	1 mg/L	97.4	70.0	130
		EG020A-W: Nickel	7440-02-0	1 mg/L	95.5	70.0	130
		EG020A-W: Vanadium	7440-62-2	1 mg/L	92.4	70.0	130
		EG020A-W: Zinc	7440-66-6	1 mg/L	97.2	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4265721)							
EP2203533-020	AMD04_40	EG020D-W: Gallium	7440-55-3	0.05 mg/L	91.5	70.0	130
		EG020D-W: Hafnium	7440-58-6	0.05 mg/L	107	70.0	130
		EG020D-W: Lanthanum	7439-91-0	0.05 mg/L	75.6	70.0	130
		EG020D-W: Yttrium	7440-65-5	0.05 mg/L	83.4	70.0	130
		EG020D-W: Zirconium	7440-67-7	0.05 mg/L	97.8	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4265723)							
EP2203533-067	AMD10_16_18	EG020A-W: Arsenic	7440-38-2	1 mg/L	84.4	70.0	130
		EG020A-W: Beryllium	7440-41-7	1 mg/L	96.4	70.0	130

Sub-Matrix: **WATER**

				Matrix Spike (MS) Report			
				Spike	SpikeRecovery(%)	Acceptable Limits (%)	
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Concentration	MS	Low	High
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4265723) - continued							
EP2203533-067	AMD10_16_18	EG020A-W: Barium	7440-39-3	1 mg/L	100.0	70.0	130
		EG020A-W: Cadmium	7440-43-9	0.25 mg/L	100	70.0	130
		EG020A-W: Chromium	7440-47-3	1 mg/L	89.3	70.0	130
		EG020A-W: Cobalt	7440-48-4	1 mg/L	95.7	70.0	130
		EG020A-W: Copper	7440-50-8	1 mg/L	98.7	70.0	130
		EG020A-W: Lead	7439-92-1	1 mg/L	102	70.0	130
		EG020A-W: Manganese	7439-96-5	1 mg/L	95.2	70.0	130
		EG020A-W: Nickel	7440-02-0	1 mg/L	96.8	70.0	130
		EG020A-W: Vanadium	7440-62-2	1 mg/L	87.1	70.0	130
		EG020A-W: Zinc	7440-66-6	1 mg/L	97.9	70.0	130
EG020W: Water Leachable Metals by ICP-MS (QCLot: 4265725)							
EP2203533-067	AMD10_16_18	EG020D-W: Gallium	7440-55-3	0.05 mg/L	80.3	70.0	130
		EG020D-W: Hafnium	7440-58-6	0.05 mg/L	81.9	70.0	130
		EG020D-W: Lanthanum	7439-91-0	0.05 mg/L	75.5	70.0	130
		EG020D-W: Yttrium	7440-65-5	0.05 mg/L	78.8	70.0	130
		EG020D-W: Zirconium	7440-67-7	0.05 mg/L	126	70.0	130
EG035W: Water Leachable Mercury by FIMS (QCLot: 4262894)							
EP2203533-005	AMD03_6	EG035W: Mercury	7439-97-6	0.1 mg/L	103	70.0	130
EG035W: Water Leachable Mercury by FIMS (QCLot: 4265780)							
EP2203533-023	AMD05_26	EG035W: Mercury	7439-97-6	0.01 mg/L	93.5	70.0	130
EG035W: Water Leachable Mercury by FIMS (QCLot: 4265781)							
EP2203533-071	AMD10_36_38	EG035W: Mercury	7439-97-6	0.01 mg/L	110	70.0	130

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2203533**	Page	: 1 of 21
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MR PAUL HAMER	Telephone	: +61-8-9406 1301
Project	: 12518217	Date Samples Received	: 01-Mar-2022
Site	: ----	Issue Date	: 29-Apr-2022
Sampler	: Steff Bright	No. of samples received	: 73
Order number	: 12518217	No. of samples analysed	: 63

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 Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **Duplicate 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: **SOIL**

Compound Group Name	Laboratory Sample ID	Client Sample ID	Analyte	CAS Number	Data	Limits	Comment
Duplicate (DUP) RPDs							
ED040T : Total Sulfate by ICPAES	EP2203533--010	AMD03_20	**Sulfate as SO4 2-**	14808-79-8	27.8 %	0% - 20%	**RPD exceeds LOR based limits**

Outliers : Analysis Holding Time Compliance

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA055: Moisture Content (Dried @ 105-110°C)						
Snap Lock Bag AMD01_16, AMD02_8, AMD02_12, AMD02_24, AMD03_6, AMD03_12, AMD03_14, AMD03_16, AMD03_18, AMD03_20, AMD03_22	----	----	----	29-Mar-2022	15-Feb-2022	**42**
Snap Lock Bag AMD05_22, AMD05_24, AMD05_26, AMD05_28, AMD05_30, AMD07_12, AMD07_14, AMD07_16, AMD07_20, AMD07_24, AMD07_30, AMD08_6, AMD08_8, AMD08_10, AMD08_14, AMD08_18, AMD08_22, AMD08_26, AMD08_30, AMD09_22, AMD09_24, AMD09_26, AMD09_38, AMD09_42, AMD09_34, AMD10_16_18, AMD10_22_24, AMD10_28_30, AMD10_30_32, AMD10_36_38, AMD10_40_42, AMD10_44_46	----	----	----	30-Mar-2022	15-Feb-2022	**43**
Snap Lock Bag AMD04_14, AMD04_22, AMD04_26, AMD04_28, AMD04_30, AMD04_34, AMD04_36, AMD04_38, AMD04_40	----	----	----	29-Mar-2022	16-Feb-2022	**41**

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EA055: Moisture Content (Dried @ 105-110°C) - Analysis Holding Time Compliance						
Snap Lock Bag						
AMD06_2, AMD06_6, AMD06_10, AMD06_12, AMD06_22, AMD06_24, AMD06_14, AMD06_16, AMD06_18, AMD06_26, AMD06_28	----	----	----	30-Mar-2022	16-Mar-2022	**14**
ED040T : Total Sulfate by ICPAES						
Soil Glass Jar - Unpreserved						
AMD01_16, AMD02_8, AMD02_12, AMD02_24, AMD03_6, AMD03_12, AMD03_14, AMD03_16, AMD03_18, AMD03_20, AMD03_22, AMD05_22, AMD05_24, AMD05_26, AMD05_28, AMD05_30, AMD07_12, AMD07_14, AMD07_16, AMD07_20, AMD07_24, AMD07_30, AMD08_6, AMD08_8, AMD08_10, AMD08_14, AMD08_18, AMD08_22, AMD08_26, AMD08_30, AMD09_22, AMD09_24, AMD09_26, AMD09_38, AMD09_42, AMD09_34, AMD10_16_18, AMD10_22_24, AMD10_28_30, AMD10_30_32, AMD10_36_38, AMD10_40_42, AMD10_44_46	31-Mar-2022	08-Feb-2022	**51**	----	----	----
Soil Glass Jar - Unpreserved						
AMD04_14, AMD04_22, AMD04_26, AMD04_28, AMD04_30, AMD04_34, AMD04_36, AMD04_38, AMD04_40	31-Mar-2022	09-Feb-2022	**50**	----	----	----

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
ED040T : Total Sulfate by ICPAES - Analysis Holding Time Compliance						
Soil Glass Jar - Unpreserved						
AMD06_2, AMD06_6, AMD06_10, AMD06_12, AMD06_22, AMD06_24, AMD06_14, AMD06_16, AMD06_18, AMD06_26, AMD06_28	31-Mar-2022	09-Mar-2022	**22**	----	----	----
ED042T: Total Sulfur by LECO						
Soil Glass Jar - Unpreserved						
AMD01_16, AMD02_8, AMD02_12, AMD02_24, AMD03_6, AMD03_12, AMD03_14, AMD03_16, AMD03_18, AMD03_20, AMD03_22, AMD05_22, AMD05_24, AMD05_26, AMD05_28, AMD05_30, AMD07_12, AMD07_14, AMD07_16, AMD07_20, AMD07_24, AMD07_30	08-Apr-2022	08-Feb-2022	**59**	----	----	----
Soil Glass Jar - Unpreserved						
AMD04_14, AMD04_22, AMD04_26, AMD04_28, AMD04_30, AMD04_34, AMD04_36, AMD04_38, AMD04_40	08-Apr-2022	09-Feb-2022	**58**	----	----	----
Soil Glass Jar - Unpreserved						
AMD06_2, AMD06_6, AMD06_10, AMD06_12, AMD06_22, AMD06_24, AMD06_14, AMD06_16, AMD06_18, AMD06_26, AMD06_28	08-Apr-2022	09-Mar-2022	**30**	----	----	----
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)						
Non-Volatile Leach: 14 day HT(e.g. SV organics)						
AMD01_16, AMD02_8, AMD02_24, AMD03_6, AMD03_14, AMD03_18, AMD03_22	30-Mar-2022	15-Feb-2022	**43**	----	----	----

Matrix: **SOIL**

Method / Container / Client Sample ID(s)	Extraction / Preparation			Analysis		
	Date extracted	Due for extraction	Days overdue	Date analysed	Due for analysis	Days overdue
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel) - Analysis						
Non-Volatile Leach: 14 day HT(e.g. SV organics)						
AMD05_22, AMD05_26, AMD05_30, AMD07_14, AMD07_20, AMD07_30, AMD08_8, AMD08_14, AMD08_22, AMD08_30, AMD09_24, AMD09_38, AMD09_34, AMD10_16_18, AMD10_28_30, AMD10_36_38, AMD10_44_46	31-Mar-2022	15-Feb-2022	**44**	----	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics)						
AMD04_14, AMD04_26, AMD04_30	30-Mar-2022	16-Feb-2022	**42**	----	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics)						
AMD04_36, AMD04_40	31-Mar-2022	16-Feb-2022	**43**	----	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics)						
AMD06_2, AMD06_10, AMD06_22, AMD06_14, AMD06_18, AMD06_28	31-Mar-2022	16-Mar-2022	**15**	----	----	----

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
EA005P: pH by PC Titrator						
Clear Plastic Bottle - Natural						
AMD01_16, AMD02_8, AMD02_24, AMD03_6, AMD03_14, AMD03_18, AMD03_22, AMD04_14, AMD04_26, AMD04_30	----	----	----	07-Apr-2022	30-Mar-2022	**8**

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
EA005P: pH by PC Titrator - Analysis Holding Time Compliance						
Clear Plastic Bottle - Natural						
AMD04_36, AMD04_40, AMD05_22, AMD05_26, AMD05_30, AMD06_2, AMD06_10, AMD06_22, AMD06_14, AMD06_18, AMD06_28, AMD07_14, AMD07_20, AMD07_30, AMD08_8, AMD08_14, AMD08_22, AMD08_30, AMD09_24, AMD09_38, AMD09_34, AMD10_16_18, AMD10_28_30, AMD10_36_38, AMD10_44_46	----	----	----	07-Apr-2022	31-Mar-2022	**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 / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA011: Net Acid Generation							
Pulp Bag (EA011)							

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA011: Net Acid Generation - Continued							
AMD01_16, AMD02_8, AMD02_12, AMD02_24, AMD03_6, AMD03_12, AMD03_14, AMD03_16, AMD03_18, AMD03_20, AMD03_22, AMD05_22, AMD05_24, AMD05_26, AMD05_28, AMD05_30, AMD07_12, AMD07_14, AMD07_16, AMD07_20, AMD07_24, AMD07_30, AMD08_6, AMD08_8, AMD08_10, AMD08_14, AMD08_18, AMD08_22, AMD08_26, AMD08_30, AMD09_22, AMD09_24, AMD09_26, AMD09_38, AMD09_42, AMD09_34, AMD10_16_18, AMD10_22_24, AMD10_28_30, AMD10_30_32, AMD10_36_38, AMD10_40_42, AMD10_44_46	**01-Feb-2022**	**04-Apr-2022**	01-Feb-2023	✓	**07-Apr-2022**	01-Oct-2022	✓
Pulp Bag (EA011) AMD04_14, AMD04_22, AMD04_26, AMD04_28, AMD04_30, AMD04_34, AMD04_36, AMD04_38, AMD04_40	**02-Feb-2022**	**04-Apr-2022**	02-Feb-2023	✓	**07-Apr-2022**	01-Oct-2022	✓
Pulp Bag (EA011) AMD06_2, AMD06_6, AMD06_10, AMD06_12, AMD06_22, AMD06_24, AMD06_14, AMD06_16, AMD06_18, AMD06_26, AMD06_28	**02-Mar-2022**	**04-Apr-2022**	02-Mar-2023	✓	**07-Apr-2022**	01-Oct-2022	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA013: Acid Neutralising Capacity							
Pulp Bag (EA013)							
AMD01_16, AMD02_8, AMD02_12, AMD02_24, AMD03_6, AMD03_12, AMD03_14, AMD03_16, AMD03_18, AMD03_20, AMD03_22, AMD05_22, AMD05_24, AMD05_26, AMD05_28, AMD05_30, AMD07_12, AMD07_14, AMD07_16, AMD07_20, AMD07_24, AMD07_30, AMD08_6, AMD08_8, AMD08_10, AMD08_14, AMD08_18, AMD08_22, AMD08_26, AMD08_30, AMD09_22, AMD09_24, AMD09_26, AMD09_38, AMD09_42, AMD09_34, AMD10_16_18, AMD10_22_24, AMD10_28_30, AMD10_30_32, AMD10_36_38, AMD10_40_42, AMD10_44_46	**01-Feb-2022**	**04-Apr-2022**	01-Feb-2023	✓	**07-Apr-2022**	01-Oct-2022	✓
Pulp Bag (EA013)							
AMD04_14, AMD04_22, AMD04_26, AMD04_28, AMD04_30, AMD04_34, AMD04_36, AMD04_38, AMD04_40	**02-Feb-2022**	**04-Apr-2022**	02-Feb-2023	✓	**07-Apr-2022**	01-Oct-2022	✓
Pulp Bag (EA013)							
AMD06_2, AMD06_6, AMD06_10, AMD06_12, AMD06_22, AMD06_24, AMD06_14, AMD06_16, AMD06_18, AMD06_26, AMD06_28	**02-Mar-2022**	**04-Apr-2022**	02-Mar-2023	✓	**07-Apr-2022**	01-Oct-2022	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content (Dried @ 105-110°C)							
Snap Lock Bag (EA055)							
AMD01_16, AMD02_8, AMD02_12, AMD02_24, AMD03_6, AMD03_12, AMD03_14, AMD03_16, AMD03_18, AMD03_20, AMD03_22	**01-Feb-2022**	**----**	----	----	**29-Mar-2022**	15-Feb-2022	×
Snap Lock Bag (EA055)							
AMD05_22, AMD05_24, AMD05_26, AMD05_28, AMD05_30, AMD07_12, AMD07_14, AMD07_16, AMD07_20, AMD07_24, AMD07_30, AMD08_6, AMD08_8, AMD08_10, AMD08_14, AMD08_18, AMD08_22, AMD08_26, AMD08_30, AMD09_22, AMD09_24, AMD09_26, AMD09_38, AMD09_42, AMD09_34, AMD10_16_18, AMD10_22_24, AMD10_28_30, AMD10_30_32, AMD10_36_38, AMD10_40_42, AMD10_44_46	**01-Feb-2022**	**----**	----	----	**30-Mar-2022**	15-Feb-2022	×
Snap Lock Bag (EA055)							
AMD04_14, AMD04_22, AMD04_26, AMD04_28, AMD04_30, AMD04_34, AMD04_36, AMD04_38, AMD04_40	**02-Feb-2022**	**----**	----	----	**29-Mar-2022**	16-Feb-2022	×
Snap Lock Bag (EA055)							
AMD06_2, AMD06_6, AMD06_10, AMD06_12, AMD06_22, AMD06_24, AMD06_14, AMD06_16, AMD06_18, AMD06_26, AMD06_28	**02-Mar-2022**	**----**	----	----	**30-Mar-2022**	16-Mar-2022	×

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA200: AS 4964 - 2004 Identification of Asbestos in Soils							
Snap Lock Bag - Subsampled by ALS (EA200)							
AMD02_8, AMD03_18, AMD07_20, AMD08_14	**01-Feb-2022**	**----**	----	----	**31-Mar-2022**	31-Jul-2022	✓
Snap Lock Bag - Subsampled by ALS (EA200)							
AMD06_14	**02-Mar-2022**	**----**	----	----	**31-Mar-2022**	29-Aug-2022	✓
ED040T : Total Sulfate by ICPAES							
Soil Glass Jar - Unpreserved (ED040T)							
AMD01_16, AMD02_8, AMD02_12, AMD02_24, AMD03_6, AMD03_12, AMD03_14, AMD03_16, AMD03_18, AMD03_20, AMD03_22, AMD05_22, AMD05_24, AMD05_26, AMD05_28, AMD05_30, AMD07_12, AMD07_14, AMD07_16, AMD07_20, AMD07_24, AMD07_30, AMD08_6, AMD08_8, AMD08_10, AMD08_14, AMD08_18, AMD08_22, AMD08_26, AMD08_30, AMD09_22, AMD09_24, AMD09_26, AMD09_38, AMD09_42, AMD09_34, AMD10_16_18, AMD10_22_24, AMD10_28_30, AMD10_30_32, AMD10_36_38, AMD10_40_42, AMD10_44_46	**01-Feb-2022**	**31-Mar-2022**	08-Feb-2022	×	**01-Apr-2022**	28-Apr-2022	✓
Soil Glass Jar - Unpreserved (ED040T)							
AMD04_14, AMD04_22, AMD04_26, AMD04_28, AMD04_30, AMD04_34, AMD04_36, AMD04_38, AMD04_40	**02-Feb-2022**	**31-Mar-2022**	09-Feb-2022	×	**01-Apr-2022**	28-Apr-2022	✓
Soil Glass Jar - Unpreserved (ED040T)							
AMD06_2, AMD06_6, AMD06_10, AMD06_12, AMD06_22, AMD06_24, AMD06_14, AMD06_16, AMD06_18, AMD06_26, AMD06_28	**02-Mar-2022**	**31-Mar-2022**	09-Mar-2022	×	**01-Apr-2022**	28-Apr-2022	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED042T: Total Sulfur by LECO							
Pulp Bag (ED042T)							
AMD08_6, AMD08_8, AMD08_10, AMD08_14, AMD08_18, AMD08_22, AMD08_26, AMD08_30, AMD09_22, AMD09_24, AMD09_26, AMD09_38, AMD09_42, AMD09_34, AMD10_16_18, AMD10_22_24, AMD10_28_30, AMD10_30_32, AMD10_36_38, AMD10_40_42, AMD10_44_46	**01-Feb-2022**	**08-Apr-2022**	31-Jul-2022	✓	**08-Apr-2022**	31-Jul-2022	✓
Soil Glass Jar - Unpreserved (ED042T)							
AMD01_16, AMD02_8, AMD02_12, AMD02_24, AMD03_6, AMD03_12, AMD03_14, AMD03_16, AMD03_18, AMD03_20, AMD03_22, AMD05_22, AMD05_24, AMD05_26, AMD05_28, AMD05_30, AMD07_12, AMD07_14, AMD07_16, AMD07_20, AMD07_24, AMD07_30	**01-Feb-2022**	**08-Apr-2022**	08-Feb-2022	×	**08-Apr-2022**	05-Oct-2022	✓
Soil Glass Jar - Unpreserved (ED042T)							
AMD04_14, AMD04_22, AMD04_26, AMD04_28, AMD04_30, AMD04_34, AMD04_36, AMD04_38, AMD04_40	**02-Feb-2022**	**08-Apr-2022**	09-Feb-2022	×	**08-Apr-2022**	05-Oct-2022	✓
Soil Glass Jar - Unpreserved (ED042T)							
AMD06_2, AMD06_6, AMD06_10, AMD06_12, AMD06_22, AMD06_24, AMD06_14, AMD06_16, AMD06_18, AMD06_26, AMD06_28	**02-Mar-2022**	**08-Apr-2022**	09-Mar-2022	×	**08-Apr-2022**	05-Oct-2022	✓

Matrix: **SOIL**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EN60-DI: Bottle Leaching Procedure - Inorganics/Non-Volatile Organics (Glass Vessel)							
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN60-DIa-G) AMD01_16, AMD02_8, AMD02_24, AMD03_6, AMD03_14, AMD03_18, AMD03_22	**01-Feb-2022**	**30-Mar-2022**	15-Feb-2022	×	**----**	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN60-DIa-G) AMD05_22, AMD05_26, AMD05_30, AMD07_14, AMD07_20, AMD07_30, AMD08_8, AMD08_14, AMD08_22, AMD08_30, AMD09_24, AMD09_38, AMD09_34, AMD10_16_18, AMD10_28_30, AMD10_36_38, AMD10_44_46	**01-Feb-2022**	**31-Mar-2022**	15-Feb-2022	×	**----**	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN60-DIa-G) AMD04_14, AMD04_26, AMD04_30	**02-Feb-2022**	**30-Mar-2022**	16-Feb-2022	×	**----**	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN60-DIa-G) AMD04_36, AMD04_40	**02-Feb-2022**	**31-Mar-2022**	16-Feb-2022	×	**----**	----	----
Non-Volatile Leach: 14 day HT(e.g. SV organics) (EN60-DIa-G) AMD06_2, AMD06_10, AMD06_22, AMD06_14, AMD06_18, AMD06_28	**02-Mar-2022**	**31-Mar-2022**	16-Mar-2022	×	**----**	----	----

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

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
EA005P: pH by PC Titrator							
Clear Plastic Bottle - Natural (EA005-P)							
AMD01_16, AMD02_8, AMD02_24, AMD03_6, AMD03_14, AMD03_18, AMD03_22, AMD04_14, AMD04_26, AMD04_30	**30-Mar-2022**	**----**	----	----	**07-Apr-2022**	30-Mar-2022	×
Clear Plastic Bottle - Natural (EA005-P)							
AMD04_36, AMD04_40, AMD05_22, AMD05_26, AMD05_30, AMD06_2, AMD06_10, AMD06_22, AMD06_14, AMD06_18, AMD06_28, AMD07_14, AMD07_20, AMD07_30, AMD08_8, AMD08_14, AMD08_22, AMD08_30, AMD09_24, AMD09_38, AMD09_34, AMD10_16_18, AMD10_28_30, AMD10_36_38, AMD10_44_46	**31-Mar-2022**	**----**	----	----	**07-Apr-2022**	31-Mar-2022	×
EA010P: Conductivity by PC Titrator							
Clear Plastic Bottle - Natural (EA010-P)							
AMD01_16, AMD02_8, AMD02_24, AMD03_6, AMD03_14, AMD03_18, AMD03_22, AMD04_14, AMD04_26, AMD04_30	**30-Mar-2022**	**----**	----	----	**07-Apr-2022**	27-Apr-2022	✓
Clear Plastic Bottle - Natural (EA010-P)							
AMD04_36, AMD04_40, AMD05_22, AMD05_26, AMD05_30, AMD06_2, AMD06_10, AMD06_22, AMD06_14, AMD06_18, AMD06_28, AMD07_14, AMD07_20, AMD07_30, AMD08_8, AMD08_14, AMD08_22, AMD08_30, AMD09_24, AMD09_38, AMD09_34, AMD10_16_18, AMD10_28_30, AMD10_36_38, AMD10_44_46	**31-Mar-2022**	**----**	----	----	**07-Apr-2022**	28-Apr-2022	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED037P: Alkalinity by PC Titrator							
Clear Plastic Bottle - Natural (ED037-P)							
AMD01_16, AMD02_8, AMD02_24, AMD03_6, AMD03_14, AMD03_18, AMD03_22, AMD04_14, AMD04_26, AMD04_30	**30-Mar-2022**	**----**	----	----	**07-Apr-2022**	13-Apr-2022	✓
Clear Plastic Bottle - Natural (ED037-P)							
AMD04_36, AMD04_40, AMD05_22, AMD05_26, AMD05_30, AMD06_2, AMD06_10, AMD06_22, AMD06_14, AMD06_18, AMD06_28, AMD07_14, AMD07_20, AMD07_30, AMD08_8, AMD08_14, AMD08_22, AMD08_30, AMD09_24, AMD09_38, AMD09_34, AMD10_16_18, AMD10_28_30, AMD10_36_38, AMD10_44_46	**31-Mar-2022**	**----**	----	----	**07-Apr-2022**	14-Apr-2022	✓
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA							
Clear Plastic Bottle - Natural (ED041G)							
AMD01_16, AMD02_8, AMD02_24, AMD03_6, AMD03_14, AMD03_18, AMD03_22, AMD04_14, AMD04_26, AMD04_30	**30-Mar-2022**	**----**	----	----	**11-Apr-2022**	27-Apr-2022	✓
Clear Plastic Bottle - Natural (ED041G)							
AMD09_34, AMD10_16_18, AMD10_28_30, AMD10_36_38, AMD10_44_46	**31-Mar-2022**	**----**	----	----	**07-Apr-2022**	28-Apr-2022	✓
Clear Plastic Bottle - Natural (ED041G)							
AMD04_36, AMD04_40, AMD05_22, AMD05_26, AMD05_30, AMD06_2, AMD06_10, AMD06_22, AMD06_14, AMD06_18, AMD06_28, AMD07_14, AMD07_20, AMD07_30, AMD08_8, AMD08_14, AMD08_22, AMD08_30, AMD09_24, AMD09_38	**31-Mar-2022**	**----**	----	----	**11-Apr-2022**	28-Apr-2022	✓

Matrix: **WATER**

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

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
ED045G: Chloride by Discrete Analyser							
Clear Plastic Bottle - Natural (ED045G)							
AMD01_16, AMD02_8, AMD02_24, AMD03_6, AMD03_14, AMD03_18, AMD03_22, AMD04_14, AMD04_26, AMD04_30	**30-Mar-2022**	**----**	----	----	**11-Apr-2022**	27-Apr-2022	✓
Clear Plastic Bottle - Natural (ED045G)							
AMD09_34, AMD10_16_18, AMD10_28_30, AMD10_36_38, AMD10_44_46	**31-Mar-2022**	**----**	----	----	**07-Apr-2022**	28-Apr-2022	✓
Clear Plastic Bottle - Natural (ED045G)							
AMD04_36, AMD04_40, AMD05_22, AMD05_26, AMD05_30, AMD06_2, AMD06_10, AMD06_22, AMD06_14, AMD06_18, AMD06_28, AMD07_14, AMD07_20, AMD07_30, AMD08_8, AMD08_14, AMD08_22, AMD08_30, AMD09_24, AMD09_38	**31-Mar-2022**	**----**	----	----	**11-Apr-2022**	28-Apr-2022	✓
ED093W: Water Leachable Major Cations							
Clear Plastic Bottle - Nitric Acid; Unfiltered (ED093W)							
AMD01_16, AMD02_8, AMD02_24, AMD03_6, AMD03_14, AMD03_18, AMD03_22, AMD04_14, AMD04_26, AMD04_30	**30-Mar-2022**	**07-Apr-2022**	27-Apr-2022	✓	**07-Apr-2022**	27-Apr-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (ED093W)							
AMD04_36, AMD04_40, AMD05_22, AMD05_26, AMD05_30, AMD06_2, AMD06_10, AMD06_22, AMD06_14, AMD06_18, AMD06_28, AMD07_14, AMD07_20, AMD07_30, AMD08_8, AMD08_14, AMD08_22, AMD08_30, AMD09_24, AMD09_38, AMD09_34, AMD10_16_18, AMD10_28_30, AMD10_36_38, AMD10_44_46	**31-Mar-2022**	**08-Apr-2022**	28-Apr-2022	✓	**08-Apr-2022**	28-Apr-2022	✓

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
EG020W: Water Leachable Metals by ICP-MS							
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020G-W)							
AMD01_16, AMD02_8, AMD02_24, AMD03_6, AMD03_14, AMD03_18, AMD03_22, AMD04_14, AMD04_26, AMD04_30	**30-Mar-2022**	**04-Apr-2022**	26-Sep-2022	✓	**05-Apr-2022**	26-Sep-2022	✓
Clear HDPE (U-T ORC) - Unfiltered; Lab-acidified (EG020G-W)							
AMD04_36, AMD04_40, AMD05_22, AMD05_26, AMD05_30, AMD06_2, AMD06_10, AMD06_22, AMD06_14, AMD06_18, AMD06_28, AMD07_14, AMD07_20, AMD07_30, AMD08_8, AMD08_14, AMD08_22, AMD08_30, AMD09_24, AMD09_38, AMD09_34, AMD10_16_18, AMD10_28_30, AMD10_36_38, AMD10_44_46	**31-Mar-2022**	**08-Apr-2022**	27-Sep-2022	✓	**08-Apr-2022**	27-Sep-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020D-W)							
AMD01_16, AMD02_8, AMD02_24, AMD03_6, AMD03_14, AMD03_18, AMD03_22, AMD04_14, AMD04_26, AMD04_30	**30-Mar-2022**	**07-Apr-2022**	26-Sep-2022	✓	**07-Apr-2022**	26-Sep-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG020D-W)							
AMD04_36, AMD04_40, AMD05_22, AMD05_26, AMD05_30, AMD06_2, AMD06_10, AMD06_22, AMD06_14, AMD06_18, AMD06_28, AMD07_14, AMD07_20, AMD07_30, AMD08_8, AMD08_14, AMD08_22, AMD08_30, AMD09_24, AMD09_38, AMD09_34, AMD10_16_18, AMD10_28_30, AMD10_36_38, AMD10_44_46	**31-Mar-2022**	**08-Apr-2022**	27-Sep-2022	✓	**08-Apr-2022**	27-Sep-2022	✓

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
EG035W: Water Leachable Mercury by FIMS							
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035W)							
AMD01_16, AMD02_8, AMD02_24, AMD03_6, AMD03_14, AMD03_18, AMD03_22, AMD04_14, AMD04_26, AMD04_30	**30-Mar-2022**	**----**	----	----	**01-Apr-2022**	27-Apr-2022	✓
Clear Plastic Bottle - Nitric Acid; Unfiltered (EG035W)							
AMD04_36, AMD04_40, AMD05_22, AMD05_26, AMD05_30, AMD06_2, AMD06_10, AMD06_22, AMD06_14, AMD06_18, AMD06_28, AMD07_14, AMD07_20, AMD07_30, AMD08_8, AMD08_14, AMD08_22, AMD08_30, AMD09_24, AMD09_38, AMD09_34, AMD10_16_18, AMD10_28_30, AMD10_36_38, AMD10_44_46	**31-Mar-2022**	**----**	----	----	**04-Apr-2022**	28-Apr-2022	✓

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		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)							
Acid Neutralising Capacity (ANC)	EA013	7	63	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content	EA055	7	63	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Net Acid Generation	EA011	7	63	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate as SO4 2- Total	ED040T	7	63	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	7	63	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Acid Neutralising Capacity (ANC)	EA013	4	63	6.35	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Net Acid Generation	EA011	4	63	6.35	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate as SO4 2- Total	ED040T	4	63	6.35	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	4	63	6.35	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Acid Neutralising Capacity (ANC)	EA013	4	63	6.35	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate as SO4 2- Total	ED040T	4	63	6.35	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfur - Total as S (LECO)	ED042T	4	63	6.35	5.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	Method	QC	Regular	Actual	Expected	Evaluation	
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	5	50	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	5	48	10.42	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Major Cations	ED093W	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Mercury by FIMS	EG035W	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	6	35	17.14	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	4	35	11.43	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	5	35	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite G	EG020G-W	5	35	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Alkalinity by PC Titrator	ED037-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	6	50	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
pH by PC Titrator	EA005-P	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard

Matrix: **WATER**

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

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Control Samples (LCS) - Continued							
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	6	48	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Major Cations	ED093W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Mercury by FIMS	EG035W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite G	EG020G-W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Alkalinity by PC Titrator	ED037-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Chloride by Discrete Analyser	ED045G	3	50	**6.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Conductivity by PC Titrator	EA010-P	2	40	**5.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	48	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Major Cations	ED093W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Mercury by FIMS	EG035W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite G	EG020G-W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)							
Chloride by Discrete Analyser	ED045G	3	50	**6.00**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	3	48	**6.25**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Mercury by FIMS	EG035W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	3	35	**8.57**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	3	35	**8.57**	**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
pH by PC Titrator	EA005-P	SOIL	In house: Referenced to APHA 4500 H+ B. This procedure determines pH of water samples by automated ISE. This method is compliant with NEPM Schedule B(3)
Conductivity by PC Titrator	EA010-P	SOIL	In house: Referenced to APHA 2510 B. This procedure determines conductivity by automated ISE. This method is compliant with NEPM Schedule B(3)
Net Acid Generation	EA011	SOIL	In house: Referenced to Miller (1998) Titremetric 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 semiquanititatively estimate the likely reactivity. The soil is then reacted with an known excess quanitity of an appropriate acid. Titration determines the acid remaining, and the ANC can be calculated from comparison with a blank titration.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Asbestos Identification in Soils	EA200	SOIL	AS 4964 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Alkalinity by PC Titrator	ED037-P	SOIL	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 as SO4 2- Total	ED040T	SOIL	In house: Total Sulfate is determined off a HCl digestion by ICPAES as S , and reported as SO4
Sulfate (Turbidimetric) as SO4 2- by Discrete Analyser	ED041G	SOIL	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)
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 SO2) is measured by infra-red detector
Chloride by Discrete Analyser	ED045G	SOIL	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 librated thiocynate forms highly-coloured ferric thiocynate which is measured at 480 nm APHA seal method 2 017-1-L
Water Leachable Major Cations	ED093W	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010; ALS QWI-EN/EG005, QWI-EN/ED093. The ICPAES technique quickly breaks the sample down into atoms and ions under extremely hot plasma. Atoms are then ionised, emitting a characteristic spectrum. The spectrometer then separates the wavelengths, prior to comparison of intensities against matrix matched standards for quantification.
Water Leachable Metals by ICP-MS - Suite A	EG020A-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, AS 4439.3, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.

Analytical Methods	Method	Matrix	Method Descriptions
Water Leachable Metals by ICP-MS - Suite B	EG020B-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite C	EG020D-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite E	EG020E-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Metals by ICP-MS - Suite G	* EG020G-W	SOIL	In house: Referenced to APHA 3125; USEPA SW846 - 6020, ALS QWI-EN/EG020. The ICPMS technique utilizes a highly efficient argon plasma to ionize selected elements. Ions are then passed into a high vacuum mass spectrometer, which separates the analytes based on their distinct mass to charge ratios prior to their measurement by a discrete dynode ion detector.
Water Leachable Mercury by FIMS	EG035W	SOIL	In house: Referenced to 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 TCLP solution. 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).
Sulfide as S	EK085T	SOIL	In-house. Sulfide in a soil is determined as the difference between Total Sulfur (Leco) and Sulfate.
Ionic Balance by PCT DA and Turbi SO4 DA	* EN055 - PG	SOIL	In house: Referenced to APHA 1030F. This method is compliant with NEPM Schedule B(3)

Preparation Methods	Method	Matrix	Method Descriptions
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
HCl Digest	EN24	SOIL	1g of soil is digested in 30 ml of 30% HCl and the resultant digest bulked and filtered for analysis by ICP.
Digestion for Total Recoverable Metals in DI Water Leachate	EN25W	SOIL	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)
Deionised Water Leach - Glass Leaching Vessel	EN60-Dla-G	SOIL	In house QWI-EN/60 referenced to AS4439.3 Preparation of Leachates
Dry and Pulverise (up to 100g)	GEO30	SOIL	#

CHAIN OF CUSTODY RECORD
AND ANALYSIS REQUEST

GHD
Level 10, 999 Hay Street
Perth WA 6000
PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Project ID	12518217
PO Number (to be invoiced)	12518217
Laboratory Quote No.	EP-174-22
Turnaround Time	Standard
Project Manager (Invoice) & GHD accounts	Paul Hamer 6222 8583, 0424 99 8460
Email Address (Results)	steff.bright@ghd.com, paul.hamer@ghd.com, GHDLabReports@ghd.com
Laboratory:	ALS Environmental
Address:	26 Rigali Way, Wangara WA 6065
Laboratory Contact:	ALS Environmental

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix: S=Soil/SD=Sediment, W=Water/A=Air	Container Type: Bottle/Jar/Vial/Bag/Glass/Plastic	Preservative	No	EA013 (ANC)	EA011 (NAG)	EA2XX (Asbestos)	EA250 (Radionuclides)	EK085T (Sulfide as S)	ED042T (Sulfur total S)	Metals in soils *	Leach and metals *	Remarks
AMD01_18	1	1/02/2022		S	PB		No	x	x			x	x	x	x	* as per analysis suite in quote provided for metals and leach analysis
AMD02_8	2	1/02/2022		S	PB		No	x	x	x	x	x	x	x	x	
AMD02_12	3	1/02/2022		S	PB		No	x	x			x	x			
AMD02_24	4	1/02/2022		S	PB		No	x	x			x	x	x	x	
AMD03_6	5	1/02/2022		S	PB		No	x	x			x	x	x	x	
AMD03_12	6	1/02/2022		S	PB		No	x	x			x	x			
AMD03_14	7	1/02/2022		S	PB		No	x	x			x	x	x	x	
AMD03_16	8	1/02/2022		S	PB		No	x	x			x	x			
AMD03_18	9	1/02/2022		S	PB		No	x	x	x	x	x	x	x	x	
AMD03_20	10	1/02/2022		S	PB		No	x	x			x	x			
AMD03_22	11	1/02/2022		S	PB		No	x	x			x	x	x	x	
AMD04_14	12	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD04_22	13	2/02/2022		S	PB		No	x	x			x	x			
AMD04_26	14	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD04_28	15	2/02/2022		S	PB		No	x	x			x	x			
AMD04_30	16	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD04_34	17	2/02/2022		S	PB		No	x	x			x	x			
AMD04_36	18	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD04_38	19	2/02/2022		S	PB		No	x	x			x	x			
AMD04_40	20	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD05_22	21	1/02/2022		S	PB		No	x	x			x	x	x	x	
AMD05_24	22	1/02/2022		S	PB		No	x	x			x	x			
AMD05_26	23	1/02/2022		S	PB		No	x	x			x	x	x	x	
AMD05_28	24	1/02/2022		S	PB		No	x	x			x	x			
AMD05_30	25	1/02/2022		S	PB		No	x	x			x	x	x	x	
AMD06_2	26	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD06_6	27	2/02/2022		S	PB		No	x	x			x	x			
AMD06_10	28	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD06_12	29	2/02/2022		S	PB		No	x	x			x	x			
AMD06_22	30	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD06_24	31	2/02/2022		S	PB		No	x	x			x	x			
AMD06_14	32	2/02/2022		S	PB		No	x	x	x	x	x	x	x	x	
AMD06_16	33	2/02/2022		S	PB		No	x	x			x	x			
AMD06_18	34	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD06_26	35	2/02/2022		S	PB		No	x	x			x	x			
AMD06_28	36	2/02/2022		S	PB		No	x	x			x	x	x	x	

Environmental Division
Perth
Work Order Reference
EP2203533

Telephone : - 61-8-9406 1301

Ac 24 1020

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Project ID 12518217	**PO Number (to be invoiced)** 12518217	Laboratory:	ALS Environmental
Laboratory Quote No. EP-174-22	**Turnaround Time** Standard	Address:	26 Rigali Way, Wangara WA 6065
Project Manager (invoice) & GHD accounts Paul Hamer 6222 8583, 0424 99 8460	**Email Address (Results)** steff.bright@ghd.com, paul.hamer@ghd.com, GHDLabReports@ghd.com	Laboratory Contact:	ALS Environmental

GHD
Level 10, 999 Hay Street
Perth WA 6000

PO Box 3106
Perth WA 6832

Reception Ph: 08 6222 8222

Page 1 of 2

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air	Container: Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Container: Preservative Unpreserved/ HCl/ H2SO4/ HNO3/ Other	Container: No	EA013 (ANC)	EA011 (NAG)	EA200 (Asbestos)	EA250 (Radionuclides)	EK085T (Sulfide as S)	ED042T (Sulfur total S)	Metals in soils *	Leach and metals *	Remarks
AMD07_12	37	2/02/2022		S	PB		No	x	x			x	x			* as per analysis suite in quote provided for metals and leach analysis
AMD07_14	38	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD07_16	39	2/02/2022		S	PB		No	x	x			x	x			
AMD07_20	40	2/02/2022		S	PB		No	x	x	x	x	x	x	x	x	
AMD07_24	41	2/02/2022		S	PB		No	x	x			x	x			
AMD07_30	42	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD07_10	43	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_22	44	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_28	45	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_2	46	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_6	47	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_18	48	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_26	49	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_32	50	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_4	51	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_8	52	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD08_6	53	2/02/2022		S	PB		No	x	x			x	x			
AMD08_8	54	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD08_10	55	2/02/2022		S	PB		No	x	x			x	x			
AMD08_14	56	2/02/2022		S	PB		No	x	x	x	x	x	x	x	x	
AMD08_18	57	2/02/2022		S	PB		No	x	x			x	x			
AMD08_22	58	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD08_26	59	2/02/2022		S	PB		No	x	x			x	x			
AMD08_30	60	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD09_22	61	3/02/2022		S	PB		No	x	x			x	x			
AMD09_24	62	3/02/2022		S	PB		No	x	x			x	x	x	x	
AMD09_26	63	3/02/2022		S	PB		No	x	x			x	x			
AMD09_38	64	3/02/2022		S	PB		No	x	x			x	x	x	x	
AMD09_42	65	3/02/2022		S	PB		No	x	x			x	x			
AMD09_34	66	3/02/2022		S	PB		No	x	x			x	x	x	x	
AMD10_16-18	67	3/02/2022		S	PB		No	x	x			x	x	x	x	
AMD10_22-24	68	3/02/2022		S	PB		No	x	x			x	x			
AMD10_28-30	69	3/02/2022		S	PB		No	x	x			x	x	x	x	
AMD10_30-32	70	3/02/2022		S	PB		No	x	x			x	x			
AMD10_36-38	71	3/02/2022		S	PB		No	x	x			x	x	x	x	
AMD10_40-42	72	3/02/2022		S	PB		No	x	x			x	x			
AMD10_44-46	73	3/02/2022		S	PB		No	x	x			x	x	x	x	

Sampled by: S.Bright	Date/Time:	Relinquished by: S.Bright	Date/Time: 1/3/2022
Received by: LDuffy	Date/Time: 24/3	Relinquished by:	Date/Time:

1020

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2203535**	Page	: 1 of 2
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MR PAUL HAMER	Contact	: Peter Ravlic
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: +61 08 6222 8583	Telephone	: +6138549 9645
Project	: 12518217	Date Samples Received	: 01-Mar-2022 11:30
Order number	: 12518217	Date Analysis Commenced	: 05-May-2022
C-O-C number	: ----	Issue Date	: 16-May-2022 08:08
Sampler	: Steff Bright		
Site	: ----		
Quote number	: EP/174/22		
No. of samples received	: 35		
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, 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	*Position*	*Accreditation Category*
Kim McCabe	Senior Inorganic Chemist	Brisbane External Subcontracting, 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.

- Radionuclides conducted by ALS Brisbane, NATA Site No. 818.
- Radiological work undertaken by ALS Laboratory Group (Ceska Lipa) under CAI accreditation No. L1163. Report No. PR2231318. NATA and CAI accreditations' are both recognised under ILAC.

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)				Sample ID	AMD02_8	AMD03_18	AMD06_14	AMD07_20	AMD08_14
				Sampling date / time	01-Feb-2022 00:00	01-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00	02-Feb-2022 00:00
Compound	*CAS Number*	*LOR*	*Unit*		**EP2203535-002**	**EP2203535-006**	**EP2203535-019**	**EP2203535-023**	**EP2203535-026**
					Result	Result	Result	Result	Result
Radionuclides / Activity									
Gross alpha	----	500	Bq/kg DW		<500	**970**	<500	<500	<500
Gross beta	----	500	Bq/kg DW		<500	<500	<500	<500	<500

Inter-Laboratory Testing

Analysis conducted by ALS Brisbane, NATA accreditation no. 825, site no. 818 (Chemistry) 18958 (Biology).

(SOIL) Radionuclides / Activity

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2203535**	Page	: 1 of 3
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MR PAUL HAMER	Contact	: Peter Ravlic
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: +61 08 6222 8583	Telephone	: +6138549 9645
Project	: 12518217	Date Samples Received	: 01-Mar-2022
Order number	: 12518217	Date Analysis Commenced	: 05-May-2022
C-O-C number	: ----	Issue Date	: 16-May-2022
Sampler	: Steff Bright		
Site	: ----		
Quote number	: EP/174/22		
No. of samples received	: 35		
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, 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*
Kim McCabe	Senior Inorganic Chemist	Brisbane External Subcontracting, 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.

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.**

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

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

- **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	: **EP2203535**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MR PAUL HAMER	Telephone	: +6138549 9645
Project	: 12518217	Date Samples Received	: 01-Mar-2022
Site	: ----	Issue Date	: 16-May-2022
Sampler	: Steff Bright	No. of samples received	: 35
Order number	: 12518217	No. of samples analysed	: 5

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:

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*

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
Gross Alpha and Beta activity in solids	EA250	SOIL	In house: Referenced to ISO 9697 / CSN 757611. Determination of Gross Alpha and Beta activity in soil and sediment by Thick Source method. An appropriate mass of sample is dried and pulverised prior to direct activity counting. (If required, Potassium may be determined separately and results corrected accordingly for 40K.) Analysis is performed by ALS (Czech Republic) who hold technical accreditation #1163 for Gross alpha and beta activity under CAI. CAI are a European accreditation body, equivalent to NATA in Australila and recognised internationally by NATA under ILAC.

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

GHD
Level 10, 999 Hay Street, Perth WA 6000
PO Box 3106, Perth WA 6832

Reception Ph: 08 6222 8222

Page 1 of 2

Project ID	12518217
PO Number (to be invoiced)	12518217
Laboratory:	ALS Environmental
Address:	26 Rigali Way, Wangara WA 6065
Laboratory Contact:	ALS Environmental
Laboratory Quote No.	EP-174-22
Turnaround Time	Standard
Project Manager (Invoice) & GHD accounts	Paul Hamer 6222 8583, 0424 99 8460
Email Address (Results)	steff.bright@ghd.com, paul.hamer@ghd.com, GHDLabReports@ghd.com

Remarks: * as per analysis suite in quote provided for metals and leach analysis

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air	Container: Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-plastic	Container: Preservative Unpreserved/ HCl/H2SO4/HNO3/Other	Container: No	EA013 (ANC)	EA011 (NAG)	EA200 (Asbestos)	EA250 (Radionuclides)	EK085T (Sulfide as S)	ED042T (Sulfur total S)	Metals in soils *	Leach and metals *
AMD01_18	1	1/02/2022		S	PB		No	x	x			x	x	x	x
AMD02_8	2	1/02/2022		S	PB		No	x	x	x	x	x	x	x	x
AMD02_12	—	1/02/2022		S	PB		No	x	x			x	x		
AMD02_24	3	1/02/2022		S	PB		No	x	x			x	x	x	x
AMD03_6	4	1/02/2022		S	PB		No	x	x			x	x	x	x
AMD03_12	—	1/02/2022		S	PB		No	x	x			x	x		
AMD03_14	5	1/02/2022		S	PB		No	x	x			x	x	x	x
AMD03_16	—	1/02/2022		S	PB		No	x	x			x	x		
AMD03_18	6	1/02/2022		S	PB		No	x	x	x	x	x	x	x	x
AMD03_20	—	1/02/2022		S	PB		No	x	x			x	x		
AMD03_22	7	1/02/2022		S	PB		No	x	x			x	x	x	x
AMD04_14	8	2/02/2022		S	PB		No	x	x			x	x	x	x
AMD04_22	—	2/02/2022		S	PB		No	x	x			x	x		
AMD04_26	9	2/02/2022		S	PB		No	x	x			x	x	x	x
AMD04_28	—	2/02/2022		S	PB		No	x	x			x	x		
AMD04_30	10	2/02/2022		S	PB		No	x	x			x	x	x	x
AMD04_34	—	2/02/2022		S	PB		No	x	x			x	x		
AMD04_36	11	2/02/2022		S	PB		No	x	x			x	x	x	x
AMD04_38	—	2/02/2022		S	PB		No	x	x			x	x		
AMD04_40	12	2/02/2022		S	PB		No	x	x			x	x	x	x
AMD05_22	13	1/02/2022		S	PB		No	x	x			x	x	x	x
AMD05_24	—	1/02/2022		S	PB		No	x	x			x	x		
AMD05_26	14	1/02/2022		S	PB		No	x	x			x	x	x	x
AMD05_28	—	1/02/2022		S	PB		No	x	x			x	x		
AMD05_30	15	1/02/2022		S	PB		No	x	x			x	x	x	x
AMD06_2	16	2/02/2022		S	PB		No	x	x			x	x	x	x
AMD06_6	—	2/02/2022		S	PB		No	x	x			x	x		
AMD06_10	17	2/02/2022		S	PB		No	x	x			x	x	x	x
AMD06_12	—	2/02/2022		S	PB		No	x	x			x	x		
AMD06_22	18	2/02/2022		S	PB		No	x	x			x	x	x	x
AMD06_24	—	2/02/2022		S	PB		No	x	x			x	x		
AMD06_14	19	2/02/2022		S	PB		No	x	x	x	x	x	x	x	x
AMD06_16	—	2/02/2022		S	PB		No	x	x			x	x		
AMD06_18	20	2/02/2022		S	PB		No	x	x			x	x	x	x
AMD06_26	—	2/02/2022		S	PB		No	x	x			x	x		
AMD06_28	21	2/02/2022		S	PB		No	x	x			x	x	x	x

Environmental Division
Perth
Work Order Reference
EP2203535

Telephone : - 61-8-9406 1301

Rec 24/3 1020

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

GHD
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Page 1 of 2

Project ID 12518217	**PO Number** (to be invoiced) 12518217
Laboratory Quote No. EP-174-22	**Turnaround Time** Standard
Project Manager (Invoice) & GHD accounts Paul Hamer 6222 8583, 0424 99 8460	**Email Address (Results)** steff.bright@ghd.com, paul.hamer@ghd.com, GHDLabReports@ghd.com
Laboratory:	ALS Environmental
Address:	26 Rigali Way, Wangara WA 6065
Laboratory Contact:	ALS Environmental

GHD Sample ID	Lab Sample ID	Date	Time	Sample Matrix (Soil/Sediment/Water/Air)	Container Type (Glass/Plastic/Vial/Bag)	Container Preservative (Unpreserved/HCl/H2SO4/HNO3/Other)	No.	EA013 (ANC)	EA011 (NAG)	EA200 (Asbestos)	EA250 (Radionuclides)	EK085T (Sulfide as S)	EC042T (Sulfur total S)	Metals in soils *	Leach and metals *	Remarks
AMD07_12	—	2/02/2022		S	PB		No	x	x			x	x			
AMD07_14	22	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD07_16	—	2/02/2022		S	PB		No	x	x			x	x			
AMD07_20	23	2/02/2022		S	PB		No	x	x	x	x	x	x	x	x	
AMD07_24	—	2/02/2022		S	PB		No	x	x			x	x			
AMD07_30	24	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD07_10	—	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_22	—	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_28	—	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_2	—	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_6	—	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_18	—	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_26	—	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_32	—	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_4	—	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD07_8	—	2/02/2022		S	PB		No									Please do not analyse, keep on hold for now
AMD08_6	—	2/02/2022		S	PB		No	x	x			x	x			
AMD08_8	25	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD08_10	—	2/02/2022		S	PB		No	x	x			x	x			
AMD08_14	26	2/02/2022		S	PB		No	x	x	x	x	x	x	x	x	
AMD08_18	—	2/02/2022		S	PB		No	x	x			x	x			
AMD08_22	27	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD08_26	—	2/02/2022		S	PB		No	x	x			x	x			
AMD08_30	28	2/02/2022		S	PB		No	x	x			x	x	x	x	
AMD09_22	—	3/02/2022		S	PB		No	x	x			x	x			
AMD09_24	29	3/02/2022		S	PB		No	x	x			x	x	x	x	
AMD09_26	—	3/02/2022		S	PB		No	x	x			x	x			
AMD09_38	30	3/02/2022		S	PB		No	x	x			x	x	x	x	
AMD09_42	—	3/02/2022		S	PB		No	x	x			x	x			
AMD09_34	31	3/02/2022		S	PB		No	x	x			x	x	x	x	
AMD10_16-18	32	3/02/2022		S	PB		No	x	x			x	x	x	x	
AMD10_22-24	—	3/02/2022		S	PB		No	x	x			x	x			
AMD10_28-30	33	3/02/2022		S	PB		No	x	x			x	x	x	x	
AMD10_30-32	—	3/02/2022		S	PB		No	x	x			x	x			
AMD10_36-38	34	3/02/2022		S	PB		No	x	x			x	x	x	x	
AMD10_40-42	—	3/02/2022		S	PB		No	x	x			x	x			
AMD10_44-46	35	3/02/2022		S	PB		No	x	x			x	x	x	x	

Sampled by: S.Bright	Date/Time:	Relinquished by: S.Bright	Date/Time: 1/3/2022
Received by: LOUFER	Date/Time: 24/3	Relinquished by:	Date/Time:

1020

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The Power of Commitment

Appendix F3 - Moora Mine Material Characterisation Study Above Ground (GHD 2020)

17 August 2020

Daniel Mance
QHSE Supervisor
Simcoa Operations Pty Ltd
973 Marriott Road, Wellesley WA 6233

Our ref: 12518217-38772-84

Simcoa - Moora Mine: Waste rock materials characterisation

Dear Daniel,

Please find following the findings of the laboratory assessment of the waste rock materials characterisation for the, Moora Mine.

1 Introduction

.

GHD was commissioned by Simcoa to complete a desk-top assessment comprising a preliminary Materials Characterisation Study, for the Moora Mine (April 2019). A summary of the findings from this desk-top assessment are presented below in section 1.1.

The primary objective of this report is to close out the data gaps that were highlighted in the previous desk-top study (April 2019).

1.1 Desk-top assessment findings

1.1.1 Characterisation of leaching impacts

It was found that while specific assay/laboratory data was unavailable, the desk-top assessment indicated that there is unlikely to be elevated concentrations of sulphide within the ore-body, and that the generation of acidic conditions is unlikely to occur at the concentrations and rates which may be a cause for concern to human health and the environment.

It was concluded that conditions should not be conducive for leaching and mobilisation of metals at concentrations which may cause adverse effects to human health and the environment, given the geological profile (ancient weathered and silicic geological profile) (GHD, 2019).

1.1.2 Radioactivity

The dominant silicic mineralogy and lithology (predominantly chert) support minerals which commonly exhibit elevated radioactivity (above that of background), are unlikely to be present at this site.

The mining process should not concentrate background radioactivity which may be present given the waste rock is not subject to processing and will be relocated to the waste rock landform, and that the ore and residual processed material will be managed off-site.

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1.1.3 Air-borne hazards

Although not confirmed, the occurrence of asbestos is not anticipated within this style of silica based ore-body. However, the silicic mineralogy of the ore body indicates that there is an elevated risk of exposure to human health from air-bore silica.

1.1.4 Recommendations

Although the site geological setting indicates that the risks of leaching and hazardous material is considered low, confirmation is required though testing and of the waste materials. The recommended laboratory testing includes a “screening” assessment of the waste rock. The scope of this screening assessment is outlined below.

2 Scope of Works

The following laboratory testing was completed to screen the potential issues and provide confidence in the previous characterisation of the waste-rock, as follows:

- Acid neutralising capacity (ANC): 12 samples,
- Net acid generation (NAG) : 12 samples,
- Sulfur speciation: 6 samples,
- Metals comprehensive: 6 samples,
- Leach testing (major-ions, pH, EC, metals): 6 samples,
- Radioactivity screen/gross alpha and beta: 4 samples, and
- Asbestos mineral fibres: 12 samples.

Samples collected were sent to a NATA accredited laboratory (ALS) for testing.

2.1 Sample Locations

Samples were collected by Simcoa on 28 May 2020, from material classified as waste rock, from faces exposed within the pit walls. Sample material was reported as representative of a typical mix of waste rock from the west and main pits.

All samples were collected at random from locations shown on Figure 1. This sampling methodology gives a good proxy for the material in the waste dumps themselves, given the waste dumps are compromised exclusively of material that has been extracted from the main and west pits.

As such, the samples taken are considered “representative” of typical waste material, and therefore not biased by material that would be utilized for product. The sample details are presented in Table A.

Table A: Laboratory Analysis Sample Summary

Sample No	Sample ID	Location	Easting	Northing	RL (mAHD)	Acid Neutralising Capacity (ANC)	Net Acid Generating Capacity (NAG)	Sulphur Speciation	Metals Comprehensive	Leach Testing (major ions, pH, EC, metals)	Radioactivity Screen/Gross alpha	Asbestos mineral fibres
1	WP210	West Pit	407205	6623204	210	X	X	X				X
2	WP220	West Pit	407215	6623155	220	X	X		X	X	X	X
3	WP215NE	West Pit	407188	6623366	215	X	X	X				X
4	WP215NW	West Pit	407122	6623335	215	X	X		X	X	X	X
5	WP215SE	West Pit	407249	6623112	215	X	X	X				X
6	MW210W	Main Pit	407518	6623488	210	X	X		X	X		X
7	MP215W	Main Pit	407524	6623299	215	X	X	X				X
8	MW215N	Main Pit	407548	6623464	215	X	X		X	X	X	X
9	MP220N	Main Pit	407578	6623264	220	X	X	X				X
10	MP220E	Main Pit	407647	6623172	220	X			X	X	X	X
11	MP224W	Main Pit	407568	6623109	224	X		X				X
12	MP228E	Main Pit	407711	6622981	228				X	X		X

Figure 1: Waste rock sample locations

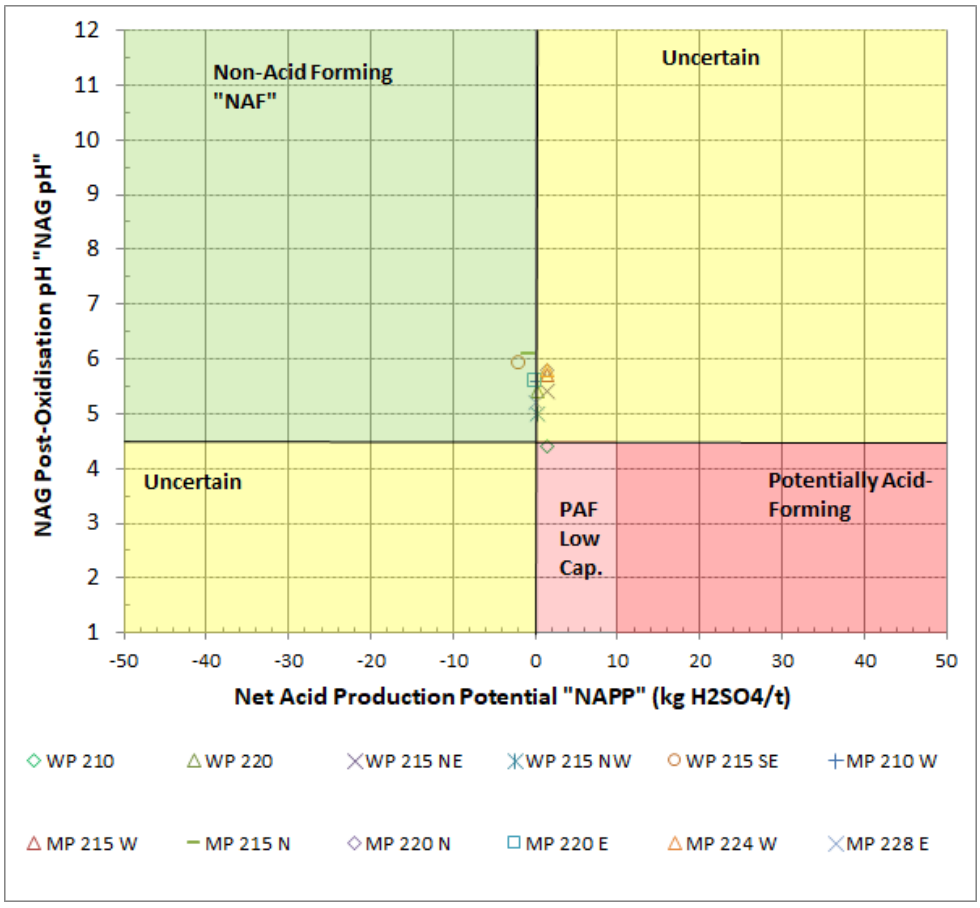

Figure 2: Waste rock classification for acid forming potential

3 Laboratory analysis results

The laboratory results are summarised in the Tables 1 to 3 in Attachment A, and the laboratory certificate of analysis is presented in Attachment B. The laboratory results are discussed in the following sections 3.1 to 3. 4.

3.1 Hazardous materials

The results of the asbestos and radioactivity of the waste rock (Table 1), indicates the following:

- Asbestos was not detected in the 12 waste rock samples.
- Radioactivity was not detected above the limits of reporting (500 bq/Kg) in four waste rock samples.

3.2 Acid generation potential

The results of the acid generation/neutralising potential of the waste rock is presented in Table 1 and Figure 2. The results indicate the following:

- The low concentrations of sulphur, at or marginally above detection limits (<0.01%), indicates that there is little stored capacity within the waste rock to produce acid though the oxidisation of sulphides (Table 1).
- The graphs (Figure 2), related to classification of the material based on the NAG and ANC tests, indicates that the waste material is deemed as a low risk from acid production, plotting as either “Non-acid forming” or “Uncertain”.

As expected in this silica style orebody, although the mass of acid which may be produced production is very low (negligible sulphides), the data indicates that the neutralising capacity of the waste rock is also low (negligible carbonates). As a consequence, the observed weak acidity (low concentrations of H^+ ions indicated in the data), deemed as a consequence of other minerals (e.g.: iron), should be subject to buffering and dilution and should not pose an adverse risk or persistence of acidic conditions within the subsurface.

3.3 Total metals and leachable metals

The results of the metals testing of the waste rock Table 2 and leachable metals in Table 3, indicates the majority of the metals concentrations are below the comparative guideline (earth crustal abundance).

A small number of total metals (Table 2) are deemed as elevated above the comparative guideline, which - if leached at elevated concentrations may be cause for concern if sensitive receptors are present. (e.g.: bismuth, strontium, molybdenum).

There are no known ecological receptors, to groundwater seepage, given the nearest location of the receiving waters is located some 1.5 km to the west of the mine site (hypersaline drainage line). Human health receptors may be exposed to the seepage from the waste rock, through contact with the seepage waters or ingestion through drinking water.

However, the leachable concentrations (Table 3), indicates that metals concentrations are generally below the limits of reporting, or at concentrations which are below the drinking water health criteria, and should not pose a risk to human health receptors for drinking or other exposure scenarios (irrigation use/dust suppression).

3.4 Saline water generation potential

The leachable data in Table 2 indicates that the total leachable constituents (major-ions) are at low concentrations (7 to 33 mg/L). As a consequence, dissolution of minerals and saline discharge, at concentrations which may be a cause for concern, from the waste rock is not anticipated.

4 Conclusions

With respect to the waste rock materials, the laboratory analysis corroborates the desk-top assessment findings (April 2019) indicating the following conclusions:

- Asbestos form minerals and radioactivity should not pose a risk to human health.
- The waste rock material is deemed not to pose an unacceptable risk, through generation of acidic conditions (negligible acid production potential).
- Metals should not leach from the waste rock under acidic conditions at concentrations which may cause an impact to human health and the environment.
- The waste rock should not leach readily dissolvable minerals at concentrations which will cause unacceptable increases in salinity.

Although the risks posed by waste rock materials is indicated as low, exposure during mining of the silica should be managed to protect human health (dust etc.).

Sincerely
GHD

Darcy Bott
Hydrogeologist
+61 8 62228513

Attachments:

Attachment A – Laboratory Results Summary Tables (DI Leachate and Soils)

Attachment B – ALS Laboratory Certificate of Analysis (CoA) and Chain of Custody (CoC)

Attachment 1

Laboratory Results Summary Tables

Field ID	Simcoa AMD Characterisation					
Sample Type	Soil					
Sample Date	4/06/2020					
Lab ID	EP2005570-002	EP2005570-004	EP2005570-006	EP2005570-008	EP2005570-010	EP2005570-012
Sample ID	WP 220	WP 215 NW	MP 210 W	MP 215 N	MP 220 E	MP 228 E

Analyte	Symbol	Unit	*General abundance of elements in Earths crust*						
Silver	Ag	(ppm)	***0.075***	0.01	**<0.01**	0.01	0.01	0.01	**<0.01**
Aluminium	Al	(%)	***8.23***	2.87	0.41	0.36	0.51	0.5	0.37
Arsenic	As	(ppm)	***1.8***	**4.9**	0.3	0.7	1.3	**1.9**	0.5
Boron	B	(%)	***0.001***	0.001	0.001	<0.001	<0.001	<0.001	<0.001
Barium	Ba	(ppm)	***425***	40	20	20	30	30	10
Beryllium	Be	(ppm)	***2.8***	0.29	0.09	0.09	0.09	0.23	0.06
Bismuth	Bi	(ppm)	***0.009***	**0.15**	**0.05**	**0.04**	**0.05**	**0.05**	**0.02**
Calcium	Ca	(%)	***4.15***	0.05	0.02	0.08	0.08	0.02	0.05
Cadmium	Cd	(ppm)	***0.15***	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Cerium	Ce	(ppm)	***66.5***	9.75	5.13	4.52	6.74	33.3	2.36
Cobalt	Co	(ppm)	***25***	1.6	0.6	0.9	0.9	5.5	0.6
Chromium (III+VI)	Cr	(ppm)	***102***	39	42	39	45	47	40
Caesium	Cs	(ppm)	***3***	0.72	0.09	0.07	0.16	0.1	0.06
Copper	Cu	(ppm)	***60***	3.2	2.4	3.3	3.4	2.8	2.3
Fluoride	F	(ppm)	***585***	60	<20	60	40	<20	<20
Iron	Fe	(%)	***5.63***	2.2	0.7	0.76	0.79	0.74	0.76
Gallium	Ga	(ppm)	***19***	9.73	1.61	1.17	1.98	1.83	1.46
Germanium	Ge	(ppm)	***1.5***	0.07	<0.05	0.06	<0.05	0.06	0.05
Hafnium	Hf	(ppm)	***3***	1.7	0.6	0.2	0.3	0.3	0.4
Mercury	Hg	(ppm)	***0.085***	0.017	0.011	0.009	0.008	0.075	0.006
Indium	In	(ppm)	***0.25***	0.023	<0.005	<0.005	0.008	0.005	<0.005
Potassium	K	(%)	***2.09***	0.13	0.07	0.04	0.08	0.04	0.03
Lanthanum	La	(ppm)	***39***	5.1	2.5	2.1	2.9	15.2	1.2
Lithium	Li	(ppm)	***20***	10.8	0.9	2.1	1.6	2.8	1
Magnesium	Mg	(%)	***2.33***	0.05	0.02	0.07	0.04	0.02	0.02
Manganese	Mn	(ppm)	***950***	58	52	71	74	71	61
Molybdenum	Mo	(ppm)	***1.2***	**4.11**	**3.39**	**3.83**	**4.15**	**3.96**	**3.77**
Sodium	Na	(%)	***2.36***	0.02	0.01	0.01	0.01	<0.01	0.01
Niobium	Nb	(ppm)	***20***	8.3	2.9	0.6	1.4	0.5	2.6
Nickel	Ni	(ppm)	***84***	17.6	4.1	6.1	5.2	6.5	4.5
Phosphorus (Total)	P	(ppm)	***1050***	150	70	330	170	160	140
Lead	Pb	(ppm)	***14***	6.5	2.5	2.8	2.3	6.3	1.5
Rubidium	Rb	(ppm)	***90***	8.1	2.6	1.5	3.8	2	1.1
Rhenium	Re	(ppm)	***0.0007***	**<0.002**	**<0.002**	**<0.002**	**<0.002**	**<0.002**	**<0.002**
Sulfur as S	S	(%)	***0.035***	0.01	0.01	0.01	0.01	<0.01	<0.01
Antimony	Sb	(ppm)	***0.2***	**0.27**	0.13	0.18	0.15	0.18	0.15
Scandium	Sc	(ppm)	***22***	2.4	1	0.6	1.2	2.1	0.5
Selenium	Se	(ppm)	***0.05***	**2**	**<1**	**<1**	**<1**	**<1**	**<1**
Tin	Sn	(ppm)	***2.3***	1.6	0.6	0.3	0.4	0.4	0.7
Strontium	Sr	(ppm)	***0.037***	**8.5**	**3.9**	**3**	**14.4**	**7.7**	**2.6**
Tantalum	Ta	(ppm)	***2***	0.65	0.21	**<0.05**	0.08	**<0.05**	0.17
tellurium	Te	(ppm)	***0.001***	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**	**<0.05**
Thorium	Th	(ppm)	***9.6***	3.6	1.6	1.02	1.33	3.13	0.83
Titanium	Ti	(%)	***0.56***	0.349	0.102	0.019	0.048	0.019	0.101
Thallium	Tl	(ppm)	***0.85***	0.05	0.02	<0.02	0.02	0.02	<0.02
Uranium	U	(ppm)	***2.7***	0.8	0.4	0.4	0.4	0.7	0.4
Vanadium	V	(ppm)	***120***	63	12	5	10	7	10
Tungsten	W	(ppm)	***1.25***	1.1	0.5	0.2	0.3	0.2	0.5
Yttrium	Y	(ppm)	***33***	2.9	1.8	1.3	1.7	2.5	0.9
Zinc	Zn	(ppm)	***70***	4	<2	3	3	<2	3
Zirconium	Zr	(ppm)	***165***	54.8	22.5	5.9	13	11.3	17.5

Matrix:	DI WATER LEACHATE
Workgroup:	EP2005570
Project name/number:	125 182 17-002

				Sample Type:	REG	REG	REG	REG	REG	REG
				ALS Sample Number:	EP2005570002	EP2005570004	EP2005570006	EP2005570008	EP2005570010	EP2005570012
				Sample Date:	18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020
				Client sample ID (1st):	WP 220	WP 215 NW	MP 210 W	MP 215 N	MP 220 E	MP 228 E
				Client sample ID (2nd):	West Pit	West Pit	Main Pit	Main Pit	Main Pit	Main Pit
				Depth Type:						
				Depth (m):						
				Site:						
				Purchase Order:						
Analyte grouping/Analyte	**CAS Number**	**Unit**	**Limit of reporting**	**ADWG**						
Physio-chemical										
pH Value		pH Unit	0.01	6.5 - 8.5	**6.7**	**6.43**	**7.17**	**7.79**	**7.26**	**6.99**
Final pH		pH Unit	0.1		**6.8**	**6.7**	**6.9**	**7.4**	**7.5**	**7.3**
Electrical Conductivity @ 25°C		µS/cm	1		**34**	**10**	**19**	**47**	**16**	**22**
Major ions										
Hydroxide Alkalinity as CaCO3	DMO-210-001	mg/L	1		<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	mg/L	1		<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	mg/L	1		**5**	**2**	**8**	**23**	**7**	**6**
Total Alkalinity as CaCO3		mg/L	1		**5**	**2**	**8**	**23**	**7**	**6**
Sulfate as SO4 - Turbidimetric	14808-79-8	mg/L	1	250*	**4**	**2**	**1**	<2	**2**	**2**
Chloride	16887-00-6	mg/L	1	250*	**3**	<1	<1	<1	<1	**1**
Calcium	7440-70-2	mg/L	1		**2**	<1	**2**	**8**	**1**	**2**
Magnesium	7439-95-4	mg/L	1		<1	<1	**1**	<1	<1	**1**
Sodium	7440-23-5	mg/L	1	180*	**3**	<1	<1	**1**	<1	**1**
Potassium	7440-09-7	mg/L	1		**2**	<1	<1	<1	<1	<1
Water Leachable Metals by ICP-MS										
Germanium	7440-56-4	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Antimony	7440-36-0	mg/L	0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Niobium	7440-03-1	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	mg/L	0.001	0.01	<0.001	<0.001	<0.001	**0.001**	<0.001	<0.001
Beryllium	7440-41-7	mg/L	0.001	0.06	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	mg/L	0.001	2	**0.001**	<0.001	<0.001	<0.001	<0.001	<0.001
Rhenium	7440-15-5	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	7440-43-9	mg/L	0.0001	0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Cerium	7440-45-1	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	**0.005**	<0.001
Caesium	7440-46-2	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	mg/L	0.001		**0.003**	<0.001	**0.002**	**0.002**	**0.002**	<0.001
Cobalt	7440-48-4	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	mg/L	0.001	2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Gallium	7440-55-3	mg/L	0.001		<0.001	<0.001	<0.001	**0.002**	<0.001	<0.001
Hafnium	7440-58-6	mg/L	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lanthanum	7439-91-0	mg/L	0.001	0.002	<0.001	<0.001	<0.001	<0.001	**0.003**	<0.001
Lead	7439-92-1	mg/L	0.001	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	7439-93-2	mg/L	0.001		**0.002**	<0.001	<0.001	**0.001**	**0.002**	<0.001
Manganese	7439-96-5	mg/L	0.001	0.5	**0.089**	**0.096**	**0.02**	**0.007**	**0.031**	**0.043**
Mercury	7439-97-6	mg/L	0.0001	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Molybdenum	7439-98-7	mg/L	0.001	0.05	**0.003**	<0.001	**0.002**	**0.004**	**0.001**	**0.002**
Nickel	7440-02-0	mg/L	0.001	0.02	**0.003**	<0.001	<0.001	<0.001	**0.003**	<0.001
Rubidium	7440-17-7	mg/L	0.001		**0.003**	<0.001	<0.001	**0.002**	**0.001**	<0.001

Green = Above laboratory Limit of reporting (LoR)
Yellow = Above Australian Drinking Water Health Guidelines (ADWG, 2018) - * = Above Aesthetic guideline in absence of Health guideline

Matrix:	DI WATER LEACHATE			**Sample Type:**	**REG**	**REG**	**REG**	**REG**	**REG**	**REG**
Workgroup:	EP2005570			**ALS Sample Number:**	EP2005570002	EP2005570004	EP2005570006	EP2005570008	EP2005570010	EP2005570012
Project name/number:	125 182 17-002			**Sample Date:**	18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020
				Client sample ID (1st):	WP 220	WP 215 NW	MP 210 W	MP 215 N	MP 220 E	MP 228 E
				Client sample ID (2nd):	West Pit	West Pit	Main Pit	Main Pit	Main Pit	Main Pit
				Depth Type:						
				Depth (m):						
				Site:						
				Purchase Order:						
Analyte grouping/Analyte	**CAS Number**	**Unit**	**Limit of reporting**	**ADWG**						
Water Leachable Metals by ICP-MS										
Selenium	7782-49-2	mg/L	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	7440-24-6	mg/L	0.001		**0.015**	**0.005**	**0.006**	**0.039**	**0.01**	**0.009**
Tellurium	22541-49-7	mg/L	0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thorium	7440-29-1	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tin	7440-31-5	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	mg/L	0.01		**0.19**	**0.03**	**0.03**	**0.04**	**0.03**	**0.14**
Uranium	7440-61-1	mg/L	0.001	0.017	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	7440-62-2	mg/L	0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Yttrium	7440-65-5	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	7440-66-6	mg/L	0.005	3*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zirconium	7440-67-7	mg/L	0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Boron	7440-42-8	mg/L	0.05	4	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	mg/L	0.05	0.3*	**2.3**	**0.93**	**0.68**	**0.54**	**0.54**	**0.46**
Tungsten	7440-33-7	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tantalum	7440-25-7	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Green = Above laboratory Limit of reporting (LoR)
Yellow = Above Australian Drinking Water Health Guidelines (ADWG, 2018) - * = Above Aesthetic guideline in absence of Health guideline

Matrix:	SOIL		Sample Type:	REG	REG	REG	REG	REG	REG	REG	REG	REG	REG	REG	REG
Workgroup:	EP2005570		ALS Sample Number:	EP2005570001	EP2005570002	EP2005570003	EP2005570004	EP2005570005	EP2005570006	P200557000	P200557000	P200557000	P200557001	P200557001	EP2005570012
Project name/number:	125 182 17-002		Sample Date:	18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020	18/05/2020
			Client sample ID (1st):	WP 210	WP 220	WP 215 NE	WP 215 NW	WP 215 SE	MP 210 W	MP 215 W	MP 215 N	MP 220 N	MP 220 E	MP 224 W	MP 228 E
			Client sample ID (2nd):	West Pit	West Pit	West Pit	West Pit	West Pit	Main Pit	Main Pit	Main Pit	Main Pit	Main Pit	Main Pit	Main Pit
			Depth Type:												
			Depth (m):												
			Site:												
			Purchase Order:												

Analyte grouping/Analyte	CAS Number	Unit	Limit of reporting													
Net Acid Generation																
pH (OX)		pH Unit	0.1		**4.4**	**5.4**	**5.4**	**5**	**5.9**	**5.6**	**5.7**	**6.1**	**5.8**	**5.6**	**5.8**	**5.2**
NAG (pH 4.5)		kg H2SO4/t	0.1		**0.6**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)		kg H2SO4/t	0.1		**10.6**	**10.6**	**10.5**	**12.6**	**3.7**	**11.8**	**9.8**	**10.3**	**8.8**	**8.8**	**9.3**	**10.7**
Acid Neutralising Capacity																
ANC as H2SO4		kg H2SO4 equiv./t	0.5		<0.5	<0.5	<0.5	<0.5	**2.2**	<0.5	<0.5	**1.1**	<0.5	<0.5	<0.5	<0.5
ANC as CaCO3		% CaCO3	0.1		<0.1	<0.1	<0.1	<0.1	**0.2**	<0.1	<0.1	**0.1**	<0.1	<0.1	<0.1	<0.1
Fizz Rating		Fizz Unit	0		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total Sulfur by LECO																
Sulfur - Total as S (LECO)		%	0.01		**0.05**	0.01	<0.01	0.01	**0.01**	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
AS 4964 - 2004 Identification of Asbestos in Soils																
Asbestos Detected	1332-21-4	g/kg	0.1		No	No	No	No	No	No	No	No	No	No	No	No
Sample weight (dry)		g	0.01		62.4	54.7	55.9	82.8	71	62.6	64.3	61	31.9	57.7	58.4	78.6
Radionuclides / Activity																
Gross alpha		Bq/kg DW	500		----	----	<500	----	<500	----	----	----	<500	----	<500	----
Gross beta		Bq/kg DW	500		----	----	<500	----	<500	----	----	----	<500	----	<500	----

Attachment 2

Laboratory Chain of Custody and
Laboratory Certificates

Simcoa Operations Pty Ltd

CHAIN OF CUSTODY RECORD AND LABORATORY ANALYSIS REQUEST FORM

PROVIDER: ALS LABORATORIES

SAMPLE COLLECTION DETAILS

PROJECT: Simcoa Operations Pty Ltd

ALS QUOTE NUMBER: EP/1006/19

Contact : Daniel Mance
Simcoa Operations
973 Marriott Road
WELLESLEY WA 6233

Tel: 08 97806761
Mob: 04384595158

Email results to: danielmance@simcoa.com.au

SAMPLE / ANALYSIS DETAILS

SAMPLE ID/LOCATION			ANALYSIS REQUIRED						
Sample No	Sample ID	LOCATION	Acid Neutralising Capacity (ANC)	Net Acid Generation (NAG)	Sulphur Speciation	Metals Comprehensive	Leach Testing (major ions, pH, EC, metals)	Radioactivity Screen/gross alpha and beta	Asbestos mineral Fibres
1	WP 210	West Pit	x	x	x				x
2	WP 220	West Pit	x	x		x	x		x
3	WP 215 NE	West Pit	x	x	x			x	x
4	WP 215 NW	West Pit	x	x		x	x		x
5	WP 215 SE	West Pit	x	x	x			x	x
6	MP 210 W	Main Pit	x	x		x	x		x
7	MP 215 W	Main Pit	x	x	x				x
8	MP 215 N	Main Pit	x	x		x	x		x
9	MP 220 N	Main Pit	x	x	x			x	x
10	MP 220 E	Main Pit	x	x		x	x		x
11	MP 224 W	Main Pit	x	x	x			x	x
12	MP 228 E	Main Pit	x	x		x	x		x

Received by Lab:	Date/time	Courier/Transport Company

EP2005570

Simcoa Operations Pty Ltd

CHAIN OF CUSTODY RECORD AND LABORATORY ANALYSIS REQUEST FORM

PROVIDER: ALS LABORATORIES

SAMPLE COLLECTION DETAILS

PROJECT: Simcoa Operations Pty Ltd

ALS QUOTE NUMBER: EP/1006/19

Contact : Daniel Mance
Simcoa Operations
973 Marriott Road
WELLESLEY WA 6233

Tel: 08 97806761
Mob: 04384595158

Email results to: danielmance@simcoa.com.au

SAMPLE / ANALYSIS DETAILS

SAMPLE ID/LOCATION			ANALYSIS REQUIRED						
Sample No	Sample ID	LOCATION	Acid Neutralising Capacity (ANC)	Net Acid Generation (NAG)	Sulphur Speciation	Metals Comprehensive	Leach Testing (major ions, pH, EC, metals)	Radioactivity Screen/gross alpha and beta	Asbestos mineral Fibres
1	WP 210	West Pit	x	x	x				x
2	WP 220	West Pit	x	x		x	x		x
3	WP 215 NE	West Pit	x	x	x			x	x
4	WP 215 NW	West Pit	x	x		x	x		x
5	WP 215 SE	West Pit	x	x	x			x	x
6	MP 210 W	Main Pit	x	x		x	x		x
7	MP 215 W	Main Pit	x	x	x				x
8	MP 215 N	Main Pit	x	x		x	x		x
9	MP 220 N	Main Pit	x	x	x			x	x
10	MP 220 E	Main Pit	x	x		x	x		x
11	MP 224 W	Main Pit	x	x	x			x	x
12	MP 228 E	Main Pit	x	x		x	x		x

Received by Lab:	ALS	Date/time	28/5/2020 9:40am	Courier/Transport Company

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2005570**	Page	: 1 of 10
Amendment	: **1**		
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: Daniel Mance	Contact	: Marnie Thomsett
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: 08 9780 6761	Telephone	: 08 9406 1311
Project	: 125 182 17-002	Date Samples Received	: 28-May-2020 09:40
Order number	: ----	Date Analysis Commenced	: 01-Jun-2020
C-O-C number	: ----	Issue Date	: 06-Aug-2020 09:13
Sampler	: ----		
Site	: ----		
Quote number	: EP/1006/19		
No. of samples received	: 12		
No. of samples analysed	: 12		

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
- Descriptive 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*
Ben Felgendrejeris	Senior Acid Sulfate Soil Chemist	Brisbane Acid Sulphate Soils, Stafford, QLD
Canhuang Ke	Inorganics Supervisor	Perth Inorganics, Wangara, WA
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA
Daniel Fisher	Inorganics Analyst	Perth ASS, Wangara, WA
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Matt Frost	Assistant Laboratory Manager	Brisbane External Subcontracting, Stafford, QLD
Vanessa Phung	Team Leader - Asbestos	Melbourne Asbestos, 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.

- ED042T conducted by ALS Brisbane, NATA Site No. 818.
- EA200 conducted by ALS Melbourne, NATA accreditation no. 825, site no 13778
- ME-MS61m, Au-ICP22, ME-ICP89 and F-IC881 will be sub-contracted to ALS Geochemistry Perth NATA Accreditation No: 825, Corporate Site No: 23001
- EG020G conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED041G: LOR raised for sulphate on sample EP2005570-008 due to possible sample matrix interference.
- Amendment (30/07/20): This report has been amended and re-released to report EK085T and ED040T on samples 1,3,5,7,9 and 11.
- ASS: EA013 (ANC) Fizz Rating: 0- None; 1- Slight; 2- Moderate; 3- Strong; 4- Very Strong; 5- Lime.
- Radiological work undertaken by ALS Laboratory Group (Ceska Lipa) under CAI accreditation No. L1163. Report No. PR2056539. NATA and CAI accreditations' are both recognised under ILAC.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.
- 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: **DI WATER LEACHATE** (Matrix: **WATER**)

Compound	CAS Number	LOR	Unit	Client sample ID	WP 220 West Pit	WP 215 NW West Pit	MP 210 W Main Pit	MP 215 N Main Pit	MP 220 E Main Pit
				Client sampling date / time	18-May-2020 00:00	18-May-2020 00:00	18-May-2020 00:00	18-May-2020 00:00	18-May-2020 00:00
					EP2005570-002	EP2005570-004	EP2005570-006	EP2005570-008	EP2005570-010
					Result	Result	Result	Result	Result
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		**6.70**	**6.43**	**7.17**	**7.79**	**7.26**
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		**34**	**10**	**19**	**47**	**16**
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		**5**	<1	**9**	**20**	**2**
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		**5**	**2**	**8**	**23**	**7**
Total Alkalinity as CaCO3	----	1	mg/L		**5**	**2**	**8**	**23**	**7**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		**4**	**2**	**1**	<2	**2**
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		**3**	<1	<1	<1	<1
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		**2**	<1	**2**	**8**	**1**
Magnesium	7439-95-4	1	mg/L		<1	<1	**1**	<1	<1
Sodium	7440-23-5	1	mg/L		**3**	<1	<1	**1**	<1
Potassium	7440-09-7	1	mg/L		**2**	<1	<1	<1	<1
EG020W: Water Leachable Metals by ICP-MS									
ø **Germanium**	7440-56-4	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Antimony	7440-36-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
ø **Niobium**	7440-03-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic	7440-38-2	0.001	mg/L		<0.001	<0.001	<0.001	**0.001**	<0.001
Beryllium	7440-41-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Barium	7440-39-3	0.001	mg/L		**0.001**	<0.001	<0.001	<0.001	<0.001
ø **Rhenium**	7440-15-5	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
Cerium	7440-45-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.005**
Caesium	7440-46-2	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Chromium	7440-47-3	0.001	mg/L		**0.003**	<0.001	**0.002**	**0.002**	**0.002**
Cobalt	7440-48-4	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
Gallium	7440-55-3	0.001	mg/L		<0.001	<0.001	<0.001	**0.002**	<0.001

Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Client sample ID	WP 220 West Pit	WP 215 NW West Pit	MP 210 W Main Pit	MP 215 N Main Pit	MP 220 E Main Pit
				Client sampling date / time	18-May-2020 00:00	18-May-2020 00:00	18-May-2020 00:00	18-May-2020 00:00	18-May-2020 00:00
Compound	CAS Number	LOR	Unit		EP2005570-002	EP2005570-004	EP2005570-006	EP2005570-008	EP2005570-010
					Result	Result	Result	Result	Result
EG020W: Water Leachable Metals by ICP-MS - Continued									
Hafnium	7440-58-6	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Lanthanum	7439-91-0	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	**0.003**
Lead	7439-92-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Lithium	7439-93-2	0.001	mg/L		**0.002**	<0.001	<0.001	**0.001**	**0.002**
Manganese	7439-96-5	0.001	mg/L		**0.089**	**0.096**	**0.020**	**0.007**	**0.031**
Molybdenum	7439-98-7	0.001	mg/L		**0.003**	<0.001	**0.002**	**0.004**	**0.001**
Nickel	7440-02-0	0.001	mg/L		**0.003**	<0.001	<0.001	<0.001	**0.003**
Rubidium	7440-17-7	0.001	mg/L		**0.003**	<0.001	<0.001	**0.002**	**0.001**
Selenium	7782-49-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Strontium	7440-24-6	0.001	mg/L		**0.015**	**0.005**	**0.006**	**0.039**	**0.010**
Tellurium	22541-49-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Thorium	7440-29-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Tin	7440-31-5	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Titanium	7440-32-6	0.01	mg/L		**0.19**	**0.03**	**0.03**	**0.04**	**0.03**
Uranium	7440-61-1	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Vanadium	7440-62-2	0.01	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01
Yttrium	7440-65-5	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
Zirconium	7440-67-7	0.005	mg/L		<0.005	<0.005	<0.005	<0.005	<0.005
Boron	7440-42-8	0.05	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05
Iron	7439-89-6	0.05	mg/L		**2.30**	**0.93**	**0.68**	**0.54**	**0.54**
Tungsten	7440-33-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
Tantalum	7440-25-7	0.001	mg/L		<0.001	<0.001	<0.001	<0.001	<0.001
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**0.27**	**0.08**	**0.18**	**0.46**	**0.18**
ø Total Cations	----	0.01	meq/L		**0.28**	<0.01	**0.18**	**0.44**	**0.05**
ø Ionic Balance	----	0.01	%		**2.48**	**----**	**0.40**	**1.87**	**----**

Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Client sample ID	MP 228 E Main Pit	----	----	----	----
				Client sampling date / time	18-May-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2005570-012	--------	--------	--------	--------
					Result	----	----	----	----
EA005P: pH by PC Titrator									
pH Value	----	0.01	pH Unit		6.99	----	----	----	----
EA010P: Conductivity by PC Titrator									
Electrical Conductivity @ 25°C	----	1	µS/cm		22	----	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg/L		9	----	----	----	----
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		6	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L		6	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L		2	----	----	----	----
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	1	mg/L		1	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	7440-70-2	1	mg/L		2	----	----	----	----
Magnesium	7439-95-4	1	mg/L		1	----	----	----	----
Sodium	7440-23-5	1	mg/L		1	----	----	----	----
Potassium	7440-09-7	1	mg/L		<1	----	----	----	----
EG020W: Water Leachable Metals by ICP-MS									
ø Germanium	7440-56-4	0.001	mg/L		<0.001	----	----	----	----
Antimony	7440-36-0	0.001	mg/L		<0.001	----	----	----	----
ø Niobium	7440-03-1	0.001	mg/L		<0.001	----	----	----	----
Arsenic	7440-38-2	0.001	mg/L		<0.001	----	----	----	----
Beryllium	7440-41-7	0.001	mg/L		<0.001	----	----	----	----
Barium	7440-39-3	0.001	mg/L		<0.001	----	----	----	----
ø Rhenium	7440-15-5	0.001	mg/L		<0.001	----	----	----	----
Cadmium	7440-43-9	0.0001	mg/L		<0.0001	----	----	----	----
Cerium	7440-45-1	0.001	mg/L		<0.001	----	----	----	----
Caesium	7440-46-2	0.001	mg/L		<0.001	----	----	----	----
Chromium	7440-47-3	0.001	mg/L		<0.001	----	----	----	----
Cobalt	7440-48-4	0.001	mg/L		<0.001	----	----	----	----
Copper	7440-50-8	0.001	mg/L		<0.001	----	----	----	----
Gallium	7440-55-3	0.001	mg/L		<0.001	----	----	----	----

Analytical Results

Sub-Matrix: DI WATER LEACHATE (Matrix: WATER)				Client sample ID	MP 228 E Main Pit	----	----	----	----
				Client sampling date / time	18-May-2020 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit		EP2005570-012	--------	--------	--------	--------
					Result	----	----	----	----
EG020W: Water Leachable Metals by ICP-MS - Continued									
Hafnium	7440-58-6	0.01	mg/L		<0.01	----	----	----	----
Lanthanum	7439-91-0	0.001	mg/L		<0.001	----	----	----	----
Lead	7439-92-1	0.001	mg/L		<0.001	----	----	----	----
Lithium	7439-93-2	0.001	mg/L		<0.001	----	----	----	----
Manganese	7439-96-5	0.001	mg/L		**0.043**	----	----	----	----
Molybdenum	7439-98-7	0.001	mg/L		**0.002**	----	----	----	----
Nickel	7440-02-0	0.001	mg/L		<0.001	----	----	----	----
Rubidium	7440-17-7	0.001	mg/L		<0.001	----	----	----	----
Selenium	7782-49-2	0.01	mg/L		<0.01	----	----	----	----
Strontium	7440-24-6	0.001	mg/L		**0.009**	----	----	----	----
Tellurium	22541-49-7	0.005	mg/L		<0.005	----	----	----	----
Thorium	7440-29-1	0.001	mg/L		<0.001	----	----	----	----
Tin	7440-31-5	0.001	mg/L		<0.001	----	----	----	----
Titanium	7440-32-6	0.01	mg/L		**0.14**	----	----	----	----
Uranium	7440-61-1	0.001	mg/L		<0.001	----	----	----	----
Vanadium	7440-62-2	0.01	mg/L		<0.01	----	----	----	----
Yttrium	7440-65-5	0.001	mg/L		<0.001	----	----	----	----
Zinc	7440-66-6	0.005	mg/L		<0.005	----	----	----	----
Zirconium	7440-67-7	0.005	mg/L		<0.005	----	----	----	----
Boron	7440-42-8	0.05	mg/L		<0.05	----	----	----	----
Iron	7439-89-6	0.05	mg/L		**0.46**	----	----	----	----
Tungsten	7440-33-7	0.001	mg/L		<0.001	----	----	----	----
Tantalum	7440-25-7	0.001	mg/L		<0.001	----	----	----	----
EG035W: Water Leachable Mercury by FIMS									
Mercury	7439-97-6	0.0001	mg/L		<0.0001	----	----	----	----
EN055: Ionic Balance									
ø Total Anions	----	0.01	meq/L		**0.19**	----	----	----	----
ø Total Cations	----	0.01	meq/L		**0.22**	----	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	WP 210 West Pit	WP 220 West Pit	WP 215 NE West Pit	WP 215 NW West Pit	WP 215 SE West Pit
			Client sampling date / time	18-May-2020 00:00	18-May-2020 00:00	18-May-2020 00:00	18-May-2020 00:00	18-May-2020 00:00
Compound	CAS Number	LOR	Unit	EP2005570-001	EP2005570-002	EP2005570-003	EP2005570-004	EP2005570-005
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**4.4**	**5.4**	**5.4**	**5.0**	**5.9**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	**0.6**	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**10.6**	**10.6**	**10.5**	**12.6**	**3.7**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	<0.5	<0.5	**2.2**
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	<0.1	<0.1	**0.2**
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**0**	**0**
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**No**	**No**	**No**	**No**
Asbestos (Trace)	1332-21-4	5	Fibres	**No**	**No**	**No**	**No**	**No**
Asbestos Type	1332-21-4	-	--	**-**	**-**	**-**	**-**	**-**
Synthetic Mineral Fibre	----	0.1	g/kg	**No**	**No**	**No**	**No**	**No**
Organic Fibre	----	0.1	g/kg	**No**	**No**	**No**	**No**	**No**
Sample weight (dry)	----	0.01	g	**62.4**	**54.7**	**55.9**	**82.8**	**71.0**
APPROVED IDENTIFIER:	----	-	--	**V.PHUNG**	**V.PHUNG**	**V.PHUNG**	**V.PHUNG**	**V.PHUNG**
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	**510**	**----**	<100	**----**	**200**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**0.05**	**----**	<0.01	**----**	**0.01**
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	**0.03**	**----**	<0.01	**----**	<0.01
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	**----**	**6.8**	**----**	**6.7**	**----**
Radionuclides / Activity								
Gross alpha	----	500	Bq/kg DW	**----**	**----**	<500	**----**	<500
Gross beta	----	500	Bq/kg DW	**----**	**----**	<500	**----**	<500

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	MP 210 W Main Pit	MP 215 W Main Pit	MP 215 N Main Pit	MP 220 N Main Pit	MP 220 E Main Pit
			Client sampling date / time	18-May-2020 00:00	18-May-2020 00:00	18-May-2020 00:00	18-May-2020 00:00	18-May-2020 00:00
Compound	CAS Number	LOR	Unit	EP2005570-006	EP2005570-007	EP2005570-008	EP2005570-009	EP2005570-010
				Result	Result	Result	Result	Result
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**5.6**	**5.7**	**6.1**	**5.8**	**5.6**
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	<0.1	<0.1	<0.1
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**11.8**	**9.8**	**10.3**	**8.8**	**8.8**
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	**1.1**	<0.5	<0.5
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	**0.1**	<0.1	<0.1
Fizz Rating	----	0	Fizz Unit	**0**	**0**	**0**	**0**	**0**
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**No**	**No**	**No**	**No**
Asbestos (Trace)	1332-21-4	5	Fibres	**No**	**No**	**No**	**No**	**No**
Asbestos Type	1332-21-4	-	--	**-**	**-**	**-**	**-**	**-**
Synthetic Mineral Fibre	----	0.1	g/kg	**No**	**No**	**No**	**No**	**No**
Organic Fibre	----	0.1	g/kg	**No**	**No**	**No**	**No**	**No**
Sample weight (dry)	----	0.01	g	**62.6**	**64.3**	**61.0**	**31.9**	**57.7**
APPROVED IDENTIFIER:	----	-	--	**V.PHUNG**	**V.PHUNG**	**V.PHUNG**	**V.PHUNG**	**V.PHUNG**
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	**----**	**140**	**----**	<100	**----**
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	**----**	<0.01	**----**	<0.01	**----**
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	**----**	<0.01	**----**	<0.01	**----**
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	**6.9**	**----**	**7.4**	**----**	**7.5**
Radionuclides / Activity								
Gross alpha	----	500	Bq/kg DW	**----**	**----**	**----**	<500	**----**
Gross beta	----	500	Bq/kg DW	**----**	**----**	**----**	<500	**----**

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	MP 224 W Main Pit	MP 228 E Main Pit	----	----	----
			Client sampling date / time	18-May-2020 00:00	18-May-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EP2005570-011	EP2005570-012	--------	--------	--------
				Result	Result	----	----	----
EA011: Net Acid Generation								
pH (OX)	----	0.1	pH Unit	**5.8**	**5.2**	----	----	----
NAG (pH 4.5)	----	0.1	kg H2SO4/t	<0.1	<0.1	----	----	----
NAG (pH 7.0)	----	0.1	kg H2SO4/t	**9.3**	**10.7**	----	----	----
EA013: Acid Neutralising Capacity								
ANC as H2SO4	----	0.5	kg H2SO4 equiv./t	<0.5	<0.5	----	----	----
ANC as CaCO3	----	0.1	% CaCO3	<0.1	<0.1	----	----	----
Fizz Rating	----	0	Fizz Unit	**0**	**0**	----	----	----
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	**No**	**No**	----	----	----
Asbestos (Trace)	1332-21-4	5	Fibres	**No**	**No**	----	----	----
Asbestos Type	1332-21-4	-	--	**-**	**-**	----	----	----
Synthetic Mineral Fibre	----	0.1	g/kg	**No**	**No**	----	----	----
Organic Fibre	----	0.1	g/kg	**No**	**No**	----	----	----
Sample weight (dry)	----	0.01	g	**58.4**	**78.6**	----	----	----
APPROVED IDENTIFIER:	----	-	--	**V.PHUNG**	**V.PHUNG**	----	----	----
ED040T : Total Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	100	mg/kg	<100	----	----	----	----
ED042T: Total Sulfur by LECO								
Sulfur - Total as S (LECO)	----	0.01	%	<0.01	----	----	----	----
EK085M: Sulfide as S2-								
Sulfide as S	----	0.01	%	<0.01	----	----	----	----
EN60: Bottle Leaching Procedure								
Final pH	----	0.1	pH Unit	**----**	**7.3**	----	----	----
Radionuclides / Activity								
Gross alpha	----	500	Bq/kg DW	<500	----	----	----	----
Gross beta	----	500	Bq/kg DW	<500	----	----	----	----

Analytical Results

Descriptive Results

Sub-Matrix: **SOIL**

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	WP 210West Pit - 18-May-2020 00:00	Beige rocky soil.
EA200: Description	WP 220West Pit - 18-May-2020 00:00	Yellow rocky soil.
EA200: Description	WP 215 NEWest Pit - 18-May-2020 00:00	Beige white rocky soil.
EA200: Description	WP 215 NWWest Pit - 18-May-2020 00:00	Yellow white rocky soil.
EA200: Description	WP 215 SEWest Pit - 18-May-2020 00:00	Orange soil with rock matter.
EA200: Description	MP 210 WMain Pit - 18-May-2020 00:00	Yellow soil with rock matter.
EA200: Description	MP 215 WMain Pit - 18-May-2020 00:00	Yellow soil with rock matter.
EA200: Description	MP 215 NMain Pit - 18-May-2020 00:00	Orange soil with rock matter.
EA200: Description	MP 220 NMain Pit - 18-May-2020 00:00	Yellow rocky soil.
EA200: Description	MP 220 EMain Pit - 18-May-2020 00:00	Orange soil with rock matter.
EA200: Description	MP 224 WMain Pit - 18-May-2020 00:00	Orange soil with rock matter.
EA200: Description	MP 228 EMain Pit - 18-May-2020 00:00	Beige soil with rock matter.

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To: ALS ENVIRONMENTAL
32 SHAND STREET
STAFFORD QLD 4053

Finalized Date: 18-JUN-2020
Account: ALSENV

CERTIFICATE PH20117147

Project: EP2005570

P.O. No.: 582865

This report is for 6 Soil samples submitted to our lab in Perth, WA, Australia on 4-JUN-2020.

The following have access to data associated with this certificate:

SUB RESULTS - PERTH		

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
LEV-01	Waste Disposal Levy
SND-ALS	Send samples to internal laboratory

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
Au-ICP22	Au 50g FA ICP-AES finish	ICP-AES
B-ICP69	Boron - HF Digest ICP-AES	ICP-AES
F-ELE81a	F by Specific Ion Electrode	TITRATOR
ME-MS61	48 element four acid ICP-MS	
Hg-MS42	Trace Hg by ICPMS	ICP-MS

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:

Cameron Brosnan, Laboratory Manager, Perth

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CERTIFICATE OF ANALYSIS PH20117147

Sample Description	Method	WEI-21	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
	Analyte	Recvd Wt.	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe
	Units	kg	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%
	LOD	0.02	0.01	0.01	0.2	10	0.05	0.01	0.01	0.02	0.01	0.1	1	0.05	0.2	0.01
EP2005570-002		0.14	0.01	2.87	4.9	40	0.29	0.15	0.05	<0.02	9.75	1.6	39	0.72	3.2	2.20
EP2005570-004		0.14	<0.01	0.41	0.3	20	0.09	0.05	0.02	<0.02	5.13	0.6	42	0.09	2.4	0.70
EP2005570-006		0.08	0.01	0.36	0.7	20	0.09	0.04	0.08	<0.02	4.52	0.9	39	0.07	3.3	0.76
EP2005570-008		0.12	0.01	0.51	1.3	30	0.09	0.05	0.08	<0.02	6.74	0.9	45	0.16	3.4	0.79
EP2005570-010		0.09	0.01	0.50	1.9	30	0.23	0.05	0.02	<0.02	33.3	5.5	47	0.10	2.8	0.74
EP2005570-012		0.13	<0.01	0.37	0.5	10	0.06	0.02	0.05	<0.02	2.36	0.6	40	0.06	2.3	0.76

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Project: EP2005570

CERTIFICATE OF ANALYSIS PH20117147

Sample Description	Method	ME-MS61	ME-MS61	ME-MS61	Hg-MS42	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61	ME-MS61
	Analyte	Ga	Ge	Hf	Hg	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P
	Units	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
	LOD	0.05	0.05	0.1	0.005	0.005	0.01	0.5	0.2	0.01	5	0.05	0.01	0.1	0.2	10
EP2005570-002		9.73	0.07	1.7	0.017	0.023	0.13	5.1	10.8	0.05	58	4.11	0.02	8.3	17.6	150
EP2005570-004		1.61	<0.05	0.6	0.011	<0.005	0.07	2.5	0.9	0.02	52	3.39	0.01	2.9	4.1	70
EP2005570-006		1.17	0.06	0.2	0.009	<0.005	0.04	2.1	2.1	0.07	71	3.83	0.01	0.6	6.1	330
EP2005570-008		1.98	<0.05	0.3	0.008	0.008	0.08	2.9	1.6	0.04	74	4.15	0.01	1.4	5.2	170
EP2005570-010		1.83	0.06	0.3	0.075	0.005	0.04	15.2	2.8	0.02	71	3.96	<0.01	0.5	6.5	160
EP2005570-012		1.46	0.05	0.4	0.006	<0.005	0.03	1.2	1.0	0.02	61	3.77	0.01	2.6	4.5	140

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CERTIFICATE OF ANALYSIS PH20117147

Sample Description	Method / Analyte / Units / LOD	ME-MS61 V ppm 1	ME-MS61 W ppm 0.1	ME-MS61 Y ppm 0.1	ME-MS61 Zn ppm 2	ME-MS61 Zr ppm 0.5	Au-ICP22 Au ppm 0.001	B-ICP69 B ppm 10	F-ELE81a F ppm 20
EP2005570-002		63	1.1	2.9	4	54.8	<0.001	10	60
EP2005570-004		12	0.5	1.8	<2	22.5	<0.001	10	<20
EP2005570-006		5	0.2	1.3	3	5.9	NSS	<10	60
EP2005570-008		10	0.3	1.7	3	13.0	0.001	<10	40
EP2005570-010		7	0.2	2.5	<2	11.3	<0.001	<10	<20
EP2005570-012		10	0.5	0.9	3	17.5	<0.001	<10	<20

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Finalized Date: 18-JUN-2020
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Project: EP2005570

CERTIFICATE OF ANALYSIS PH20117147

CERTIFICATE COMMENTS

ANALYTICAL COMMENTS

Applies to Method:	NSS is non-sufficient sample. ALL METHODS
Applies to Method:	REEs may not be totally soluble in this method. ME-MS61

ACCREDITATION COMMENTS

Applies to Method:	NATA Accreditation covers the performance of this service but does not cover the performance of ALS Perth Sample Preparation. Corporate Accreditation No: 825, Corporate Site No: 23001. The Technical Signatory is Wendy Wong, Senior QC Chemist Au-ICP22 ME-MS61

LABORATORY ADDRESSES

Applies to Method:	Processed at ALS Perth located at 31 Denninup Way, Malaga, Australia. Processed at ALS Perth Sample Preparation at 79 Distinction Road, Wangara, WA, Australia			
	Au-ICP22	B-ICP69	Hg-MS42	LEV-01
	LOG-22	ME-MS61	SND-ALS	WEI-21
Applies to Method:	Processed at ALS Brisbane located at 32 Shand Street, Stafford, Brisbane, QLD, Australia. Processed at ALS Brisbane Sample Preparation at 116 Delta Street, Geebung, QLD 4034, Australia F-ELE81a			