

YINNETHARRA LITHIUM PROJECT

STATIC TAILINGS CHARACTERISATION MALINDA DEPOSIT

PREPARED FOR:

DELTA LITHIUM LIMITED



JANUARY 2025

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YINNETHARRA LITHIUM PROJECT STATIC TAILINGS CHARACTERISATION - MALINDA DEPOSIT

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EXECUTIVE SUMMARY

Electrostate Malinda Pty Ltd (Electrostate), a subsidiary of Delta Lithium Limited (Delta Lithium), is developing the Yinnetharra Lithium Project which located approximately about 260 km east of Carnarvon and 120 km northeast of Gascoyne Junction. Delta Lithium is focussing on initial development towards mining approval for the Malinda deposit. The site is located approximately 4 km of the total strike above which has presence of lithium-bearing pegmatites from surface to depths greater than 350 m. Delta Lithium commissioned MBS to undertake a geochemical characterisation of the tailings material and the potential adverse effects of storage on the receiving environment during the life of mine and post-closure.

The geochemical tailings characterisation was undertaken for the lithium tailings stream residues (deslime, magnetic separation, mica flotation and final spodumene flotations) to be blended and disposed in the TSF, and one bulk tailings composite sample produced from seven drill holes within the M1 orebody.

STANDARD GEOCHEMICAL TESTING

The composite production ratio tailings and magnetic separation tailings which forms ones component of this were assessed for acid formation potential. Both samples were classified as non-acid-forming and do not present a risk of acid mine drainage.

Although variably enriched in bismuth, caesium, rubidium, tin and tantalum in the deslimes, magnetic separation, mica flotation tailings and overall tailings composite, none of the elements were considered environmentally available at concentrations exceeding relevant guidelines, nor were they considered particularly soluble under neutral conditions.

Only manganese (564 mg/kg) and nickel (85 mg/kg) exceeded ecological investigation limits (DEC 2010) / added contaminant limit (NEPM 2013) as risk screening criteria and only against ecologically significant areas in the final tailings composite. Manganese (500 mg/kg) is a default criterion often exceeded for fresh rock-derived materials containing mafics. Although potentially available over long periods based on aqua regia digestion, all of the metals and metalloids analysed were considered insoluble under neutral conditions.

Analysis of acidic extracts in acetic acid and 1 M HCl extract (bioavailable) indicated that manganese and iron, in particular, were soluble under acid conditions due to presence as acid reactive oxyhydroxides. Chromium, nickel and molybdenum were soluble only in 1M HCl, however total concentrations were not at levels considered a risk to fauna etc. if ingested.

The supernatant from the tailings composite sample was identified to be circum-neutral and non-saline. Metal and metalloid concentrations in the supernatant were below all respective non-potable use (DER 2014) and livestock drinking water guidelines (ANZECC 2000).

Four water leachates (1:10) were completed on the tailings composite with leaching periods of 1 day, 2 days, 3 days and 14 days to determine potential leaching over different time periods. There was only a marginal increase in the pH and ion concentrations across all leaching periods. The concentration of lithium, however, increased from 0.04 to 0.13 mg/L from the 1-day period to the 14-day period reflecting rate limited dissolution of residual spodumene. Based on the acid extracts (as spodumene is acid-reactive), an upper concentration of approximately 3 mg/L lithium in porewaters is possible prior to effects of evapoconcentration which marginally exceeds the ANZECC 2000 irrigation guideline of 2.5 mg/L. Lithium has limited guideline values but is considered to be of low toxicity, in particular in the presence of other cations (sodium, potassium, calcium, magnesium) which are known to lower its toxicity.

LEAF TESTING

LEAF 1313 testing provided information on the change in solubility of metals and metalloids in the tailings composite sample with changes in pH. Given the non-acid-forming nature of the material, this is primarily to indicate the nature of the forms of metals/metalloids in the material.

The testing identified metals and metalloids were typically soluble at extreme pH values (pH 13 and pH 2). Livestock drinking water, long-term irrigation, or non-potable use guidelines were exceeded only at extreme pH conditions (outside expected) for aluminium, fluoride, iron, lithium, molybdenum and uranium and are therefore not environmentally significant. Manganese and phosphorus reported concentrations exceeding the respective long-term irrigation guidelines at more common circum-neutral to alkaline conditions. Manganese however is limited in mobility, requiring reducing/anaerobic conditions to be soluble.

LEAF 1314 testing provided information on the change in solubility of metals and metalloids in the tailings composite with change in liquid/solid (L/S) ratios. This provides an indication instantaneous and cumulative release of constituents likely to be present at environmentally significant concentrations.

The testing identified that the tailings material in the proposed TSF is expected to generate circum-neutral leachates of freshwater quality. Long-term leachate quality from bulk tailings composite is not anticipated to exceed broadly applicable environmental quality guidelines and is not expected to confer significant environmental risk. Concentrations of source-controlled species are expected to rapidly diminish over time in a post-closure environment, should leaching occur. Overall, L/S ratio leachate results for bulk tailings composite sample indicate the potential for consistent, but very low-level leaching of lithium, phosphorus and rubidium over time, although concentrations are not deemed to be environmentally significant given seepage controls during operations and post closure and/or binding with underlying soils (in the case of phosphorus).

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1. INTRODUCTION

1.1 PROJECT BACKGROUND

Electrostate Malinda Pty Ltd (Electrostate), a subsidiary of Delta Lithium Limited (Delta Lithium), is developing the Yinnetharra Lithium Project which located approximately about 260 km east of Carnarvon and 120 km northeast of Gascoyne Junction (Figure 1). The Project sits within a tenement package comprised of seven tenements, four granted tenements (including the Malinda Deposit) and three pending tenement applications covering an area of 517 km².

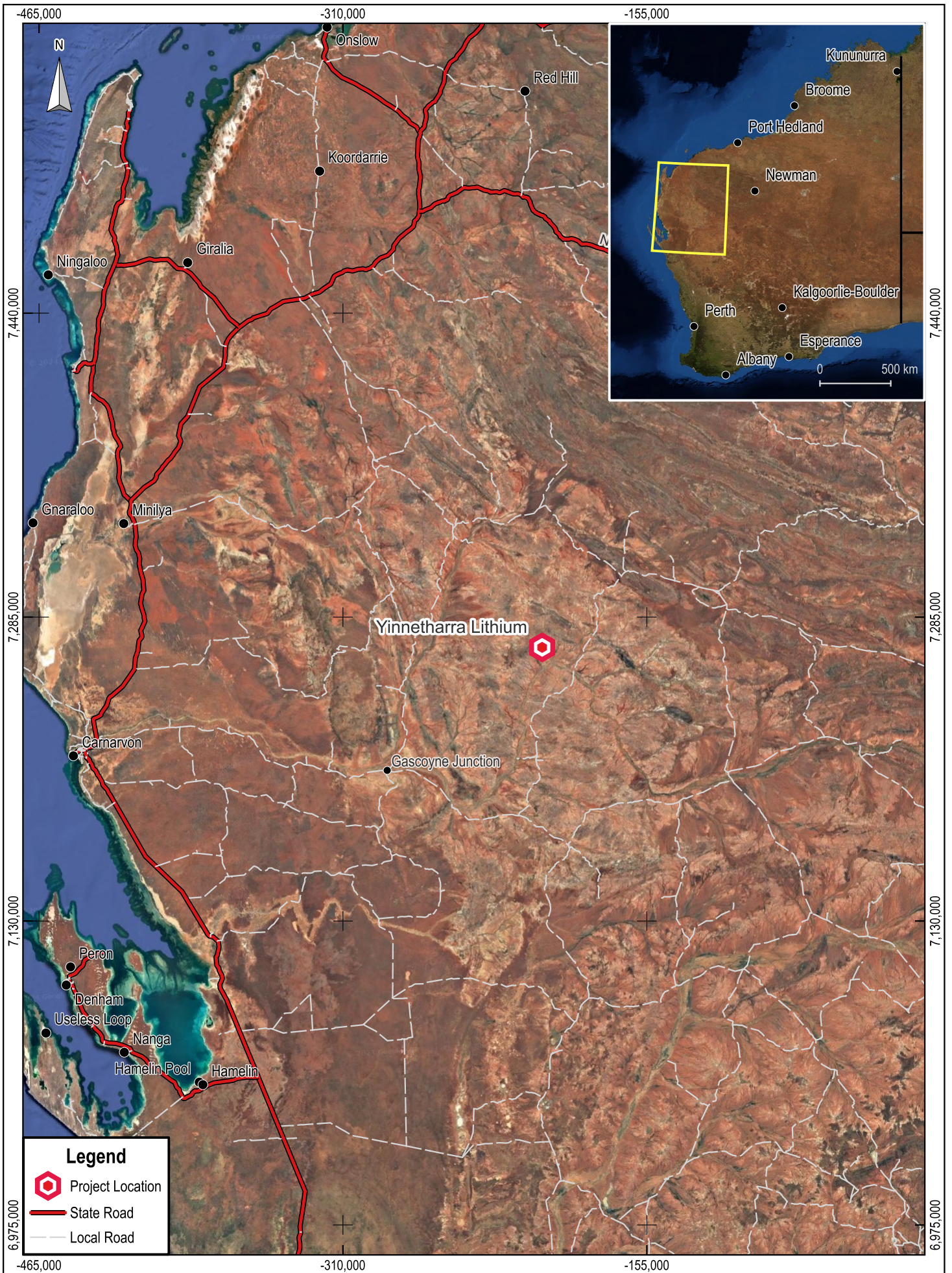
Delta Lithium is focussing on initial development towards mining approval for the Malinda deposit which is approximately 4 km of the total strike above which has presence of lithium bearing pegmatites from surface to depths greater than 350 m. The initial estimated quantity of rock to be mined is more than 88 million tonnes across five pits (namely M1, M47, M36 East, M36 West, M69 (Figure 2)) across four identified major lithologies in the Malinda deposit including amphibolite, schist, quartz infill/porphyry and pegmatite.

Delta Lithium commissioned MBS Environmental (MBS) to undertake a geochemical characterisation of the beneficiation tailings material and the potential for adverse effects on the receiving environment during the life of mine and post-closure.




1.2 OBJECTIVE AND SCOPE OF WORK

The major objectives of the geochemical works included:

- Liaise with Delta Lithium metallurgists to select representative samples of metallurgical trial residues (as considered representative of final site process tailings) for further laboratory analysis. This comprised four tailings streams (deslimes, magnetics separation, mica flotation and rough flotation tailings) from the current M1 Bulk sampling plus a volume weighted composite of these to be supplied to MBS for testing. The material from M1 bulk sampling comprised approximately 90% of the ore to be mined for the Project.
- Prepare a geochemical characterisation report for the static tailings assessment, which comprised:
 - Illustrating the potential for tailings to contribute to saline and/or neutral leaching of environmentally significant metals and/or metalloids to the environment.
 - Analysis of the flotation tailings supernatant as indication of decant return/process water composition.
 - Discussion of the relative environmental and bioavailability of metals/metalloids under potential placement conditions.
 - Testing of the time dependence (timed static extracts) for lithium solubility reactions as a key species of interest.
 - Discussion/review of lithium toxicity in the potentially receiving environment (namely groundwater although plant/gut bioavailability will also be considered).
 - Description of and reporting and interpretation of pH-dependence LEAF 1313 and LEAF 1314 (liquid-solid ratio dependence) testworks in relation to short and long-term solubility potential.
 - Guidance/commentary on the compatibility/risk potential of static tailings regards proposed disposal means.
 - Determination of respirable crystalline silica content for general human health considerations in relation the dried tailings. Confirmation (as expected) of absence of asbestiform minerals.



Legend

-  Project Location
-  State Road
-  Local Road

Scale: 1:2500000
 Original Size: A4
 Image: Google Satellite
 Grid: GDA94 / MGA zone 51

0 50 100 km

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Figure 1

Location Plan

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Scale: 1: 25,000
 Original Size: A4

Grid: GDA94 / MGA zone 50 (EPSG:28350)

0 0.5 1 km

Delta Lithium Limited
 Yinnetharra Lithium Project

Figure 2

Site Layout

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2. ENVIRONMENTAL SETTING

2.1 CLIMATE

The Project area has a semi-arid to arid climate with hot summers and mild winters, the average evaporation exceeds the average precipitation during every month of the year. Rainfall at the Yinnetharra Project occurs in two seasons, January to March and May to July. Summer rainfall is less reliable than the May to July rainfall, but it can vary significantly especially when it is produced by tropical lows and cyclones. The Gascoyne Junction weather station (BoM 006022) is the closest to the project area and is located about 130 km southwest of Yinnetharra (Chart 1). Rainfall at Gascoyne Junction has been recorded since 1940, the mean annual rainfall is 210 mm. The mean annual pan evaporation rate of 2,844 mm is derived from the SILO database for the Jimba Jimba/Gascoyne Junction area. The average annual pan evaporation is an order of magnitude higher than the annual precipitation and the annual rainfall deficit is about 2,640 mm. Rainfall events are episodic with highly variable amounts resulting from low-pressure cells and cyclonic disturbances. The monthly mean maximum temperatures range from 23.4°C in July to 40°C in December and monthly mean minimum temperatures range from 9.6°C in July to 21.2°C in December. Mean monthly temperature and rainfall data for Gascoyne Junction is summarised in Chart 1.

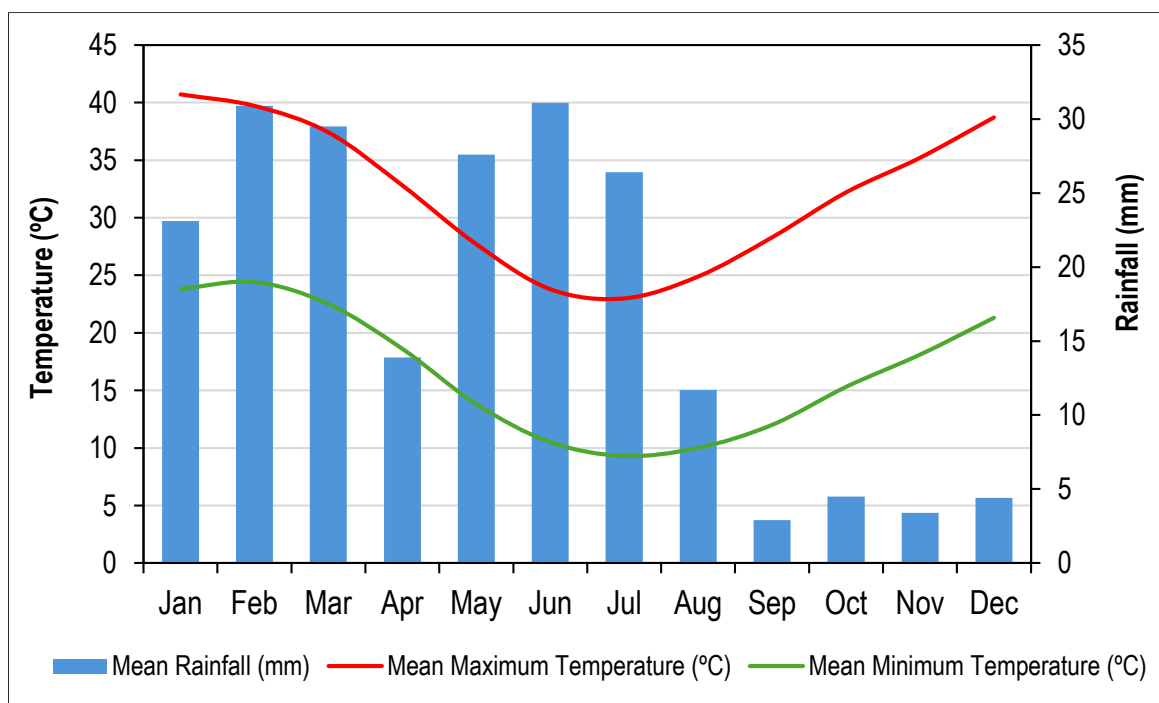


Chart 1: Monthly Climate Data for Gascoyne Junction Station 006022 (BoM, 2024)

2.2 LANDFORM AND SOILS

The northern part of the project area is predominantly influenced by hardpan wash plains (with hills, ranges and stony plains) on sedimentary rocks, stony soils, red loams and red/brown non-cracking clays with some deep sands. The vegetation is dominated by Mulga shrublands with snakewood. In the southwest, the area is covered by undulating stony uplands, stony plains, hills and ranges on Gascoyne Complex granitic and sedimentary rocks, (DWER 2009). The regional topography averages about 400 mAHD and slopes gently to the southwest to an elevation of about 280 mAHD (Rockwater 2023).

2.3 PROJECT GEOLOGY

The Yinnetharra project is located in the Gascoyne province, which includes a range of Neoproterozoic to Paleoproterozoic gneisses, granites, and metasedimentary basins. These rocks record the amalgamation of the Archean Pilbara and Yilgarn Cratons of the West Australian Craton which formed over a billion years of subsequent intracontinental crustal reworking. Due to this complex structural history the province can now be subdivided into several fault, shear and metamorphic zones (Johnson 2011). The project overlies siliclastic metasedimentary pelitic and psammitic (sandstone) schist, calc-silicate rocks of the Morrissey Metamorphics and felsic intrusive granitic rocks of the Perseverance supersuite (Figure 3). The pelitic schist, gneiss and metamorphosed feldspathic sandstones and conglomerates of the Poonaroo Metamorphics outcrop north of the project area.

2.4 HYDROLOGY, HYDROGEOLOGY AND GROUNDWATER QUALITY

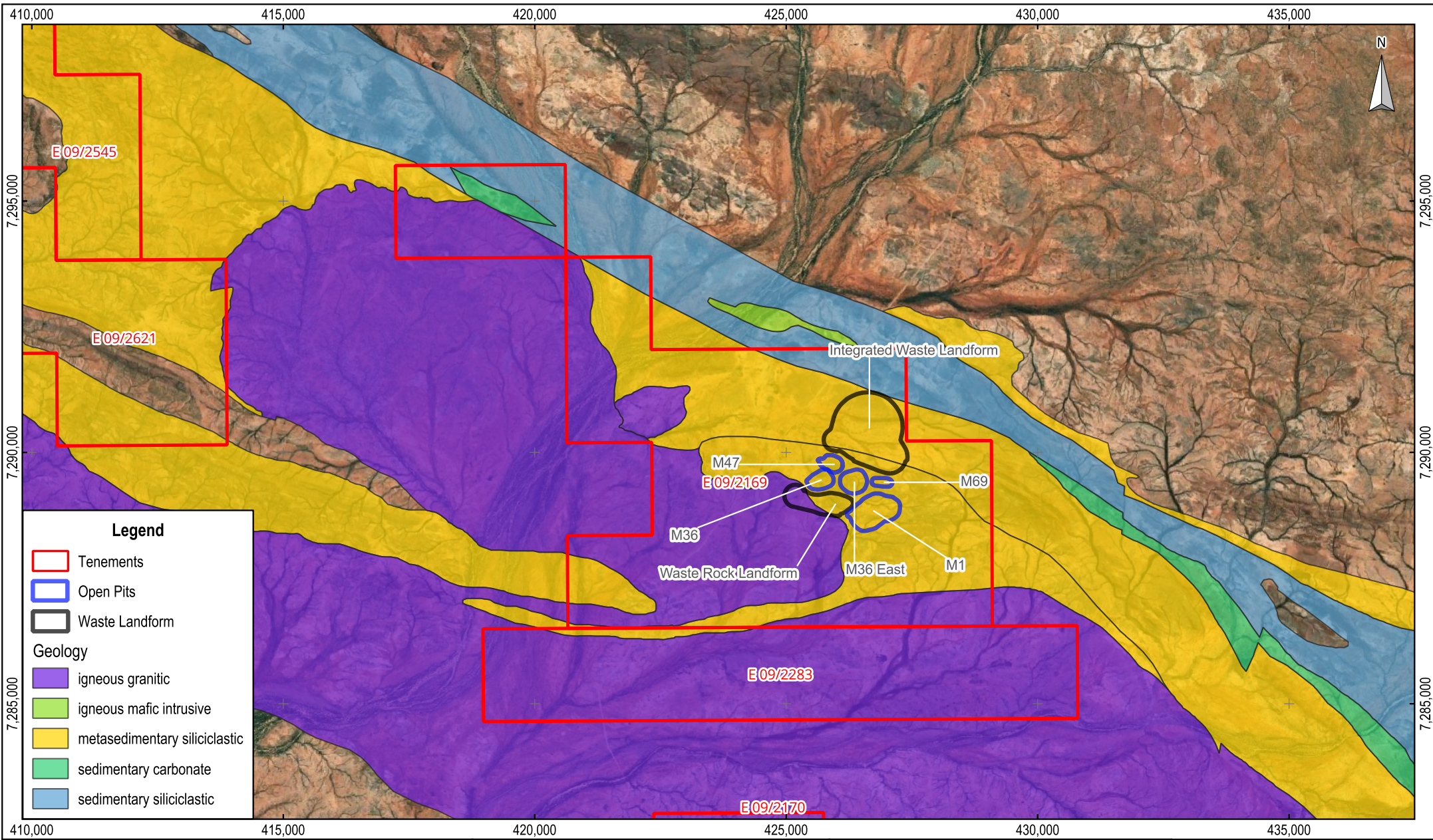
Local alluvial plains and watercourses drain the Archean basement and present lower evaporation than the interior eastern Gascoyne River. The drainage channels are generally broad and defined by large floodways within very wide valleys. The Lyons River is the major tributary of the Gascoyne River, which drains the Kennedy Range area and has higher rainfall.

Rainfall in the region results in high runoff to creeks and rivers, leading to episodic recharge into permeable sediments along the Lyons and Gascoyne River where runoff concentrates. Recharge into the paleochannel aquifer is likely a combination of vertical leakage from surface alluvium and river infiltration, along with lateral flow from the fractured rock aquifers in the vicinity (Rockwater 2024).

Groundwater occurrence in the study area is grouped into three hydrostratigraphic units, based on their ability to store and transmit groundwater including fractured rock, paleochannel and sedimentary aquifers (Rockwater 2024) summarised as follows:

- In the fractured aquifers, groundwater occurs within fractures associated with consolidated bedrock units. Water strike depths at Yinnetharra primarily range between 20 to 80 m. The groundwater is saline (7,720 to 25,000 mg/L TDS), has high hardness and contains elevated levels of sulfate, nitrate, uranium, and arsenic. Delta is in the process of installing a reverse osmosis plant to treat groundwater for future potable use.
- The Lyons paleochannel located north of Yinnetharra has been extensively investigated and developed for process water supply for the Yangibana Project. The paleochannel aquifer is divided into three hydrostratigraphic units (GRM 2018a) including shallow alluvium and calcrete deposits; a thick confining clay layer which acts as an aquitard (up to 100 m thick); and a basal sand or calcrete aquifer (up to 40 m thick). The water is saline (9,300 mg/L) in the main trunk, while the northern Lyon paleochannel tributary aquifer has marginally brackish (~1,000 mg/L) water (GRM 2018b).
- Sedimentary aquifers have the potential for substantial potable water production in permeable sandstone and conglomerates. Salinity ranges between 1,300 and 5,000 mg/L (Rockwater 2012). Salinity increases with depth (Rockwater 1982). Groundwater near Gascoyne Junction at a depth around 150 mbgl has notably higher salinity levels, ranging from 9,500 to 11,000 mg/L (Rockwater 1982).

Regional groundwater discharge is westward towards the coast. Groundwater discharge may also occur through evapotranspiration of riparian vegetation or discharge from permanent pools along the Gascoyne River.



Scale: 1: 100,000
 Original Size: A4

Grid: GDA94 / MGA zone 50 (EPSG:28350)

0 2,500 5,000 m

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Figure 3

Project Geology

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3. GEOCHEMICAL CHARACTERISATION METHODS

3.1 ACID-FORMING WASTE CLASSIFICATION METHODOLOGY

There is no single method to reliably determine whether mine or process wastes containing small quantities of sulfur will produce net acidity upon field exposure to air and water for all scenarios. Sulfide minerals are variable in their behaviour under oxidising conditions and not all forms will produce sulfuric acid (H_2SO_4). The acid-neutralising capacity of these materials is also variable, and the relative rates of acid-forming and acid-neutralising reactions is important when considering if the materials have potential to generate acidic and metalliferous drainage.

Instead, a combination of approaches is often applied to more accurately classify mine or process waste. These approaches are listed below in order of increasing data requirements (and therefore increased reliability):

- The method of "Sulfur Analysis", which only requires data for total sulfur content. Its adoption is based on long-term experience of hard rock wastes from Western Australian mine sites under arid and semi-arid climatic conditions. Experience has shown that waste rock containing very low sulfur contents (less than 0.3 %) rarely produces significant amounts of acidic seepage (Price 1997).
- The concept of "Ratio Analysis", which compares the relative proportions of acid neutralising minerals, measured by the Acid Neutralising Capacity (ANC), to acid generating minerals, measured by the Maximum Potential Acidity (MPA). Experience has shown that the risk of generating acidic seepage is generally low when this ratio (the Neutralisation Potential Ratio – NPR) is above a value of two (Price 2009).
- Acid-Base Accounting (ABA), in which the Net Acid Producing Potential (NAPP) value, which is calculated by subtracting ANC from MPA, is used to classify the acid generating potential of mine waste. Positive NAPP values indicate that the waste has the potential to generate more acid than it can neutralise.
- Procedures recommended by AMIRA International (AMIRA 2002), which take into consideration measured values provided by the Net Acid Generation (NAG) test and calculated NAPP values.
- Kinetic leaching column test data, which provides information for the relative rates of acid generation under controlled laboratory conditions, intended to simulate those within a waste rock stockpile or tailings storage facility.

Classification of wastes in this report is based on consideration of NAPP and NAG pH results as well as total sulfur analysis/ratio analysis concepts above where this is appropriate. The following is a definition of terms as used in ABA reporting by MBS:

- Analysis for total sulfur (Tot_S) and sulfate-sulfur (SO_4_S), both reported as sulfur (%).
- Analysis for ANC (reported as $kg\ H_2SO_4/t$).
- Calculation of carbonate ANC (CC ANC), reported as $kg\ H_2SO_4/t$, from measured concentrations of total carbon (TC) or total inorganic carbon (TIC) (TIC avoids interferences for some samples such as shales from organic carbon).
- Calculation of Maximum Potential Acidity (MPA) = $Tot_S * 30.6$, reported as $kg\ H_2SO_4/t$.
- Calculation of Acid Production Potential (AP) = $[(Tot_S - SO_4_S) * 30.6]$ $kg\ H_2SO_4/t$.
- Calculation of NAPP = $[AP - ANC]$ $kg\ H_2SO_4/t$. Using AP versus MPA corrects for non-oxidisable sulfur present in the sample (i.e. sulfate).
- Calculation of Effective NAPP = $[AP - CC\ ANC]$ $kg\ H_2SO_4/t$. Effective NAPP values correspond more directly to ANC associated with readily reactive carbonates, providing non-neutralising carbonates such as siderite are absent.
- Analysis for NAG potential (reported as $kg\ H_2SO_4/t$) to both pH 4.5 and pH 7.
- Analysis for NAG pH (the pH of the NAG test liquors).

- Calculation of NPR = ANC/AP (reported as kg H₂SO₄/t).

This AMIRA approach is more conservative than either the Analysis Concept or the Ratio Concept alone, although it assumes the absence of insoluble sulfur such as barite (barium sulfate), which is a non-acid producing mineral that can interfere with the results. The AMIRA approach of using NAG testing is particularly useful for PAF-LC (Potentially Acid Forming – Low Capacity) materials or where there is very low ANC in the host rock. A combined acid generation classification scheme based on NAPP and NAG determinations which is based on AMIRA 2002 and the 2016 DMP *Draft Guidance Materials Characterisation Baseline Data Requirements for Mining Proposals* (DMP 2016) and the equivalent federal guidelines (DIIS 2016), is presented in Table 1. This classification system, based on static ABA procedures and used in conjunction with geological, geochemical and mineralogical analysis can still leave materials classified as 'Uncertain' which may warrant further investigation by, for example, kinetic characterisation.

Table 1: Acid Formation Risk Classification Criteria

Primary Geochemical Waste Type Class	NAPP Value kg H ₂ SO ₄ /t	NAG pH
Potentially Acid-Forming (PAF)	≥10	<4.5
Potentially Acid Forming – Low Capacity (PAF-LC)	0 to 10	<4.5
Uncertain (UC)	Positive	>4.5
Uncertain (UC)	Negative	<4.5
Non-Acid-Forming (NAF)	Negative	>4.5 or sulfur <0.2%*
Acid-Consuming (AC)	<-100	>4.5
Barren	≤2 and sulfur <0.05%	–

* Application of 0.2% total sulfur as a screening tool for the need for determination of NAG pH for classification may be applied on a site-specific basis in conjunction with assessment of ANC and NPR. This uses a ratio analysis approach for low risk samples based on Western Australian conditions where extensive experience has indicated no potential for samples with less than 0.2% sulfur to generate net acidity in arid conditions for waste rock from hard rock mines. A negative NAPP and NPR of more than 4 (DIIS 2016) indicates no potential risk of acid generation in such instances.

A sound knowledge of geological and geochemical processes must also be employed in the application of the above methods.

3.2 LABORATORY METHODS

Results of analysis are collated in Appendix 1 and laboratory reports provided in Appendix 2. All analysis results with % indicated as the reporting unit in this report refer to % weight/weight dry basis unless otherwise specified as consistent with standard laboratory reporting. Results in mg/kg (ppm) may be converted to % by division by 10,000.

3.2.1 Acid-Base Accounting

Preliminary analysis of ABA parameters included total sulfur, sulfate sulfur, total carbon, ANC, and NAG.

Total sulfur and carbon and acid insoluble carbon (organic carbon and/or graphite) were measured by combustion-based elemental analysis using a 'LECO' type instrument.

The ABA scheme relies on measurement of oxidisable sulfur. The value of this fraction of sulfur in mine waste samples is calculated as the difference between total sulfur and sulfate-sulfur, which is present in a fully oxidised form and therefore not capable of generating additional acidity. Sulfate-sulfur content was determined by a heated hydrochloric acid extraction followed by Inductively Coupled Plasma – Optical Emission Spectrometry (ICP-OES) analysis.

Sample ANC was measured by a modified Sobek procedure (AMIRA International 2002), which involves addition of dilute hydrochloric acid to the sample, followed by gentle simmering (two hours) to complete the reaction. The concentration of acid used for this procedure is first determined by testing the vigour of the reaction of the sample with hydrochloric acid, as assessed by the rate evolution of carbon dioxide gas and any colour change (a 'fizz rating'). The ANC was then determined by titrating the excess acid remaining after addition and reaction, using standardised sodium hydroxide solution.

The NAG test involves the addition of hydrogen peroxide, a strong oxidising agent, to a sample of mine waste to oxidise reactive sulfides. After cooling the sample pH is measured (NAG pH) and any acidity generated is measured by back titrating with sodium hydroxide solution to a pH of 4.5 (NAG to pH 4.5) and then pH 7 (NAG to pH 7). NAG is expressed in units of kg H₂SO₄/t. A significant NAG result (i.e. final NAG pH less than 4.5) generally indicates that the sample is PAF and the test provides a direct measure of the NAG potential. A NAG pH of 4.5 or more generally indicates that the sample is NAF but may still be capable of generating metalliferous drainage following oxidation of the sulfide minerals. Results for titrations of aliquots of the NAG solution to endpoint pH values of 4.5 and 7.0 allow estimation by the difference between these results of the relative amounts of non-acid producing base metal (e.g. copper) and iron sulfides in the sample.

3.2.2 Elemental Composition

3.2.2.1 Total Elemental Composition

Major and trace metals and metalloids were measured following digestion of a finely ground sample (sub 800 µm) with a four-acid mixture of nitric, hydrochloric, perchloric and hydrofluoric acids, which is a total determination for the elements measured. Digest solutions were analysed using inductively coupled plasma mass spectrometry (ICP-MS) or optical emission spectrometry (ICP-OES). Samples were analysed for a suite of 48 metals and metalloids.

From this data, the geochemical abundance index (GAI) for each element was calculated by comparison to the average earth crustal abundance (AusIMM 2001, Smith and Huyck 1999). Where concentrations of any given element fall below the laboratory limit of reporting (LOR), an indicative value equal to the respective LOR is used to calculate GAI or the GAI is assigned as zero. The main purpose of the GAI is to provide an indication of any elemental enrichment that could be of environmental significance. The GAI (based on a log-2 scale) is expressed in integer increments from 0 to 6 (INAP 2009). A GAI of 0 indicates that the content of the element is less than or up to three times the average crustal abundance; a GAI of 1 corresponds to a three-to-six-fold enrichment; a GAI of 2 corresponds to a 6 to 12 fold enrichment and so forth, up to a GAI of 6, which corresponds to a 96-fold, or greater, enrichment above average crustal abundances. A GAI of 3 or more is generally considered 'significant' and may warrant further investigation.

3.2.2.2 Environmentally Significant Composition

Environmentally significant concentrations of 53 metals and metalloids were determined following two-acid (Aqua-Regia) digestion of nitric and hydrochloric acid in a 1:3 ratio. The aqua regia digestion method is considered effective for measuring trace element concentrations in soils and provides an estimate of the maximum element availability to plants.

The results were compared to default contaminated site ecological investigation levels (EIL) (DEC 2010) and added contaminant limits (ACL) (NEPM 2013).

3.2.3 Leachate Characterisation

3.2.3.1 Water Leachable Characterisation

Samples were subject to a water leach similar to the Australian Standards Leaching Procedure (ASLP) 4439.3 Class 1 specification (Standards Australia 1997), except that the solid to liquid ratio used was 1:10 instead of 1:20. The use of a tumbled water extract of a finely ground sample allows the laboratory water extraction test to mimic weathering conditions that may be expected in a temperate, semi-arid environment over a period of several years. Extracting samples at a solid to liquid ratio of 1:10 in the present work was a compromise between the higher solid to liquid ratios

that may be experienced in saturated waste rock storage conditions and the 1:20 ratio often used to simulate short-term leaching by rainwater and comparison to water quality criteria (ASLP extraction ratios are derived from a United States Environmental Protection Authority (USEPA) default attenuation factor of 20). Hence 1:10 extract ratio results are conservative if comparison to water quality criteria but appropriate for comparison to plant uptake considerations. The filtered (0.45 µm) leachate solutions were analysed using ICP-OES, ICP-MS or other methods as necessary, for a range of elements including major ions (calcium, magnesium, potassium, sodium, sulfate and chloride) and a suite of 53 environmentally significant metals and metalloids. Leachates were simultaneously tested for electrical conductivity (EC), pH, fluoride and alkalinity (bicarbonate, carbonate and hydroxide forms) using electrochemical and volumetric (titration) methods.

The standard procedure described above was also performed for differing static leaching periods of 1, 3, 7 and 14 days. After each period leachates were analysed for pH, EC, sodium, potassium, lithium, magnesium and calcium. This allows a simple determination of the effect of slower dissolution rates for determining final concentrations in potential leachates.

3.2.3.2 Dilute Acetic Acid Leachate Characterisation

One sample was subject to a dilute acetic acid leach (initial pH 2.9) according to the Australian Standards Leaching Procedure (ASLP) 4439.3 specification (1:20 extraction ratio). Dissolved metal and metalloid concentrations in the filtered (0.45 µm) extract were determined using ICP-OES or ICP-MS as necessary. This test provides indication of the metals and metalloids that are likely to be leached as well as their concentrations, should acidic conditions prevail due to sulfide oxidation or by co-storage with other sources of PAF mine waste. The pH of the extract is chosen to reflect a typical value for silicate ANC buffered porewaters (i.e. absence or exhaustion of reactive neutralising carbonates).

3.2.3.3 1 M HCl Leachate Characterisation

The composite tailings sample was analysed for metals and metalloids using a 1 Molar hydrochloric acid (HCl) leach according to the Australian Standards Leaching Procedure (ASLP) 4439.3 specification (1:20 extraction ratio). Dissolved metal and metalloid concentrations in the filtered (0.2 µm) extract were determined using ICP-OES or ICP-MS as necessary. Analysis for 1 M HCl extractable metals provides an indication of the proportion of metals that are bioavailable/bio-accessible and hence have potential for uptake (ANZECC 2000). Where these results exceed adopted criteria, further investigation is required.

3.2.3.4 NAG Liquor Analysis

The peroxide digestion solutions (i.e. 'liquor') generated during NAG testing (Section 3.2.1) were analysed (after filtration and dilution) for a suite of environmentally significant metals and metalloids using ICP-MS/OES as required. This analysis provides an indication of elemental solubility under highly oxidising conditions, and therefore useful information on potential release of metals and metalloids during sulfide oxidation.

3.2.3.5 Leaching Environmental Assessment Framework – US EPA Test Method 1313

The Leaching Environmental Assessment Framework (LEAF) comprises four different leachate assessment methods and is currently being evaluated for assessment of waste derived materials in Western Australia. The Department of Water and Environmental Regulation (DWER) advocates adoption of one of these tests (US EPA SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Test Method 1313 (pH Dependence)) for characterisation of mine wastes. Test Method 1313 determines how liquid-solid partitioning varies with the pH (nine different pH values) of the (filtered) leachates using a parallel batch extraction method.

The main waste stream to be produced by volume (Flotation tailings) was analysed by MPL Envirolab Laboratories using US EPA Test Method 1313, which involves parallel batch extraction with nine solutions (including natural pH) at a solid to liquid extraction ratio of 1:10, with final pH values between 2 and 13 pH units. Each filtered extract solution was analysed for final pH, EC, fluoride and the following metals and metalloids: Ag, As, Al, B, Bi, Be, Ca, Cd, Co, Cr, Cr (VI), Cs, Cu, Fe, Hg, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Rb, S, Sb, Se, Sn, Sr, Th, Tl, U, V, W and Zn.

Samples for natural LEAF 1313 natural pH were also analysed for nitrogen suite (TN, NO₃, NO₂, NH₄, organic nitrogen) and DOC to determine whether denitrification processes and nitrate leaching can potentially occur post closure. The samples were also analysed for acrylamide to detect any residual species of polyacrylamides used for flocculation/processing.

3.2.3.6 Leaching Environmental Assessment Framework – US EPA Test Method 1314

A second LEAF test (US EPA SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Test Method 1314 – Liquid to Solid Ratio Using an Up-Flow Percolation Column) was also employed in this study on Blended spodumene tailings and performed by MPL Envirolab. This method provides information on both instantaneous and cumulative release of constituents as a function of liquid to solid (L/S) ratios. Results can be used to determine the anticipated leaching concentrations, release rates, and extents of release of metals and metalloids under varying flushing/leaching scenarios.

Test Method 1314 introduces eluent (deionised water) into a column of moderately packed granular sample in an up-flow pumping arrangement (to minimise air entrainment and flow channelling), with eluate collection occurring as a function of the cumulative liquid to solid ratio. Eluates were chemically analysed for final pH, EC, fluoride and the following metals and metalloids: Ag, As, Al, B, Bi, Be, Ca, Cd, Co, Cr, Cr (VI), Cs, Cu, Fe, Hg, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Rb, S, Sb, Se, Sn, Sr, Th, Tl, U, V, W and Zn.

3.2.4 Particle Size Distribution

Particle size distribution (PSD) was measured by Microanalysis on the solid phase of the tailings composite sample by laser diffraction. PSD data allows assessment of the likelihood of dust generation during material handling at site and informs assessment of geotechnical properties (outside the scope of this report).

3.2.5 Mineralogical Assessment

Selected samples were submitted to MPL Envirolab for quantitative powder X-Ray diffraction analysis (QXRD) of the crystalline and amorphous mineral constituents. Samples were dried and ground to a very fine powder (<60 µm) using a microniser mill and sub-sampled for analysis with addition of a zinc oxide internal standard, which supports the quantification approach. XRD patterns were then collected using a PANalytical Cubix wavelength dispersive XRD with quantitative analysis performed using an automated Rietveld method of correction. Full experimental details are provided in the mineralogical laboratory report presented in Appendix 2.

3.2.6 Fibrous Minerals

The tailings composite sample was treated to isolate the respirable fraction by means of sedimentation/elutriation – this also serves to remove gangue material which can physically interfere with identification of fibres. A small, weighed subsample of material was agitated in water and allowed to settle for a specific time. The subsampled portion of suspended respirable material was then filtered to deposit uniformly onto a clean low background filter (0.2 µm pore size nuclepore filter).

The sample was analysed by Scanning Electron Microscopy (SEM) by Microanalysis Australia for a 'presence/absence' determination.

Fibre identification was based on criteria as per ISO22262-1. A fibre was considered countable where the measured diameter was less than 3 µm and the length greater than 5 µm, with an aspect ratio (length:diameter) greater than 3:1. This definition aligns with the guidance note for respirable fibres published by the National Occupational Health and Safety Commission (NOHSC) on the 'Membrane Filtration Method' (NOHSC 2005). The NOHSC criterion was nationally adopted within the work health and safety (WHS) regulations in 2022.

Any fibres were then visually examined and compared to known electron diffraction patterns of asbestos fibres followed by chemical composition using energy dispersive X-Ray Spectroscopy (EDS).

3.2.7 Respirable Silica

Crystalline silica, a form of silicon dioxide, is one of the most abundant minerals in the earth's crust, with quartz being the most common form. It is present as part of a mixture of minerals in almost all types of rock, sands, clays, shales, and gravel. The main forms of crystalline silica are alpha-quartz (α -quartz), cristobalite and tridymite, the most prevalent of which is α -quartz.

Respirable crystalline silica is an aggressive, lung damaging dust when it is able to penetrate deep into the lung in sufficient quantity. The greater the dose (cumulative exposure) the greater the degree of lung damage. The non-crystalline form of silica (i.e. amorphous silica) does not cause such lung damage. For the crystalline dust particles to reach the extremities of the lung where they have the potential to do damage, they must be particularly small.

4. DESCRIPTION OF SAMPLES

A total of six samples, detailed in Table 2, were selected as part of the characterisation. One bulk composite of feed ore (M1 Bulk composite) was produced from seven drill holes (YDRD011, 13, 14, 15, 17, 18, 19) within the M1 orebody. Drillhole locations of these within the orebody (by Delta Lithium defined domains) are shown in Figure 4.

From this bulk composite, the pilot trial metallurgical process produced the following samples of tailings residues which were analysed:

- Deslimes (Slimes).
- Magnetic separation (Mags).
- Mica flotation (Mica Con).
- Final rougher tailings from spodumene flotations (RO Tail).

Note that the four tailings streams are intended to be blended together and disposed in the TSF as illustrated in Chart 2. This combined stream sample was analysed as a 'Tailings Composite'. Analysis of the component streams was conducted primarily as a cross check and to allow identification of the source stream for any species of interest/concern. The magnetic separation (Mags) was assessed for acid-base accounting as it is known reactive sulfide minerals (namely pyrrhotite) where present would mostly report to that stream.

One supernatant sample from the from the liquid phase of the tailings' slurry (Tailings Filtrate).

Table 2: Summary of the Stream Samples

Sample ID	Type/Description	Mass % of Final Tailings Stream
Mags	Tailings	2.0
Mica Con	Tailings	19
RO Tail (Rougher Tails)	Tailings	70
Slimes	Tailings	9.1
Tailings Filtrate	Supernatant	
Tailings Composite	Tailings Composite of all solids fractions (Mags, Mica, RO Tails and Slimes) in production proportions	100

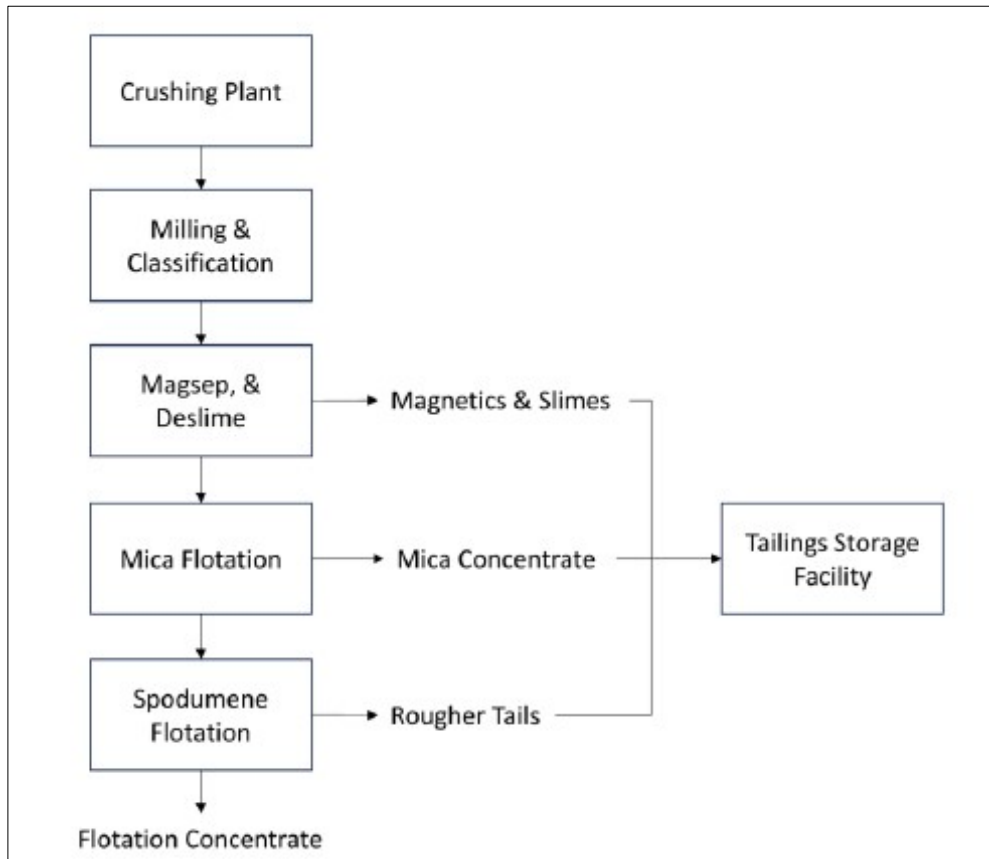


Chart 2: Block Flow Diagram – Ore Flotation Flowsheet

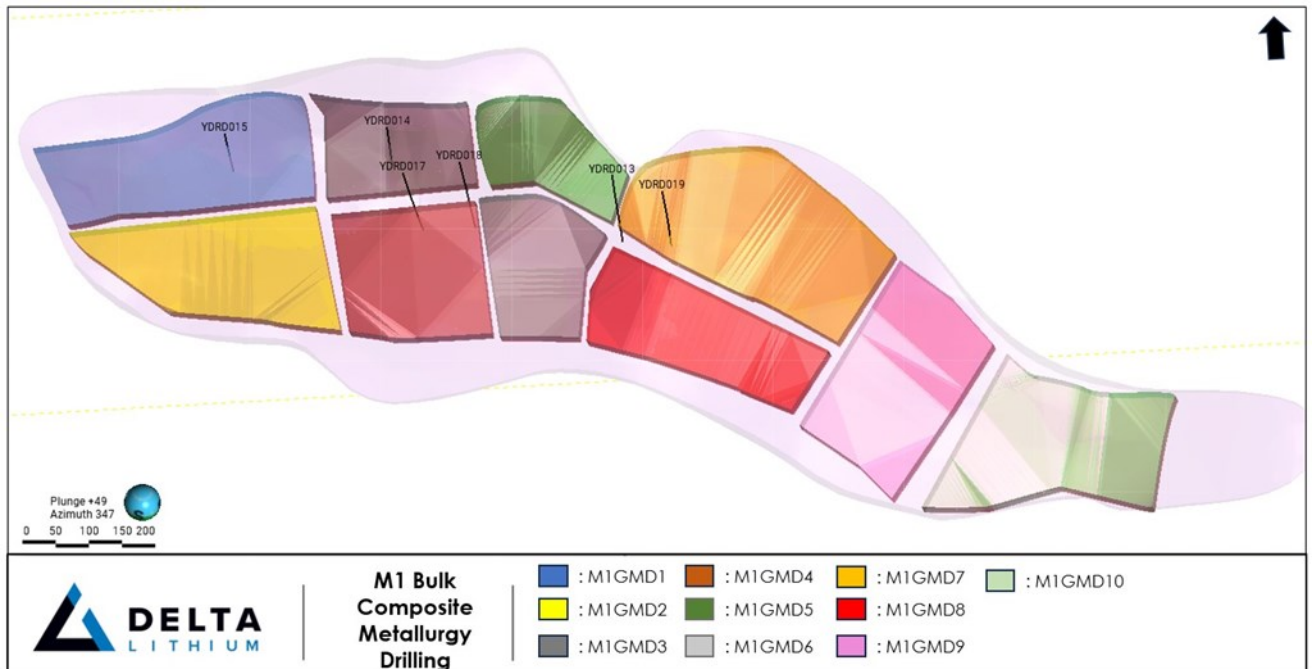


Figure 4: Locations of Selected Drillholes within the M1 Orebody

5. RESULTS AND DISCUSSION

5.1 MINERALOGICAL ASSESSMENT

Results for the mineralogical assessment of the tailings composite, magnetic separation tailings (Mags) and mica flotation tailings (Mica Con) are summarised in Table 3. The quantitative XRD analysis reports are provided in Appendix 2. The following key points were noted from the XRD results:

- All three samples were dominated by inert silicates (78 to 92%) essentially in the form of quartz, plagioclase and mica. A high content of spodumene (15%) was also reported for the magnetic separation stream sample, possibly carried into this stream attached to the magnetic minerals.
- Very low amounts of carbonates were detected in the form of calcite in each of the three samples indicating limited acid neutralisation potential. No acid-forming sulfide minerals were present either.
- Low levels of phosphate minerals (1% in the form of apatite and lithiophilite) and oxides (1%) were present the magnetic separation stream sample.

Table 3: Mineralogical Composition Summary (% by Weight)

Group	Phase	Formula	Tailings Composite.	Mags	Mica Con
Silicates	Braunite	$Mn_7(SiO_4)_8O_8$	<i>N.D</i>	1	<i>N.D</i>
	Spodumene	$LiAl(SiO_3)_2$	1	15	1
	Potassium Feldspar	$KAlSi_3O_8$	12	4	5
	Quartz	SiO_2	32	20	4
	Sodium Plagioclase	$NaAlSi_3O_8$	36	17	33
	Mica	$(K,Ca,Na,Li)(Al,Mg,Fe)_2(Si,Al)_4O_{10}(OH)_2$	11	20	48
	Amphibole	$(Na,Ca,Li)_2(Fe,Mg,Al)_5(Si,Al)_8O_{22}(OH)_2$	<i>N.D</i>	1	<i>N.D</i>
	Chlorite	$(Fe,Al,Mg,Li,Ni)_6(Si,Al)_4O_{10}(OH)_8$	<0.5	<0.5	<0.5
	Total Silicates		92	78	91
Carbonates	Calcite	$CaCO_3$	<0.5	1	<0.5
	Total Carbonates		<0.5	1	<0.5
Others	Apatite	$(Ca,Mn,Ba,Pb,REE)_5(PO_4)_3(OH,F,Cl)$	<i>N.D</i>	1	<i>N.D</i>
	Lithiophilite	$Li(Mn,Fe)PO_4$	<i>N.D</i>	1	<i>N.D</i>
	Columbite	$(Fe,Mn)(Nb,Ta)_2O_6$	<i>N.D</i>	<0.5	<i>N.D</i>
	Hematite	Fe_2O_3	<i>N.D</i>	1	<i>N.D</i>
	Magnetite	Fe_3O_4	<i>N.D</i>	1	<i>N.D</i>
	Spinel	$(Fe,Mg,Mn,Li)(Fe,Al,Mn,Co,Cr)_2O_4$	<i>N.D</i>	1	<i>N.D</i>
	Amorphous Content		8	15	9
Total			100	99	100

N.D: Not Detected

5.2 ACID AND METALLIFEROUS DRAINAGE CHARACTERISATION

Laboratory results for total sulfur, total carbon, ANC, NAG and calculated acid-base accounting parameters for the tailings composite and the residues from the magnetic separation (Mags) are collated in Table A1-2 of Appendix 1.

5.2.1 Sulfur Forms and Acid Neutralisation Capacity

Based on examination of the data in Table A1-2 (Appendix 1), a summary of total sulfur, sulfate sulfur and ANC is provided in Table 4, the following are noted as key points:

- Total sulfur concentrations were low for the magnetic separation sample (0.02%) and below the limit of reporting for the tailings composite (<0.01%).
- ANC values were low for the tailings composite (7 kg H₂SO₄/t) and moderate for magnetic separation sample (30 kg H₂SO₄/t). This difference between the two samples is attributed to a slightly higher proportion of rapid-reacting carbonate minerals in the form of calcite detected in the magnetic separation stream (Table 3, 1% calcite).

Table 4: Total Sulfur Content, Sulfate Sulfur and ANC

Type	Total S	SO ₄ S	ANC
	%	%	kg H ₂ SO ₄ /t
Tailings Composite	<0.01	<0.01	7
Mags	0.02	<0.01	30

5.2.2 Acid and Metalliferous Drainage Classification

Acid formation potentials of the magnetic separation and bulk tailings samples were classified using methods outlined in Section 3.1 on the results of tailings composite and Mags samples (Appendix 1, Table A1-2). A summary of the acid formation potential and acid mine drainage (AMD) classification is provided in Table 5. Both samples are classified as non-acid forming due to their negative NAPP values and alkaline NAG pH of 7.2 and 8.9. They further classify as NAF-Barren because of their low total sulfur content (Total S less than 0.05%). This indicates the tailings have acid forming nor acid neutralising potential overall.

Table 5: Acid Formation Potential Summary

Type	AP	NAPP	NAG pH	Classification
	kg H ₂ SO ₄ /t		pH Units	
Tailings Composite	<0.3	-7	7.2	NAF (Barren)
Magnetic Separation	0.6	-29	8.9	NAF(Barren)

5.3 ELEMENTAL COMPOSITION

5.3.1 Total Elemental Composition

Mineral deposits, by their nature, are anticipated to have some elements present in concentrations above the average crustal abundance. They do, however, provide a useful screening tool for identifying elements requiring further assessment by more specific test methods including leachates.

Metal and metalloid elemental concentrations of the four tailings streams and the composite tailings sample, together with the calculated GAls for these samples (as outlined in Section 3.2.2.1), are presented in Table A1-3 and Table A1-4 of Appendix 1. The key enriched elements are summarised in Table 6.

In addition to the elements listed in Table 6, the magnetic separation sample (Mags) was also noted to be enriched in chromium, manganese, niobium, phosphorus, rhenium, uranium and tungsten with GAI from 3 to 5. This is as expected as the majority of rare earth minerals are at least weakly magnetic and report to this fraction. The overall tailings (tailings composite), however, dilute these by mass. The magnetics stream can optionally be used to produce a tantalum concentrate on this basis.

Table 6: Summary of Elemental Enrichments

Element	Average Crustal Abundance*	Sample ID				
		Mags	Mica Con	RO Tails	Slimes	Tailings Comp.
	mg/kg					
Bi	0.2	9.1 GAI 4	2.8 GAI 3	0.5 GAI 0	7.2 GAI 4	1.7 GAI 2
Cs	3	79 GAI 4	126 GAI 4	23 GAI 2	48 GAI 3	45 GAI 3
Li	30**	>5,000 GAI 6	1,770 GAI 5	218 GAI 2	2,096 GAI 5	780 GAI 4
Mo	2**	443 GAI 6	1.2 GAI 0	1.8 GAI 0	89 GAI 4	18 GAI 2
Rb	120**	1,552 GAI 3	>2,000 GAI 6	919 GAI 2	1,000 GAI 2	1,176 GAI 2
Sn	2.5	48 GAI 3	99 GAI 4	1.5 GAI 0	21 GAI 2	9.1 GAI 2
Ta	2	1,908 GAI 6	35 GAI 3	5.3 GAI 0	25 GAI 3	46 GAI 3

*AusIMM (2001), ** Crustal Abundance of Granite

5.3.2 Total Environmentally Available Composition

The two-acid / aqua regia analysis provides an estimate of the maximum element available to the environment over long term weathering conditions and is the default method applied for assessment against environmental guidelines when they refer to 'totals'. Environmentally available (Aqua Regia) concentrations of heavy metal and metalloids were analysed by two-acid digest (aqua regia) and can be compared to default EIL (DEC 2010) and ACL (NEPM 2013) for surface soils as a screening method of risk assessment (although tailings are not intended for surface soil disposal). Full results are presented in Table A1-5 of Appendix 1. Table 7 and Chart 3 provide a summary of key environmentally significant metals and metalloids:

- Environmentally available proportions of the key metals and metalloids in the composite tailings sample ranged from 17 to 54% of the total elemental composition by four-acid (Section 5.3.1). Exceedances of soil screening criteria in the overall tailings composite were only reported for manganese (564 mg/kg) and nickel (85 mg/kg) for the most sensitive soil classification (areas of ecological significance). Manganese (500 mg/kg) is a fixed default criterion (DEC 2010) which is typically exceeded for all crushed rock samples with a mafic signature and is not a good indication of risk by itself.
- All four tailings samples reported 100% of bismuth, molybdenum, chromium and nickel total concentrations as being environmentally available. Concentrations of molybdenum (92 to 450 mg/kg), chromium (786 to 3,566 mg/kg) and nickel (425 to 1,968 mg/kg) exceeded the EILs for the deslime and magnetic separation stream residues.

- The deslimes and magnetic separation tailings reported 100% of total manganese as being environmentally available (Slime 1,041 mg/kg and Mags 18,875 mg/kg) exceeding the EILs (DEC 2010) guideline value of 500 mg/kg. These concentrations are related to the presence of manganese and iron oxides (Table 3).
- Concentrations of zinc in the aqua regia digest of the Mags tailings (235 mg/kg, 81% environmentally available) exceeded the EIL Ecological Significance guideline value of 150 mg/kg. Due to mass dilution (Mags being only 2% of mass), the concentration in the tailings composite to be disposed (47 mg/kg) is much lower.
- Potentially environmentally available concentrations of lithium ranged from 10% to 50% of total concentrations across all samples. Due to the elevated total lithium concentrations, the environmentally available concentrations were high, particularly for the Mags tailings, with a concentration exceeding 2,500 mg/kg. This concentration is correlated to the elevated levels of phosphorus in the aqua regia of the Slimes and Mags samples associated with the presence of lithium phosphate detected in the sample (Table 3).

Table 7: Summary of Selected Metals and Metalloids

Lithology	Cr	Li	Mn	Mo	Ni	Zn
	mg/kg					
Slimes	786	392	1,041	92	425	101
Mags	3,566	>2,500	18,875	450	1,968	236
Mica Con	23	273	144	1.5	6.7	119
RO Tail	15	44	129	1.8	6.4	5.9
Tailings Composite	154	216	564	18	85	47
Ecological Significance*	160	N/G	500	40	25	150
Urban / Residential / POS*	470	N/G	500	40	100	700
Commercial / Industrial*	770	N/G	500	40	170	1,100

* EIL (DEC 2010) / ACL (NEPM 2013), N/G: refers to No Guideline value given

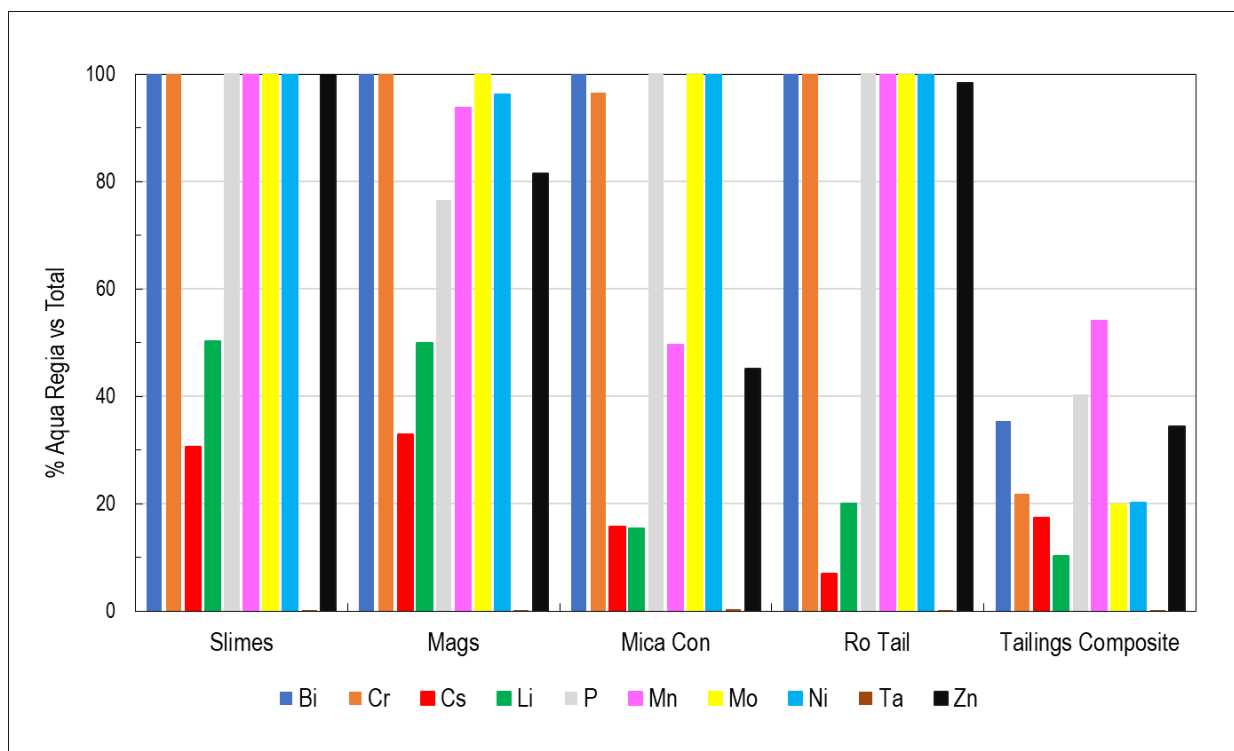


Chart 3: Environmentally Available Proportions of Key Metals/Metalloids

5.4 NATURALLY OCCURRING RADIONUCLIDES

Naturally occurring radioactive materials (NORM) arise due to the presence of one or more radioactive isotopes naturally present in a material. NORM activity in particular is determined by concentrations of thorium (Th-232) and uranium (U-238), which are naturally radioactive gamma (γ) emitting elements present in ores and concentrates. Potassium (K-40) is also a low-level gamma emitter treated separately to the above in most assessments. Potassium (K-40) is a natural low-level beta (β) radiation emitter with long half-lives (slow decay rate); however β , emission is a significantly lower risk to health than gamma emission and is normally only assessed in regards for internal ingestion in waters, food etc. (DMP 2010).

The activity concentrations of the samples were calculated from their total elemental concentrations (Section 5.3.1), assuming secular equilibrium and based on specific activities for each of the three naturally occurring radioactive elements (U, Th and K). Results are outlined in Table 8, where the specific activities (relates elemental concentration to activity concentration) for naturally occurring proportions of the isotopes applied were: U (U-238) 12,500 Bq/g U, Th (Th-232) 4,090 Bq/g Th and K (K-40) 30.9 Bq/g K (DMP 2010, IAEA 2006).

A level of 1 Bq/g head of chain activity concentration is considered 'inherently safe' to humans for uranium and thorium series radionuclides (IAEA 2004, IAEA 2006) and this value is set as the 'exclusion limit' as the resulting effective dose to workers is very unlikely to be more than 1 mSv/year. The level of 1 Bq/g for these applies individually to each radionuclide (U/Th), however the sum is often compared to this value as a conservative screening tool (Table 8). Levels of Th/U head of chain activity above 10 Bq/g are considered a dangerous good (ten times the exclusion limit) for transport purposes (ARPANSA 2019).

Overall, naturally occurring radiation levels in all waste types are low and do not classify under any relevant criteria above, being well below the levels of activity (exemption limits) which would trigger possible further assessment. This is consistent with MBS observations for all Western Australian LCT pegmatite orebodies where levels of uranium and thorium have been found to be low.

Table 8: Calculated Mean Activity by Waste Type

Sample ID	U		Th		K		238U + 232Th
	mg/kg	Bq/g	mg/kg	Bq/g	mg/kg	Bq/g	Bq/g
Slimes	13.5	0.1668	0.33	0.0013	2.9461	0.0001	0.1681
Mags	66.	0.8169	3.88	0.0157	2.4707	0.0001	0.8326
Mica Con	3.4	0.0419	0.16	0.0006	5.4484	0.0002	0.0426
RO Tail	0.6	0.0069	0.05	0.0002	2.1523	0.0001	0.0071
Tailings Composite	2.3	0.0291	0.15	0.0006	2.8618	0.0001	0.0297

5.5 WATER LEACHATE CHARACTERISATION

5.5.1 Major Ions, pH and Salinity

Salinity, pH, and major ions in 1:10 extracts for the four tailings streams and the tailings composite sample are summarised in Table A1-6 of Appendix 1. Samples across all the tailings stream residues and the composite sample were found to have:

- Circum-neutral to alkaline pH ranging from pH 7.1 to 9.0 for all samples. The highest pH values were reported for the Mags samples (pH 9.0), exceeding the upper limit of Livestock Drinking Water guidelines (ANZECC 2000, pH 8.5). Revised draft Livestock Drinking Water guidelines were issued in November 2023 however these are yet to be ratified/adopted and are not used as comparisons by MBS until such time as they are formally adopted.
- Salinity was very low across all samples (<10 to 54 mg/L TDS) with very low concentrations for all major ions. The total soluble alkalinity was low (4 to 28 mg CaCO₃/L).

The 1:10 ASLP water leaching procedure (Section 3.2.3.1) was repeated to mimic slow movement/leaching by infiltrating water (e.g. rainwater) on four subsamples of the tailings composite for leaching periods of 1, 2, 3 and 14 days. Final leachates were analysed for pH, EC, major cations and lithium concentrations. The results presented in Table 9 below indicated that:

- Leachate pH remained circumneutral and increased in from pH of 6.9 (1 day) to pH of 7.2 (14 day). Salinity was low ranging from 12 mg/L TDS (1 day) to 22 mg/L TDS (14 day).
- Concentrations potassium and magnesium were below the limits of reporting across all leaching periods. Concentrations of calcium ranged from <0.5 mg/L to 0.9 mg/L and sodium was very consistent at 3.2 mg/L across the leaching period.
- Lithium concentrations remained relatively low across all leaching periods despite its three-fold increase from 1-day leach to 14-day leach, ranging from 40 to 130 µg/L. The increase in concentration over time was expected and is a result of the gradual dissolution/reaction of residual spodumene [LiAl(SiO₃)₂] which is also driven by dissolved carbon dioxide. The pore water concentration of lithium under field conditions (prolonged contact and also subject to evapoconcentration) will therefore be higher and better represented by the tailings supernatant concentration (0.62 mg/L in this instance).

These results indicated that extended periods of leaching through the existing tailings material is unlikely to generate acid and/or saline metalliferous drainage. The exception to this is lithium which is likely to increase in concentration to low mg/L concentrations with time if net seepage is allowed. However this is mitigated by indicated low toxicity of lithium in presence of other cations (i.e. in receiving waters), supernatant/seepage recovery during operations and capping at closure which will prevent net seepage from that point.

Table 9: Water Leachates Results on Tailings Composite Splits S1 to S4

Sample ID	pH	TDS	Ca	K	Mg	Na	Li
		mg/L	mg/L	mg/L	mg/L	mg/L	µg/L
Tailings Composite S1 – 1 day	6.9	12	<0.50	<0.50	<0.50	2.3	40
Tailings Composite S2 – 2 days	6.8	19	0.90	<0.50	<0.50	3.3	53
Tailings Composite S3 – 3 days	7.2	19	0.78	<0.50	<0.50	3.2	83
Tailings Composite S4 – 14 days	7.2	22	0.90	<0.50	<0.50	3.3	130
Livestock Drinking Water DGV*	6.5–8.5	4,000	1,000	N/G	250	N/G	N/G
NPUG (DER 2014)	N/G	N/G	N/G	N/G	N/G	N/G	N/G
Freshwater Protection 95% DGV*	6.5–8.5	N/G	N/G	N/G	N/G	N/G	N/G

* ANZECC 2000 / ANZG 2018

N/G: No Guideline value exists

5.5.2 Water Soluble Metals and Metalloids and Supernatant

Observed concentrations of metals and metalloids in the extract may not represent maximum potential concentrations. This test method can be limited by the rates of dissolution, desorption and solubility, especially for sparingly soluble minerals such as gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$), barite (BaSO_4) and fluorite (CaF_2). Hence, an understanding of minerals present is important. Geochemical speciation modelling programs, such as PHREEQC (USGS 2021), provide a useful means for identifying mineral phases that may be responsible for controlling concentrations of water quality constituents and contaminants.

Results for metals and metalloid concentrations in the 1:10 water extracts are presented in Table A1-7 of Appendix 1. ANZECC livestock (cattle) drinking water guidelines (ANZECC 2000) and Department of Environment Regulation non-potable groundwater use guidelines (DER 2014) are provided for comparison. The results indicate:

- Concentrations of most metals and metalloids were low or below their limits of reporting, except for aluminium. The deslime and magnetic separation tailings reported elevated aluminium (0.25 mg/L and 0.35 mg/L) exceeding the NPUG of 0.2 mg/L, but did not exceed the livestock drinking water guidelines of 5 mg/L.
- Lithium concentrations in the 1:10 water leachates ranged from 7.9 µg/L (RO Tail) to 2,990 µg/L in the magnetic separation sample (Mags). This is consistent with the XRD results, finding the highest spodumene content present in the magnetic separation sample (15%). Lithium concentration in the tailings composite was 40 to 130 µg/L depending on length of extraction time/contact and 625 µg/L in the supernatant.

Composition of the tailings supernatant analysed in the tailings filtrate sample is shown together with the 1:10 ASLP water leachate results of tailings residues Table A1-6 and Table A1-7 of Appendix 1. The following key points were noted from the results:

- The supernatant was circum-neutral (pH of 6.6) with a low salinity (333 mg/L TDS) and moderate alkalinity (22 mg CaCO_3 /L). The major anions were sulfate (116 mg/L) and chloride (67 mg/L), and the major cation was sodium (67 mg/L).
- Concentrations of most metals and metalloids analysed were close or below their respective limit of reporting except for manganese, nickel, zinc and cobalt. Concentrations of manganese (4.2 mg/L) were considered the most notable being significantly higher than solids extracts of the tailings. This may be an artifact of sample storage (manganese is more soluble under reducing conditions which may have developed during sample storage prior to analysis). Manganese, nickel, and zinc exceeded their respective ANZECC (2000) freshwater protection 80% value, and cobalt concentration exceeded the ANZECC (2000) freshwater protection 95% value noting this is at source concentrations only. All dissolved elemental concentration remained below their respective NPUG (DER 2014) and Livestock Drinking Water guidelines (ANZECC 2000) values. Manganese will rapidly precipitate from solution with presence of oxygen.

5.6 DILUTE ACETIC ACID AND 1 M HCl LEACHATE CHARACTERISATIONS

As discussed in Sections 3.2.3.2, analysis of metals content in dilute acetic acid leachates can provide an indication of metals and metalloids that may be leachable over extended periods if moderately acidic conditions (approximately pH 3.5) were to prevail or if materials are in contact with plant root exudates. It also provides an indication of the acid neutralising/reactive species. As discussed in Section 5.2.2, the bulk tailings composite is unlikely to form acid due to weathering over time.

Analysis for 1 M HCl extractable metals (Section 3.2.3.3) provides an indication of the proportion of metals that are bioavailable/bioaccessible through ingestion.

Dilute acetic acid and 1 M HCl leachate results for the tailings composite sample are presented in Table A1-8 of Appendix 1. The dilute acetic acid and 1 M HCl leachate results of the tailings composite showed similar key results as summarised in Table 10:

- Concentrations of manganese and iron in particular reflect readily reactive oxides/hydroxides of these elements are present. As 1M HCl (strong acid) concentrations of manganese were similar to acetic acid (weak acid) it indicates manganese oxides as the most reactive forms. The amount of extractable manganese (400 mg/kg) represents 71% of aqua regia amount.
- Chromium, nickel and molybdenum were primarily only soluble under strong acid (1M HCl) conditions and still reflect low proportions/amounts in total indicating no potential for ingestion toxicity from these or other elements.
- Lithium (acid-reactive spodumene) was 2.7 mg/L in acetic and 3.2 mg/L in 1M HCl extracts. This likely represents the maximum concentrations of reactive lithium which may be dissolved in tailings pore waters prior to effects of evapoconcentration. The ANZECC 2000 irrigation water guideline for lithium is 2.5 mg/L.

Table 10: Key ASLP Acetic Acid and 1 M HCl Leachate Results of Tailings Composite

Sample ID	Leachate	Al	Cr	Fe	Li	Mn	Mo	Ni
		mg/L	mg/L	mg/L		mg/L	µg/L	mg/L
Tailings Composite	1 M HCl	4.10	2.6	38	3.2	20	310	1.6
	1:20 ASLP Acetic Acid	1.20	0.011	15	2.7	17	1.5	0.02
Livestock Drinking Water DGV*		5.0	1.0	No limit	2.5***	N/G	150	1.0
NPUG (DER 2014)**		0.2	0.5	0.3	2.5***	5	500	0.2

* Livestock Drinking Water DGV (ANZECC 2000/ANZG 2018)

** Non Potable Groundwater Use DGV (DER 2014)

*** Long-Term Irrigation Water DGV (ANZECC 2000/ANZG 2018)

N/G: No Guideline value exists

5.7 NAG LIQUOR ANALYSIS

The composition of the peroxide digestion solutions (i.e. 'liquor') generated during NAG testing of the tailings composite sample is presented in Table A1-9 of Appendix 1. This analysis provides an indication of elemental solubility under highly oxidising conditions. Results indicated that under highly oxidative conditions, concentrations of most metals and metalloids analysed were low. The highest concentrations were reported for aluminium (0.61 mg/L), lithium (1.4 mg/L), iron (0.21 mg/L), manganese (0.32 mg/L), sulfur (0.51 mg/L) and phosphorus (0.33 mg/L). Therefore, if oxidative conditions (low to moderate) prevail in the TSF, any leachate is unlikely to release significant amounts of metals and metalloids due to the non-acid forming nature of the bulk tailings material (Section 5.2.2).

5.8 LEACHING ENVIRONMENT ASSESSMENT FRAMEWORK (LEAF)

The tailings composite sample was assessed using the US EPA SW-846 Test Method 1313 (Leaching Environmental Assessment Framework - LEAF), across nine different pH values. The LEAF 1313 test provides information on the changes in solubility with pH (Section 3.2.3.5).

The tailings composite sample was also subjected to US EPA SW 846 Test Method 1314 LEAF at various solid to liquid ratios using an up-flow percolation column (Section 3.2.3.6). The LEAF 1314 assessment provides information on both instantaneous and cumulative species solubility characteristics as a function of L/S ratio.

The 1:20 deionised water ASLP extraction is considered a more appropriate predictor for seepage water quality by incident rainfall and hence more appropriate for comparison to water quality criteria. All approaches undertaken for this study are discussed below in sections.

5.9 LEAF 1313

Results for water-soluble analytes in the pH-dependent extracts (10:1 Liquid to soil) of the tailings composite analysed using US EPA SW-846 Test Method 1313 (Section 3.2.3.5) are presented in tabular and chart formats in Appendix 1. Comparison to environmental criteria have been added as comparators to these, however these comparisons are only relevant for circum-neutral pH extracts. LEAF 1313 extends outside this range for the purpose of determining mineral forms not for risk assessment purposes. These comparators include the:

- Livestock drinking water quality guidelines (ANZECC 2000).
- Department of Health non-potable groundwater use guidelines (DER 2014).
- ANZG 95% and 80% freshwater protection guideline values (ANZG 2018).
- Long-term irrigation (Li Only) (ANZECC 2000).

5.9.1 Metals

A summary of results for the LEAF test pH behaviour as grouped by analyte into four classes is summarised in Table 11. Results are discussed by classes below. Table 12 summarises these results in the context of exceedances of relevant environmental criteria. In order to assess the environmental significance of exceedances observed in the LEAF 1313 tests results were weighted towards:

- Exceedances at environmentally relevant pH values i.e. between 6.5 and 8.5.
- Exceedances of the least sensitive environmental criteria i.e. ANZECC (2000) livestock drinking water guidelines.
- The environmental significance (i.e. ecotoxicity) of the element.
- ANZECC freshwater aquatic 80% species protection level would apply to any surface water bodies (unlikely) or groundwater impacts (e.g. stygofauna) during operations (highly disturbed). The 95% species protection level would be more relevant post-closure or off lease. Both are considered conservative in comparison to 1:10 leachates as this does not account for dilution/attenuation prior to any potential receptors.

The key points from LEAF 1313 results of the tailings composite sample indicated:

- Elements that were unreactive or insoluble in variable pH leachates (Class 1) were silver, bismuth, selenium, thorium, lanthanum, antimony, tin and thallium. None of these elements exceeded their respective guideline trigger values with many below their limit of reporting. Therefore, these elements present no significant environmental risk under any pH under field conditions.
- Elements that exhibited acid-soluble behaviour (Class 2) were cadmium, manganese, strontium, sulfate, zinc, lithium, nickel, fluoride, lead, calcium and vanadium. Concentrations of these elements were highest under extreme acidic conditions (pH 2 leachates) which are not expected under field conditions. The following is noted:

- Manganese concentrations at alkaline pHs were very low (<0.17 mg/L). At pH 8 to 4, the manganese concentrations exceeded the long-term irrigation guideline of 0.2 mg/L with concentrations ranging from 0.22 mg/L to 2.7 mg/L. At pH 2, the manganese concentration exceeded non-potable use guideline of 5 mg/L with a concentration of 48 mg/L. Manganese is not considered environmentally toxic and often occurs above 1 mg/L in groundwaters — higher solubility is driven by reducing (anaerobic) conditions.
- Lithium concentrations at alkaline and natural pHs were very low (<0.1 mg/L). At pH 2, the lithium concentration exceeded the long-term irrigation guideline of 2.5 mg/L with a concentration of 7.4 mg/L. Lithium at this pH was consistent with the 1M HCl extractions given the difference in ratio of the extracts (1:10 for LEAF, 1:20 for 1M HCl).
- Fluoride concentrations at alkaline and neutral pHs were very low (<0.25 mg/L). At pH 2, the fluoride concentration exceeded livestock drinking water trigger value of 2.0 mg/L with a concentration of 3.3 mg/L.
- Cadmium, zinc, nickel and lead concentrations were marginally more soluble under acidic conditions than alkaline and circum neutral conditions but did not exceed the non-potable water or livestock drinking water guidelines
- Strontium, sulfate, calcium and vanadium concentration were marginally more soluble under acidic conditions than alkaline and circum neutral conditions. Concentrations remained below all respective guidelines at all pHs.
- Elements that exhibited alkaline-soluble behavior (Class 3) were molybdenum, tungsten (weakly), silicon and potassium. The following is noted:
 - Molybdenum concentrations at acidic and neutral pHs were very low (<0.006 mg/L). At pH 13, the molybdenum concentration slightly exceeded the long-term irrigation guideline of 0.01 mg/L with a concentration of 0.012 mg/L.
 - Tungsten, silicon and potassium were more soluble under alkaline conditions than acidic and neutral conditions. Concentrations remained below all respective guidelines at all pHs.
- Elements exhibiting amphoteric behavior (Class 4) included arsenic, aluminium, caesium, chromium, rubidium, copper, uranium and phosphorous. The following is noted:
 - Aluminium concentrations exceeded the 95% freshwater protection guideline of 0.055 mg/L at all pHs and exceeded the non-potable use guideline of 0.2 mg/L at pH 7 to 13. The highest concentrations were reported under highly alkaline (pH 13) and extreme acid (pH 2) final pH conditions with respective concentrations of 4.3 and 8.6 mg/L. The livestock drinking water guideline value of 5.0 mg/L was exceeded at pH 2.0.
 - Phosphorous concentrations exceeded the long-term irrigation guideline of 0.05 mg/L at all pH values. The highest concentrations were reported under highly alkaline (pH 13) and acidic (pH 4 to 2) conditions with concentrations of 1.3 mg/L (pH 13), 1.7 mg/L (pH 4) and 70 mg/L (pH 2).
 - Uranium concentrations exceeded the long-term irrigation guideline of 0.01 mg/L under highly alkaline and acidic conditions with concentrations of 0.084 mg/L (pH 13), 0.021 mg/L (pH 12) and 0.13 (pH 2). The 80% and 95% freshwater protection guidelines of 0.0005 mg/L were exceeded at pHs of 7 to 10.5.
 - Copper and chromium concentrations exceeded their respective 80% and/or 90% freshwater protection guidelines in at least one leachate; however, they did not exceed non-potable water or livestock drinking water guidelines. The freshwater protection guidelines are highly conservative guidelines, and the exceedances are considered insignificant.
 - Caesium, rubidium and arsenic exhibited amphoteric behaviour; however, concentrations remained below all respective guideline values at all pH values.

Table 11: Summary of LEAF 1313 Test Results by Element

Class	Definition of Class	Elements in Class
Class 1	Insoluble/unreactive Class 1 analytes are present at very low or non-detectable concentrations at all pH values.	Ag, Bi, Se, Th, La, Sb, Sn, Tl
Class 2	Acid-soluble/reactive Class 2 analytes are present at low to very low concentrations at circum-neutral and alkaline conditions but become increasingly soluble under acidic conditions. Many metallic elements such as calcium and magnesium are Class 2.	Cd, Mn, Sr, SO ₄ , Zn, Li, Ni, Ca, F, Pb, V
Class 3	Alkali-soluble/reactive Class 3 analytes are present at low to very low concentrations at circum-neutral and acidic conditions but become increasingly soluble under alkaline conditions.	Mo, K, W (weakly), Si
Class 4	Acid- and alkali-soluble/reactive Class 4 analytes are present at low to very low concentrations at circum-neutral pH but become increasingly soluble under acidic and alkaline conditions. Amphoteric elements (for example aluminium and zinc) are Class 4 analytes.	Al, U, Cu, Cr, Cs, Rb, As, P

Table 12: Summary of Exceedances of Environmental Criteria from LEAF 1313

Element	Guideline	Guideline Criteria (mg/L)	Concentration at Neutral pH	pH where Guideline is exceeded	Concentration at pH (mg/L)	Environmental Significance at Neutral pH
Al	Livestock DGV (ANZECC 2000) Non-potable Use Guideline (DER 2014)	5 0.2	0.52	2 <7	8.6 0.5 – 4.3	Not significant: Extremely acidic pH conditions required for significant exceedances. Non-potable use guideline is an aesthetic based not health based guideline.
Cd	95% Freshwater Protection (ANZG 2018) 80% Freshwater Protection (ANZG 2018)	0.0002 0.0008	0.0001	4 2	0.0003 0.0014	Not significant: Extremely acidic pH conditions required for exceedances.
Co	95% Freshwater Protection (ANZG 2018)	0.0014	0.0005	<4	0.002 – 0.006	Not significant: Extremely acidic pH conditions required for exceedances.
Cr(III)	95% Freshwater Protection (ANZG 2018) 80% Freshwater Protection (ANZG 2018)	0.0033 0.04	0.0027	< 8 2	0.0076 – 0.032 0.068	Not significant, no exceedance at circum-neutral pH.
Cu	80% Freshwater Protection (ANZG 2018)	0.0014	0.0039	>7 and <4	0.003 – 0.11	Marginal exceedance of freshwater criteria during operations in 1:10 extract. Conservative guideline however, no exceedance of NPUG/Livestock
F	Livestock DGV (ANZECC 2000)	2.0	0.19	2	3.3	Not significant: Extremely acidic pH conditions required for exceedances.
Fe	Non-potable Use Guideline (DER 2014)	0.3	0.17	8 – 12 and 2	0.52 – 34	Not Significant: Aesthetic guideline only and not exceeded at neutral pH
Li	Long-Term Irrigation (ANZECC 2000)	2.5	0.10	2	7.4	Not significant: Extremely acidic pH conditions required for exceedance of existing guideline.
Mn	Long-Term Irrigation (ANZECC 2000) Non-potable Use Guideline (DER 2014) 95% Freshwater Protection (ANZG 2018)	0.2 5.0 4.9	0.29	5.5 – 8 2 4	0.22 – 1.5 48 2.7	Not significant: Slight exceedance of long-term irrigation guideline which would cause black staining/clogging. Extremely acidic pH conditions required for NPUG and freshwater exceedances.

Element	Guideline	Guideline Criteria (mg/L)	Concentration at Neutral pH	pH where Guideline is exceeded	Concentration at pH (mg/L)	Environmental Significance at Neutral pH
Mo	Long-Term Irrigation (ANZECC 2000)	0.01	0.004	13	0.012	Not significant: Extremely alkaline pH conditions required for any exceedances.
Ni	95% Freshwater Protection (ANZG 2018) 80% Freshwater Protection (ANZG 2018)	0.011 0.017	0.0028	4 2	0.016 0.057	Not significant: Extremely acidic pH conditions required for exceedances. Low solubility at neutral pH.
P	Long-Term Irrigation (ANZECC 2000)	0.05	0.2	2 to 13	0.2 – 70	Significant: Long-term irrigation exceedances at all pH conditions (no guidelines for Livestock//NPUG). Indicates potential for promotion of algal growth in surface waters (groundwaters unlikely due to binding in subsoils).
Pb	95% Freshwater Protection (ANZG 2018) 80% Freshwater Protection (ANZG 2018)	0.0034 0.0094	0.0014	10.5 2.0	0.0047 0.10	Not significant: Low concentration at neutral pH Conservative guideline values.
U	Long-Term Irrigation (ANZECC 2000) 80% Freshwater Protection (ANZG 2018)	0.01 0.0005	0.0017	>12 and 2 <10.5 and <7	0.021 – 0.13 0.002 – 0.007	Not significant: Low concentration at neutral pH. Extremely acidic or alkaline pH conditions required for long-term irrigation exceedances.
Zn	95% Freshwater Protection (ANZG 2018) 80% Freshwater Protection (ANZG 2018)	0.008 0.031	0.036	10.5 >12 and <9	0.030 0.036 – 0.76	Marginal exceedance of freshwater criteria during operations in 1:10 extract. Conservative guideline however, no exceedance of NPUG/Livestock

* As per previous discussion, guidelines for Freshwater protection are considered conservative as receptors are not yet established and LEAF 1:10 extracts do not account for release rate or further dilution/attenuation prior to any receptors (e.g. stygofauna or surface waters).

5.9.2 Acrylamide, Nitrogen and Dissolved Organic Carbon

The samples were also analysed for acrylamide monomer to detect any residual presence related to potential use of polyacrylamides used for flocculation/processing. This has been requested by DWER in previous assessments of tailings. Acrylamide concentrations were non-detectable/below limits of reporting (0.0001 mg/L) and subsequently below the Australian Drinking Water Guideline of 0.0002 mg/L (NHMRC 2011) at pH 9. Total nitrogen and dissolved organic carbon (DOC) were reported 0.45 and 2.2 mg/L respectively as shown in Table 13. DOC represents residual bio-degradable process reagents which will breakdown with time. Dissolved phosphorous concentrations (0.2 mg/L) indicate a slight potential for algal growth in supernatants/pore waters (based on long term irrigation guidelines). Phosphorous in particular would also be an aquatic stressor for the same reasons in comparison to aquatic criteria (Table 13) however there is no direct pathway for this. Phosphorous seepage into subsoils will bind to clays and iron (attenuate) as well as dilute prior to any surface water receptor via groundwater expression.

Table 13: Summary of Nutrient and Acrylamide Data

Sample ID	Type	NH ₃	NO ₃	Total P	Total N	DOC	Acrylamide
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Tailings Composite	pH 9 LEAF Extract	<0.006	0.063	0.2	0.45	2.2	<0.0001
ANZECC Long-term Irrigation Guidelines		N/G	N/G	0.05	5	N/G	N/G
ANZECC Aquatic Stressors (WA or NT Tropical Wetland)		0.013	0.045	0.08	1.15	N/G	N/G
Australian Drinking Water Guidelines*		N/G	50	N/G	N/G	N/G	0.0002*

*NHMRC 2011

5.10 LEAF 1314

Results for water soluble metals, metalloids and fluoride in extracts collected at variable liquid/solid (L/S) ratios (between 0.2 and 10 L/kg) are presented in Appendix 1 in both tabular and chart formats, for the tailings composite sample. Environmental water quality guideline values, where available, have been included in the relevant results tables and charts as a comparator. In most cases, the livestock drinking water quality guideline value for cattle (ANZECC 2000) has been presented. Other values were used where no appropriate livestock value was available:

- ANZECC (2000) long-term trigger value (LTV) for lithium in irrigation waters (2.5 mg/L or 2,500 µg/L).
- USEPA (2017) maximum contaminant level for thallium (0.002 mg/L or 2 µg/L) in drinking water).
- DER (2014) Non-Potable Groundwater Use (NPUG) guideline values for beryllium (0.6 mg/L or 600 µg/L), fluoride (15 mg/L), manganese (5 mg/L or 5,000 µg/L) and silver (0.001 mg/L or 1 µg/L). The values are typically ten times the corresponding human drinking water guideline values.

LEAF Test Method 1314 provides information on instantaneous and cumulative release of constituents as a function of L/S ratio. The results can be presented as leachate concentrations (i.e. the concentration (mg/L) expected in leachate at any given ratio) or cumulative release (i.e. the mass of constituent dissolved (mg/kg) from the solid over cumulative L/S ratio). Leachate concentrations are useful for assessing whether chemical species are likely to be present at environmentally significant concentrations, whereas trends in cumulative release provides an indication of the expected leaching behaviour of a given chemical species. A summary of results for the LEAF test leaching behaviour as grouped by analyte into three classes is summarised for Blended spodumene tailings in Table 14.

Table 14: Leaching Behaviour of Chemical Species in Composite Spodumene Tailings

Leaching Behaviour Types	Chemical Species Associated with Behaviour Type
<p>Insoluble/unreactive Insoluble/unreactive chemical species are present at very low or non-reportable concentrations at all L/S ratios. They are unlikely to be present in leachate at environmentally significant concentrations.</p>	Ag, Be, Bi, Cs, Hg, La, Nb, Sb, Se, Sn, Ta, Th, Tl.
<p>Source Term Controlled* Chemical species that are source term controlled are present in relatively soluble forms within the sample material, but the reservoir (total amount) of the soluble forms is limited. These species may be present at environmentally significant levels for 'first flush' conditions, but leachate concentrations will tend to decline over time, as they are washed out of the material.</p> <p>Depending on the species, leachate concentrations may decline to below levels considered to be environmentally significant (or detectable) as the material is leached by saturated flow under a range of environmental conditions (e.g. landfill).</p>	Al, As, Ba, Br, Ca, Cd, Cl, Co, Cr, Cu, F, Fe, Mn, Mo, Na, Ni, Pb, S, Sr, Ti, U, V, W, Zn
<p>Solubility Controlled Solubility-controlled analytes are present in sparingly-soluble forms within the sample material, where dissolved concentrations are typically limited by dissolution of certain minerals or saturation of the leach solution with respect to those minerals.</p> <p>Solubility-controlled analytes will tend to be present at relatively steady concentrations in leachate over medium-to-long-term timescales and will not be rapidly flushed from the material under expected conditions.</p>	Li, P, Rb, Si, K

* *Underlined species behaviour indicates 'long-lag' source term controlled, where depletion is not rapid, and may also exhibit solubility controlled effects after the 'first flush' of soluble salts, or responses to changes in pH, ionic strength, and concentrations of other constituents in response to changes in L/S ratio.*

5.10.1 Leachate Salinity and pH

Leachate EC was highest (350 $\mu\text{S}/\text{cm}$) in the initial (very low) L/S ratio leachates of 0.2 L/kg and rapidly fell for subsequent (increasing) L/S ratios, which reflects the initially high accumulation of soluble salts in the porewater and subsequent 'first flush' dilution. EC ranged between 33 and 6 $\mu\text{S}/\text{cm}$ for L/S ratios between 0.5 and 10 L/kg, indicating very low concentrations of dissolved salts and therefore seepage of low-salinity from these co-mingled mine wastes.

Leachate pH varied between acidic (pH 4.8) and neutral (pH 7.1) for L/S ratios between 0.2 and 10 L/kg. Circum-neutral pH values between 6.2 and 7.1 were predominantly observed in most of the L/S ratio leachates (0.2 to 10 L/S). The highest pH value of 7.1 was observed for the 1.5 L/kg ratio before slightly dropping to pH 6.4 – 6.5 from 4.5 L/S ratio leachate. Such effects of decreasing pH with increasing L/S ratios are consistent with decreasing leachate ionic strength resulting from rapid "wash out" of soluble salts.

Overall, the tailings material from the existing TSF is expected to generate circum-neutral to slightly acidic leachates of fresh quality.

5.10.2 Insoluble/Unreactive Chemical Species

Chemical species considered insoluble/unreactive included those that were either at/close to or below the method reporting limit (PQL – practical quantification limit) at all L/S ratios or where measurable concentrations were only reported at the lowest L/S ratio (i.e. in saturated porewater). No measurable concentrations were observed at any L/S ratio for silver, beryllium, bismuth, caesium, mercury, lanthanum, neodymium, antimony, selenium, tin, tantalum,

thorium, thallium. Leachate concentrations of aluminium, arsenic, barium, bromide, calcium, cadmium, chloride, cobalt, chromium, copper, fluoride, iron, manganese, molybdenum, sodium, nickel, lead, titanium, uranium, vanadium, tungsten and zinc were predominantly below the laboratory PQL at high L/S ratios (e.g. above 2.0 L/kg) and any measurable concentrations typically just above or at the laboratory PQL and not considered environmentally significant.

5.10.3 Source Term Controlled Chemical Species

Cumulative release trends for tailings composite indicated that the solubility of lithium, phosphorus, potassium, rubidium and silicon were controlled by a finite, soluble source term. Concentrations of these species in leachate are expected to decrease over time as the source term is depleted should leaching occur. Of these species, only lithium was present in moderate concentrations in L/S ratio leachates other than the 'first flush' (0.2 L/kg, 1,300 µg/L) leachate. Following the first flush concentrations of lithium dropped to 210 µg/L in the 0.5 L/kg ratio leachate and next decreased steadily from 95 to 60 µg/L (1.0 to 10 L/kg).

These species were 'long-lag' source term controlled and characterised by slower cumulative solute release over time. It is considered that this behaviour is likely a combination of two forms for these elements (some soluble salts and remainder as minerals forms of lower solubility, most likely as ion-exchangeable forms).

To summarise, long-term leachate quality from bulk tailings composite is not anticipated to exceed broadly applicable environmental quality guidelines and is not expected to confer significant environmental risk. In fact, concentrations of the above source-controlled species are expected to rapidly diminish over time in a post closure environment, should leaching occur.

5.10.4 Solubility Controlled Chemical Species

Cumulative release trends for tailings composite sample indicated that the solubility of fluoride, phosphorus, lithium, aluminium, sodium, rubidium and molybdenum. The following is noted:

- Fluoride concentrations increased from the initial 0.2 L/kg (0.3 mg/L) to 0.5 L/kg (1.5 mg/L) L/S ratio leachate before falling to rapidly to negligible concentrations from the 2.0 L/kg ratio. Phosphorus followed a similar trend peaking to 3.1 mg/L in the 0.5 L/kg and decreased steadily to 0.3 mg/L in the final 10 L/kg ratio leachate. Fluoride concentrations remained below its corresponding ANZECC (2000) livestock drinking water guideline of 2.0 mg/L at all L/S ratios tested. These trends are consistent with the potential dissolution of phosphate minerals in the form of apatite.
- Aluminium, sodium and molybdenum exhibited very similar leaching behaviour where maximum concentrations were measured for all in the initial 0.2 L/kg 'first flush' leachate (0.44, 47 and 0.59 mg/L, respectively) before falling to approximately near or less than the PQL values for L/S ratios between 4.5 and 5 L/kg. Concentrations of aluminium in the 0.2 and 0.5 L/kg leachates (440 – 220 µg/L) exceeded the NPUG (DER 2014) trigger value of 200 µg/L. Concentrations of molybdenum exceeded the ANZECC (2000) livestock drinking water guideline trigger value of 10 µg/L up to the 0.5 L/kg ratio leachate (43 – 59 µg/L).
- The lithium concentration was highest in the initial 'first flush' 0.2 L/kg leachate (1.3 mg/L) and dropped rapidly from the 0.5 L/kg leachate, but demonstrated solubility-controlled behaviour by slight fluctuations between 47 and 74 µg/L for L/S ratios between 1.5 and 10 L/kg. Solubility of lithium is attributed to dissolution of residual spodumene detected in the composite tailings sample (Section 5.1).
- Concentrations of rubidium were detected above the laboratory PQL at 3.0 – 8.0 µg/L in low L/S ratio leachates (0.2 – 0.5 L/kg) and 2 µg/L for higher L/S ratios above 5.0 L/kg but did not exceed any of the available guideline trigger values.

Overall, L/S ratio leachate results for bulk tailings composite sample indicate the potential for consistent, but very low level leaching of lithium phosphorus and rubidium over time, although concentrations are not deemed to be environmentally significant.

5.11 PARTICLE SIZE DISTRIBUTION

Results of particle sizing for the tailings composite sample quantified by laser diffraction are presented in Table 15 and PSD curve is shown in Chart 4.

Most particles (80%, P₈₀ Table 15) exhibit a size of less than approximately 200 µm (fine sand texture). The proportion of particles less than 100 µm (and so considered capable of becoming airborne from dry material) was approximately 50%, indicating that the tailings material to have a high potential for dust generation in the absence of controls including moisture content. Placement as wet tailings directly into the tailings facility normally achieves sufficient control for this.

Table 15: Summary Particle Sizing Results – Bulk Tailings Composite

Parameter	Units	Tailings Composite
10th Percentile size (P ₁₀ , median)	µm	16.58
50th Percentile size (P ₅₀ , median)	µm	105.14
80th Percentile size (P ₈₀)	µm	196.46
% passing 45 µm	%	22

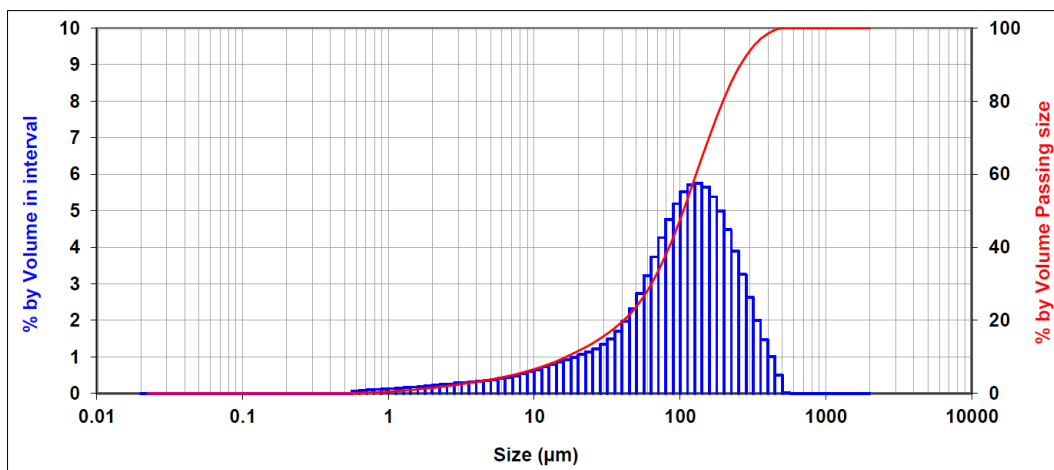


Chart 4: Tailings Composite Particle Size Distribution

5.12 ASBESTOS AND RESPIRABLE CRYSTALLINE SILICA

Laboratory results for presence of asbestos fibres and respirable crystalline silica (RCS) for the bulk tailings composite sample are presented in Appendix 2.

5.12.1 Asbestos

The tailings composite sample was analysed for the presence of asbestiform mineral fibres (as outlined in section 3.2.6) using a scanning electron microscope (SEM) with elemental analysis by energy dispersive spectroscopy (EDS).

The sample was not found to contain any asbestos/asbestiform mineral fibres.

5.12.2 Respirable Crystalline Silica

The respirable crystalline silica content was determined following the SWeRF method (as outlined in section 3.2.7). The respirable (PM₄) fraction of crystalline silica in the tailings sample, is outlined in Table 16.

The Work Health and Safety (based of the Globally Harmonised System) considers >0.1 % w/w respirable crystalline silica in a bulk material as a carcinogen. Results reported a concentration of α -quartz of 0.539 % w/w. This is a concentration which classified the tailings as a hazardous substance (inhalation carcinogen) on the basis of prolonged and repeated exposure to the airborne dust. It should be noted however that bulk materials up to 1% respirable crystalline silica can be handled without causing exceedances of occupational exposure guidelines at source, provided suitable controls are implemented (DWER 2018). Therefore, it is recommended that the tailings material should be managed appropriately to prevent dust generation during operations prior to capping at closure.

Table 16: Respirable (PM₄) Crystalline Silica Concentrations (wt%)

α -Quartz	Cristobalite	Tridymite
0.539	<0.001	<0.001

6. SUMMARY OF KEY FINDINGS

A geochemical tailings characterisation was undertaken for the lithium tailings stream residues (deslime, magnetic separation, mica flotation and final spodumene flotations) to be blended and disposed in the TSF and one bulk tailings composite sample produced from seven drill holes within the M1 orebody.

The key findings of this assessment are outlined in the following sections.

6.1 STANDARD GEOCHEMICAL TESTING

The composite production ratio tailings and magnetic separation tailings which forms one component of this were assessed for acid formation potential. Both samples were classified as non-acid-forming and do not present a risk of acid mine drainage.

Although variably enriched in bismuth, caesium, rubidium, tin and tantalum in the deslimes, magnetic separation, mica flotation tailings and overall tailings composite, none of the elements were considered environmentally available at concentrations exceeding relevant guidelines, nor were they considered particularly soluble under neutral conditions.

Only manganese (564 mg/kg) and nickel (85 mg/kg) exceeded ecological investigation limits (DEC 2010) / added contaminant limit (NEPM 2013) as risk screening criteria and only against ecologically significant areas in the final tailings composite. Manganese (500 mg/kg) is a default criterion often exceeded for fresh rock derived materials containing mafics. Although potentially available over long periods based on aqua regia digestion, they and other metals and metalloids were not considered soluble under neutral conditions.

Analysis of acidic extracts in acetic acid and 1 M HCl extract (bioavailable) indicated that manganese and iron, in particular, were soluble under acid conditions due to presence as acid reactive oxyhydroxides. Chromium, nickel and molybdenum were soluble only in 1M HCl, however total concentrations were not at levels considered a risk to fauna etc. if ingested.

The supernatant from the tailings composite sample was identified to circum-neutral and non-saline. Metal and metalloid concentrations in the supernatant were below all respective non-potable use (DER 2014) and livestock drinking water guidelines (ANZECC 2000).

Four water leachates (1:10) were completed on the tailings composite with leaching periods of 1 day, 2 days, 3 days and 14 days to determine potential leaching over different time periods. There was only a marginal increase in the pH and ion concentrations across all leaching periods. The concentration of lithium, however, increased from 0.04 to 0.13 mg/L from the 1-day period to the 14-day period reflecting rate limited dissolution of residual spodumene. Based on the acid extracts (as spodumene is acid reactive), an upper concentration of approximately 3 mg/L lithium in porewaters is possible prior to effects of evapoconcentration which marginally exceeds the ANZECC 2000 irrigation guideline of 2.5 mg/L. Lithium has limited guideline values but is considered to be of low toxicity, in particular in the presence of other cations (sodium, potassium, calcium, magnesium) which are known to lower its toxicity.

6.2 LEAF TESTING

LEAF 1313 testing provided information on the change in solubility of metals and metalloids in the tailings composite sample with changes in pH.

The testing identified metals and metalloids were typically soluble at extreme pH values (pH 13 and pH 2) and any guideline exceedances were typically that of only the conservative 95% and 80% freshwater protection guidelines. Livestock drinking water, long term irrigation, or non-potable use guidelines were exceeded only at extreme pH conditions (outside expected) for aluminium, fluoride, iron, lithium, molybdenum and uranium and are therefore not environmentally significant. Manganese and phosphorus reported concentrations exceeding the respective long-term irrigation guidelines at more common circum neutral to alkaline conditions. Manganese, however, is limited in mobility, requiring reducing/anaerobic conditions to be soluble.

LEAF 1314 testing provided information on the change in solubility of metals and metalloids in the tailings composite with change in liquid/solid (L/S) ratios. This provides an indication instantaneous and cumulative release of constituents likely to be present at environmentally significant concentrations.

The testing identified that the tailings material in the proposed TSF is expected to generate circum-neutral leachates of freshwater quality. Long-term leachate quality from bulk tailings composite is not anticipated to exceed broadly applicable environmental quality guidelines and is not expected to confer significant environmental risk. Concentrations of source-controlled species are expected to rapidly diminish over time in a post-closure environment, should leaching occur. Overall, L/S ratio leachate results for bulk tailings composite sample indicate the potential for consistent, but very low-level leaching of lithium, phosphorus and rubidium over time, although concentrations are not deemed to be environmentally significant given seepage controls during operations and post closure and/or binding with underlying soils (in the case of phosphorus).

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8. GLOSSARY OF TECHNICAL TERMS

Term	Explanation
AC	Acid consuming material. Defined as NAF material which has a NAPP value in excess of -100 kg H ₂ SO ₄ /t
ACM	Acid consuming material.
alkalinity	The capability of water to neutralise acid. Alkalinity is measured in the laboratory by titrating a sample to pH 8.3 and expressing the result with units of milligrams CaCO ₃ equivalents per litre (mg CaCO ₃ /L).
amorphous	Describing solid substances lacking a clearly defined crystalline lattice structure usually associated with rock minerals (e.g. iron oxyhydrogen gels and humic substances).
amphoteric	Metal or metalloid that is soluble in both acidic and alkaline media.
ANC	Acid Neutralising Capacity. A process where a sample is reacted with excess 0.5 m HCl at a pH of about 1.5, for 2-3 hours at 80-90°C followed by back-titration to pH=7 with sodium hydroxide. This determines the acid consumed by soluble materials in the sample.
AP	Acid Potential. Similar to MPA, but only is based on the amount of sulfide-sulfur (calculated at the difference between total sulfur and sulfate-sulfur (SO ₄ -S)) rather than total sulfur. AP (kg H ₂ SO ₄ /t) = (Total S – SO ₄ -S) x 30.6.
apatite	A group of phosphate minerals (e.g. hydroxylapatite, fluorapatite and chlorapatite) containing high concentrations of hydroxide, fluoride and chloride ions.
calcite	Calcium carbonate CaCO ₃ .
calcrete	Breccia or conglomerate cemented together by calcareous material, formed in soils under semi-arid conditions.
CC ANC	Calculated Carbonate Acid Neutralising Potential. The estimated amount of ANC provided by carbonate minerals. CC ANC (kg H ₂ SO ₄ /t) = TC or TIC (%) x 81.7
circum-neutral pH	pH value near 7.
EC	Electrical conductivity. A measurement of solution salinity. Conversion: 1000 µS/cm = 1 dS/m = 1 mS/cm
Effective NAPP	NAPP calculated using CC ANC rather than traditional ANC. Effective NAPP (kg H ₂ SO ₄ /t) = AP – CC ANC
evapotranspiration	Process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces, and by transpiration (uptake and evaporation from leaves) from plants.
feldspar	Abundant rock forming aluminosilicate mineral with substitution varieties of potassium, calcium and sodium. Potassium feldspars can themselves be subject to substitution by other alkali metals such as rubidium and caesium but also lithium.
felsic	Silicate minerals, magma, and rocks which are enriched in the lighter elements such as silicon, oxygen, aluminium, sodium, and potassium.
granite	A coarse-grained, intrusive igneous rock composed primarily of light coloured minerals such as quartz, plagioclase, orthoclase and muscovite mica. Granite is one of the main components of continental crust.

Term	Explanation
MPA	Maximum Potential Acidity. A calculation where the total sulfur in the sample is assumed to all be present as pyrite. This value is multiplied by 30.6 to produce a value known as the Maximum Potential Acidity reported in units of kg H ₂ SO ₄ /t. MPA should include only the non-sulfate sulfur to avoid over-estimation of acid production in which case it may be referred to as AP.
NAF	Non Acid Forming
NAG	Net Acid Generation. A process where a sample is reacted with 15% hydrogen peroxide solution at pH = 4.5 to oxidise all sulfides and then time allowed for the solution to react with acid soluble materials. This is a direct measure of the acid generating capacity of the sample but can be affected by the presence of organic materials.
NAGpH	The pH after the NAG test with hydrogen peroxide and heating is completed i.e. oxidation of all sulfides.
NAPP	Net Acid Producing Potential. NAPP (kg H ₂ SO ₄ /t) = AP – ANC.
oxidisable sulfur	A form of sulfur (sulfide, S ²⁻) that reacts with oxygen and water to form sulfuric acid (H ₂ SO ₄). It is estimated as the fraction that remains when sulfate (SO ₄ ²⁻) is subtracted from the total sulfur. An alternative method for estimating oxidisable sulfur is by measurement of chromium reducible sulfur.
PAF	Potentially Acid Forming.
PAF-HC	Potentially Acid Forming – High Capacity. Waste rock classification for samples with NAPP values greater than 10 kg H ₂ SO ₄ /t.
PAF-LC	Potentially Acid Forming – Low Capacity. Waste rock classification for samples with NAPP values less than or equal to 10 kg H ₂ SO ₄ /t.
pegmatite	Very coarse intrusive igneous rock that commonly consist of quartz, feldspar and mica.
porphyry	An igneous rock with texture consisting of large crystals (phenocrysts) dispersed in a fine grained feldspathic matrix or groundmass. The phenocrysts may consist of quartz, feldspar etc.
pyrite	Iron (II) sulfide, FeS ₂ . Pyrite is the most common sulfide minerals and the major acid forming mineral oxidising to produce sulfuric acid.
pyrrhotite	Iron (II) sulfide, Fe ₇ S ₈ or Fe _(1-x) S where S = 0 to 0.2. The second most common iron sulfide mineral with produces varying amounts of sulfuric acid upon oxidation depending on the amount of oxygen available – it may react instead to produce elemental sulfur rather than sulfuric acid.
QXRD	Quantitative X-ray Diffraction analysis, a technique used to estimate relative proportions of waste rock comprising key mineral phase constituents.
siderite	Iron(II) carbonate FeCO ₃ . Oxidation of Iron(II) to iron(III) following reaction with acid results in siderite being non-net acid neutralising (unlike calcite for example).
spodumene	Lithium aluminium inosilicate [LiAl(SiO ₃) ₂] the primary source of 'hard rock' lithium.
sulfide	Minerals comprising reduced sulfur (i.e. S ²⁻), such as iron (II) sulfide, FeS ₂ . Pyrite is the most common sulfide minerals and the major acid forming mineral, oxidising to produce sulfuric acid.
TIC	Total Inorganic Carbon.
TSF	Tails Storage Facility.

APPENDICES

APPENDIX 1: COLLATED LABORATORY RESULTS

Table A1-1: Sample Descriptions

Sample ID	Type	Deposit
Tailings Composite	Tailings Composite	Malinda
Mags	Tailings	Malinda
Mica Con	Tailings	Malinda
Ro Tail	Tailings	Malinda
Slimes	Tailings	Malinda
Tailings Filtrate	Supernatant	Malinda

Table A1-2: Acid Base Accounting (ABA) Summary

Sample ID	Deposit	pH	EC	TDS	Total S	SO4_S	Total C	ANC	AP	NAPP	NAG pH	NAG (pH 4.5)	NAG (pH 7)	MPA	CC-ANC	Eff. NAPP (CC-ANC)	NPR	Classification
		pH Units	uS/cm	mg/L	%	%	%	kg H ₂ SO ₄ /tonne			pH Units	kg H ₂ SO ₄ /tonne			Ratio			
Tailings Composite	Malinda	7.8	28	18	<0.01	<0.01	0.02	7	<0.3	-7.0	7.2	0	0	<0.3	2	-7	7.0	NAF
Mags	Malinda	9.5	73	47	0.02	<0.01	0.18	30	0.6	-29.4	8.9	0	0	0.6	15	-14	49.0	NAF

Table A1-3: Summary of Elemental Composition Results

Sample ID	Deposit	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	In	K	La	Li	Mg	Mn	Mo
		mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	%	mg/kg
Tailings Composite	Malinda	<0.05	3.1	0.30	54	28	1.67	0.08	0.20	0.6	1.9	144	45	8.40	0.33	16	8.50	0.69	<0.01	2.86	0.27	780	0.02	561	18
Mags	Malinda	0.38	7.8	3.60	176	34	9.11	2.19	0.75	10	40	2615	79	169	6.43	24	7.70	3.62	<0.01	2.47	5.61	>5000	0.26	20,125	443
Mica Con	Malinda	<0.05	9.3	<0.2	83	16	2.83	0.07	0.58	0.3	1.0	23	126	4.20	0.51	47	8.20	0.76	<0.01	5.45	0.10	1,770	0.14	291	1.24
Ro Tail	Malinda	<0.05	1.8	0.20	41	28	0.49	0.02	0.06	0.4	0.2	13	23	1.70	0.08	7.26	7.60	0.27	<0.01	2.15	0.26	218	0.00	112	1.80
Slimes	Malinda	0.06	4.1	0.70	74	28	7.16	0.34	0.48	0.5	8.4	707	48	35	0.64	17	7.40	2.72	<0.01	2.95	0.24	2,096	0.05	1,044	89

Sample ID	Deposit	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V	W	Y	Zn	Zr
		%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Tailings Composite	Malinda	3.36	74	84	1,016	7.90	1,176	0.00	20	0.06	0.17	<0.05	21	9.10	46	0.01	0.15	75	6.93	2.36	1.85	3.80	0.17	69	7.68
Mags	Malinda	1.71	2447	2046	26,126	31	1,552	0.05	150	0.99	1.85	0.08	48	98	1,908	0.04	3.88	351	6.16	66	25	51	6.10	290	40
Mica Con	Malinda	3.00	81	6.10	700	8.10	>2000	<0.002	60	0.03	1.02	<0.05	99	10	35	0.01	0.16	241	12	3.40	2.96	9.46	0.10	264	8.02
Ro Tail	Malinda	3.35	8.24	6.30	368	6.10	919	<0.002	<10	0.02	<0.05	<0.05	1.50	5.90	5.25	<0.005	0.05	5.00	5.33	0.56	0.16	0.39	0.06	6.00	2.54
Slimes	Malinda	2.80	42	422	2,819	18	1,000	0.01	50	0.15	0.17	<0.05	19	21	25	0.03	0.33	62	7.25	14	5.14	4.45	0.42	136	28

Table A1-4: Geochemical Abundance Indices (GAIs)

Sample ID	Deposit	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	In	K	La	Li	Mg	Mn	Mo
		mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	%	mg/kg
Tailings Composite	Malinda	0	0	0	0	2	2	0	0	0	0	0	3	0	0	0	0	0	0	0	0	4	0	0	2
Mags	Malinda	1	0	0	0	2	4	0	1	0	0	3	4	0	0	0	0	0	0	0	0	6	0	3	6
Mica Con	Malinda	0	0	0	0	1	3	0	1	0	0	0	4	0	0	0	0	0	0	0	0	5	0	0	0
Ro Tail	Malinda	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	0
Slimes	Malinda	0	0	0	0	2	4	0	0	0	0	1	3	0	0	0	0	0	0	0	0	5	0	0	4
Average Crustal Abundance		0.07	8	25	430	3	0.2	3	0.18	45	25	200	3	60	5	17	15	3	0.1	2.6	30	30	2.1	900	2

Sample ID	Deposit	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V	W	Y	Zn	Zr
		%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Tailings Composite	Malinda	0	1	0	0	0	2	1	0	0	0	0	2	0	3	2	0	0	2	0	0	1	0	0	0
Mags	Malinda	0	6	4	4	0	3	5	0	1	0	0	3	0	6	4	0	0	2	3	0	5	0	1	0
Mica Con	Malinda	0	1	0	0	0	6	0	0	0	0	0	4	0	3	3	0	0	3	0	0	2	0	1	0
Ro Tail	Malinda	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Slimes	Malinda	0	0	1	0	0	2	2	0	0	0	0	2	0	3	4	0	0	2	1	0	1	0	0	0
Average Crustal Abundance		2.4	20	80	1000	16	120	0.001	500	0.2	16	0.2	2.5	350	2	0.001	10	5000	1	3	150	1	30	70	160

Values of three or higher are highlighted.

Where elemental concentrations were below laboratory limit of reporting (<LOR), a GAI of zero was assigned.

Table A1-5: Total Environmentally Available Elemental Composition

Sample ID	Deposit	Au	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	Hg	In	K	La	Li	Mg	Mn	Mo	
		mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	%	mg/kg	mg/kg	%	mg/kg	mg/kg
Slimes	Malinda	0.0014	0.06	0.72	0.64	3.20	40	3.24	8.6	0.42	0.44	1.50	8.2	786	14	36.4	0.68	2.23	0.020	0.342	0.003	<0.002	0.23	0.83	392	0.061	1,041	92	
Mags	Malinda	0.0083	0.07	0.90	3.34	4.50	111	5.13	9.4	1.97	0.62	8.44	38	3,566	26	169	5.53	3.94	0.09	0.06	0.01	0.007	0.33	4.62	2,500	0.179	18,875	450	
Mica Con	Malinda	0.0004	0.03	0.78	0.15	3.10	15	2.01	4.9	0.08	0.56	1.31	0.4	23	20	4.1	0.15	3.039	0.010	0.342	<0.002	0.004	0.40	0.72	273	0.034	144	1.45	
Ro Tail	Malinda	0.0001	<0.01	0.18	0.10	0.80	6	0.40	1.0	0.04	0.06	1.12	0.2	15	1.6	1.8	0.15	0.41	0.020	0.131	<0.002	<0.002	0.10	0.62	44	0.004	129	1.81	
Tailings Composite	Malinda	0.0004	0.02	0.45	0.28	1.90	15	1.26	2.5	0.12	0.19	1.66	1.8	154	8.3	8.6	0.39	1.482	0.020	0.227	0.002	0.003	0.23	0.9	216	0.023	564	18	
EIL / ACL (DEC 2010 / NEPM 2013) - Ecological Significance		N/G	N/G	N/G	40	N/G	300	N/G	N/G	N/G	3.0	N/G	50	160	N/G	190	N/G	N/G	N/G	N/G	1.0	N/G	N/G	N/G	N/G	N/G	500	40	
EIL / ACL (DEC 2010 / NEPM 2013) - Urban / Residential / POS		N/G	N/G	N/G	100	N/G	300	N/G	N/G	N/G	3.0	N/G	50	470	N/G	560	N/G	N/G	N/G	N/G	N/G	1.0	N/G	N/G	N/G	N/G	N/G	500	40
EIL / ACL (DEC 2010 / NEPM 2013) - Commercial / Industrial		N/G	N/G	N/G	160	N/G	300	N/G	N/G	N/G	3.0	N/G	50	770	N/G	830	N/G	N/G	N/G	N/G	N/G	1.0	N/G	N/G	N/G	N/G	N/G	500	40

Sample ID	Deposit	Na	Nb	Ni	P	Pb	Pd	Pt	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V	W	Y	Zn	Zr	
		%	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Slimes	Malinda	0.06	2.73	425	3,025	13.7	0.002	<0.002	135	0.0105	56	0.09	0.11	0.03	4.0	27	0.09	0.03	0.6	9.0	0.61	19	4.8	2.09	0.8	101	4.9	
Mags	Malinda	0.04	7.1	1,968	20,000	24.4	0.007	0.01	250	0.0484	145	0.48	0.75	0.07	11	94	0.21	0.03	3.6	61	1.1	62	24	11	4.6	236	1.6	
Mica Con	Malinda	0.03	0.79	6.70	547	4.7	<0.001	<0.002	257	0.0003	64	0.02	0.17	0.01	7.0	5.8	0.12	0.01	0.2	10	1.04	4.0	0.8	1.04	0.2	119	4.1	
Ro Tail	Malinda	0.08	0.21	6.35	288	2.4	<0.001	<0.002	43	0.0003	5.0	0.01	0.01	0.01	0.4	3.5	0.01	0.00	0.1	2.0	0.24	1.5	0.2	0.19	0.1	5.9	1.5	
Tailings Composite	Malinda	0.08	0.58	85	1,136	4.6	<0.001	<0.002	130	0.0021	27	0.04	0.11	0.01	2.9	8.2	0.01	0.01	0.3	11	0.59	4.9	1.4	1.04	0.3	47	2.8	
EIL / ACL (DEC 2010 / NEPM 2013) - Ecological Significance		N/G	N/G	25	N/G	470	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	50	N/G	N/G	N/G	N/G	N/G	N/G	N/G	50	N/G	N/G	N/G	150	N/G
EIL / ACL (DEC 2010 / NEPM 2013) - Urban / Residential / POS		N/G	N/G	100	N/G	1,100	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	50	N/G	N/G	N/G	N/G	N/G	N/G	N/G	50	N/G	N/G	N/G	700	N/G
EIL / ACL (DEC 2010 / NEPM 2013) - Commercial / Industrial		N/G	N/G	170	N/G	1,800	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	50	N/G	N/G	N/G	N/G	N/G	N/G	N/G	50	N/G	N/G	N/G	1,100	N/G

Table A1-6: Water Leachate (1:10) - Major Ions, pH, and Salinity

Sample ID	Deposit	pH	EC	TDS	Ca	K	Mg	Na	Sulfate	Fluoride	Chloride	Alkalinity (mg CaCO ₃ /L)			
			µs/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	OH-	CO ₃	HCO ₃
Slimes	Malinda	8.5	33	21	0.57	1.90	0.40	5.9	1.6	0.4	3	<5	19	<1	19
Mags	Malinda	9.0	54	35	0.72	0.60	0.33	2.8	3.4	0.1	2	<2	21	7	28
Mica Con	Malinda	7.1	25	16	0.10	4.40	0.03	2.3	1.6	0.6	<2	<3	9	<1	9
Ro Tail	Malinda	7.3	<10	<6	0.37	0.10	0.12	1.1	<0.3	<0.1	<2	<4	4	<1	4
Tailings Composite	Malinda	7.8	18	12	0.81	0.90	0.32	2.5	0.7	0.2	<2	<1	10	<1	10
Tailings Filtrate *	Malinda	6.6	520	333	29	2.90	4.84	67	116	1.3	67	<1	22	<1	22
Livestock Drinking Water DGV (ANZECC 2000/ANZG 2018)		6.5-8.5	5,970	4,000	1,000	N/G	250	N/G	1000	2	N/G	N/G	N/G	N/G	N/G
NPUG (DER 2014)		N/G	N/G	N/G	N/G	N/G	N/G	N/G	1,000	15	250	N/G	N/G	N/G	N/G
Freshwater Protection 80% DGV (ANZECC 2000/ANZG 2018)		N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G
Freshwater Protection 95% DGV (ANZECC 2000/ANZG 2018)		6.5-8.5	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G

N/G : No applicable guideline value.

* Supernatant Analysis

Table A1-7: Water Leachate (1:10) - Metals and Metalloids

Sample ID	Deposit	Au	Ag	Al	As	B	Ba	Be	Bi	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	Hg	In	La	Li	Mn	Mo	Nb
		µg/L	µg/L	mg/l	µg/L	mg/l	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/l	mg/l	µg/L	mg/l	mg/l	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/l	µg/L
Slimes	Malinda	<0.01	<0.01	0.25	2.20	0.02	1.14	<0.1	0.336	<0.02	0.02	<0.1	<0.01	0.00	<0.01	0.08	0.74	0.10	0.06	<0.1	<0.002	0.012	203	0.10	29.13	0.26
Mags	Malinda	<0.01	0.01	0.35	3.10	0.02	0.82	<0.1	0.390	<0.02	0.11	<0.1	<0.01	<0.002	<0.01	0.10	0.53	0.10	0.01	<0.1	<0.002	0.060	2,990	0.03	9.44	0.23
Mica Con	Malinda	<0.01	<0.01	0.01	0.70	0.01	<0.05	<0.1	0.010	<0.02	0.00	<0.1	<0.01	<0.003	<0.01	<0.01	0.06	<0.1	<0.005	<0.1	<0.002	0.003	149	0.04	1.19	<0.05
Ro Tail	Malinda	<0.01	<0.01	0.02	0.10	0.01	0.17	<0.1	0.012	<0.02	0.01	<0.1	<0.01	<0.004	<0.01	<0.01	0.06	<0.1	<0.005	<0.1	<0.002	0.004	7.9	0.01	0.08	<0.05
Tailings Composite	Malinda	<0.01	0.01	0.02	0.50	0.02	0.32	<0.1	0.021	<0.02	0.01	<0.1	<0.01	<0.001	<0.01	<0.01	0.26	<0.1	<0.005	<0.1	<0.002	0.008	80	0.14	4.05	<0.05
Tailings Filtrate *	Malinda	<0.01	<0.01	<0.01	1.20	0.62	4.35	<0.1	<0.005	0.24	<0.002	1.60	<0.01	0.003	<0.01	<0.01	<0.02	0.20	<0.005	<0.1	<0.002	<0.002	625	4.20	0.49	<0.05
Livestock Drinking Water DGV (ANZECC 2000/ANZG 2018)		N/G	N/G	5.0	500	5.0	N/G	N/G	N/G	10	N/G	1000	1.0	N/G	1.0	No limit	N/G	N/G	N/G	2.0	N/G	N/G	N/G	N/G	150	N/G
NPUG (DER 2014)		N/G	1000	0.2	100	40	20000	600	N/G	20	N/G	N/G	0.5	N/G	20	0.3	N/G	N/G	N/G	10	N/G	N/G	N/G	5	500	N/G
Freshwater Protection 80% DGV (ANZECC 2000/ANZG 2018)		N/G	0.2	0.15	140	2.5	N/G	N/G	N/G	0.8	N/G	N/G	0.04	N/G	0.0025	N/G	N/G	N/G	N/G	5.4	N/G	N/G	N/G	3.6	N/G	N/G
Freshwater Protection 95% DGV (ANZECC 2000/ANZG 2018)		N/G	0.05	0.055	13	0.94	N/G	N/G	N/G	0.2	N/G	1.4	0.0033	N/G	0.0014	0.3	N/G	N/G	N/G	0.6	N/G	N/G	N/G	1.9	N/G	N/G

Sample ID	Deposit	Ni	P	Pb	Pd	Pt	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V	W	Y	Zn	Zr
		mg/l	mg/l	µg/L	µg/L	µg/L	µg/L	µg/L	mg/l	µg/L	mg/l	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/l	µg/L	mg/l	µg/L
Slimes	Malinda	<0.01	0.70	0.5	<0.01	<0.01	32	0.003	0.5	0.25	<0.01	<0.5	0.2	3.46	0.190	<0.1	0.008	<0.01	0.060	4.56	<0.01	3.63	0.010	<0.01	0.700
Mags	Malinda	<0.01	1.06	0.7	<0.01	<0.01	6.6	0.004	1.1	0.22	<0.01	<0.5	0.2	2.78	0.165	<0.1	0.007	<0.01	0.020	15.4	<0.01	2.06	0.071	<0.01	0.170
Mica Con	Malinda	<0.01	0.84	<0.5	<0.01	<0.01	50	<0.001	0.5	0.07	<0.01	<0.5	<0.1	0.32	0.006	<0.1	<0.005	<0.01	0.090	0.08	<0.01	1.65	<0.005	<0.01	0.020
Ro Tail	Malinda	<0.01	0.08	<0.5	<0.01	<0.01	1.8	<0.001	<0.1	0.02	<0.01	<0.5	<0.1	2.27	0.017	<0.1	<0.005	<0.01	<0.01	0.39	<0.01	0.07	<0.005	<0.01	0.030
Tailings Composite	Malinda	<0.01	0.30	<0.5	<0.01	<0.01	12	<0.001	0.2	0.07	<0.01	<0.5	<0.1	3.23	0.020	<0.1	<0.005	<0.01	0.030	0.54	<0.01	0.69	<0.005	<0.01	0.050
Tailings Filtrate *	Malinda	0.02	9.87	<0.5	<0.01	<0.01	38	<0.001	38.6	0.06	<0.01	<0.5	<0.1	170	0.007	<0.1	<0.005	<0.01	0.13	0.20	<0.01	0.25	<0.005	0.06	<0.02
Livestock Drinking Water DGV (ANZECC 2000/ANZG 2018)		1.0	N/G	100	N/G	N/G	N/G	N/G	333	N/G	N/G	20	N/G	N/G	N/G	N/G	N/G	N/G	N/G	200	N/G	N/G	N/G	20	N/G
NPUG (DER 2014)		0.2	N/G	100	N/G	N/G	N/G	N/G	333	30	N/G	100	N/G	N/G	N/G	N/G	N/G	N/G	N/G	170	N/G	N/G	N/G	3	N/G
Freshwater Protection 80% DGV (ANZECC 2000/ANZG 2018)		0.017	N/G	9.4	N/G	N/G	N/G	N/G	N/G	9	N/G	34	N/G	N/G	N/G	N/G	N/G	N/G	N/G	0.5	0.006	N/G	N/G	0.031	N/G
Freshwater Protection 95% DGV (ANZECC 2000/ANZG 2018)		0.011	N/G	3.4	N/G	N/G	N/G	N/G	N/G	9	N/G	11	N/G	N/G	N/G	N/G	N/G	N/G	0.03	0.5	0.006	N/G	N/G	0.008	N/G

N/G : No applicable guideline value.

* Supernatant Analysis

Table A1-8: ASLP Acid Leachate (1:20) - Metals and Metalloids

Sample ID	Deposit	Type	pH	EC	TDS	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cs	Cu	Fe	Hg	K	La	Li	Mg	Mn
				µs/cm	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Tailings Composite	Malinda	1M HCl	N/A	N/A	N/A	<1	4.10	3.5	130	7.0	51	51	1.80	32	2.6	27	0.16	38	<0.5	1.8	13	3,200	2.3	20
	Malinda	1:20 ASLP Acetic Acid	N/A	7.2	4.82	<1	1.20	<1	44.0	2.5	<1	0.011	0.28	1.60	0.011	2.1	0.03	15	<0.05	0.89	<0.5	2,700	1.7	17
Livestock Drinking Water DGV (ANZECC 2000/ANZG 2018)			6.5-8.5	5970	4000	N/G	5.0	500.0	N/G	N/G	N/G	1000.0	10.0	1000.0	1.0	N/G	1.0	No limit	2.0	N/G	N/G	N/G	250.0	N/G
NPUG (DER 2014)			N/G	N/G	N/G	N/G	0.2	100	20000	600	N/G	N/G	20	N/G	0.5	N/G	20	0.3	10	N/G	N/G	N/G	N/G	5
Freshwater Protection 80% DGV (ANZECC 2000/ANZG 2018)			N/G	N/G	N/G	N/G	0.15	140	N/G	N/G	N/G	N/G	0.8	N/G	0.04	N/G	0.0025	N/G	5.4	N/G	N/G	N/G	N/G	3.6
Freshwater Protection 95% DGV (ANZECC 2000/ANZG 2018)			6.5-8.5	N/G	N/G	N/G	0.055	13	N/G	N/G	N/G	N/G	0.2	1.4	0.0033	N/G	0.0014	0.3	0.6	N/G	N/G	N/G	N/G	1.9

Sample ID	Deposit	Type	Mo	Na	Nb	Ni	P	Pb	Rb	S	Sb	Se	Si	Sn	Sr	Ta	Th	Ti	Tl	U	V	W	Zn		
			µg/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Tailings Composite	Malinda	1M HCl	310	1.3	3.0	1.6	41	96	71	<0.50	1.0	<1	3.2	5.3	260	<1	4.5	0.012	<1	110	0.02	<10	0.30		
	Malinda	1:20 ASLP Acetic Acid	1.5	1.1	<1	0.015	23	3.90	21	<0.0005	1.3	<1	1.3	<1	82	<1	<0.5	0.002	N/A	19	<1	<1	0.22		
Livestock Drinking Water DGV (ANZECC 2000/ANZG 2018)			150.0	N/G	N/G	1.0	N/G	100.0	N/G	333.0	N/G	20.0	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	200.0	N/G	N/G	20.0	
NPUG (DER 2014)			500	N/G	N/G	0.2	N/G	100	N/G	333	30	100	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	170	N/G	N/G	3	
Freshwater Protection 80% DGV (ANZECC 2000/ANZG 2018)			N/G	N/G	N/G	0.017	N/G	9.4	N/G	N/G	9	34	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	0.5	0.006	N/G	0.031	
Freshwater Protection 95% DGV (ANZECC 2000/ANZG 2018)			N/G	N/G	N/G	0.011	per to guide	3.4	N/G	N/G	9	11	N/G	N/G	N/G	N/G	N/G	N/G	N/G	N/G	0.03	0.5	0.006	N/G	0.008

N/G : No applicable guideline value.

Table A1-9: NAG Liquor - Metals and Metalloids

Sample ID	Deposit	Type	EC	TDS	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cs	Cu	Fe	Hg	K	La	Li	Mg	Mn
			µs/cm	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L	µg/L	mg/L	µg/L	µg/L	mg/L
Tailings Composite	Malinda	NAG Liquor	7	4.69	<1	0.61	<1	2	<0.5	<1	<0.5	0.20	<1	0.091	2.2	0.0029	0.21	<5	<0.5	<0.5	1,400	<0.50	0.32

Sample ID	Deposit	Type	Mo	Na	Nb	Ni	P	Pb	Rb	S	Sb	Se	Si	Sn	Sr	Ta	Th	Ti	Tl	U	V	W	Zn
			µg/L	mg/L	µg/L	mg/L	mg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	mg/L
Tailings Composite	Malinda	NAG Liquor	6	0.76	10	0.0027	0.33	1.2	14	0.51	<1	<1	1.9	1.8	3.6	8.2	<0.5	<0.002	<1	41	0.0012	<10	0.028

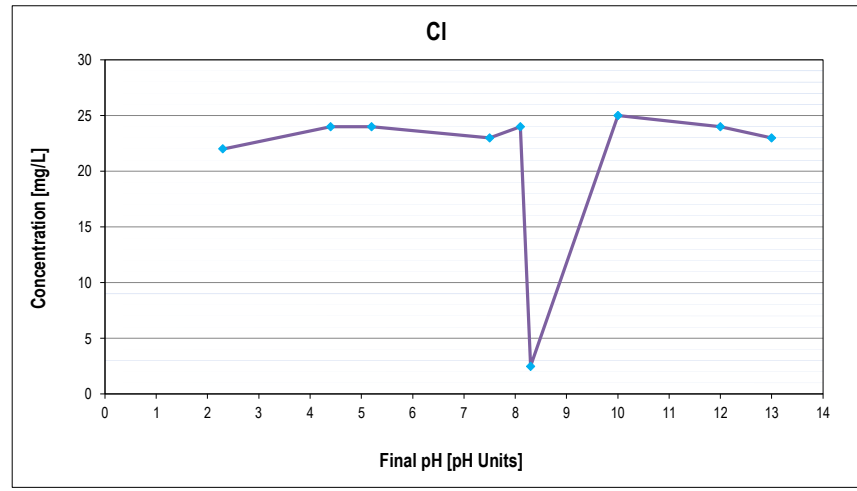
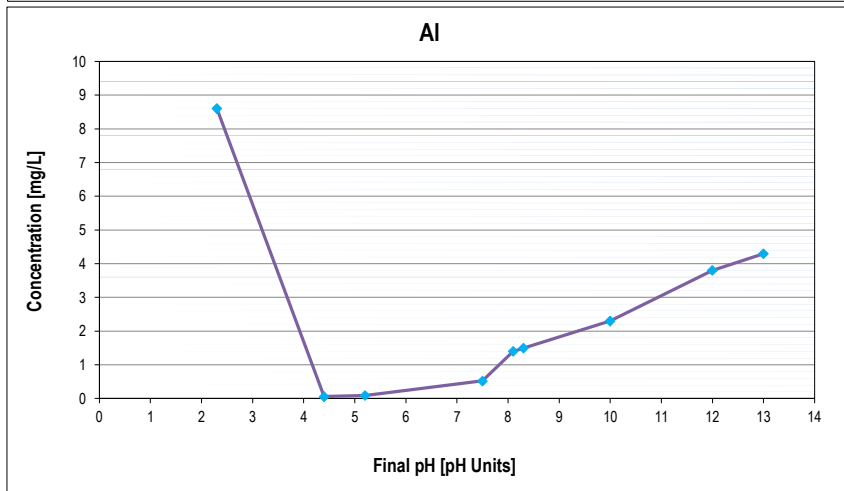
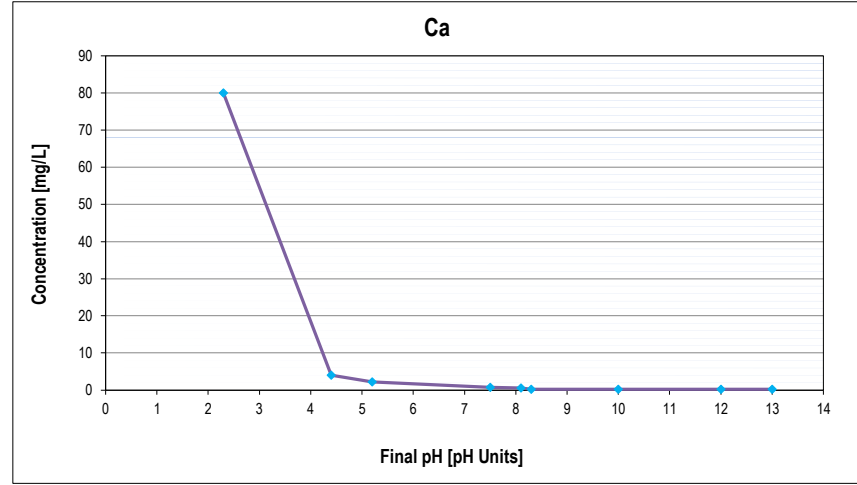
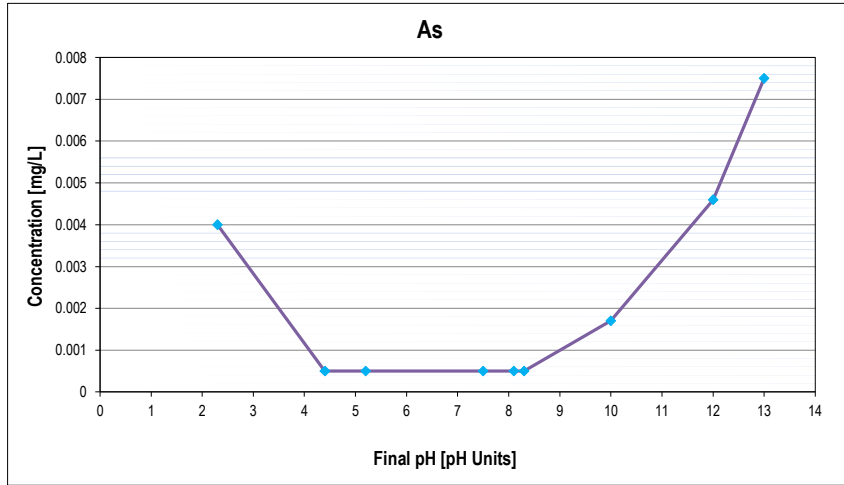
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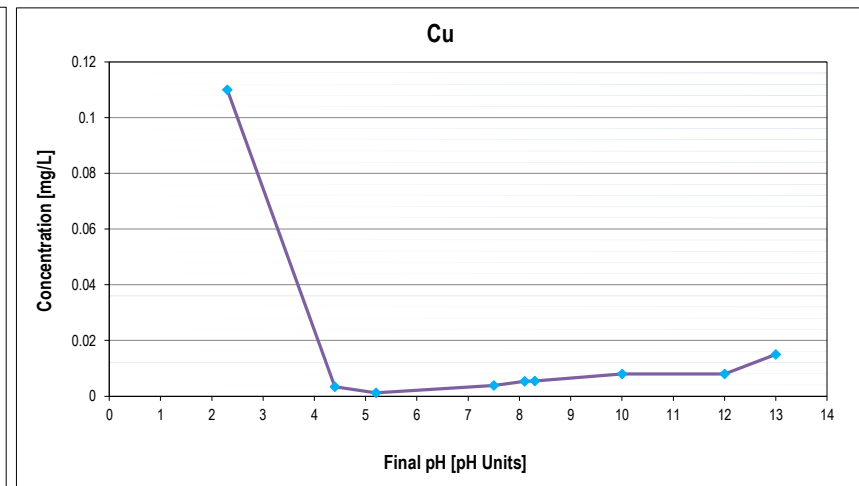
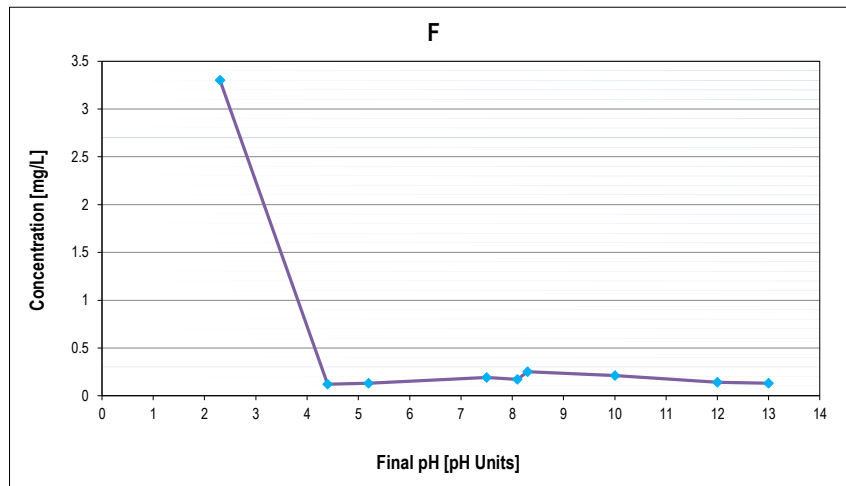
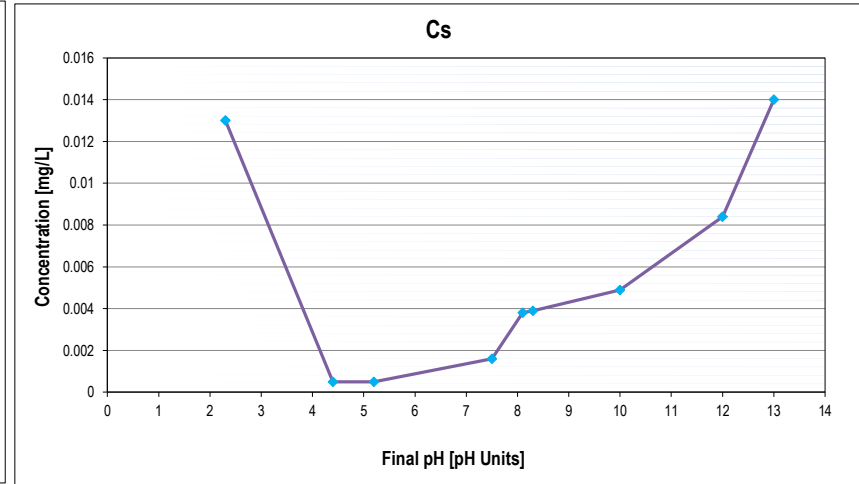
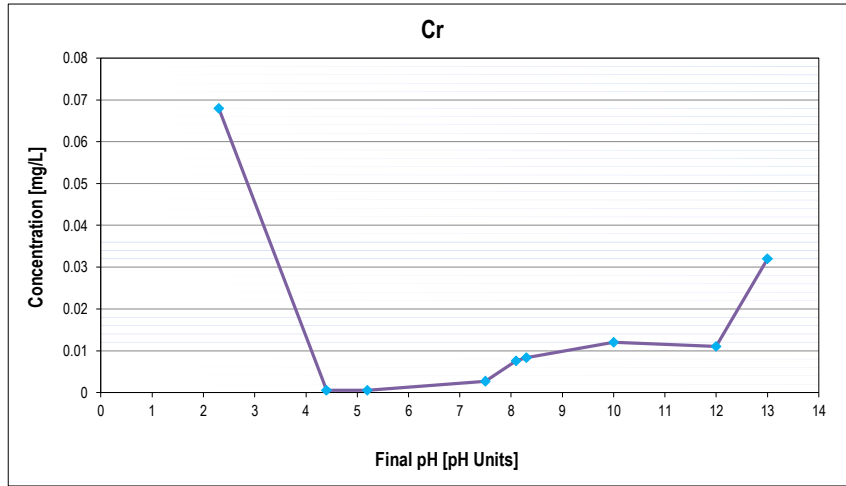
Table A1-10: LEAF 1313 Results

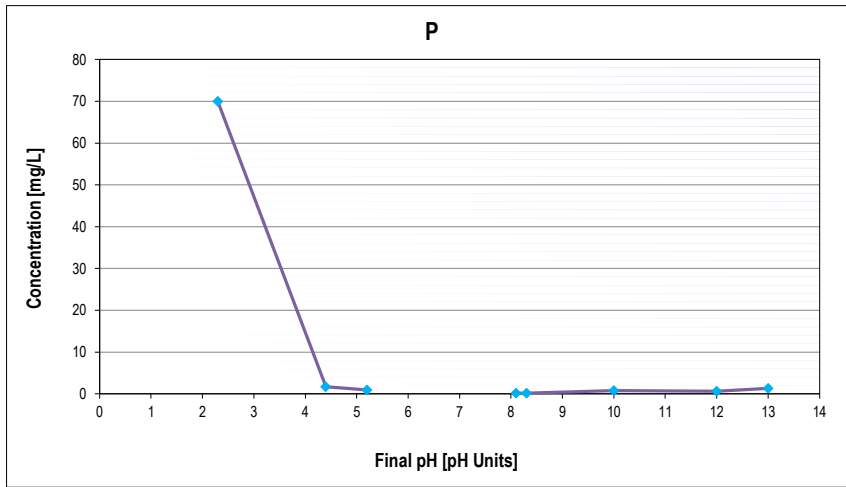
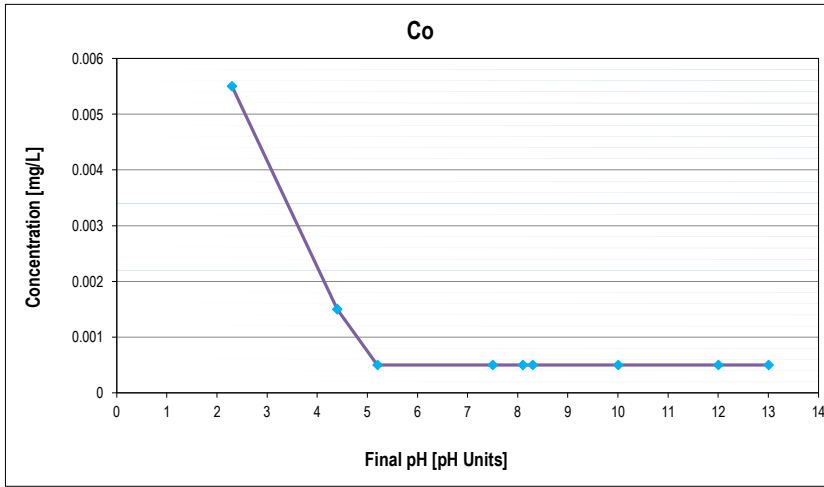
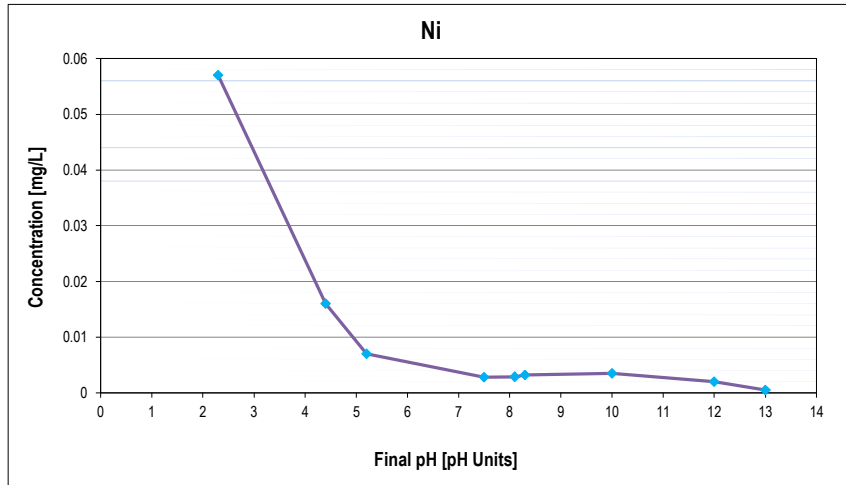
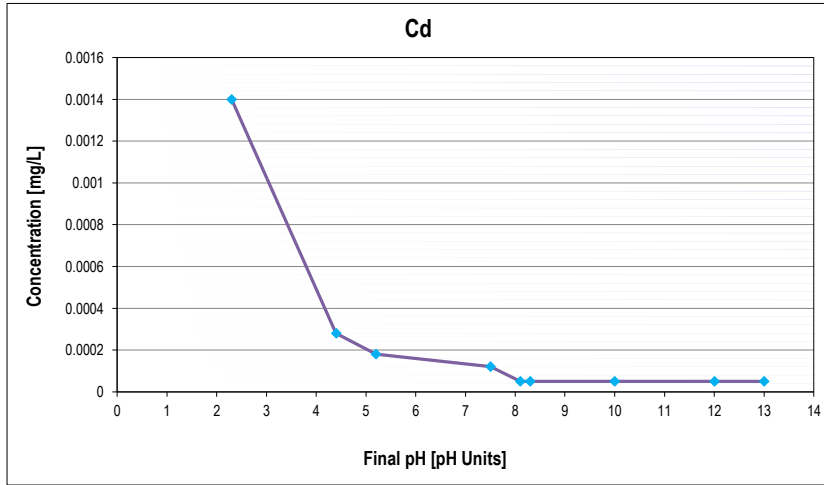
Analyte	Units	pH 13	pH 12	pH 10.5	pH 9	pH 8	pH 7	pH 5.5	pH 4	pH 2	Livestock Drinking Water DGV (ANZG 2018)	NPUG (DER 2014)	Freshwater Protection 80% DGV (ANZG 2018)	Freshwater Protection 95% DGV (ANZG 2018)	Long Term Irrigation (ANZECC 2000)
pH	SU	13	12	10	8.3	8.1	7.5	5.2	4.4	2.3	6.5 - 8.5	6.5 - 8.5	6.5 - 8.5	6.5 - 8.5	6.5 - 8.6
Ag	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	N/G	1	0.0002	0.00005	N/G
Al	mg/L	4.3	3.8	2.3	1.5	1.4	0.520	0.090	0.059	8.6	5	0.2	0.15	0.055	5
As	mg/L	0.0075	0.0046	0.0017	0.0005	0.0005	0.0005	0.0005	0.0005	0.0040	0.0005	0.1	0.14	0.013	0.1
Ba	mg/L	0.09	0.11	0.19	0.35	0.31	0.37	0.27	0.14	0.36	N/G	20	N/G	N/G	N/G
Be	mg/L	0.0003	0.0003	0.0006	0.0003	0.0005	0.0003	0.0003	0.0003	0.0100	N/G	0.6	N/G	N/G	0.1
Bi	mg/L	<0.001	0.0012	0.0018	0.0011	0.0012	<0.001	<0.001	<0.001	<0.001	N/G	N/G	N/G	N/G	N/G
Ca	mg/L	0.25	0.25	0.25	0.25	0.56	0.76	2.20	4.00	80.00	1000	N/G	N/G	N/G	N/G
Cd	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0003	0.0014	0.01	0.02	0.0008	0.0002	0.01
Cl	mg/L	23	24	25	3	24	23	24	24	22	N/G	250	N/G	N/G	N/G
Co	mg/L	0.001	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.002	0.006	1	N/G	N/G	0.0014	0.05
Cr	mg/L	0.0320	0.0110	0.0120	0.0083	0.0076	0.0027	0.0005	0.0005	0.0680	1	0.5	0.04	0.0033	0.1
Cs	mg/L	0.0140	0.0084	0.0049	0.0039	0.0038	0.0016	0.0005	0.0005	0.0130	N/G	N/G	N/G	N/G	N/G
Cu	mg/L	0.0150	0.0080	0.0080	0.0055	0.0054	0.0039	0.0012	0.003	0.11	1	20	0.0025	0.0014	0.2
ECond	mS/m	1700	210	9	23	37	28	85	120	440	5970	N/G	N/G	N/G	N/G
F	mg/L	0.13	0.14	0.21	0.25	0.17	0.19	0.13	0.12	3.30	2	15	N/G	N/G	N/G
Fe	mg/L	0.082	0.52	0.760	0.590	0.560	0.170	0.029	0.06	34	No limit	0.3	N/G	0.3	0.2
K	mg/L	2600	270	14	1.2	3.4	3.10	2.90	2.1	3.7	2600	3.7	N/G	N/G	N/G
La	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.004	N/G	N/G	N/G	N/G	N/G
Li	mg/L	0.08	0.08	0.10	0.09	0.10	0.10	0.3	0.5	7.4	N/G	N/G	N/G	N/G	2.5
Mg	mg/L	0.25	0.25	0.25	0.3	0.3	0.3	0.9	1.1	5.0	250	N/G	N/G	N/G	N/G
Mn	mg/L	0.003	0.075	0.150	0.170	0.22	0.29	1.50	2.70	48	N/G	5	3.6	1.9	0.2
Mo	mg/L	0.012	0.006	0.005	0.004	0.005	0.004	0.005	0.005	0.004	0.15	0.5	N/G	N/G	0.01
Na	mg/L	5.5	4.7	5.0	3.3	3.9	4.4	4.7	3.3	4.6	N/G	N/G	N/G	N/G	N/G
Ni	mg/L	0.0005	0.0020	0.0035	0.0032	0.0029	0.0028	0.0070	0.0160	0.0570	1	0.2	0.017	0.011	0.2
Ny	mg/L	0.0005	0.0022	0.0027	0.0024	0.0023	0.0005	0.0011	0.0011	0.0015	N/G	N/G	N/G	N/G	N/G
P	mg/L	1.30	0.61	0.78	0.20	0.20	0.9	1.7	70.0	70.0	N/G	0.8 (STV)	N/G	Refer to guideline	0.05
Pb	mg/L	0.001	0.0025	0.0047	0.0032	0.003	0.0014	0.0005	0.0005	0.100	0.1	0.1	0.0094	0.0034	2
Rb	mg/L	0.180	0.085	0.040	0.024	0.026	0.011	0.008	0.015	0.086	N/G	N/G	N/G	N/G	N/G
S	mg/L	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.500	333	333	N/G	N/G	N/G
SO4	mg/L	0.825	0.825	0.825	0.825	0.825	0.825	0.825	0.825	1.650	1000	1000	N/G	N/G	N/G
Sb	mg/L	0.0023	0.0018	0.0019	0.0017	0.0019	0.0018	0.0018	0.0019	0.0018	N/G	0.03	0.009	0.009	N/G
Se	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.02	0.1	0.034	0.011	0.02
Si	mg/L	17.0	12	11.0	6.60	6.20	3.30	2.90	7.50	7.50	N/G	N/G	N/G	N/G	N/G
Sn	mg/L	0.0074	0.0038	0.0017	0.0015	0.0014	0.0011	0.0005	0.0005	0.0005	N/G	N/G	N/G	N/G	N/G
Sr	mg/L	0.0029	0.0042	0.0049	0.0071	0.0080	0.0096	0.0190	0.0280	0.4100	N/G	N/G	N/G	N/G	N/G
Ta	mg/L	0.0005	0.0012	0.0020	0.0012	0.0011	0.0005	0.0005	0.001	0.0020	N/G	N/G	N/G	N/G	N/G
Th	mg/L	0.0010	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0011	N/G	N/G	N/G	N/G	N/G
Ti	mg/L	0.0005	0.0035	0.0028	0.0025	0.0026	0.0005	0.0005	0.0005	0.0020	N/G	N/G	N/G	N/G	N/G
Tl	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	N/G	N/G	N/G	0.00003	N/G
U	mg/L	0.0840	0.0210	0.0066	0.0028	0.0030	0.0017	0.0005	0.001	0.13	0.2	0.17	0.0005	0.0005	0.01
V	mg/L	0.003	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	N/G	N/G	0.006	0.006	0.1
W	mg/L	0.041	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	N/G	N/G	N/G	N/G	N/G
Zn	mg/L	0.050	0.046	0.030	0.042	0.047	0.036	0.160	0.17	0.76	20	3	0.031	0.008	2

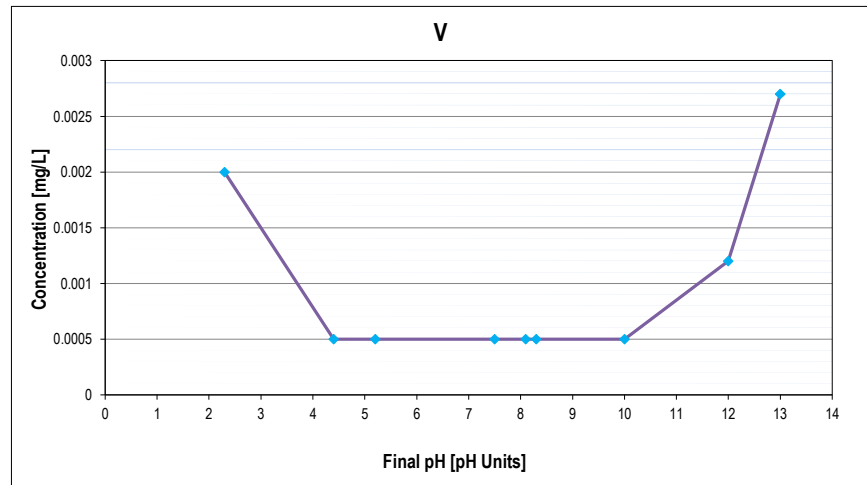
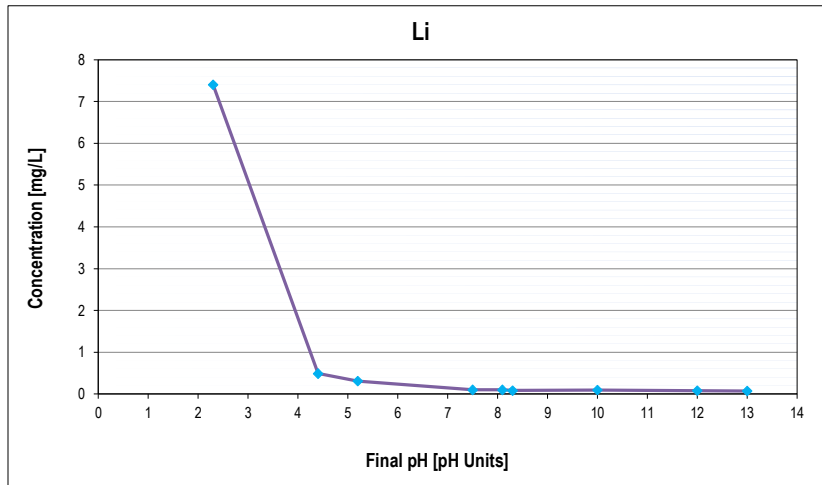
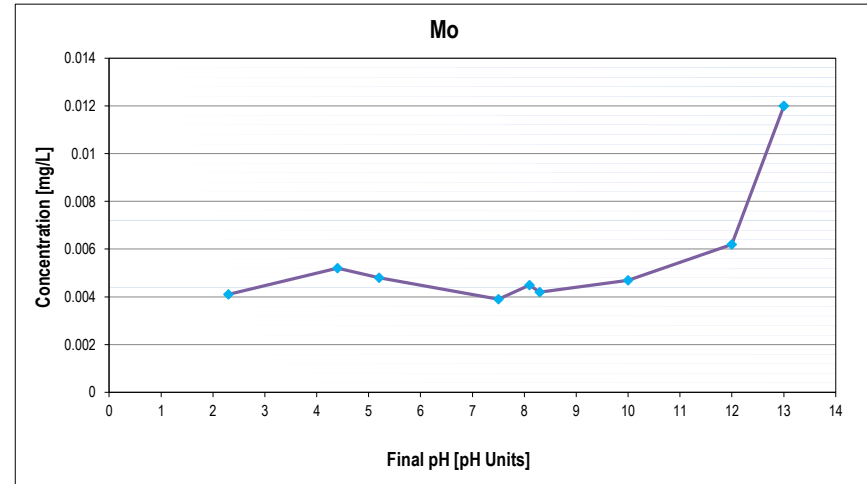
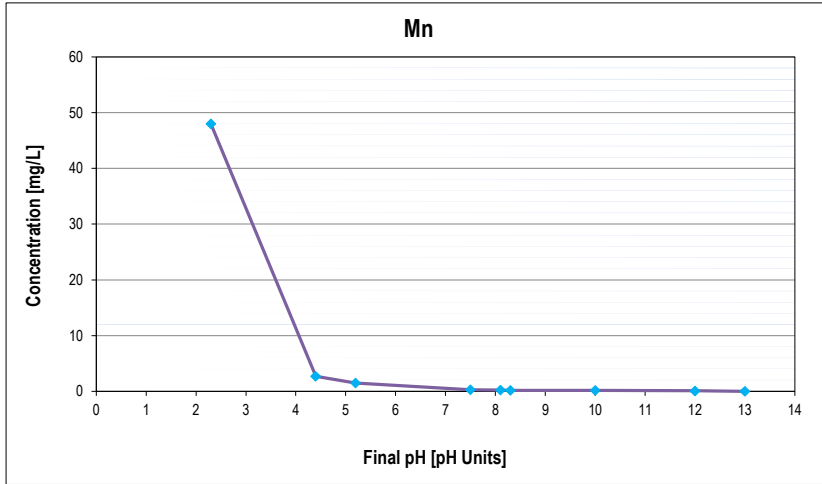
Table A1-10: LEAF 1313 Results

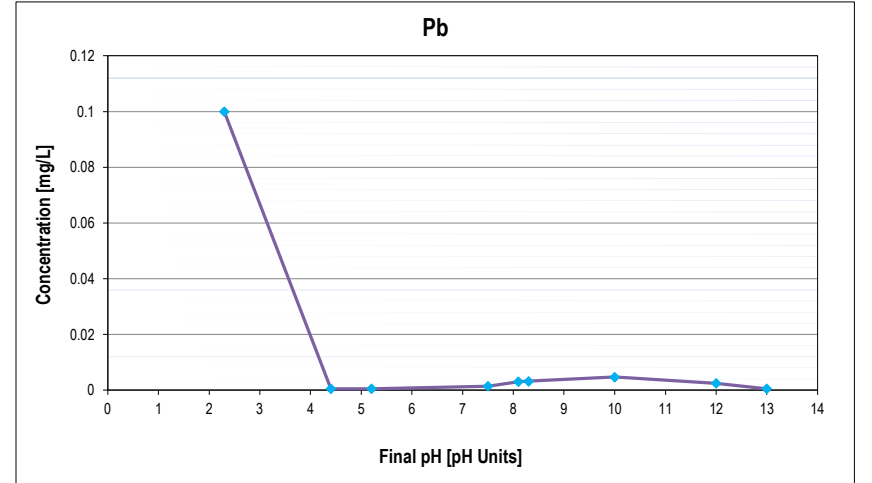
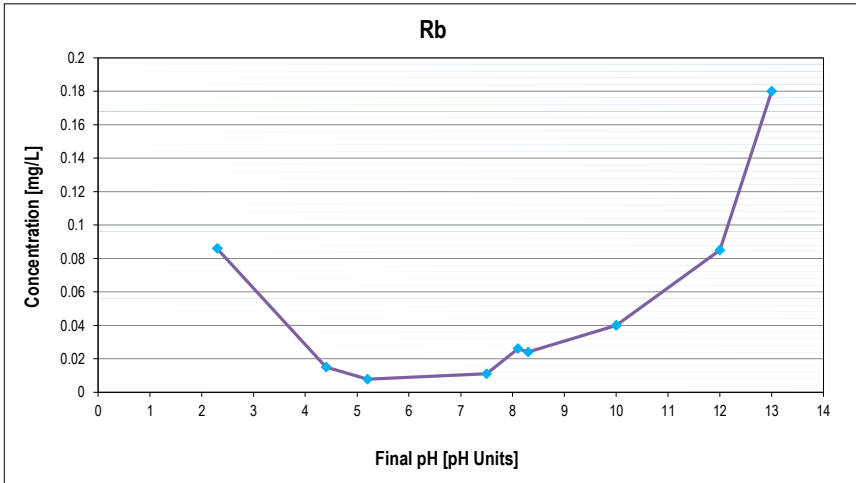
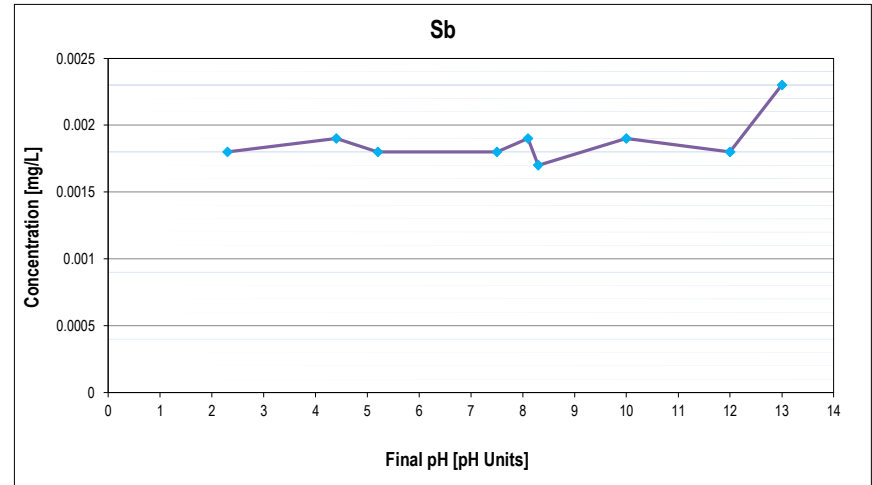
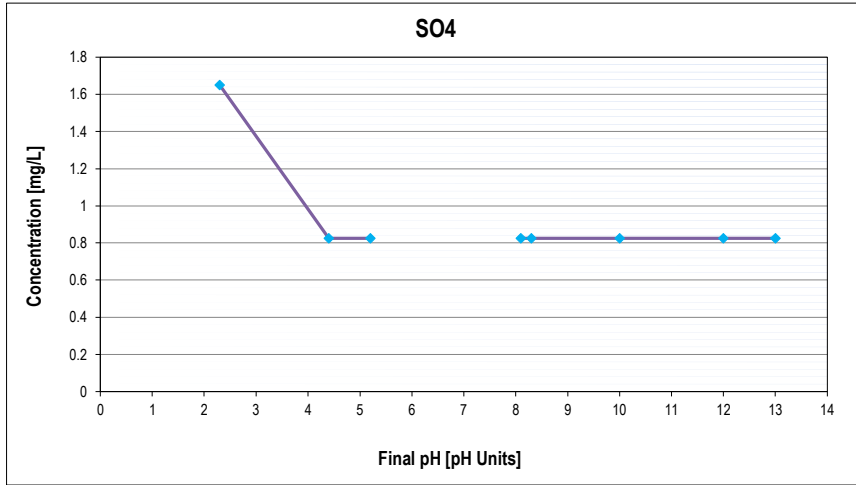
Analyte	Recreational Water Use (NHMRC, 2011)
pH	5-9
Ag	1
Al	2
As	0.07
Ba	20
Be	0.6
Bi	N/G
Ca	N/G
Cd	0.02
Cl	N/G
Co	N/G
Cr	0.5
Cs	N/G
Cu	20
ECond	N/G
F	15
Fe	3
K	N/G
La	0.02
Li	N/G
Mg	N/G
Mn	5
Mo	0.5
Na	N/G
Ni	0.2
Ny	N/G
P	N/G
Pb	0.1
Rb	N/G
S	1667
SO4	5000
Sb	0.03
Se	0.1
Si	N/G
Sn	N/G
Sr	N/G
Ta	N/G
Th	N/G
Ti	N/G
Tl	N/G
U	0.2
V	N/G
W	N/G
Zn	30











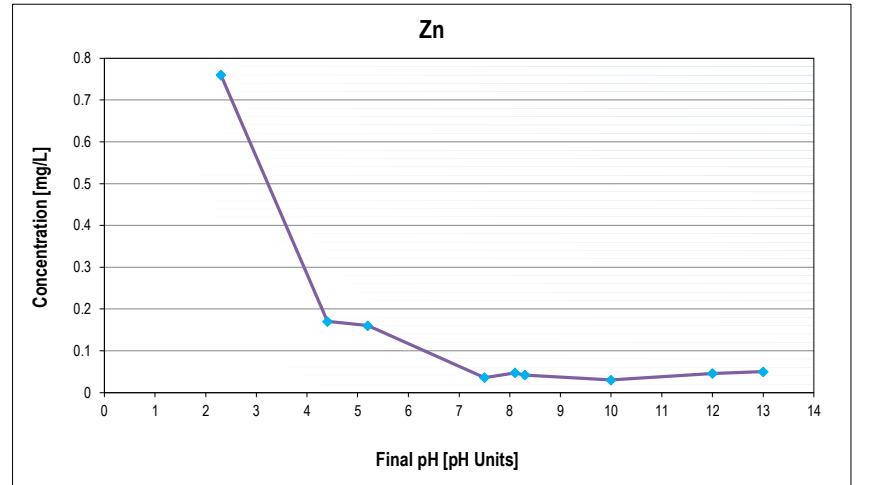
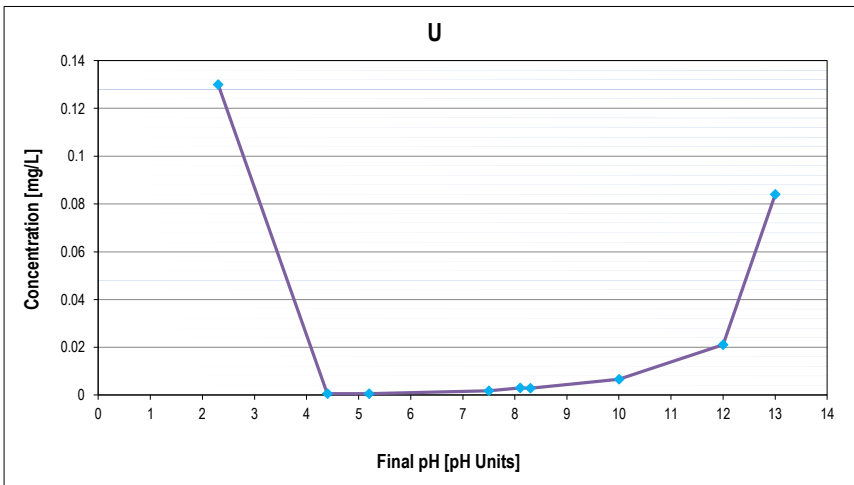
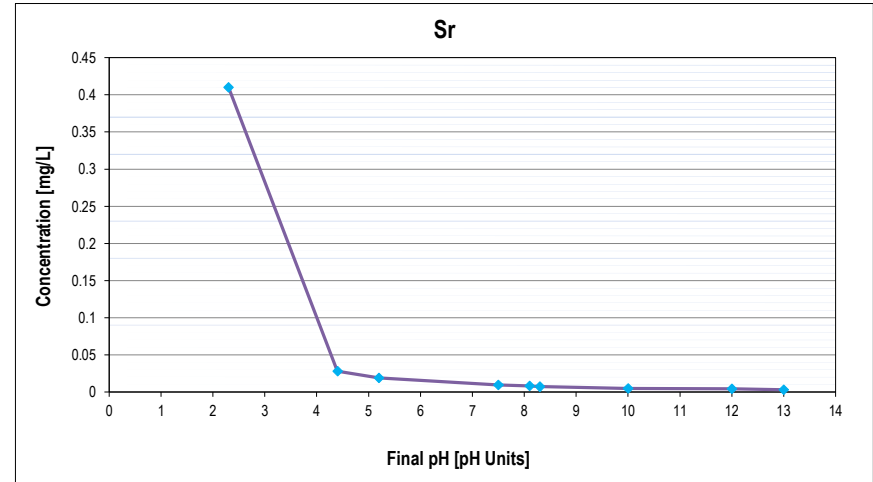
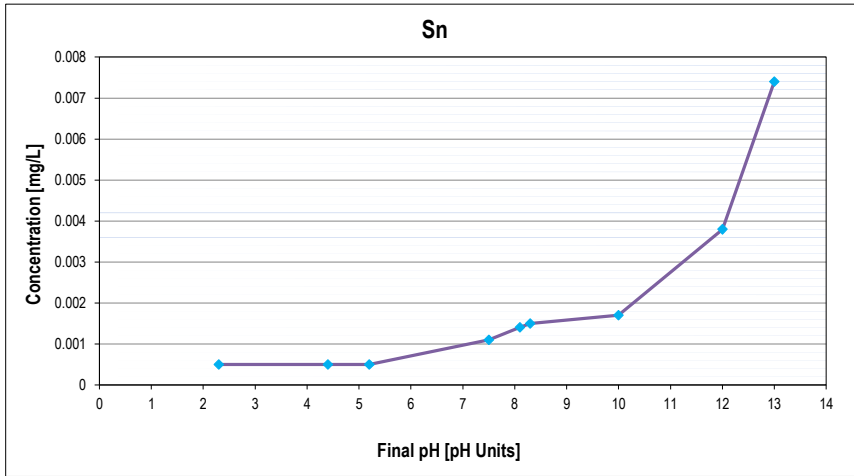
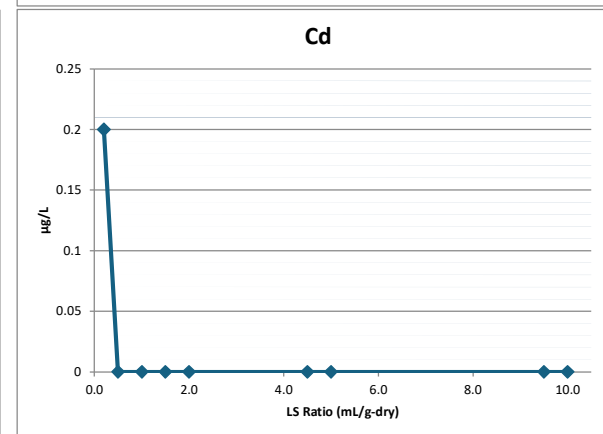
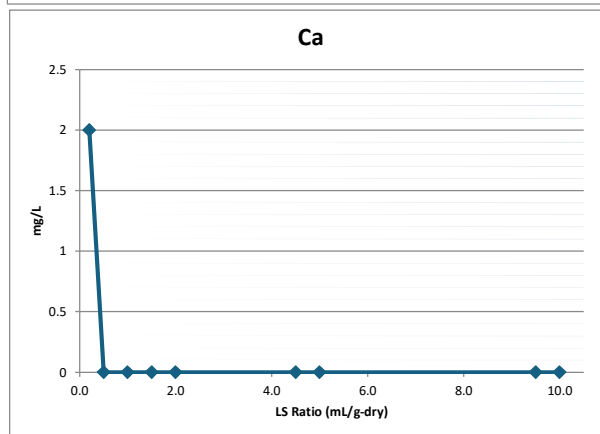
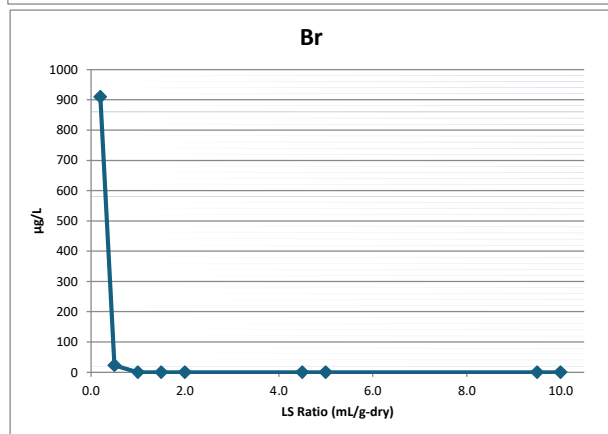
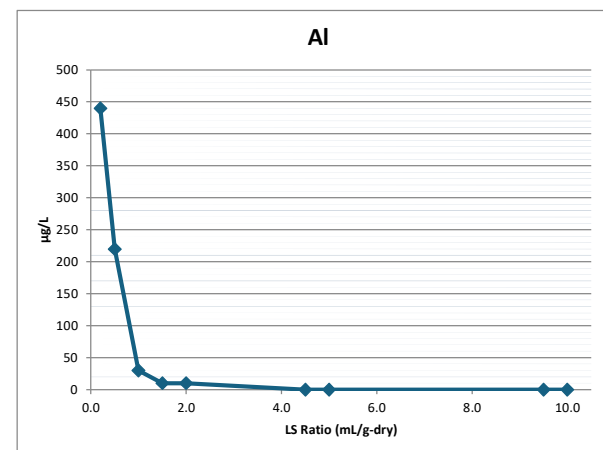
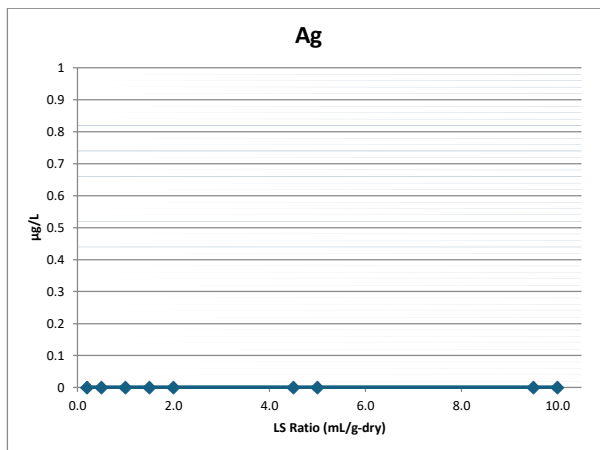
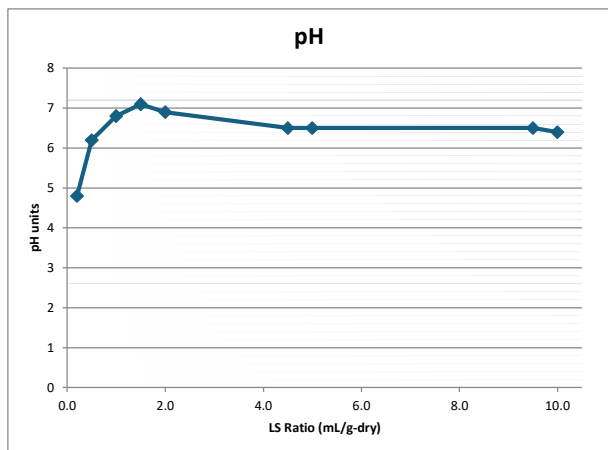
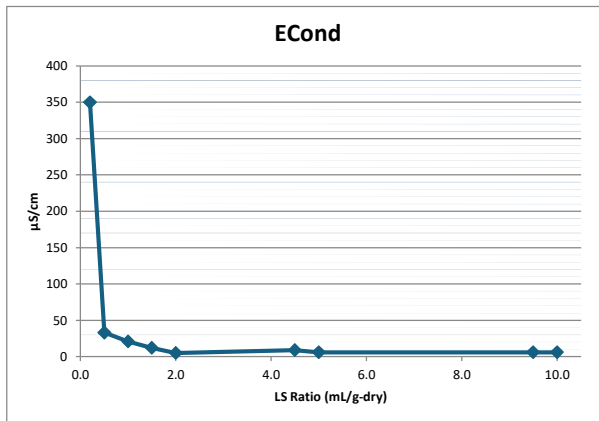
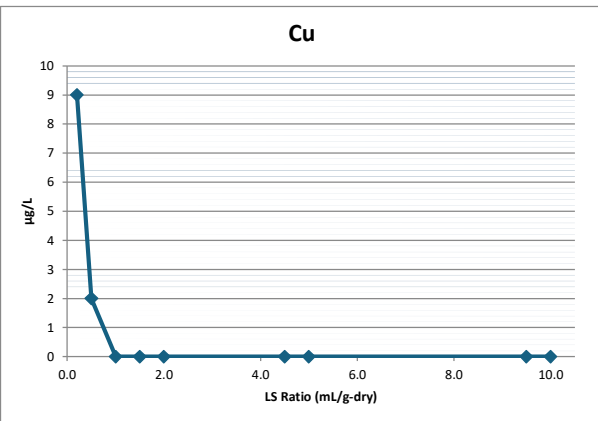
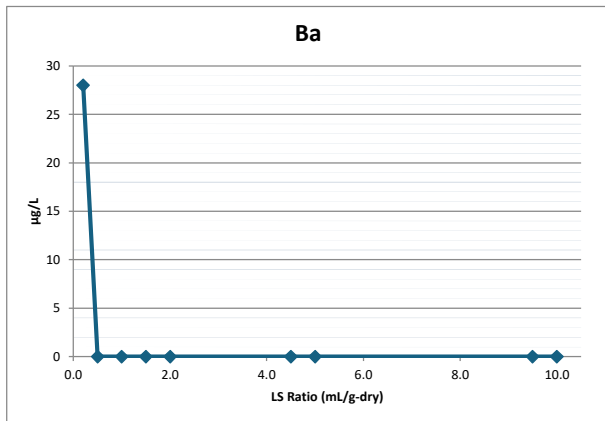
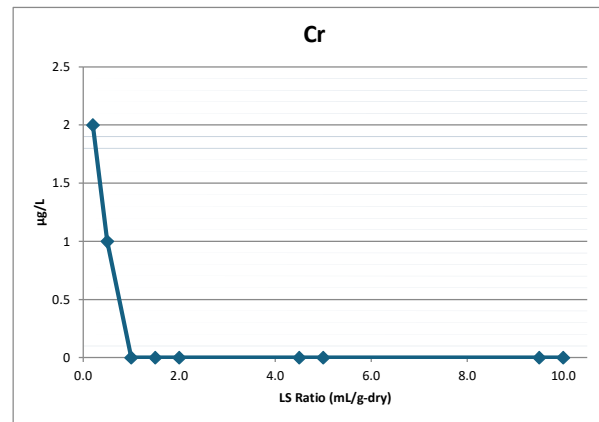
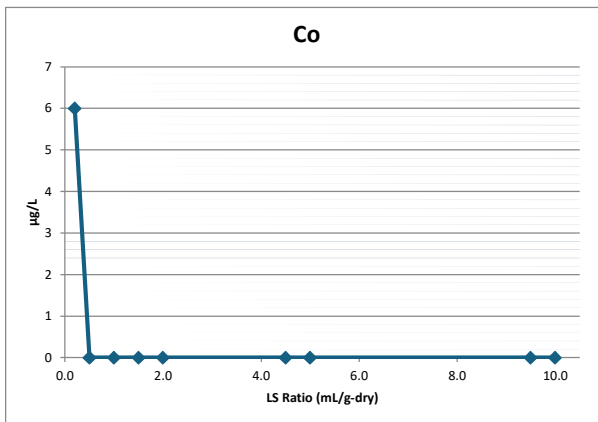
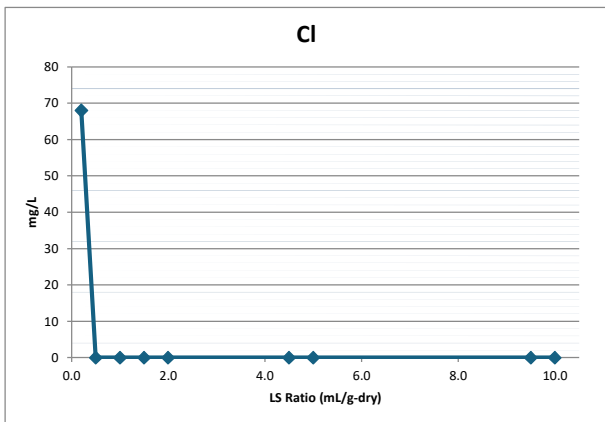
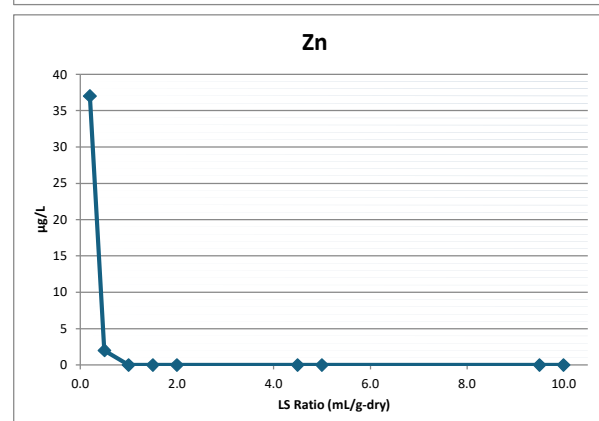
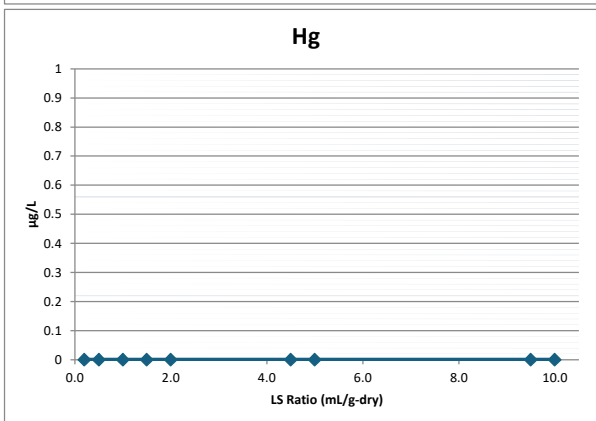
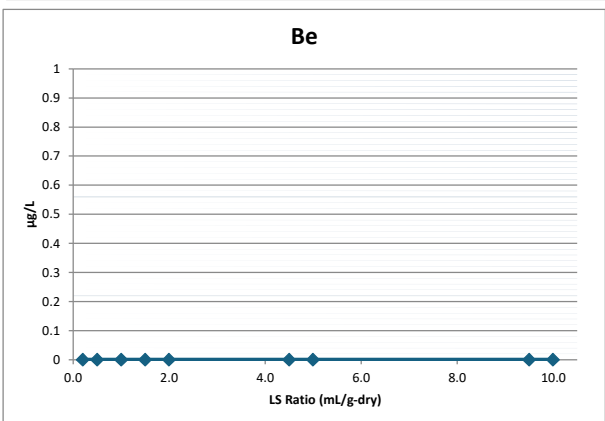
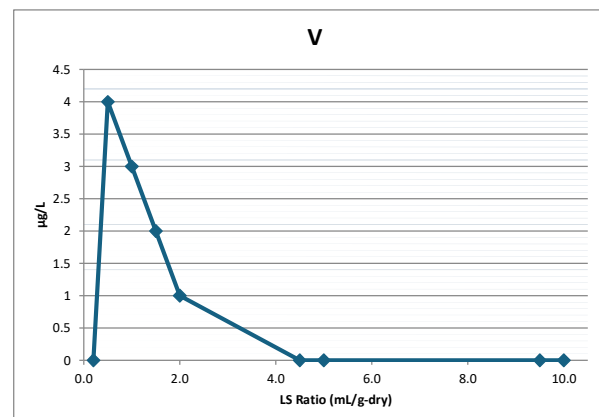
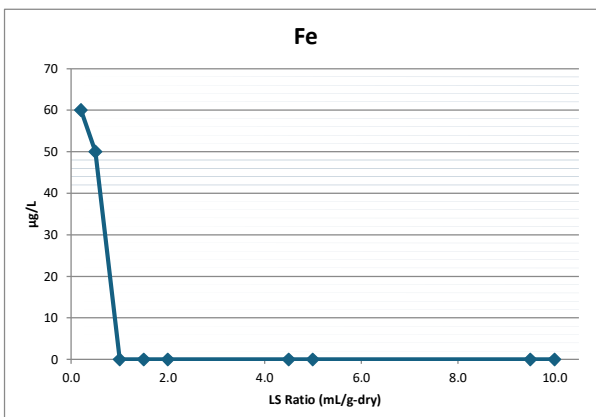
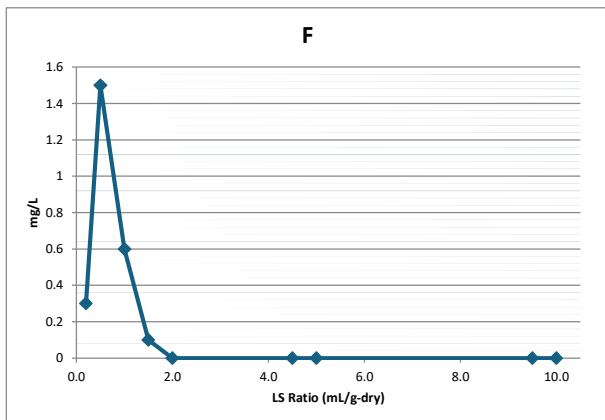


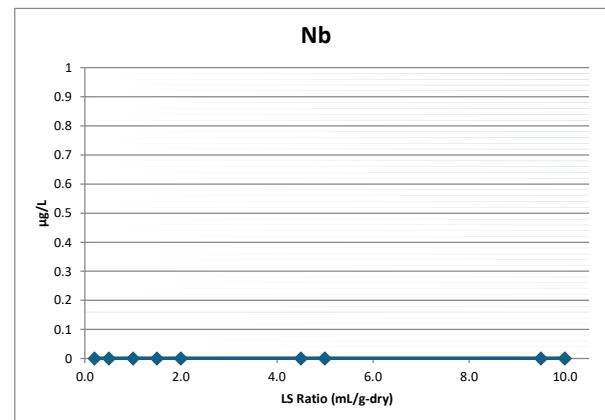
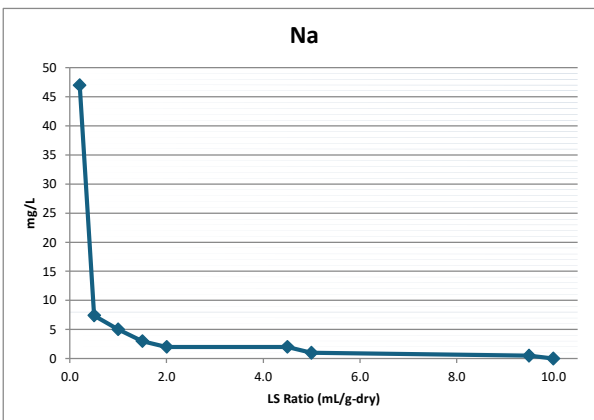
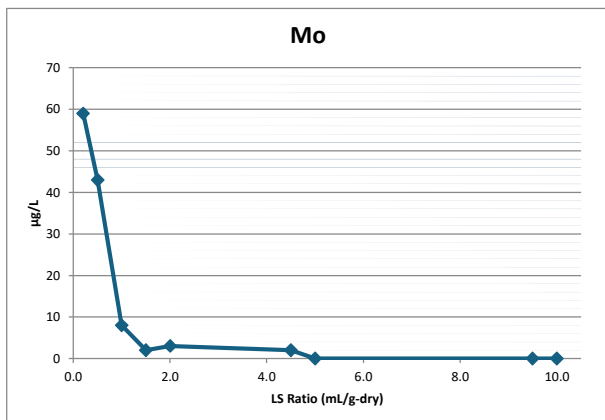
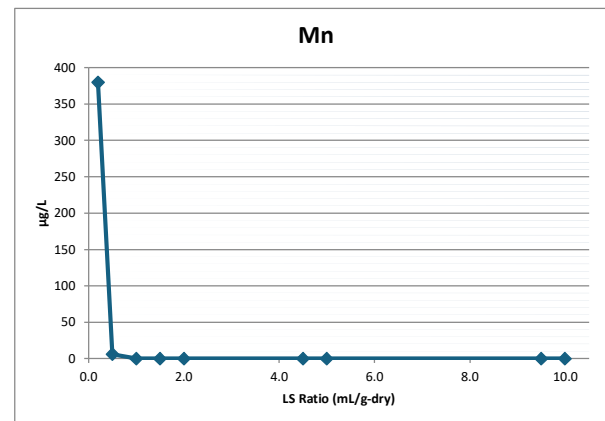
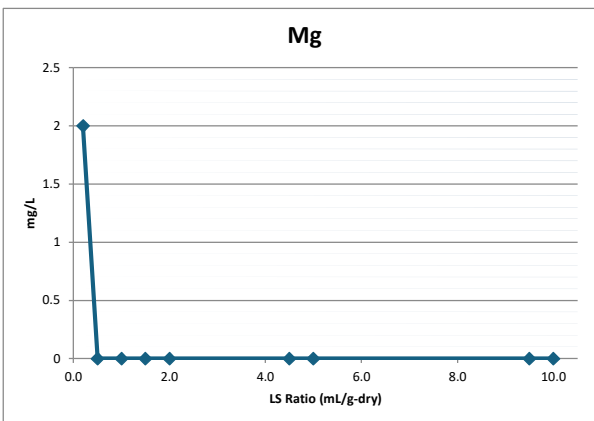
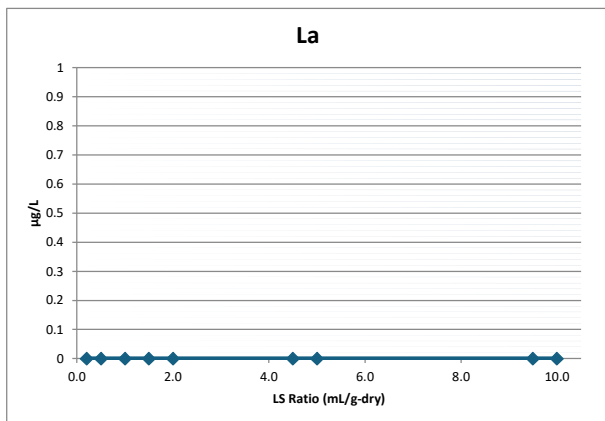
Table A1-11: LEAF 1314 Results

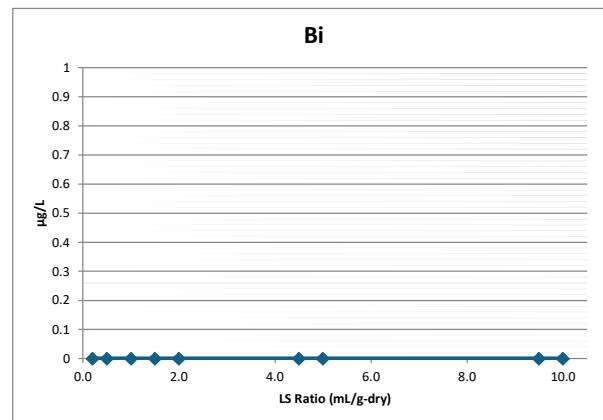
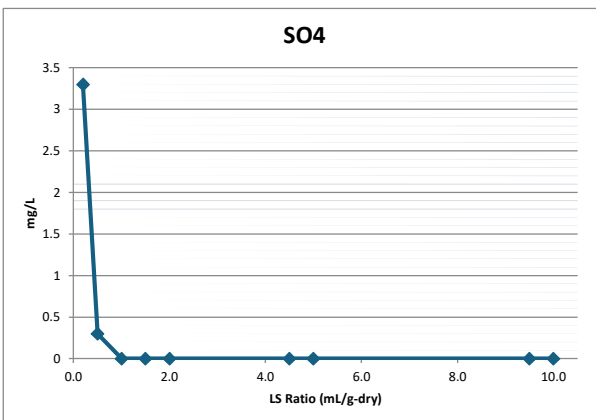
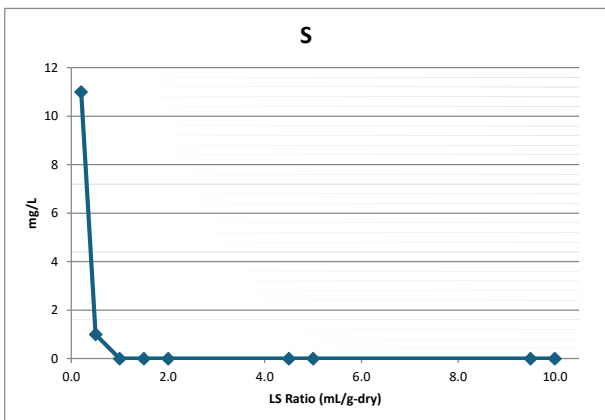
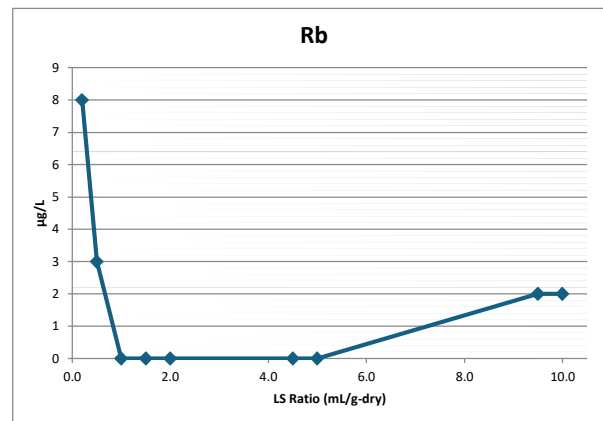
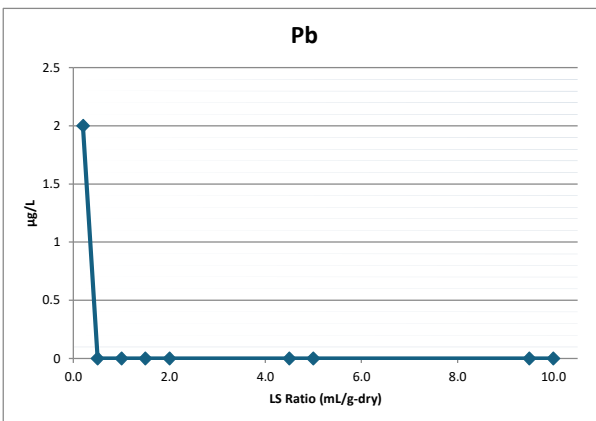
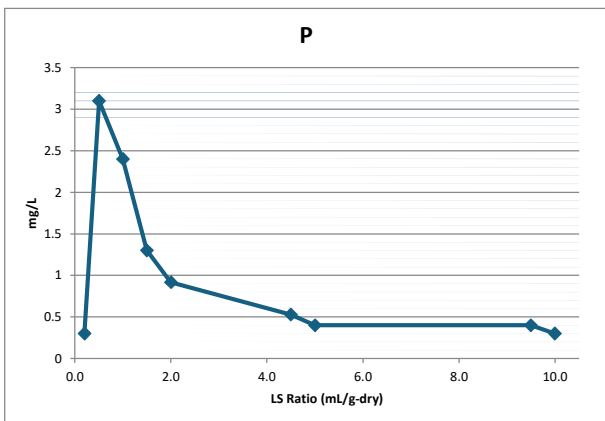
Analyte	Units	L/S										Livestock Drinking Water DGV (ANZG 2018)	NPUG (DER 2014)	Freshwater Protection 80% DGV (ANZG 2018)	Freshwater Protection 95% DGV (ANZG 2018)	Long Term Irrigation (ANZECC 2000)	Recreational Water Use (NHMRC, 2011)
		0.2	0.5	1.0	1.5	2.0	4.5	5.0	9.5	10.0							
Volume	mL	136	204	339	339	339	1697	339	3055	339							
pH	pH units	4.8	6.2	6.8	7.1	6.9	6.5	6.5	6.5	6.4	6.5 - 8.5	6.5 - 8.5	6.5 - 8.5	6.5 - 8.5	6.5 - 8.6	5-9	
Ag	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/G	1	0.2	0.05	N/G	1000	
Al	µg/L	440	220	30	10	10	<10	<10	<10	<10	5000	200	150	55	5000	2000	
As	µg/L	1.0	5.0	2.0	<1	<1	<1	<1	<1	<1	500	100	140	13	100	70	
Ba	µg/L	28	<1	<1	<1	<1	<1	<1	<1	<1	N/G	20000	N/G	N/G	N/G	20000	
Be	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	N/G	600	N/G	N/G	100	600	
Bi	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/G	N/G	N/G	N/G	N/G	N/G	
Br	µg/L	910	23	<10	<10	<10	<10	<10	<10	<10	N/G	N/G	N/G	N/G	N/G	N/G	
Ca	mg/L	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1000	N/G	N/G	N/G	N/G	N/G	
Cd	µg/L	0.20	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	10	20	0.8	0.2	10	20	
Cl	mg/L	68	<1	<1	<1	<1	<1	<1	<1	<1	N/G	250	N/G	N/G	N/G	N/G	
Co	µg/L	6	<1	<1	<1	<1	<1	<1	<1	<1	1000	N/G	N/G	1.4	50	N/G	
Cr	µg/L	2.0	1.0	<1	<1	<1	<1	<1	<1	<1	1000	500	40	3.3	100	500	
Cs	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/G	N/G	N/G	N/G	N/G	N/G	
Cu	µg/L	9.0	2.0	<1	<1	<1	<1	<1	<1	<1	1000	20000	2.5	1.4	200	20000	
ECond	µS/cm	350	33	21	12	5	9	6	6	6	5970	N/G	N/G	N/G	N/G	N/G	
F	mg/L	0	2	1	0	<0.1	<0.1	<0.1	<0.1	<0.1	2	15	N/G	N/G	N/G	15	
Fe	µg/L	60	50	<10	<10	<10	<10	<10	<10	<10	No limit	300	N/G	300	200	3000	
Hg	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	2	10	5.4	0.6	2	10	
K	mg/L	6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	1.0	N/G	N/G	N/G	N/G	N/G	N/G	
La	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/G	N/G	N/G	N/G	N/G	20	
Li	µg/L	1300	210	95	74	47	51	71	64	60	N/G	N/G	N/G	N/G	2500	N/G	
Mg	mg/L	2.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	250	N/G	N/G	N/G	N/G	N/G	
Mn	µg/L	380	6	<5	<5	<5	<5	<5	<5	<5	N/G	5000	3600	1900	200	5000	
Mo	µg/L	59	43	8	2	3	2	<1	<1	<1	150	500	N/G	N/G	10	500	
Na	mg/L	47.00	7.40	5.00	3.00	2.0	2.0	1.0	0.5	<0.5	N/G	N/G	N/G	N/G	N/G	N/G	
Nb	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/G	N/G	N/G	N/G	N/G	N/G	
Ni	µg/L	11	<1	<1	<1	<1	<1	<1	<1	<1	1000	200	17	11	200	200	
P	mg/L	0.3	3.1	2.4	1.3	0.9	0.5	0.4	0.4	0.3	N/G	0.8 (STV)	N/G	Refer to guideline	0.05	N/G	
Pb	µg/L	2	<1	<1	<1	<1	<1	<1	<1	<1	100	100	9.4	3.4	2000	100	
Rb	µg/L	8.0	3.0	<1	<1	<1	<1	<1	2.0	2.0	N/G	N/G	N/G	N/G	N/G	N/G	
S	mg/L	11	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	333	333	N/G	N/G	N/G	1667	
SO4	mg/L	3.3	0.30	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1000	1000	N/G	N/G	N/G	5000	
Sb	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/G	30	9	9	N/G	30	
Se	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	20	100	34	11	20	100	
Si	mg/L	7.5	6.8	4.7	2.9	2.4	2.6	1.8	1.6	1.6	N/G	N/G	N/G	N/G	N/G	N/G	
Sn	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/G	N/G	N/G	N/G	N/G	N/G	
Sr	µg/L	14	<1	<1	<1	<1	<1	<1	<1	<1	N/G	N/G	N/G	N/G	N/G	N/G	
Ta	µg/L	<1	<1	<1	<2	<1	<1	<2	<1	<1	N/G	N/G	N/G	N/G	N/G	N/G	
Th	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	N/G	N/G	N/G	N/G	N/G	N/G	
Ti	µg/L	<1	3	<1	<1	<1	<1	<1	<1	<1	N/G	N/G	N/G	N/G	N/G	N/G	
Tl	µg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	N/G	N/G	N/G	0.03	N/G	N/G	
U	µg/L	0.90	0.70	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	200	170	0.5	0.5	10	200	
V	µg/L	<1	4.0	3.0	2.0	1.0	<1	<1	<1	<1	N/G	N/G	6	6	100	N/G	
W	µg/L	<1	3.0	2.0	<1	<1	<1	<1	<1	<1	N/G	N/G	N/G	N/G	N/G	N/G	
Zn	µg/L	37	2.0	<1	<1	<1	<1	<1	<1	<1	20000	3000	31	8	2000	30000	

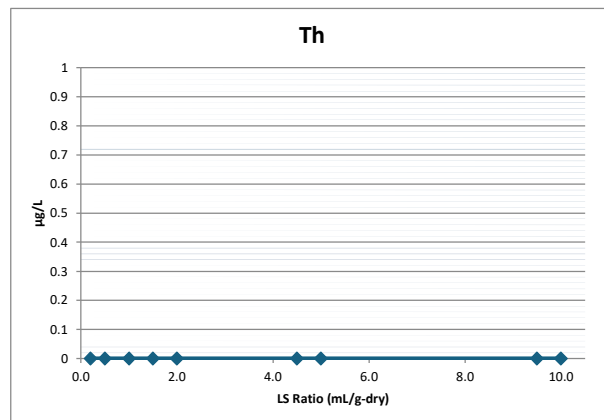
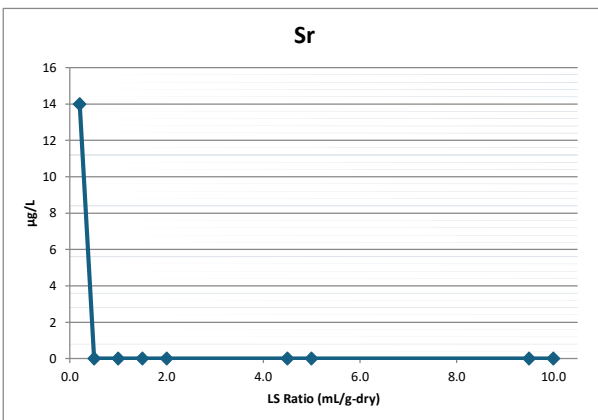
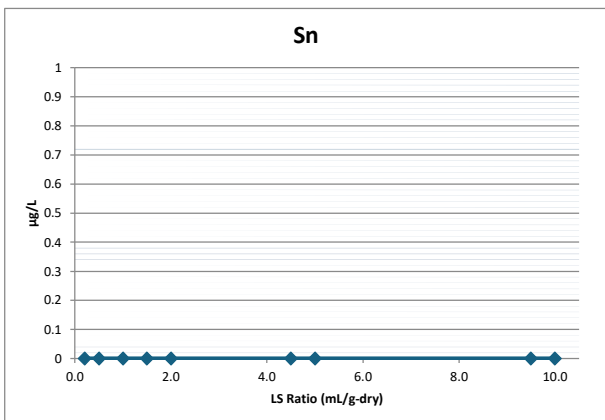
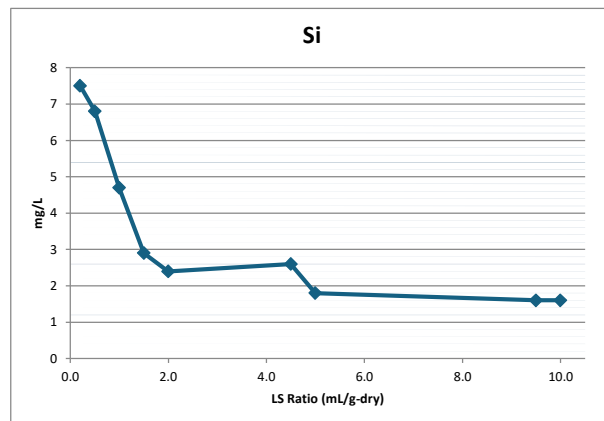
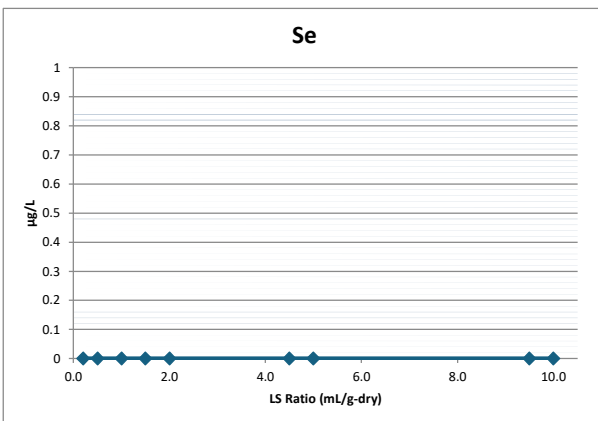
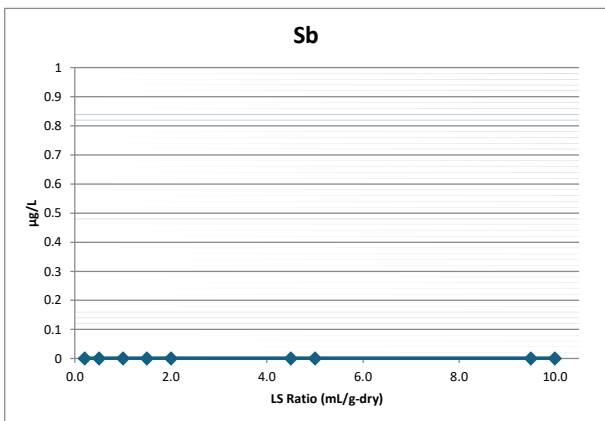


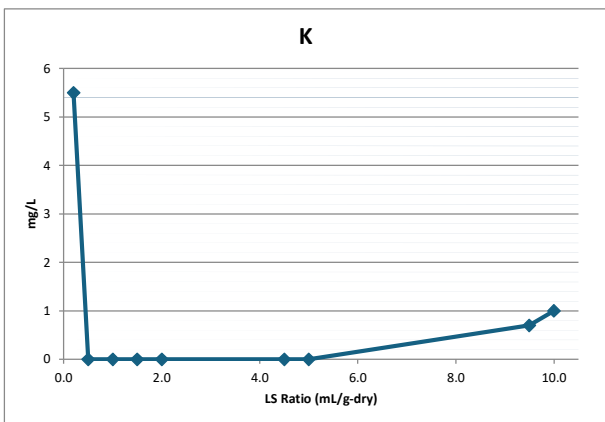
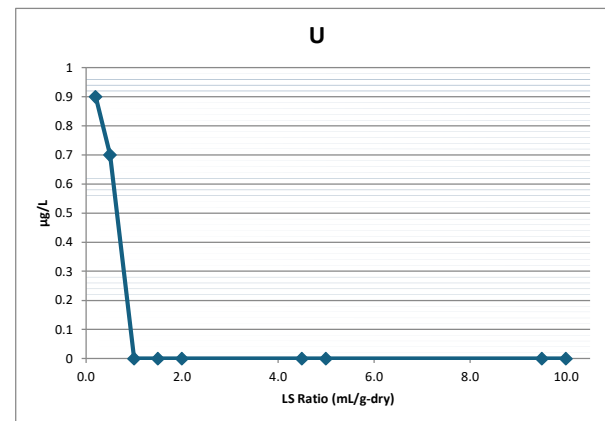
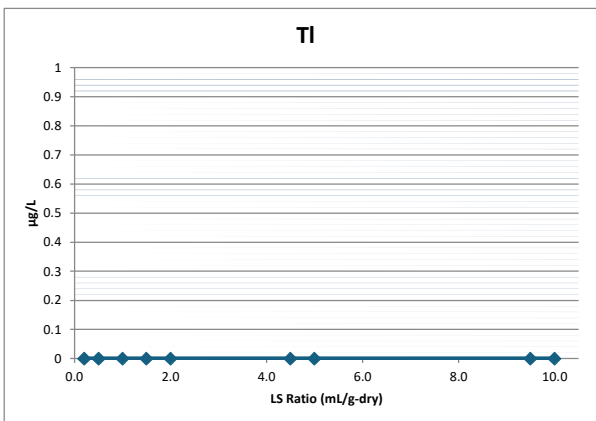
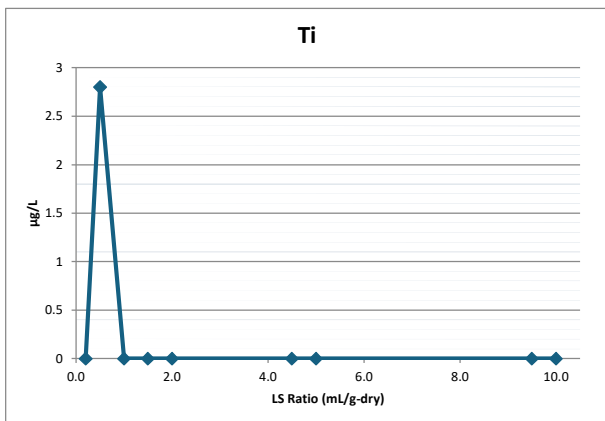












APPENDIX 2: LABORATORY REPORTS



Client: MBS Environmental Pty Ltd
Client address: 4 Cook St, West Perth, WA, 6005, Australia
Client ID: Tailings Composite
Job ID: 24_1542
Lab ID: 24_1542_001
Revision No. : 0

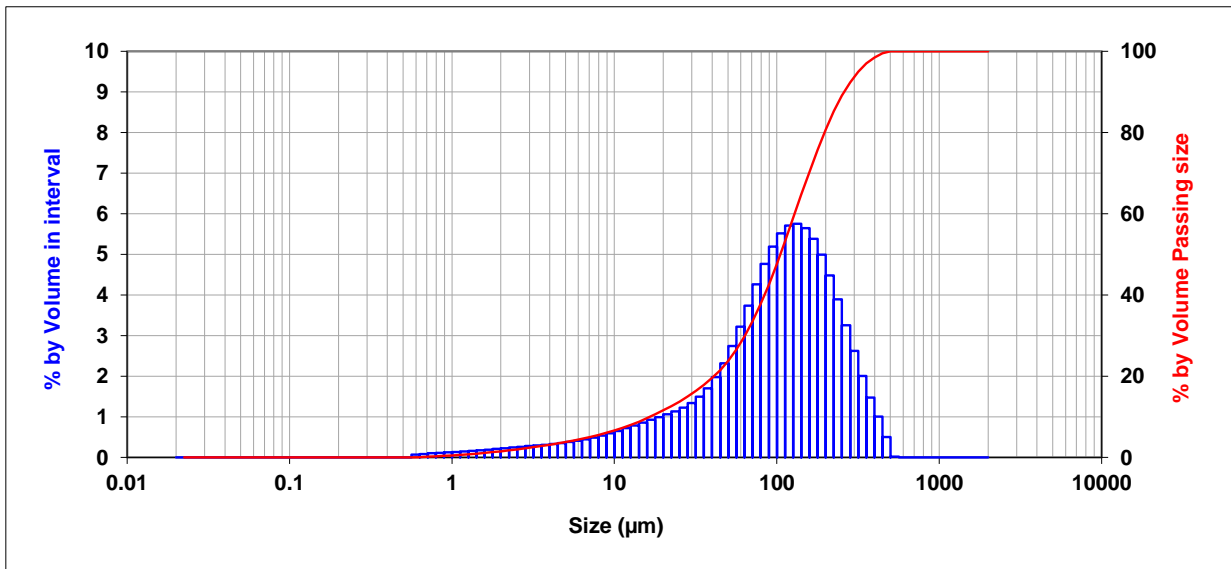
Date received: 29/08/2024
Date analysed: 04/09/2024
Date reported: 04/09/2024

Comment: None.

Analysis: Laser diffraction size distribution following ISO13320-1:2020
Dispersant: Water
Additives: 10 millilitres sodium hexametaphosphate
Sonication: 25 min sonication

Result units: Volume
Analysis model: General purpose
RI/ABS: 1.544 / 0.1

Concentration: 0.0658 % vol **Vol. Weighted Mean D[4,3]:** 124.99 µm **d(0.1):** 16.58 µm
Obscuration: 16.83 % **Surface Weighted Mean D[3,2]:** 26.12 µm **d(0.5):** 105.14 µm
Weighted Residual: 0.824 % **Specific Surface Area:** 0.23 m²/cc **P80:** 196.46 µm
d(0.9): 259.18 µm



Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %	Size (µm)	Vol Under %
0.020	0.00	0.142	0.00	1.002	0.49	7.096	5.04	50.238	23.83	355.66	97.01
0.022	0.00	0.159	0.00	1.125	0.63	7.962	5.53	56.368	26.57	399.05	98.48
0.025	0.00	0.178	0.00	1.262	0.77	8.934	6.06	63.246	29.78	447.74	99.48
0.028	0.00	0.200	0.00	1.416	0.93	10.024	6.65	70.963	33.52	502.38	99.98
0.032	0.00	0.224	0.00	1.589	1.10	11.247	7.30	79.621	37.79	563.68	100.00
0.036	0.00	0.252	0.00	1.783	1.29	12.619	8.02	89.337	42.55	632.46	100.00
0.040	0.00	0.283	0.00	2.000	1.50	14.159	8.81	100.237	47.75	709.63	100.00
0.045	0.00	0.317	0.00	2.244	1.73	15.887	9.66	112.468	53.26	796.21	100.00
0.050	0.00	0.356	0.00	2.518	1.97	17.825	10.59	126.191	58.97	893.37	100.00
0.056	0.00	0.399	0.00	2.825	2.23	20.000	11.58	141.589	64.73	1002.37	100.00
0.063	0.00	0.448	0.00	3.170	2.51	22.440	12.64	158.866	70.37	1124.68	100.00
0.071	0.00	0.502	0.00	3.557	2.81	25.179	13.77	178.250	75.75	1261.91	100.00
0.080	0.00	0.564	0.00	3.991	3.12	28.251	15.00	200.000	80.74	1415.89	100.00
0.089	0.00	0.632	0.07	4.477	3.45	31.698	16.34	224.404	85.23	1588.66	100.00
0.100	0.00	0.710	0.15	5.024	3.81	35.566	17.83	251.785	89.12	1782.50	100.00
0.112	0.00	0.796	0.26	5.637	4.18	39.905	19.53	282.508	92.37	2000.00	100.00
0.126	0.00	0.893	0.37	6.325	4.59	44.774	21.51	316.979	95.00		

Analysed: Jade Byrnes-Haese, Cert IV (Laboratory Techniques)
Reported: Jade Byrnes-Haese, Cert IV (Laboratory Techniques)
Approved: Nimue Pendragon, B.Sc.(Nanotechnology)

MAQR84 v1.3

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Client:	MBS Environmental	Date Received:	29/08/2024
Client address:	4 Cook St, West Perth, WA 6005	Date Analysed:	17/09/2024
Job number:	24_1542	Date Reported:	17/09/2024
Lab ID:	24_1542_001		
Client ID:	Tailings Composite		
Analysis :	Respirable (PM4) silica concentration analysis by X-ray diffraction (XRD) and scanning electron microscopy (SEM) using the modified SWeRF (EN17289-3) method ¹		
Revision number:	0		
Comments:	None		

Sample preparation

The sample was supplied to Microanalysis Australia as a bulk material. The sample was tested as received.

A representative sub-sample of was wet sieved at 150 μm , and the < 150 μm fraction (suspension) was thoroughly homogenized and sized by laser diffraction reporting size between 150 μm and 20 nm.

The respirable fraction was abstracted by settling and decantation, and the abstracted particle size, composition and morphology was verified by scanning electron microscope (SEM) for equivalent aerodynamic diameter (EAD).

Once the equivalent aerodynamic size was verified by SEM, the abstracted fraction was analysed qualitatively and quantitatively by X-ray diffraction to assess the crystalline silica concentration.

Analysis

The wet sieving was conducted using a light-flow (approximately 1 L/min) water spray jet on a 150 μm stainless steel Endecotts sieve. The < 150 μm fraction was collected in a bucket for laser diffraction analysis. Each size fraction was then oven dried at 105 °C. The dried weights of each of the fractions were noted and the fraction percentage calculated based on the original dried starting weight.

The laser diffraction size distribution analyses were conducted using a Malvern Mastersizer MS2000 calibrated using QAS3002 certified reference material and certified within specification. The analyses were conducted following ISO13320-1:2020.

For the sedimentation, the time for a specific fall height for PM4 (EAD) particles was calculated using Stokes Law. The samples were then homogenised and allowed to settle for the calculated time before the supernatant was decanted off, down to the limit of the fall height. The density and viscosity of water at 21°C, and an assumed particle density of 2.65 g/cc were used.

The electron microscope used was a Carl Zeiss EVO50 equipped with an Oxford Instruments INCA energy dispersive spectrometer (EDS). All images were acquired using backscatter electrons, unless otherwise specified to highlight particle composition. The contrast in backscatter electron images is proportional to average elemental composition i.e. the brighter the particle the higher the atomic number. Some images with contrasting brightness particles were examined by EDS for elemental composition.

The extracted fraction was deposited on a filter membrane for XRD analysis. Quantification was by the RIR method. Only crystalline material present in the sample will give peaks in the XRD scan. Amorphous (non-crystalline) material will add to the background but is estimated by the software. The search match software used was EVA (Bruker). The ICDD card set was ICDD PDF4+ 2021. The X-ray source was cobalt radiation. ICDD match probabilities are reported as an indication of how well the diffraction peaks of this sample compare with currently published literature on the quoted mineral. No Rietveld refinement was conducted on the acquired spectrum unless otherwise stated.

The respirable (as defined in ISO 7708) silica concentration of the bulk was calculated by multiplying the volume percent of the respirable-only (PM4) fraction by the α -quartz, cristobalite and tridymite concentrations of the respirable only fraction.

Summary

The size distribution of the sample by wet sieving and laser diffraction is shown below:

Client ID	Size fraction (by aerodynamic diameter) volume percent			
	Non-inhalable	Inhalable, PM100	Thoracic, PM10	Respirable, PM4
Tailings Composite	71.42	28.58	4.96	2.19

Assuming all mineral phases occur at the same relative concentrations across all size intervals, a volume percent distribution equates to a mass distribution. The respirable fraction, PM4 is therefore 2.19 wt %.

The normalised, interpreted semi-quantitative mineralogy by X-Ray diffraction of the abstracted PM4 fraction is shown below:

Crystalline mineral phase	Concentration (wt %) of PM4 only	ICDD match probability
Albite (NaAlSi3O8)	40	High
Quartz, syn (SiO2)	31	High
Microcline (KAlSi3O8)	15	Medium
Muscovite (KFe0.15Al2.9Si2.97O10.15(OH)1.81)	9	Medium
Vermiculite (Mg3((AlSi3O10)(OH))(H2O))	1	Medium
Kaolinite (Al2Si2O5(OH)4)	2	Medium
Hematite (Fe2O3)	1	Low
Dolomite (CaMg(CO3)2)	1	Low

The XRD interpretation determined The PM4 fraction to be approximately 21 wt % amorphous. The above percentages represent only the crystalline fraction

The respirable (PM4) crystalline silica concentrations with respect to the bulk sample are shown below:

Lab ID	Client ID	Respirable (PM4) wt % of the bulk material for mineral phase		
		α -Quartz	Cristobalite	Tridymite
24_1542_001	Tailings Composite	0.539	<0.001	<0.001

Note: Three polymorphs of crystalline silica are scheduled as Group 1 carcinogens by IARC – α -quartz, cristobalite and tridymite².

Analyst: Matthew Rowles, Ph.D. Physics
Reported: Matthew Rowles, Ph.D. Physics
Approved: Nimue Pendragon, B.Sc.(Nanotechnology)

¹ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3979281/>

² <https://monographs.iarc.fr/ENG/Monographs/vol100C/mono100C-14.pdf>

Client: MBS Environmental
Job number: 24_1542
Lab ID: 24_1542_001
Client ID: Tailings Composite
Revision no.: 0
Analysis: Scanning electron microscopy (SEM) with elemental analysis by energy dispersive spectroscopy (EDS) – qualitative ‘yes/no’ for presence of asbestos fibre
Comments: None

Date received: 29/08/2024
Date analysed: 16/09/2024
Date reported: 16/09/2024

Executive summary

The sample **WAS NOT** found to contain asbestos mineral fibre.

Sample preparation

The sample was supplied to Microanalysis Australia on 29/08/2024. A representative sub-sample was removed and placed on top of a double-sided carbon tab before being carbon coated. Non-conducting samples require coating prior to SEM analysis to prevent charging whilst being analysed by the electron beam.

Analysis

The sample was analysed using a Carl Zeiss EVO50 scanning electron microscope (SEM) fitted with an Oxford INCA X-Max energy dispersive spectrometer (EDS). EDS is a semi-quantitative technique (at best) on well prepared, optically flat samples. Factors such as sample unevenness may adversely bias elemental concentration interpretation. EDS has a spatial resolution of ~5 µm meaning spectra from particles less than this size may contain elemental concentrations biased by their surroundings.

Summary

All images were acquired using backscatter electrons. Image contrast is directly proportional to average atomic number i.e. the brighter the area, the higher the atomic number.

Chrysotile (white asbestos) or more technically correct, asbestiform Antigorite, has the stoichiometric formula $Mg_3Si_2O_5(OH)_2$. The relative concentration of elements in decreasing order is: O, Mg, Si and H (H is not detectable by EDS).

Actinolite has the stoichiometric formula $Ca_2(Fe,Mg)_5Si_8O_{22}(OH)_2$. The relative concentration of elements in decreasing order is: O, Si, Fe, Mg, Ca and H (H is not detectable by EDS). Actinolite is an amphibole asbestos mineral with a fibrous habit characterised by parallel sided, blocky fibres with irregular terminations.

Crocidolite (blue asbestos) has the stoichiometric formula $Na_2(Fe,Mg)_3Fe_2Si_8O_{22}(OH)_2$. The relative concentration of elements in decreasing order is: O, Si, Fe, Mg, Na and H (H is not detectable by EDS). As the parent mineral of Crocidolite, Riebeckite has the same stoichiometry as its asbestiform counterpart, but different morphology.

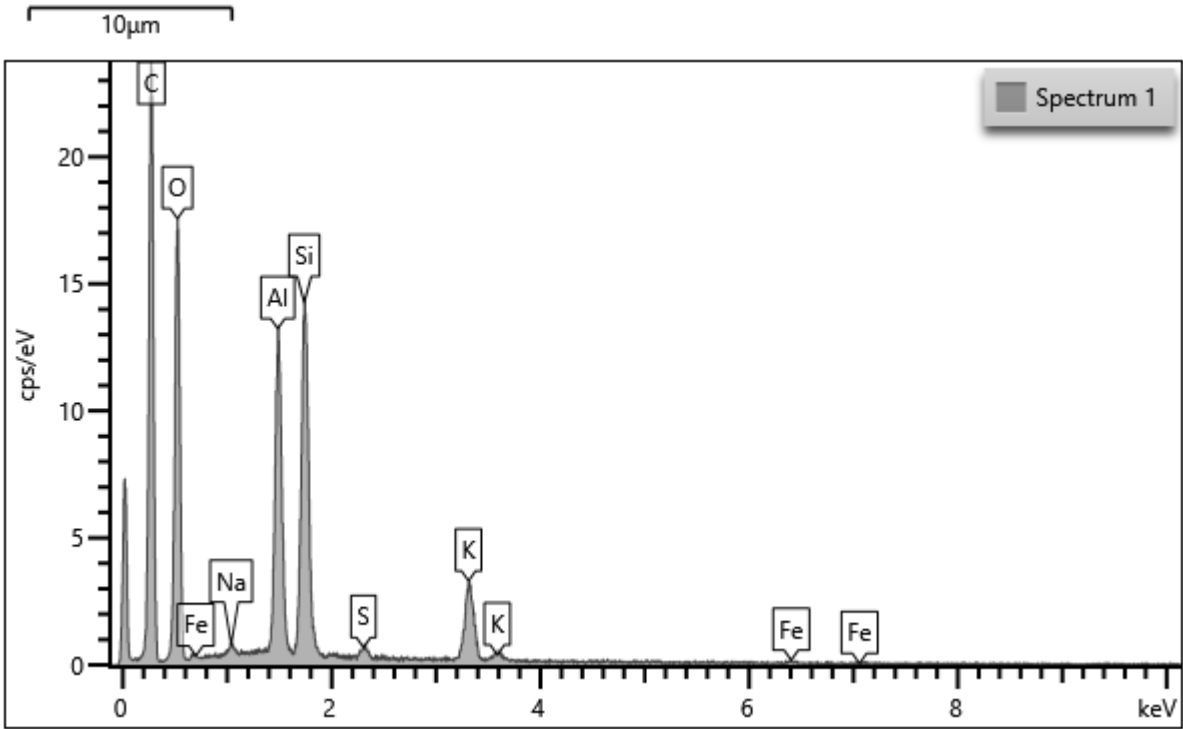
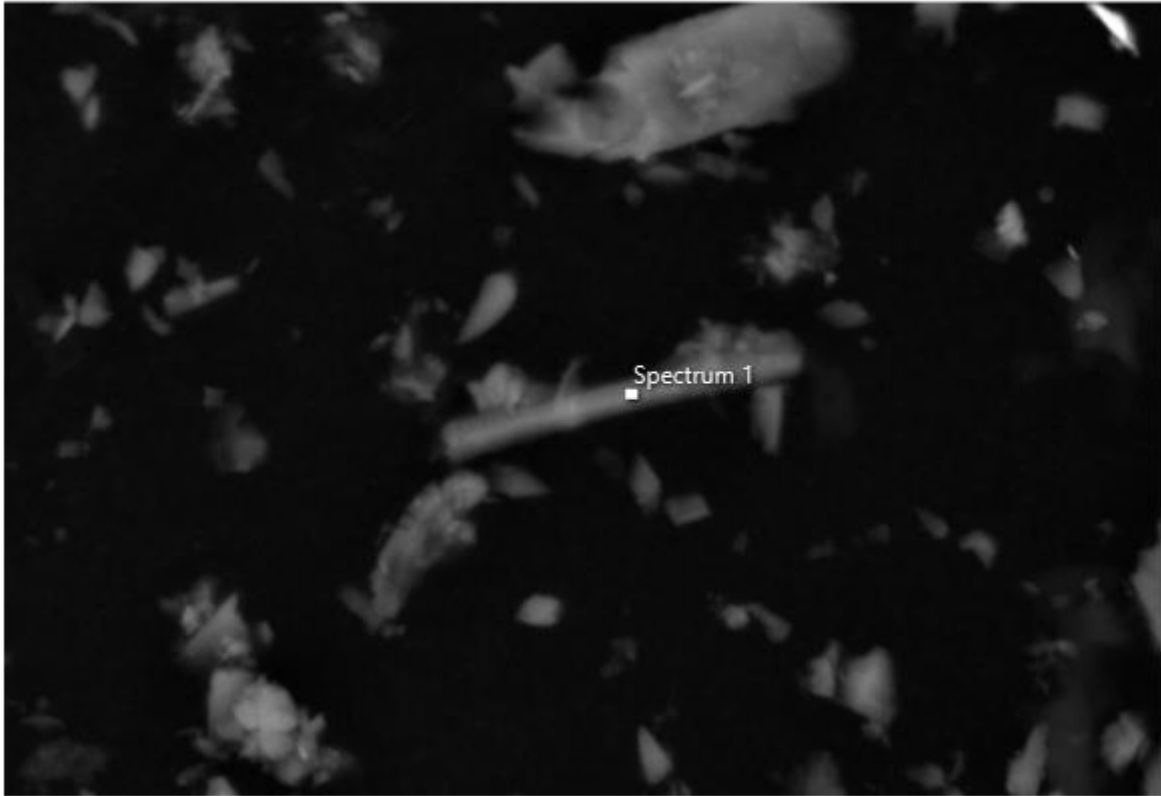
Amosite (brown asbestos) is part of the amphibole Cummingtonite-Grunerite mineral series. The more highly asbestiform fibres are commonly towards the iron-rich end member Grunerite. The series has the stoichiometric formula $Mg_2Mg_5Si_8O_{22}(OH)_2 - Fe_2Fe_5Si_8O_{22}(OH)_2$.

Analyst: Damon Blakey, *B.Sc. (Forensic Biology and Toxicology)*

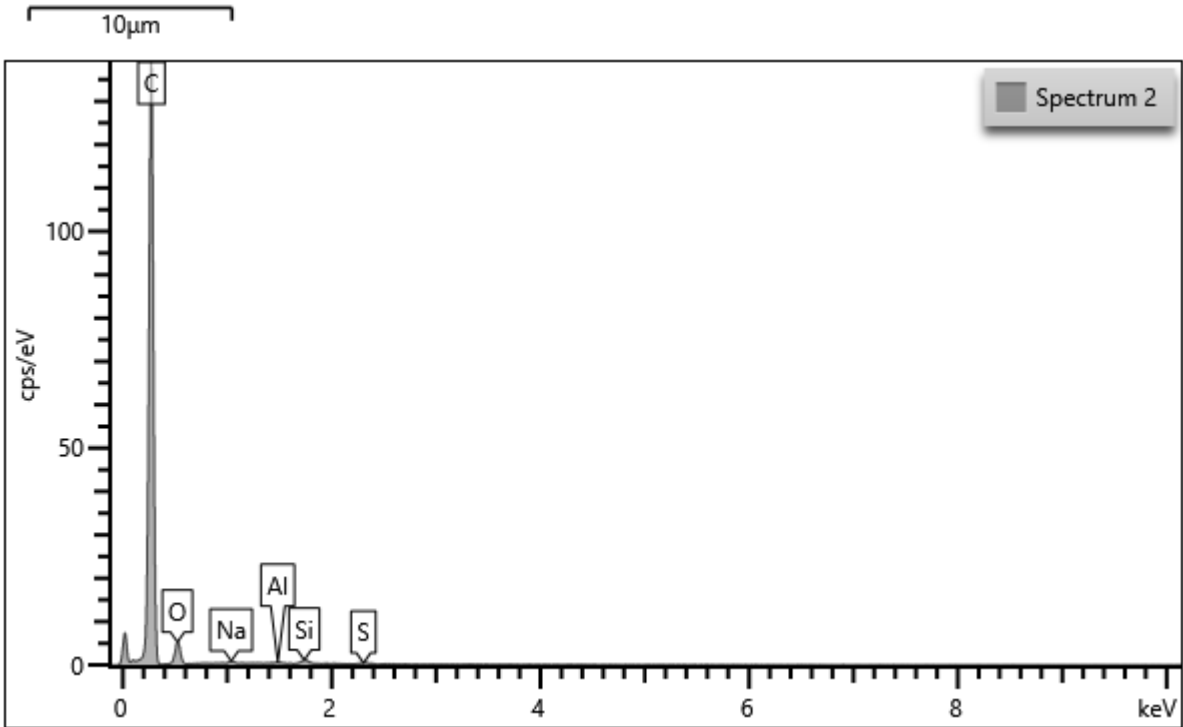
Reported: Damon Blakey, *B.Sc. (Forensic Biology and Toxicology)*

Approved: Nimue Pendragon, *B.Sc. (Nanotechnology)*

Electron Image 1 (SE)



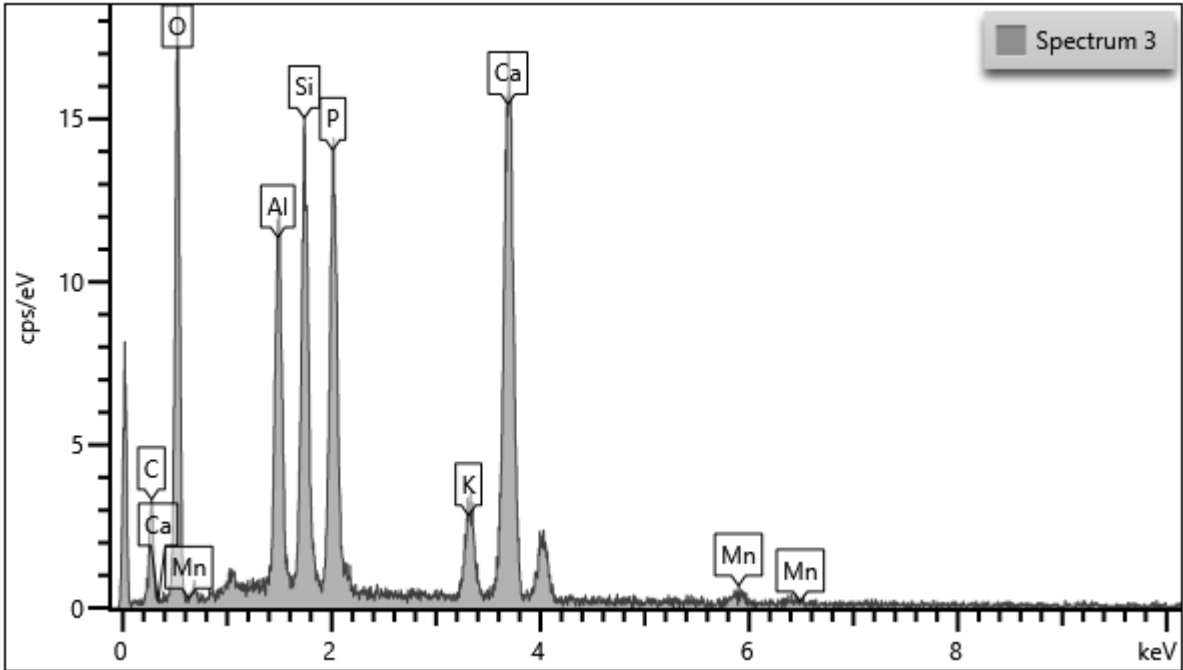
Electron Image 2 (SE)



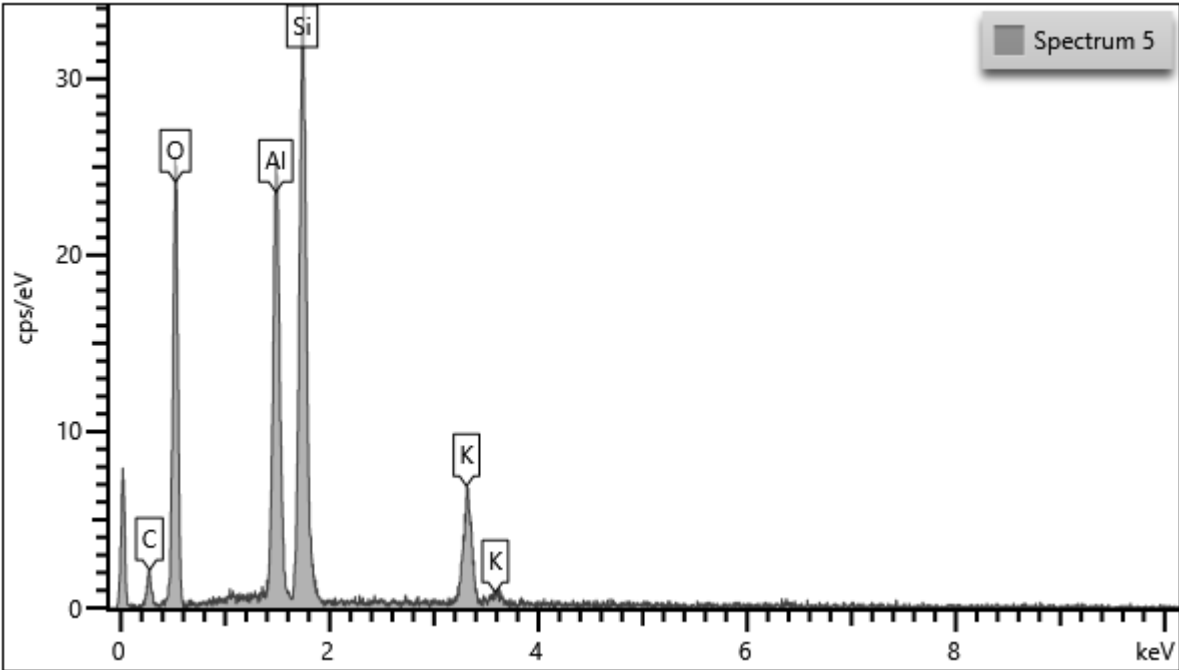
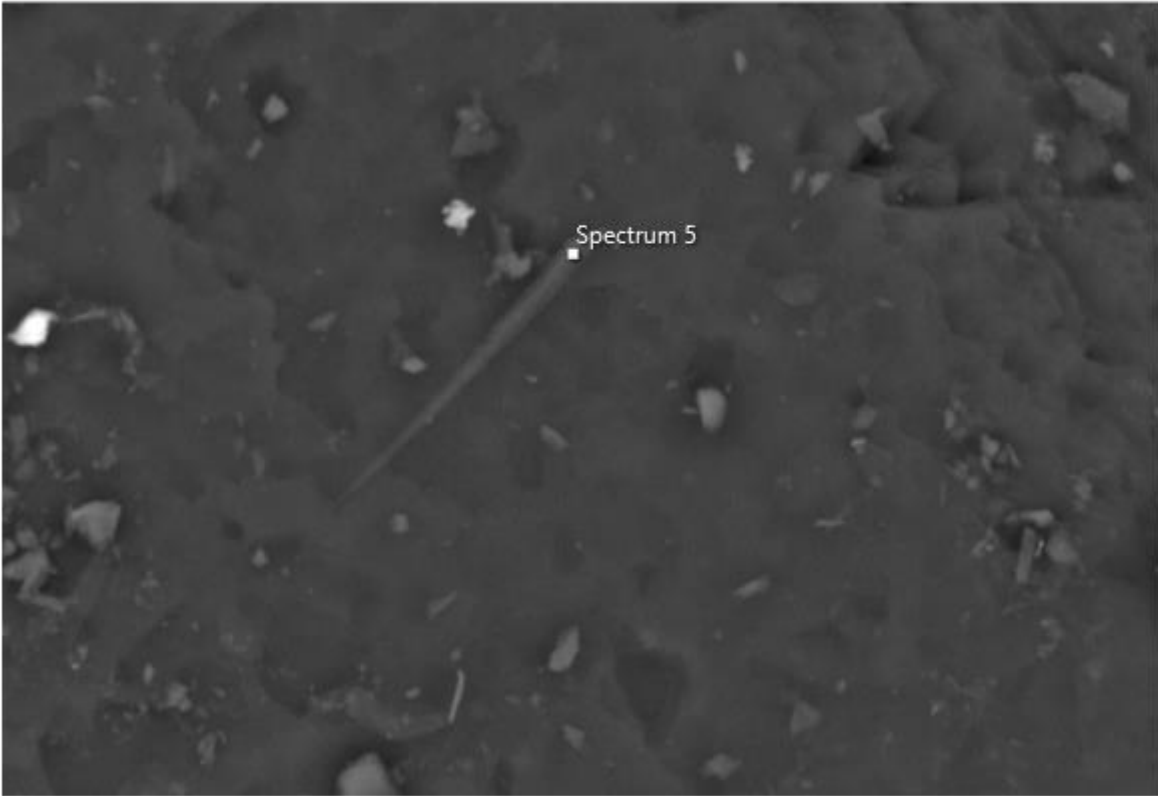
Electron Image 3 (SE)



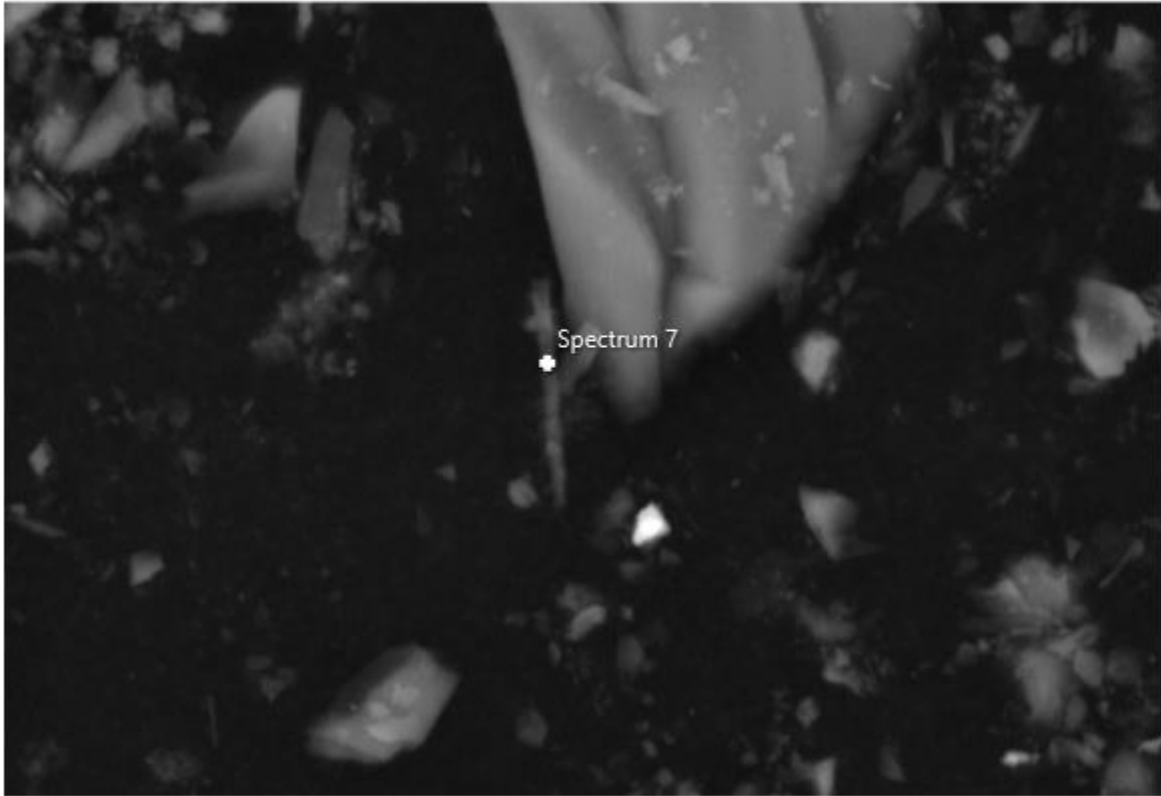
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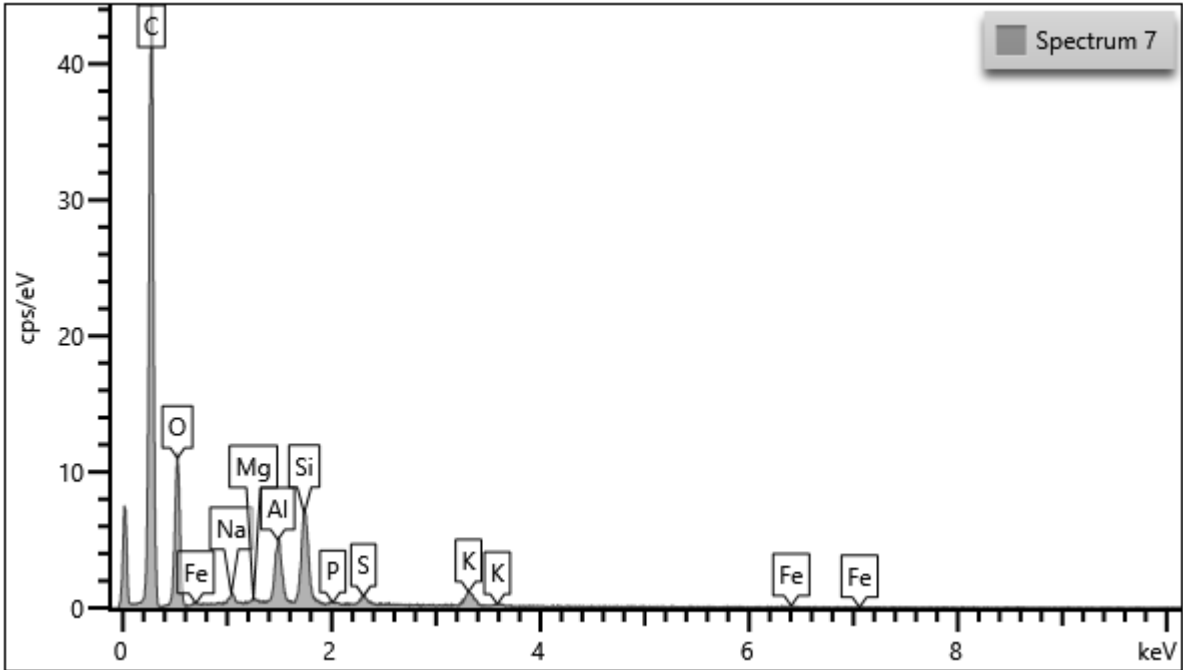
Electron Image 4 (SE)



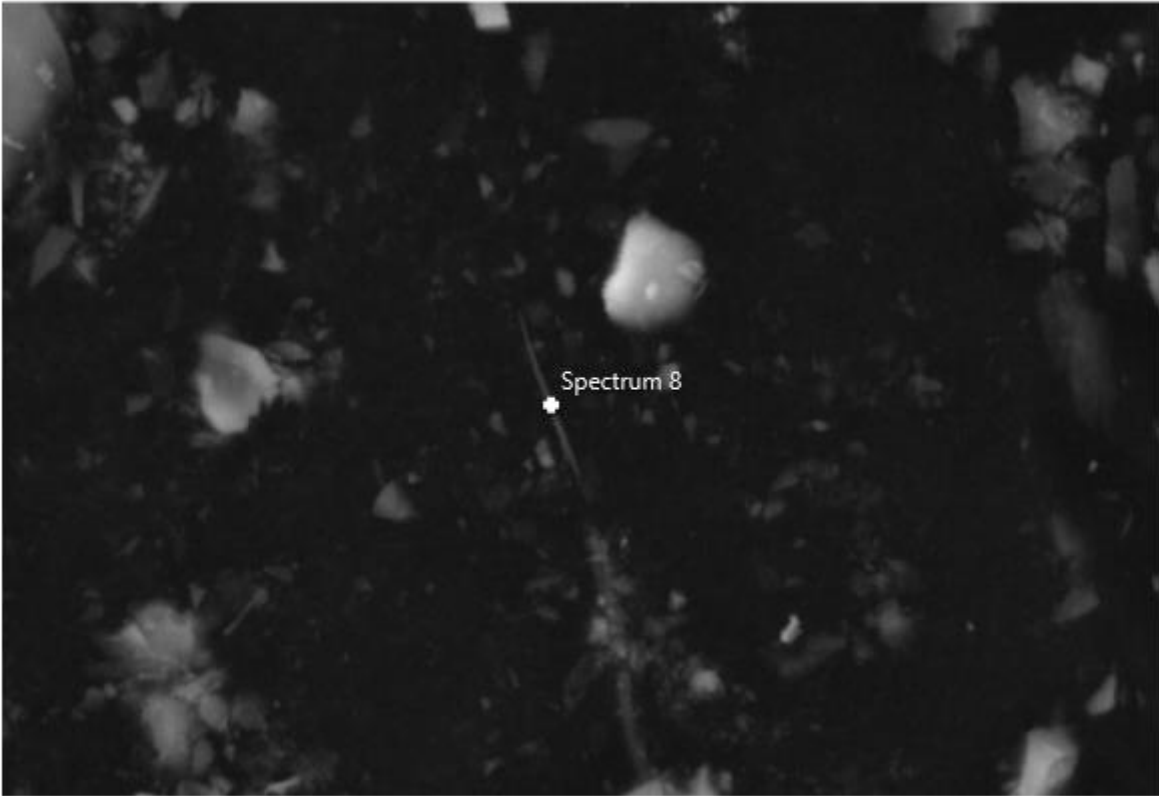
Electron Image 5 (SE)



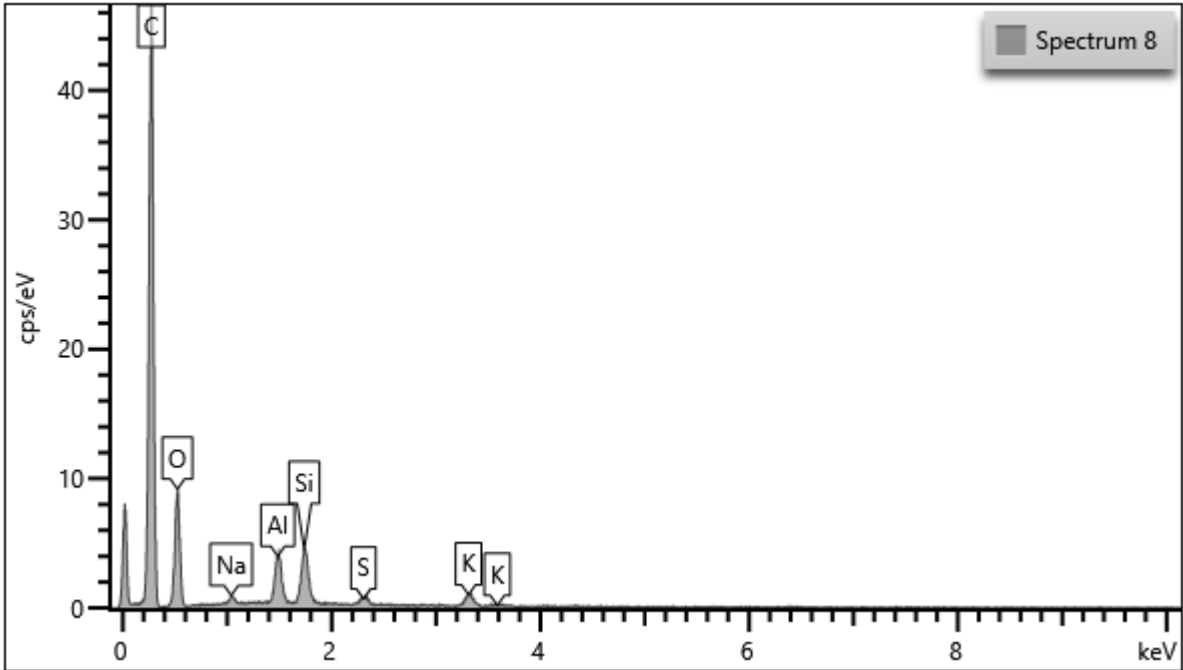
10µm



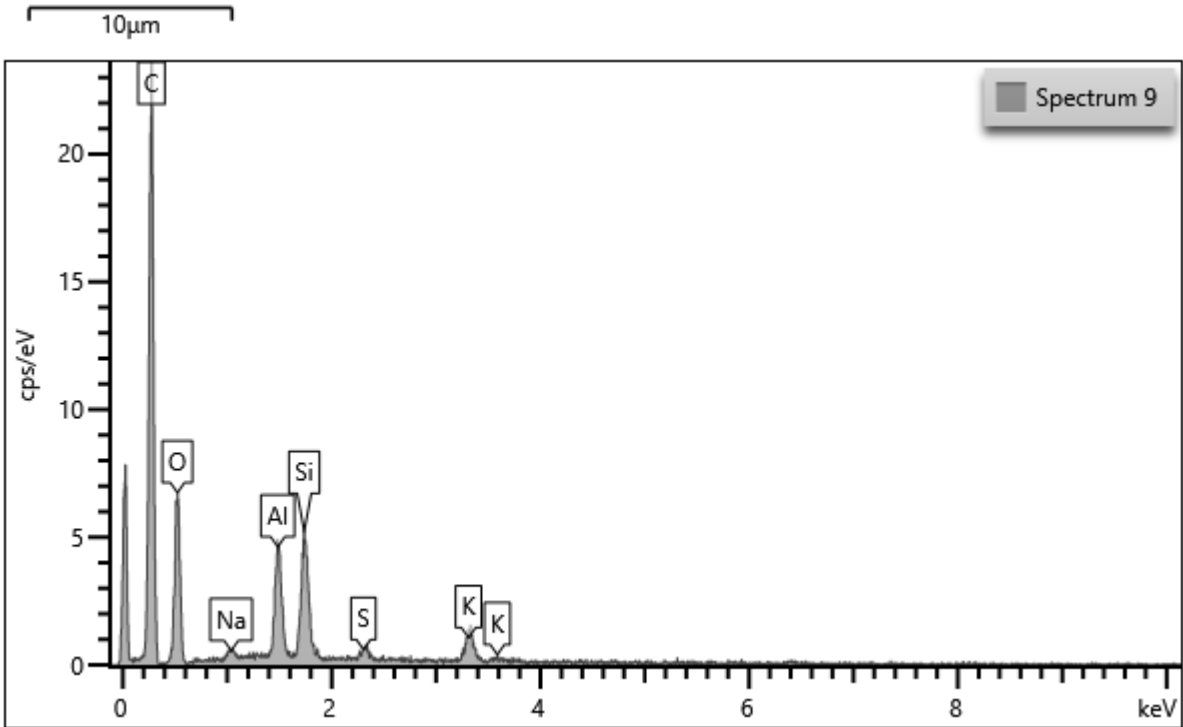
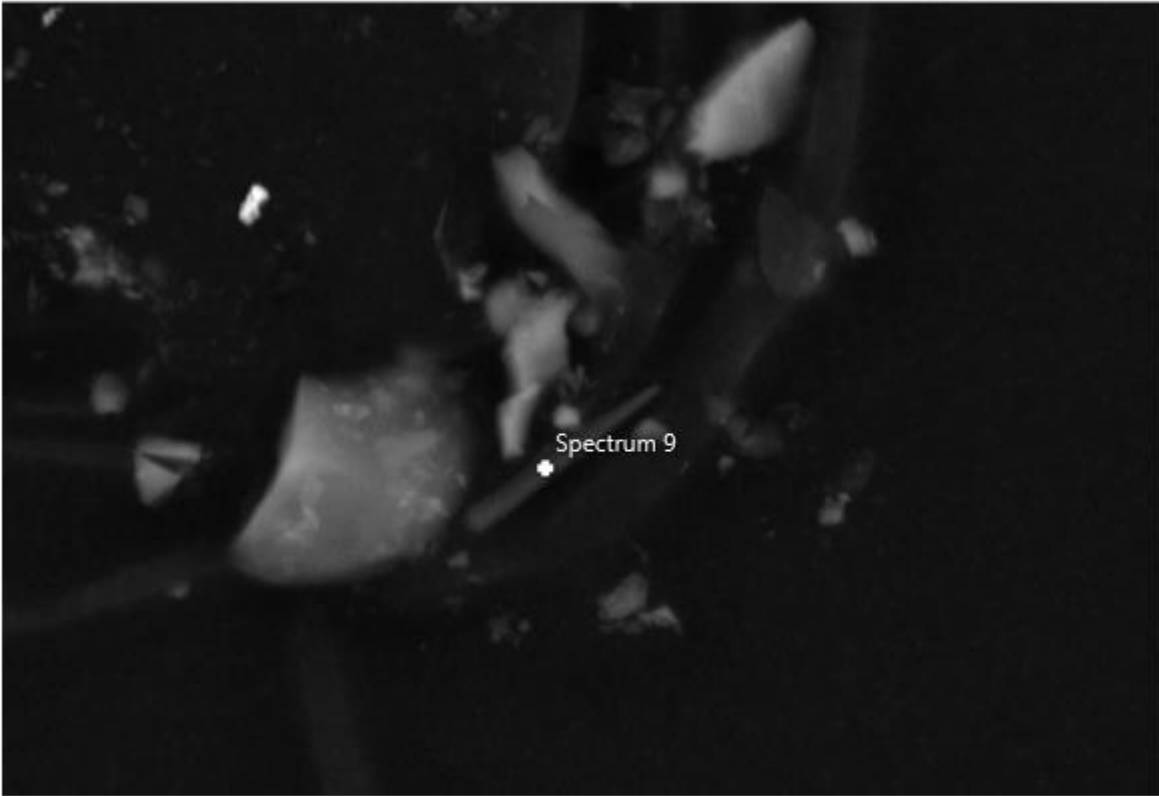
Electron Image 6 (SE)



10µm



Electron Image 7 (SE)



QUANTITATIVE X-RAY DIFFRACTION ANALYSIS

REPORT PREPARED FOR MARTINICK BOSCH SELL PTY LTD

CLIENT CODE 282.00

JOB CODE 2415732

No. of SAMPLES 3

CLIENT O/N DLYTSC

SAMPLE SUBMISSION No.

PROJECT DELTA LITHIUM

STATE

DATE RECEIVED 18/09/2024

DATE COMPLETED 27/09/2024

DATE WRITTEN 27/09/2024

WRITTEN BY Dr Cat Kealley

ANALYSING LABORATORY Perth

SAMPLE DETAILS

DISCLAIMER

This report relates specifically to the sample(s) that were drawn and/or provided by the client or their nominated third party. The reported result(s) provide no warranty or verification on the sample(s) representing any specific goods and/or shipment and only relate to the sample(s) as received and tested. This report is prepared solely for the use of the client named in this report. Intertek accepts no responsibility for any loss, damage or liability suffered by a third party as a result of any reliance upon or use of this report.

The results provided are not intended for commercial settlement purposes.

SIGNIFICANT FIGURES

The detection limit for most crystalline phases is approximately 0.5 wt%. However, this is dependent on instrument conditions, matrix, crystallinity and whether the pattern for the phase has been sufficiently deconvoluted in the presence of overlapping reflections.

Uncertainty in the analysis should reflect errors (absolute) of no greater than: +/-10% for phases 50-95%, +/- 5% for phases 10-50% and +/- 2% for phases <10%.

Please note that results are rounded off to integer values

LEGEND

ND	Not Detected
EMPTY CELL	Phase not included in refinement

JOB INFORMATION

PREPARATION

XRD16 (dry 50C, mill < 60um, micronised)

ANALYTICAL METHOD

XRDQUANT01 - Quantitative analysis, crystalline and amorphous content

SAMPLING

Sample(s) coned and quartered, then grab(s) taken

AMORPHOUS CONTENT DETERMINATION

Internal standard single scan

ADDITIONS

Internal standard ZnO (zincite)

SAMPLE PRESENTATION

Sample(s) packed and presented as unoriented powder mount(s) of the total sample

JOB INFORMATION

INSTRUMENTATION AND PARAMETERS

INSTRUMENT: PANalytical Cubix³ XRD
Cobalt radiation (operating at 40 kV and 40 mA)
BBHD monochromator (incident beam)

PARAMETERS:

Parameter	Setting
Start angle (deg 2 θ)	5
End angle (deg 2 θ)	95
Step size (deg 2 θ)	0.02
Time/active length (secs)	30
Active length (deg 2 θ)	4.01

SOFTWARE:

Qualitative analysis: Bruker Diffrac.EVA 6.0 Search/Match
ICDD PDF-2 (2023) database

Quantitative analysis: SIROQUANT Version 4
ICSD (2023) database

RESULTS

The quantitative analysis of the crystalline and amorphous content of each sample is given in the file, **282.00_2415732 XRD RESULTS.xlsx**, attached to the report email.

Calculation of the phase abundances has been based on the Brindley contrast corrections using a particle diameter of 10 μm .

NOTES

1

The amorphous content may contain some of the more poorly crystalline clay phases and conversely the clay phase content may contain some poorly crystalline or amorphous material. Where there is a significant presence of clay material, the distinction between poorly crystalline material and amorphous content can be imprecise.

2

For confirmation of the clay mineralogy, a clay separation followed by analysis of oriented clay mounts (glycol and heat treated) would be required.

QUALITY CONTROL

A standard is used for quality control on the instrument and software.

A standard reference material (SRM) is a powder which consists of sub-micrometre, equi-axed, non-aggregated grains that do not display the effects of absorption contrast, extinction, or preferred orientation.

An aliquot of the NIST SRM656 reference material, spiked with 10% Al₂O₃ (SRM 676a) for the amorphous content determination, was prepared as un-oriented powder mount of the total sample.

Sample ID NIST SRM656 (High α Phase Powder)

		2415732	method	SRM	SRM
			std dev	certified	uncert
Phase	Formula	wt%	wt%	wt%	wt%
Amorphous content		9.6	0.5	9.6	0.6
Si ₃ N ₄ , alpha	Si ₃ N ₄	87.5	0.5	87.4	0.6
Si ₃ N ₄ , beta	Si ₃ N ₄	2.9	0.1	3.0	0.1

Each interval defined by the certified value and its uncertainty is a 95% confidence interval for the true value of the mean in the absence of systematic error.

METHOD DESCRIPTION

A diffraction pattern is calculated using the Rietveld method^{1,2}, and the difference between the calculated and measured diffraction patterns is minimised. The total calculated pattern is the sum of the calculated patterns of the individual crystalline phases.

Results are given as the weight percentages of the individual crystalline phases and total amorphous content, as described overleaf.

The total amorphous content includes amorphous material and unanalysed materials, such as unknown minerals, or known minerals for which there is not a suitable crystal structure.

Corrections are incorporated into the process that allows for a more accurate description of the mineral's contribution to the measured pattern and to allow for variation due to atomic substitution, layer disordering, preferred orientation, and other factors that affect the acquisition of the XRD scan.

Some limitations of qualitative XRD analysis are as follows:

There is a limit of detection of approximately 0.5 wt% on the crystalline phases. The detection of a phase may be dependent on its crystallinity. Where there exist multiple phases, overlap of diffracted reflections can occur, thus rendering some ambiguity into the interpretation. Overlapping reflections of a major phase can mask the presence of minor or trace phases.

Some phases cannot be unambiguously identified, as they are present in minor or trace amounts.

Some limitations of quantitative XRD analysis by a full-profile Rietveld method are as follows:

The limitations for qualitative XRD analysis apply.

The method as described is standardless: it relies solely on the published crystallographic data available for each phase. Some data may not exactly describe the phases present.

Particle size is important with respect to the absorption of the X-rays by the sample. Micronising reduces the particle size to that more suitable for quantitative analysis.

The accuracy of the analysis is dependent on sampling and sample preparation in addition to the calculated profiles being exactly representative of the chemistry of the component phases and their crystallinity. Some preferred orientation effects and reflection overlaps may occur which cannot be adequately resolved.

References:

1. Rietveld, H. M. (1969). A profile refinement method for nuclear and magnetic structures. *J. Appl. Cryst.* 2, 65-71.
2. Loopstra, B. O. & Rietveld, H. M. (1969). The structure of some alkaline-earth metal uranates. *Acta Cryst.* B25, 787-791.

AMORPHOUS CONTENT

INTERNAL STANDARD METHOD

The amorphous content is determined from the addition of a known amount of a well-characterised, crystalline reference material (spike) to each sample^{1,2}.

Single scan

When amorphous material is present, the calculated weight percentage of the spike is larger than actually weighed out. The amount of amorphous material is calculated by scaling the calculated spike's weight percentage to be equal to its known addition.

Double scan

Diffraction data are collected from both unspiked and spiked specimens. The weight percentages calculated from an unspiked specimen are often more accurate as the intensities are not diluted by the spike addition. The weight percentages from the unspiked sample are normalised by the amorphous content calculated from the spiked specimen.

EXTERNAL STANDARD METHOD

The amorphous content is determined by the comparison of the diffracted intensities of an unspiked specimen with a specimen of a well-characterised, crystalline reference material³.

References:

1. Hill, R. J. & Howard, C. J. (1987). Quantitative phase analysis from neutron powder diffraction data using the Rietveld method. *J. Appl. Cryst.* 20, pp. 467–474.
2. I. C. Madsen, N. V. Y. Scarlett, R. Kleeberg and K. Knorr (2019) "Quantitative phase analysis", in *International Tables for Crystallography Volume H Powder Diffraction*, eds. C. J. Gilmore, J. A. Kaduk and H. Schenk, Chapter 3.9, pp.344 – 373, London: Wiley.
3. O'Connor, B.H., and Raven, M.D. (1988), "Application of the Rietveld refinement procedure in assaying powdered mixtures", *Powder Diffraction* 3, pp. 2-6.

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MINERALS TEST REPORT

CLIENT

MARTINICK BOSCH SELL PTY LTD
4 Cook Street
WEST PERTH, W.A. 6005
AUSTRALIA

JOB INFORMATION

JOB CODE : 282.0/2415553
NO. SAMPLES : 5
NO. ELEMENTS : 75
CLIENT ORDER NO. : DLYTSC (Job 1 of 3)
SAMPLE SUBMISSION NO. :
PROJECT : DELTA LITHIUM
SAMPLE TYPE : Tailings
DATE RECEIVED : 29/08/2024
DATE TESTED : 13/09/2024 - 14/10/2024
DATE REPORTED : 14/10/2024
DATE PRINTED : 14/10/2024

REPORT NOTES

TESTED BY

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APPROVED SIGNATURE FOR



Andrew RILEY
Regional Manager
Geochemistry Western Australia

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For more information on the uncertainty on individual reported values, please contact the laboratory.

MEASUREMENT OF UNCERTAINTY

Measurement of uncertainty estimates are available for most tests upon request.

SAMPLE STORAGE

All solid samples (assay pulps, bulk pulps and residues) will be stored for 60 days without charge. Following this samples will be stored at a daily rate until clients written advice regarding return, collection or disposal is received. If storage information is not supplied on the submission, or arranged with the laboratory in writing the default will be to store the samples with the applicable charges. Storage is charged at \$4.00 per m3 per day, expenses related to the return or disposal of samples will also be charged. Current disposal costs including packaging in a Class2 waste disposal facility is charged at \$175.00 per m3.

Samples received as liquids, waters or solutions will be held for 60 days free of charge then disposed of, unless written advice for return or collection is received.

LEGEND	X	= Less than Detection Limit	NA	= Not Analysed
	SNR	= Sample Not Received	UA	= Unable to Assay
	LNR	= Lab Not Received	>	= Value beyond Limit of Method
	DTF	= Result still to come	+	= Extra Sample Received Not Listed
	I/S	= Insufficient Sample for Analysis		

UNITS	ppm for Solid Samples	= mg/Kg
	ppb for Solid Samples	= µg/Kg
	ppm for Liquid Samples	= mg/L
	ppb for Liquid Samples	= µg/L



ELEMENTS	Au	Au	Ag	Ag	Ag	Al
UNITS	ppb	ug/l	ppm	ppm	ug/l	ppm
DETECTION LIMIT	0.1	0.01	0.05	0.01	0.01	10
DIGEST	AR005/	18Ws10/	4A/	AR005/	18Ws10/	4A/
ANALYTICAL FINISH	MS	MS	MS	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	0.4	X	X	0.02	0.01	3.15%
0002 Mags	8.3	X	0.38	0.07	0.01	7.76%
0003 Mica Con	0.4	X	X	0.03	X	9.25%
0004 Ro Tail	0.1	X	X	X	X	1.79%
0005 Slimes	1.4	X	0.06	0.06	X	4.06%

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500						
0004 CRM-TMDW-500		X			2.07	
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147			0.59			4.89%
0012 OREAS 753			0.09			4.33%
0013 OREAS 45f	18.4			0.06		
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank	X			X		
0003 Control Blank			X			X
0004 Control Blank		X			X	



ELEMENTS	Al	Al	ANC	As	As	As
UNITS	%	mg/l	kgH ₂ SO ₄ /t	ppm	ppm	ug/l
DETECTION LIMIT	0.0001	0.01	1	0.2	0.03	0.1
DIGEST	AR005/	18Ws10/	ANCx/	4A/	AR005/	18Ws10/
ANALYTICAL FINISH	MS	OE	VOL	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	0.4452	0.02	7	0.3	0.28	0.5
0002 Mags	0.9041	0.35	30	3.6	3.34	3.1
0003 Mica Con	0.7777	0.01		X	0.15	0.7
0004 Ro Tail	0.1843	0.02		0.2	0.10	0.1
0005 Slimes	0.7183	0.25		0.7	0.64	2.2

CHECKS						
0001 Tailings Composite			5			

STANDARDS						
0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500		0.11				
0004 CRM-TMDW-500						83.1
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6			97			
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147				36.1		
0012 OREAS 753				5.2		
0013 OREAS 45f	4.8929				2.03	
0014 GWS-6						

BLANKS						
0001 Control Blank			0			
0002 Control Blank	X				X	
0003 Control Blank				X		
0004 Control Blank		X				X



ELEMENTS	B	B	Ba	Ba	Ba	Be
UNITS	ppm	mg/l	ppm	ppm	ug/l	ppm
DETECTION LIMIT	0.5	0.01	0.1	0.05	0.05	0.05
DIGEST	AR005/	18Ws10/	4A/	AR005/	18Ws10/	4A/
ANALYTICAL FINISH	MS	OE	MS	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	1.9	0.02	53.7	14.87	0.32	28.15
0002 Mags	4.5	0.02	175.9	111.24	0.82	33.96
0003 Mica Con	3.1	0.01	83.2	14.70	X	16.26
0004 Ro Tail	0.8	0.01	41.2	5.71	0.17	27.81
0005 Slimes	3.2	0.02	73.5	40.08	1.14	27.88

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500		X				
0004 CRM-TMDW-500					50.12	
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147			2064.2			32.59
0012 OREAS 753			14.3			104.19
0013 OREAS 45f	2.5			160.14		
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank	X			X		
0003 Control Blank			X			X
0004 Control Blank		X			X	



ELEMENTS	Be	Be	Bi	Bi	Bi	C
UNITS	ppm	ug/l	ppm	ppm	ug/l	%
DETECTION LIMIT	0.005	0.1	0.01	0.005	0.005	0.01
DIGEST	AR005/	18Ws10/	4A/	AR005/	18Ws10/	
ANALYTICAL FINISH	MS	MS	MS	MS	MS	/CSA
SAMPLE NUMBERS						
0001 Tailings Composite	1.264	X	1.67	2.533	0.021	0.02
0002 Mags	5.130	X	9.11	9.401	0.390	0.18
0003 Mica Con	2.011	X	2.83	4.911	0.010	
0004 Ro Tail	0.404	X	0.49	0.971	0.012	
0005 Slimes	3.238	X	7.16	8.558	0.336	

CHECKS						
0001 Tailings Composite						0.02

STANDARDS						
0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500						
0004 CRM-TMDW-500		21.0			10.481	
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						0.33
0011 OREAS 147			13.17			
0012 OREAS 753			1.97			
0013 OREAS 45f	0.963			0.168		
0014 GWS-6						

BLANKS						
0001 Control Blank						X
0002 Control Blank	X			X		
0003 Control Blank			X			
0004 Control Blank		X			X	



ELEMENTS	CO3	Ca	Ca	Ca	Cd	Cd
UNITS	mgCaCO3/L	ppm	%	mg/l	ppm	ppm
DETECTION LIMIT	1	20	0.0001	0.01	0.01	0.002
DIGEST	18Ws10/	4A/	AR005/	18Ws10/	4A/	AR005/
ANALYTICAL FINISH	VOL	MS	MS	OE	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	X	775	0.1216	0.81	0.20	0.191
0002 Mags	7	2.19%	1.9711	0.72	0.75	0.616
0003 Mica Con	X	664	0.0810	0.10	0.58	0.556
0004 Ro Tail	X	249	0.0367	0.37	0.06	0.063
0005 Slimes	X	3368	0.4186	0.57	0.48	0.435

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500				35.62		
0004 CRM-TMDW-500						
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147		1.13%			0.19	
0012 OREAS 753		787			1.66	
0013 OREAS 45f			0.0738			0.007
0014 GWS-6	X					

BLANKS

0001 Control Blank						
0002 Control Blank				X		X
0003 Control Blank		X			X	
0004 Control Blank	X				X	



ELEMENTS	Cd	Ce	Ce	Ce	Cl	Co
UNITS	ug/l	ppm	ppm	ug/l	mg/l	ppm
DETECTION LIMIT	0.02	0.01	0.002	0.002	2	0.1
DIGEST	18Ws10/	4A/	AR005/	18Ws10/	18Ws10/	4A/
ANALYTICAL FINISH	MS	MS	MS	MS	COL	MS
SAMPLE NUMBERS						
0001 Tailings Composite	X	0.56	1.660	0.006	X	1.9
0002 Mags	X	10.33	8.444	0.111	2	39.7
0003 Mica Con	X	0.25	1.308	0.003	X	1.0
0004 Ro Tail	X	0.44	1.119	0.009	X	0.2
0005 Slimes	X	0.51	1.497	0.019	3	8.4

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339

0002 OREAS 753

0003 CRM-TMDW-500

0004 CRM-TMDW-500

10.45

0.013

0005 KCI-0.02M

0006 PD-1

0007 ANC-6

0008 ABA-Std1

0009 GWS-6

0010 OREAS 45f

0011 OREAS 147

1141.70

6.8

0012 OREAS 753

0.17

0.9

0013 OREAS 45f

21.422

0014 GWS-6

38

BLANKS

0001 Control Blank

0002 Control Blank

X

0003 Control Blank

X

X

0004 Control Blank

X

X

X



ELEMENTS	Co	Co	ColourChange	Cr	Cr	Cr
UNITS	ppm	ug/l	NONE	ppm	ppm	mg/l
DETECTION LIMIT	0.01	0.1	0	0.2	0.1	0.01
DIGEST	AR005/	18Ws10/	ANCx/	4A/	AR005/	18Ws10/
ANALYTICAL FINISH	MS	MS	QUAL	MS	MS	OE
SAMPLE NUMBERS						
0001 Tailings Composite	1.78	X	No	143.9	154.4	X
0002 Mags	38.06	X	No	2614.9	3565.7	X
0003 Mica Con	0.39	X		23.4	22.6	X
0004 Ro Tail	0.19	X		13.1	15.0	X
0005 Slimes	8.22	X		706.7	785.6	X

CHECKS						
0001 Tailings Composite			No			

STANDARDS						
0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500						0.02
0004 CRM-TMDW-500		25.0				
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147				78.2		
0012 OREAS 753				26.6		
0013 OREAS 45f	38.06				365.8	
0014 GWS-6						

BLANKS						
0001 Control Blank						
0002 Control Blank	X				X	
0003 Control Blank				X		
0004 Control Blank		X				X



ELEMENTS	Cs	Cs	Cs	Cu	Cu	Cu
UNITS	ppm	ppm	ug/l	ppm	ppm	mg/l
DETECTION LIMIT	0.05	0.01	0.001	0.5	0.05	0.01
DIGEST	4A/	AR005/	18Ws10/	4A/	AR005/	18Ws10/
ANALYTICAL FINISH	MS	MS	MS	MS	MS	OE
SAMPLE NUMBERS						
0001 Tailings Composite	44.55	8.33	X	8.4	8.59	X
0002 Mags	78.94	26.05	X	169.1	169.24	X
0003 Mica Con	125.69	19.70	X	4.2	4.13	X
0004 Ro Tail	23.03	1.62	X	1.7	1.77	X
0005 Slimes	47.96	13.65	0.002	34.9	36.36	X

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500						0.02
0004 CRM-TMDW-500			X			
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147	248.51			298.2		
0012 OREAS 753	64.35			18.8		
0013 OREAS 45f		1.85			335.17	
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank		X			X	
0003 Control Blank	X			X		
0004 Control Blank			X			X



ELEMENTS	EC	EC	F	F	Fe	Fe
UNITS	uS/cm	uS/cm	ppm	mg/l	%	%
DETECTION LIMIT	10	10	50	0.1	0.001	0.0002
DIGEST	Ws5/	18Ws10/	FC7/	18Ws10/	4A/	AR005/
ANALYTICAL FINISH	MTR	MTR	SIE	SIE	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	28	18	590	0.2	0.326	0.3907
0002 Mags	73	54	3413	0.1	6.429	5.5321
0003 Mica Con		25	4508	0.6	0.512	0.1539
0004 Ro Tail		X	156	X	0.079	0.1534
0005 Slimes		33	1849	0.4	0.642	0.6803

CHECKS						
0001 Tailings Composite	27					

STANDARDS						
0001 AMIS0339			1312			
0002 OREAS 753						
0003 CRM-TMDW-500						
0004 CRM-TMDW-500						
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6	316					
0010 OREAS 45f						
0011 OREAS 147					3.318	
0012 OREAS 753					0.583	
0013 OREAS 45f						13.8148
0014 GWS-6		329		0.6		

BLANKS						
0001 Control Blank	X					
0002 Control Blank						X
0003 Control Blank					X	
0004 Control Blank		X		X		



ELEMENTS	Fe	Final-pH	Fizz-Rate	Ga	Ga	Ga
UNITS	mg/l	NONE	NONE	ppm	ppm	ug/l
DETECTION LIMIT	0.01	0.1	1	0.01	0.005	0.02
DIGEST	18Ws10/	ANCx/	ANCx/	4A/	AR005/	18Ws10/
ANALYTICAL FINISH	OE	MTR	QUAL	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	X	1.5	X	16.07	1.482	0.26
0002 Mags	0.10	2.4	X	24.36	3.939	0.53
0003 Mica Con	X			47.20	3.039	0.06
0004 Ro Tail	X			7.26	0.409	0.06
0005 Slimes	0.08			17.36	2.225	0.74

CHECKS						
0001 Tailings Composite		1.6	X			

STANDARDS						
0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500	0.10					
0004 CRM-TMDW-500						X
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6		1.7				
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147				20.62		
0012 OREAS 753				15.40		
0013 OREAS 45f					20.029	
0014 GWS-6						

BLANKS						
0001 Control Blank		1.5				
0002 Control Blank					X	
0003 Control Blank				X		
0004 Control Blank	X					X



ELEMENTS	Ge	Ge	Ge	HCO3	Hf	Hf
UNITS	ppm	ppm	ug/l	mgCaCO3/L	ppm	ppm
DETECTION LIMIT	0.1	0.01	0.1	2	0.01	0.002
DIGEST	4A/	AR005/	18Ws10/	18Ws10/	4A/	AR005/
ANALYTICAL FINISH	MS	MS	MS	VOL	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	8.5	0.02	X	10	0.69	0.227
0002 Mags	7.7	0.09	0.1	21	3.62	0.062
0003 Mica Con	8.2	0.01	X	9	0.76	0.342
0004 Ro Tail	7.6	0.02	X	4	0.27	0.131
0005 Slimes	7.4	0.02	0.1	19	2.72	0.342

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339

0002 OREAS 753

0003 CRM-TMDW-500

0004 CRM-TMDW-500

X

0005 KCI-0.02M

0006 PD-1

0007 ANC-6

0008 ABA-Std1

0009 GWS-6

0010 OREAS 45f

0011 OREAS 147

2.8

3.18

0012 OREAS 753

6.0

0.96

0013 OREAS 45f

0.02

0.861

0014 GWS-6

102

BLANKS

0001 Control Blank

0002 Control Blank

X

X

0003 Control Blank

X

X

0004 Control Blank

X

2



ELEMENTS	Hf	Hg	Hg	In	In	In
UNITS	ug/l	ppm	ug/l	ppm	ppm	ug/l
DETECTION LIMIT	0.005	0.002	0.1	0.01	0.002	0.002
DIGEST	18Ws10/	AR005/	18Ws10/	4A/	AR005/	18Ws10/
ANALYTICAL FINISH	MS	MS	MS	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	X	0.002	X	X	0.003	X
0002 Mags	0.014	0.005	X	X	0.007	X
0003 Mica Con	X	X	X	X	0.004	X
0004 Ro Tail	X	X	X	X	X	X
0005 Slimes	0.056	0.003	X	X	X	X

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500						
0004 CRM-TMDW-500	X		X			0.006
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147				2.59		
0012 OREAS 753				X		
0013 OREAS 45f		0.030			0.086	
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank		X			X	
0003 Control Blank				X		
0004 Control Blank	X		X			X



ELEMENTS	K	K	K	La	La	La
UNITS	ppm	%	mg/l	ppm	ppm	ug/l
DETECTION LIMIT	10	0.0005	0.1	0.01	0.002	0.002
DIGEST	4A/	AR005/	18Ws10/	4A/	AR005/	18Ws10/
ANALYTICAL FINISH	MS	MS	OE	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	2.86%	0.2251	0.9	0.27	0.926	0.008
0002 Mags	2.47%	0.3282	0.6	5.61	4.617	0.060
0003 Mica Con	5.45%	0.4026	4.4	0.10	0.721	0.003
0004 Ro Tail	2.15%	0.0956	0.1	0.26	0.622	0.004
0005 Slimes	2.95%	0.2281	1.9	0.24	0.828	0.012

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500			2.5			
0004 CRM-TMDW-500						0.004
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147	1.64%			682.18		
0012 OREAS 753	1.93%			0.07		
0013 OREAS 45f		0.0811			10.566	
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank		X			X	
0003 Control Blank	X			X		
0004 Control Blank			X			X



ELEMENTS	Li	Li	Li	Li-Rp1	Mg	Mg
UNITS	ppm	ppm	ug/l	%	ppm	%
DETECTION LIMIT	0.1	0.02	0.05	0.01	10	0.0005
DIGEST	4A/	AR005/	18Ws10/	FP1/	4A/	AR005/
ANALYTICAL FINISH	MS	MS	MS	OE	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	780.2	216.06	80.27		229	0.0225
0002 Mags	>5000.0	>2500.00	2989.70	0.87	2638	0.1785
0003 Mica Con	1769.7	273.20	148.73		1432	0.0343
0004 Ro Tail	217.8	43.76	7.91		29	0.0041
0005 Slimes	2095.6	391.71	202.91		505	0.0613

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500						
0004 CRM-TMDW-500			20.84			
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147	2258.0				5311	
0012 OREAS 753	>5000.0				54	
0013 OREAS 45f		9.35				0.1509
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank		X				X
0003 Control Blank	X				X	
0004 Control Blank			X			



ELEMENTS	Mg	Mn	Mn	Mn	Mo	Mo
UNITS	mg/l	ppm	ppm	mg/l	ppm	ppm
DETECTION LIMIT	0.01	0.5	0.2	0.001	0.05	0.01
DIGEST	18Ws10/	4A/	AR005/	18Ws10/	4A/	AR005/
ANALYTICAL FINISH	OE	MS	MS	OE	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	0.32	561.4	563.7	0.137	18.17	17.79
0002 Mags	0.33	2.01%	1.89%	0.028	442.50	450.02
0003 Mica Con	0.03	290.5	144.2	0.038	1.24	1.45
0004 Ro Tail	0.12	112.2	129.3	0.014	1.80	1.81
0005 Slimes	0.40	1043.6	1041.3	0.101	89.48	92.00

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500	8.95			0.040		
0004 CRM-TMDW-500						
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147		393.2			7.98	
0012 OREAS 753		738.6			3.23	
0013 OREAS 45f			149.6			1.17
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank				X		X
0003 Control Blank		X			X	
0004 Control Blank	X				X	



ELEMENTS	Mo	MPA	Na	Na	Na	NAG
UNITS	ug/l	kgH2SO4/t	ppm	%	mg/l	kgH2SO4/t
DETECTION LIMIT	0.05	1	10	0.0005	0.1	1
DIGEST	18Ws10/		4A/	AR005/	18Ws10/	NAGx/
ANALYTICAL FINISH	MS	/CALC	MS	MS	OE	VOL
SAMPLE NUMBERS						
0001 Tailings Composite	4.05	X	3.36%	0.0776	2.5	0
0002 Mags	9.44	X	1.71%	0.0373	2.8	0
0003 Mica Con	1.19		3.00%	0.0277	2.3	
0004 Ro Tail	0.08		3.35%	0.0836	1.1	
0005 Slimes	29.13		2.80%	0.0565	5.9	

CHECKS						
0001 Tailings Composite		X				0

STANDARDS						
0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500					6.1	
0004 CRM-TMDW-500	100.83					
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						29
0009 GWS-6						
0010 OREAS 45f		X				
0011 OREAS 147			9509			
0012 OREAS 753			2.18%			
0013 OREAS 45f				0.0314		
0014 GWS-6						

BLANKS						
0001 Control Blank		X				6
0002 Control Blank				X		
0003 Control Blank			X			
0004 Control Blank	X				X	



ELEMENTS	NAGpH	NAG(4.5)	NAPP	Nb	Nb	Nb
UNITS	NONE	kgH2SO4/t	kgH2SO4/t	ppm	ppm	ug/l
DETECTION LIMIT	0.1	1	1	0.01	0.002	0.05
DIGEST	NAGx/	NAGx/		4A/	AR005/	18Ws10/
ANALYTICAL FINISH	MTR	VOL	/CALC	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	7.2	0	-7	73.66	0.578	X
0002 Mags	8.9	0	-29	2446.71	7.084	0.23
0003 Mica Con				81.27	0.790	X
0004 Ro Tail				8.24	0.213	X
0005 Slimes				41.52	2.725	0.26

CHECKS						
0001 Tailings Composite	7.2	0	-5			

STANDARDS						
0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500						
0004 CRM-TMDW-500						0.08
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1	2.9	19				
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147				1145.78		
0012 OREAS 753				35.31		
0013 OREAS 45f					0.086	
0014 GWS-6						

BLANKS						
0001 Control Blank	5.0	0	0			
0002 Control Blank					X	
0003 Control Blank				X		
0004 Control Blank						X



ELEMENTS	Nb-Rp1	Ni	Ni	Ni	OH	P
UNITS	ppm	ppm	ppm	mg/l	mgCaCO3/L	ppm
DETECTION LIMIT	0.02	0.5	0.04	0.01	1	50
DIGEST	FP1/	4A/	AR005/	18Ws10/	18Ws10/	4A/
ANALYTICAL FINISH	MS	MS	MS	OE	VOL	MS
SAMPLE NUMBERS						
0001 Tailings Composite		83.8	85.30	X	X	1016
0002 Mags	2588.00	2045.8	1968.14	X	X	2.61%
0003 Mica Con		6.1	6.70	X	X	700
0004 Ro Tail		6.3	6.35	X	X	368
0005 Slimes		422.2	424.94	X	X	2819

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753	37.00					
0003 CRM-TMDW-500				0.06		
0004 CRM-TMDW-500						
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147		23.2				1586
0012 OREAS 753		10.8				890
0013 OREAS 45f			190.15			
0014 GWS-6					X	

BLANKS

0001 Control Blank						
0002 Control Blank			X			
0003 Control Blank		X				X
0004 Control Blank				X	X	



ELEMENTS	P	P	Pb	Pb	Pb	Pd
UNITS	ppm	mg/l	ppm	ppm	ug/l	ppb
DETECTION LIMIT	2	0.05	0.5	0.005	0.5	1
DIGEST	AR005/	18Ws10/	4A/	AR005/	18Ws10/	AR005/
ANALYTICAL FINISH	MS	OE	MS	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	1136	0.30	7.9	4.626	X	X
0002 Mags	>2.00%	1.06	30.9	24.380	0.7	7
0003 Mica Con	547	0.84	8.1	4.749	X	X
0004 Ro Tail	288	0.08	6.1	2.367	X	X
0005 Slimes	3025	0.70	17.6	13.700	0.5	2

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500		X				
0004 CRM-TMDW-500					41.7	
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147			28.9			
0012 OREAS 753			9.9			
0013 OREAS 45f	218			12.404		42
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank	X			X		X
0003 Control Blank			X			
0004 Control Blank		X			X	



ELEMENTS	Pd	pH	pH	pH Drop	Pt	Pt
UNITS	ug/l	NONE	NONE	NONE	ppb	ug/l
DETECTION LIMIT	0.01	0.1	0.1	0.1	2	0.01
DIGEST	18Ws10/	Ws5/	18Ws10/	ANCx/	AR005/	18Ws10/
ANALYTICAL FINISH	MS	MTR	MTR	MTR	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	X	7.8	7.8	4.4	X	X
0002 Mags	X	9.5	9.0	2.8	6	X
0003 Mica Con	X		7.1		X	X
0004 Ro Tail	X		7.3		X	X
0005 Slimes	X		8.5		X	X

CHECKS						
0001 Tailings Composite		8.1		4.6		

STANDARDS						
0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500						
0004 CRM-TMDW-500	X					X
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6		9.0				
0010 OREAS 45f						
0011 OREAS 147						
0012 OREAS 753						
0013 OREAS 45f					38	
0014 GWS-6			8.8			

BLANKS						
0001 Control Blank		5.9				
0002 Control Blank					X	
0003 Control Blank						
0004 Control Blank	X		6.3			X



ELEMENTS	Rb	Rb	Rb	Rb-Rp1	Re	Re
UNITS	ppm	ppm	ug/l	ppm	ppm	ppm
DETECTION LIMIT	0.05	0.005	0.02	0.02	0.002	0.0002
DIGEST	4A/	AR005/	18Ws10/	FP1/	4A/	AR005/
ANALYTICAL FINISH	MS	MS	MS	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	1175.77	130.317	11.92		0.003	0.0021
0002 Mags	1552.43	250.295	6.61		0.048	0.0484
0003 Mica Con	>2000.00	256.536	50.39	2997.52	X	0.0003
0004 Ro Tail	918.58	43.182	1.81		X	0.0003
0005 Slimes	999.95	135.297	31.50		0.010	0.0105

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500						
0004 CRM-TMDW-500			10.28			
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147	1255.45				X	
0012 OREAS 753	540.76				X	
0013 OREAS 45f		14.221				X
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank		X				X
0003 Control Blank	X				X	
0004 Control Blank			X			



ELEMENTS	Re	S	S	S	S	S-SO4
UNITS	ug/l	%	%	ppm	mg/l	%
DETECTION LIMIT	0.001	0.001	0.01	2	0.1	0.01
DIGEST	18Ws10/	4A/		AR005/	18Ws10/	S71/
ANALYTICAL FINISH	MS	MS	/CSA	MS	OE	OE
SAMPLE NUMBERS						
0001 Tailings Composite	X	0.002	X	27	0.2	X
0002 Mags	0.004	0.015	0.02	145	1.1	X
0003 Mica Con	X	0.006		64	0.5	
0004 Ro Tail	X	X		5	X	
0005 Slimes	0.003	0.005		56	0.5	

CHECKS						
0001 Tailings Composite			0.01			X

STANDARDS						
0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500					X	
0004 CRM-TMDW-500	X					
0005 KCI-0.02M						
0006 PD-1						4.21
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f			0.02			
0011 OREAS 147		0.027				
0012 OREAS 753		0.014				
0013 OREAS 45f				265		
0014 GWS-6						

BLANKS						
0001 Control Blank			X			X
0002 Control Blank				X		
0003 Control Blank		X				
0004 Control Blank	X				X	



ELEMENTS	SO4	Sb	Sb	Sb	Sc	Sc
UNITS	mg/l	ppm	ppm	ug/l	ppm	ppm
DETECTION LIMIT	0.3	0.002	0.005	0.01	0.05	0.005
DIGEST	18Ws10/	4A/	AR005/	18Ws10/	4A/	AR005/
ANALYTICAL FINISH	OE	MS	MS	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	0.7	0.056	0.044	0.07	0.17	0.108
0002 Mags	3.4	0.987	0.482	0.22	1.85	0.750
0003 Mica Con	1.6	0.028	0.021	0.07	1.02	0.170
0004 Ro Tail	X	0.024	0.010	0.02	X	0.014
0005 Slimes	1.6	0.149	0.093	0.25	0.17	0.111

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500	X					
0004 CRM-TMDW-500				10.20		
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147		10.610			10.53	
0012 OREAS 753		0.267			0.05	
0013 OREAS 45f			0.220			31.680
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank			X			X
0003 Control Blank		X			X	
0004 Control Blank	X			X		



ELEMENTS	Sc	Se	Se	Se	Sn	Sn
UNITS	mg/l	ppm	ppm	ug/l	ppm	ppm
DETECTION LIMIT	0.01	0.05	0.01	0.5	0.1	0.02
DIGEST	18Ws10/	4A/	AR005/	18Ws10/	4A/	AR005/
ANALYTICAL FINISH	OE	MS	MS	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	X	X	0.01	X	20.8	2.85
0002 Mags	X	0.08	0.07	X	47.5	10.75
0003 Mica Con	X	X	0.01	X	98.6	6.99
0004 Ro Tail	X	X	0.01	X	1.5	0.44
0005 Slimes	X	X	0.03	X	19.2	3.99

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500	X					
0004 CRM-TMDW-500				10.5		
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147		0.88			535.8	
0012 OREAS 753		0.05			83.5	
0013 OREAS 45f			0.36			1.95
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank			X			X
0003 Control Blank		X			X	
0004 Control Blank	X			X		



ELEMENTS	Sn	Sr	Sr	Sr	Ta	Ta
UNITS	ug/l	ppm	ppm	ug/l	ppm	ppm
DETECTION LIMIT	0.1	0.1	0.01	0.02	0.01	0.005
DIGEST	18Ws10/	4A/	AR005/	18Ws10/	4A/	AR005/
ANALYTICAL FINISH	MS	MS	MS	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	X	9.1	8.21	3.23	46.01	0.014
0002 Mags	0.2	97.8	93.79	2.78	1908.41	0.206
0003 Mica Con	X	9.6	5.76	0.32	34.97	0.117
0004 Ro Tail	X	5.9	3.49	2.27	5.25	0.012
0005 Slimes	0.2	20.9	27.16	3.46	24.63	0.093

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500						
0004 CRM-TMDW-500	X			252.82		
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147		299.0			17.75	
0012 OREAS 753		13.7			20.51	
0013 OREAS 45f			13.03			X
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank				X		X
0003 Control Blank		X			X	
0004 Control Blank	X				X	



ELEMENTS	Ta	TDSEva	Te	Te	Te	Th
UNITS	ug/l	mg/Kg	ppm	ppm	ug/l	ppm
DETECTION LIMIT	0.001	20	0.005	0.002	0.1	0.01
DIGEST	18Ws10/	18Ws10/	4A/	AR005/	18Ws10/	4A/
ANALYTICAL FINISH	MS	GR	MS	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	0.020	X	0.006	0.008	X	0.15
0002 Mags	0.165	X	0.037	0.027	X	3.88
0003 Mica Con	0.006	X	0.012	0.011	X	0.16
0004 Ro Tail	0.017	X	X	0.003	X	0.05
0005 Slimes	0.190	X	0.030	0.027	X	0.33

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500						
0004 CRM-TMDW-500	0.130				3.2	
0005 KCI-0.02M		1498.0				
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147			0.046			97.05
0012 OREAS 753			0.050			0.15
0013 OREAS 45f				0.022		
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank				X		
0003 Control Blank			X			X
0004 Control Blank	X	X			X	



ELEMENTS	Th	Th	Ti	Ti	Ti	Ti
UNITS	ppm	ug/l	ppm	ppm	mg/l	ppm
DETECTION LIMIT	0.001	0.005	1	1	0.01	0.01
DIGEST	AR005/	18Ws10/	4A/	AR005/	18Ws10/	4A/
ANALYTICAL FINISH	MS	MS	MS	MS	OE	MS
SAMPLE NUMBERS						
0001 Tailings Composite	0.292	X	75	11	X	6.93
0002 Mags	3.645	0.007	351	61	X	6.16
0003 Mica Con	0.225	X	241	10	X	12.06
0004 Ro Tail	0.096	X	5	2	X	5.33
0005 Slimes	0.604	0.008	62	9	X	7.25

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500					X	
0004 CRM-TMDW-500		X				
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147			4703			11.00
0012 OREAS 753			33			3.73
0013 OREAS 45f	7.600			852		
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank	X			X		
0003 Control Blank			X			X
0004 Control Blank		X			X	



ELEMENTS	TI	TI	TotAlk	U	U	U
UNITS	ppm	ug/l	mgCaCO3/L	ppm	ppm	ug/l
DETECTION LIMIT	0.005	0.01	5	0.005	0.001	0.005
DIGEST	AR005/	18Ws10/		4A/	AR005/	18Ws10/
ANALYTICAL FINISH	MS	MS	/CALC	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	0.586	0.03	10	2.355	4.850	0.541
0002 Mags	1.081	0.02	28	66.154	61.779	15.353
0003 Mica Con	1.044	0.09	9	3.397	3.975	0.080
0004 Ro Tail	0.243	X	X	0.555	1.533	0.391
0005 Slimes	0.614	0.06	19	13.508	19.107	4.558

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500						
0004 CRM-TMDW-500		10.24				10.128
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147				15.969		
0012 OREAS 753				2.562		
0013 OREAS 45f	0.117				1.071	
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank	X				X	
0003 Control Blank				X		
0004 Control Blank		X				X



ELEMENTS	V	V	V	W	W	W
UNITS	ppm	ppm	mg/l	ppm	ppm	ug/l
DETECTION LIMIT	0.05	0.02	0.01	0.05	0.01	0.02
DIGEST	4A/	AR005/	18Ws10/	4A/	AR005/	18Ws10/
ANALYTICAL FINISH	MS	MS	OE	MS	MS	MS
SAMPLE NUMBERS						
0001 Tailings Composite	1.85	1.44	X	3.80	1.04	0.69
0002 Mags	24.57	24.46	X	51.42	10.93	2.06
0003 Mica Con	2.96	0.77	X	9.46	1.04	1.65
0004 Ro Tail	0.16	0.18	X	0.39	0.19	0.07
0005 Slimes	5.14	4.75	X	4.45	2.09	3.63

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500			0.03			
0004 CRM-TMDW-500						0.14
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147	60.04			5.29		
0012 OREAS 753	1.08			5.39		
0013 OREAS 45f		218.06			X	
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank		X			X	
0003 Control Blank	X			X		
0004 Control Blank			X			X



ELEMENTS	Y	Y	Y	Zn	Zn	Zn
UNITS	ppm	ppm	ug/l	ppm	ppm	mg/l
DETECTION LIMIT	0.01	0.001	0.005	1	0.2	0.01
DIGEST	4A/	AR005/	18Ws10/	4A/	AR005/	18Ws10/
ANALYTICAL FINISH	MS	MS	MS	MS	MS	OE
SAMPLE NUMBERS						
0001 Tailings Composite	0.17	0.321	X	69	46.7	X
0002 Mags	6.10	4.552	0.071	290	236.3	X
0003 Mica Con	0.10	0.228	X	264	119.3	X
0004 Ro Tail	0.06	0.102	X	6	5.9	X
0005 Slimes	0.42	0.836	0.010	136	101.1	X

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339						
0002 OREAS 753						
0003 CRM-TMDW-500						0.07
0004 CRM-TMDW-500			X			
0005 KCI-0.02M						
0006 PD-1						
0007 ANC-6						
0008 ABA-Std1						
0009 GWS-6						
0010 OREAS 45f						
0011 OREAS 147	27.01			143		
0012 OREAS 753	0.25			87		
0013 OREAS 45f		6.659			22.2	
0014 GWS-6						

BLANKS

0001 Control Blank						
0002 Control Blank		X			X	
0003 Control Blank	X			X		
0004 Control Blank			X			X



ELEMENTS	Zr	Zr	Zr
UNITS	ppm	ppm	ug/l
DETECTION LIMIT	0.05	0.01	0.02
DIGEST	4A/	AR005/	18Ws10/
ANALYTICAL FINISH	MS	MS	MS
SAMPLE NUMBERS			
0001 Tailings Composite	7.68	2.80	0.05
0002 Mags	40.37	1.60	0.17
0003 Mica Con	8.02	4.09	0.02
0004 Ro Tail	2.54	1.48	0.03
0005 Slimes	28.18	4.94	0.70

CHECKS

0001 Tailings Composite

STANDARDS

0001 AMIS0339			
0002 OREAS 753			
0003 CRM-TMDW-500			
0004 CRM-TMDW-500			0.04
0005 KCI-0.02M			
0006 PD-1			
0007 ANC-6			
0008 ABA-Std1			
0009 GWS-6			
0010 OREAS 45f			
0011 OREAS 147	107.51		
0012 OREAS 753	9.83		
0013 OREAS 45f		27.56	
0014 GWS-6			

BLANKS

0001 Control Blank			
0002 Control Blank		X	
0003 Control Blank	X		
0004 Control Blank			X



METHOD CODE DESCRIPTION

Method Code Date Tested Package	Analysing Laboratory NATA Laboratory Accreditation	NATA Scope of Accreditation
/CALC 13/09/24 17:04	Intertek Genalysis Perth 3244 3237	*
No digestion or other pre-treatment undertaken. Results Determined by calculation from other reported data.		
/CALC 13/09/24 17:04 18Ws10/VOL09	Intertek Genalysis Perth 3244 3237	*
No digestion or other pre-treatment undertaken. Results Determined by calculation from other reported data.		
/CSA 13/09/24 17:04 ARD01	Intertek Genalysis Perth 3244 3237	ENV_W061(Per), MPL_W161(Adl)
Induction Furnace Analysed by Infrared Spectrometry		
18Ws10/COL 13/09/24 06:26 18Ws10/COL01	Intertek Genalysis Perth 3244 3237	
18hr Water Extraction using a sample:water ratio of 1:10. Analysed by Inductively Coupled Plasma UV-Visible Spectrometry		
18Ws10/GR 13/09/24 06:26 18Ws10/GR	Intertek Genalysis Perth 3244 3237	
18hr Water Extraction using a sample:water ratio of 1:10. Analysed by Gravimetric Technique		
18Ws10/MS 13/09/24 06:26 18Ws10/MS	Intertek Genalysis Perth 3244 3237	
18hr Water Extraction using a sample:water ratio of 1:10. Analysed by Inductively Coupled Plasma Mass Spectrometry.		
18Ws10/MTR 13/09/24 06:26 18Ws10/MTR	Intertek Genalysis Perth 3244 3237	
18hr Water Extraction using a sample:water ratio of 1:10. Analysed with Electronic Meter Measurement		
18Ws10/OE 13/09/24 06:26	Intertek Genalysis Perth 3244 3237	
18hr Water Extraction using a sample:water ratio of 1:10. Analysed by Inductively Coupled Plasma Optical (Atomic) Emission Spectrometry.		

METHOD CODE DESCRIPTION

Method Code Date Tested Package	Analysing Laboratory NATA Laboratory Accreditation	NATA Scope of Accreditation
18Ws10/OE 13/09/24 06:26 18Ws10/OE	Intertek Genalysis Perth 3244 3237	18hr Water Extraction using a sample:water ratio of 1:10. Analysed by Inductively Coupled Plasma Optical (Atomic) Emission Spectrometry.
18Ws10/SIE 13/09/24 06:26 18Ws10/SIE	Intertek Genalysis Perth 3244 3237	18hr Water Extraction using a sample:water ratio of 1:10. Analysed by Specific Ion Electrode.
18Ws10/VOL 13/09/24 06:26 18Ws10/VOL09	Intertek Genalysis Perth 3244 3237	18hr Water Extraction using a sample:water ratio of 1:10. Analysed by Inductively Coupled Plasma Volumetric Technique
4A/MS 13/09/24 06:26 4A/MSQ48	Intertek Genalysis Perth 3244 3237	MPL_W002, MS_IM_001(Per), *(AdI), *[Tvl] Multi-acid digest including Hydrofluoric, Nitric, Perchloric and Hydrochloric acids in Teflon Tubes. Analysed by Inductively Coupled Plasma Mass Spectrometry.
ANCx/MTR 13/09/24 06:26 ARD01	Intertek Genalysis Perth 3244 3237	ENV_W035 Acid Neutralizing Capacity Digestion Procedure. Analysed with Electronic Meter Measurement
ANCx/QUAL 13/09/24 06:26 ARD01	Intertek Genalysis Perth 3244 3237	ENV_W035 Acid Neutralizing Capacity Digestion Procedure. Analysed by Qualitative Inspection
ANCx/VOL 13/09/24 06:26 ARD01	Intertek Genalysis Perth 3244 3237	ENV_W035 Acid Neutralizing Capacity Digestion Procedure. Analysed by Volumetric Technique.
AR005/MS 13/09/24 06:19 AR005/MSQ53	Intertek Genalysis Perth 3244 3237	* 0.5 gram mini Aqua-Regia digest. Analysed by Inductively Coupled Plasma Mass Spectrometry.

METHOD CODE DESCRIPTION

Method Code Date Tested Package	Analysing Laboratory NATA Laboratory Accreditation	NATA Scope of Accreditation
FC7/SIE 13/09/24 06:26 FC7/SIE	Intertek Genalysis Perth 3244 3237 Alkaline fusion (Nickel crucible) specific for Fluorine. Analysed by Specific Ion Electrode.	ENV_W012
NAGx/MTR 13/09/24 06:26 ARD01	Intertek Genalysis Perth 3244 3237 Net Acid Generation Extraction of samples with H2O2 Analysed with Electronic Meter Measurement	ENV_W036
NAGx/VOL 13/09/24 06:26 ARD01	Intertek Genalysis Perth 3244 3237 Net Acid Generation Extraction of samples with H2O2 Analysed by Volumetric Technique.	ENV_W036
S71/OE 13/09/24 06:26 S71/OE	Intertek Genalysis Perth 3244 3237 Digestion to eliminate sulphides. Analysed by Inductively Coupled Plasma Optical (Atomic) Emission Spectrometry.	ENV_W062, ICP_IM_001
Ws5/MTR 13/09/24 06:26 ARD01	Intertek Genalysis Perth 3244 3237 Water Extraction using a sample:water ratio of 1:5. Analysed with Electronic Meter Measurement	*

* Denotes not on Scope of Accreditation

MINERALS TEST REPORT

CLIENT

MARTINICK BOSCH SELL PTY LTD
4 Cook Street
WEST PERTH, W.A. 6005
AUSTRALIA

JOB INFORMATION

JOB CODE : 282.0/2415554
NO. SAMPLES : 1
NO. ELEMENTS : 63
CLIENT ORDER NO. : DLYTSC (Job 2 of 3)
SAMPLE SUBMISSION NO. :
PROJECT : DELTA LITHIUM
SAMPLE TYPE : Solutions
DATE RECEIVED : 29/08/2024
DATE TESTED : 11/09/2024 - 20/09/2024
DATE REPORTED : 20/09/2024
DATE PRINTED : 20/09/2024

REPORT NOTES

TESTED BY

Intertek
544 Bickley Road, Maddington 6109, Western Australia
PO Box 144, Gosnells 6990, Western Australia
Tel: +61 8 9263 0100
Email: min.aus.per@intertek.com

APPROVED SIGNATURE FOR



Andrew RILEY
Regional Manager
Geochemistry Western Australia

This report relates specifically to the sample(s) tested that were drawn and/or provided by the client or their nominated third party to Intertek. The reported result(s) provide no warranty or verification on the sample(s) representing any specific goods and/or shipment. This report was prepared solely for the use of the client named in this report. Intertek accepts no responsibility for any loss, damage or liability suffered by a third party as a result of any reliance upon or use of this report. The results provided are not intended for commercial settlement purposes.

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SIGNIFICANT FIGURES

It is common practice to report data derived from analytical instrumentation to a maximum of two or three significant figures. Some data reported herein may show more figures than this. The reporting of more than two or three figures in no way implies that figures beyond the least significant digit have significance.

For more information on the uncertainty on individual reported values, please contact the laboratory.

MEASUREMENT OF UNCERTAINTY

Measurement of uncertainty estimates are available for most tests upon request.

SAMPLE STORAGE

All solid samples (assay pulps, bulk pulps and residues) will be stored for 60 days without charge. Following this samples will be stored at a daily rate until clients written advice regarding return, collection or disposal is received. If storage information is not supplied on the submission, or arranged with the laboratory in writing the default will be to store the samples with the applicable charges. Storage is charged at \$4.00 per m3 per day, expenses related to the return or disposal of samples will also be charged. Current disposal costs including packaging in a Class2 waste disposal facility is charged at \$175.00 per m3.

Samples received as liquids, waters or solutions will be held for 60 days free of charge then disposed of, unless written advice for return or collection is received.

LEGEND	X	= Less than Detection Limit	NA	= Not Analysed
	SNR	= Sample Not Received	UA	= Unable to Assay
	LNR	= Lab Not Received	>	= Value beyond Limit of Method
	DTF	= Result still to come	+	= Extra Sample Received Not Listed
	I/S	= Insufficient Sample for Analysis		

UNITS	ppm for Solid Samples	= mg/Kg
	ppb for Solid Samples	= µg/Kg
	ppm for Liquid Samples	= mg/L
	ppb for Liquid Samples	= µg/L



ELEMENTS	Au	Ag	Al	As	B	Ba
UNITS	ug/l	ug/l	mg/l	ug/l	mg/l	ug/l
DETECTION LIMIT	0.01	0.01	0.01	0.1	0.01	0.05
DIGEST						
ANALYTICAL FINISH	/MS	/MS	/OE	/MS	/OE	/MS
SAMPLE NUMBERS						
0001 Tailings Filtrate	X	X	X	1.2	0.62	4.35
CHECKS						
0001 Tailings Filtrate	X	X	X	1.2	0.63	4.45
STANDARDS						
0001 GWS-6						
0002 GWS-6						
0003 GWS-6						
0004 GWS-6						
0005 GWS-6						
0006 KCl-0.05M						
0007 CRM-TMDW-500	X	1.98		80.6		50.57
0008 CRM-TMDW-500			0.12		X	
BLANKS						
0001 Control Blank	X	X	X	X	X	X



ELEMENTS	Be	Bi	CO3	Ca	Cd	Ce
UNITS	ug/l	ug/l	mgCaCO3/L	mg/l	ug/l	ug/l
DETECTION LIMIT	0.1	0.005	1	0.01	0.02	0.002
DIGEST						
ANALYTICAL FINISH	/MS	/MS	/VOL	/OE	/MS	/MS
SAMPLE NUMBERS						
0001 Tailings Filtrate	X	X	X	28.82	0.24	X
CHECKS						
0001 Tailings Filtrate	X	X	X	28.91	0.23	0.002
STANDARDS						
0001 GWS-6						
0002 GWS-6						
0003 GWS-6			X			
0004 GWS-6						
0005 GWS-6						
0006 KCl-0.05M						
0007 CRM-TMDW-500	19.7	10.442			10.43	0.014
0008 CRM-TMDW-500				35.37		
BLANKS						
0001 Control Blank	X	X	X	0.01	X	X



ELEMENTS	Cl	Co	Cr	Cs	Cu	EC
UNITS	mg/l	ug/l	mg/l	ug/l	mg/l	uS/cm
DETECTION LIMIT	2	0.1	0.01	0.001	0.01	10
DIGEST						
ANALYTICAL FINISH	/COL	/MS	/OE	/MS	/OE	/MTR
SAMPLE NUMBERS						
0001 Tailings Filtrate	67	1.6	X	0.003	X	520
CHECKS						
0001 Tailings Filtrate	67	1.5	X	0.003	X	520
STANDARDS						
0001 GWS-6	38					
0002 GWS-6						320
0003 GWS-6						
0004 GWS-6						
0005 GWS-6						
0006 KCl-0.05M						
0007 CRM-TMDW-500		25.1		X		
0008 CRM-TMDW-500			0.02		0.02	
BLANKS						
0001 Control Blank	X	X	X	X	X	X



ELEMENTS	F	Fe-Sol	Ga	Ge	HCO3	Hf
UNITS	mg/l	mg/l	ug/l	ug/l	mgCaCO3/L	ug/l
DETECTION LIMIT	0.1	0.01	0.02	0.1	2	0.005
DIGEST						
ANALYTICAL FINISH	/SIE	/OE	/MS	/MS	/VOL	/MS
SAMPLE NUMBERS						
0001 Tailings Filtrate	1.3	X	X	0.2	22	X
CHECKS						
0001 Tailings Filtrate	1.3	X	X	0.2	22	X
STANDARDS						
0001 GWS-6						
0002 GWS-6						
0003 GWS-6					100	
0004 GWS-6						
0005 GWS-6	0.6					
0006 KCl-0.05M						
0007 CRM-TMDW-500			X	X		X
0008 CRM-TMDW-500		0.10				
BLANKS						
0001 Control Blank	X	X	X	X	2	X



ELEMENTS	Hg	In	K	La	Li	Mg
UNITS	ug/l	ug/l	mg/l	ug/l	ug/l	mg/l
DETECTION LIMIT	0.1	0.002	0.1	0.002	0.05	0.01
DIGEST						
ANALYTICAL FINISH	/MS	/MS	/OE	/MS	/MS	/OE
SAMPLE NUMBERS						
0001 Tailings Filtrate	X	X	2.9	X	625.24	4.84
CHECKS						
0001 Tailings Filtrate	X	X	2.9	X	643.22	4.84
STANDARDS						
0001 GWS-6						
0002 GWS-6						
0003 GWS-6						
0004 GWS-6						
0005 GWS-6						
0006 KCl-0.05M						
0007 CRM-TMDW-500	X	0.006		0.005	20.71	
0008 CRM-TMDW-500			2.5			9.02
BLANKS						
0001 Control Blank	X	X	X	X	X	X



ELEMENTS	Mn	Mo	Na	Nb	Ni	OH
UNITS	mg/l	ug/l	mg/l	ug/l	mg/l	mgCaCO3/L
DETECTION LIMIT	0.001	0.05	0.1	0.05	0.01	1
DIGEST						
ANALYTICAL FINISH	/OE	/MS	/OE	/MS	/OE	/VOL
SAMPLE NUMBERS						
0001 Tailings Filtrate	4.221	0.49	67.4	X	0.02	X
CHECKS						
0001 Tailings Filtrate	4.255	0.51	67.5	X	0.02	X
STANDARDS						
0001 GWS-6						
0002 GWS-6						
0003 GWS-6						X
0004 GWS-6						
0005 GWS-6						
0006 KCl-0.05M						
0007 CRM-TMDW-500		101.34		0.07		
0008 CRM-TMDW-500	0.040		6.0		0.06	
BLANKS						
0001 Control Blank	X	X	X	X	X	X



ELEMENTS	P	Pb	Pd	pH	Pt	Rb
UNITS	mg/l	ug/l	ug/l	NONE	ug/l	ug/l
DETECTION LIMIT	0.05	0.5	0.01	0.1	0.01	0.02
DIGEST						
ANALYTICAL FINISH	/OE	/MS	/MS	/MTR	/MS	/MS
SAMPLE NUMBERS						
0001 Tailings Filtrate	9.87	X	X	6.6	X	38.04
CHECKS						
0001 Tailings Filtrate	9.98	X	X	6.6	X	38.77
STANDARDS						
0001 GWS-6						
0002 GWS-6				8.9		
0003 GWS-6						
0004 GWS-6						
0005 GWS-6						
0006 KCl-0.05M						
0007 CRM-TMDW-500		40.6	X		X	10.34
0008 CRM-TMDW-500	X					
BLANKS						
0001 Control Blank	X	X	X	5.7	X	X



ELEMENTS	Re	S	SO4	Sb	Sc	Se
UNITS	ug/l	mg/l	mg/l	ug/l	mg/l	ug/l
DETECTION LIMIT	0.001	0.1	0.3	0.01	0.01	0.5
DIGEST						
ANALYTICAL FINISH	/MS	/OE	/OE	/MS	/OE	/MS
SAMPLE NUMBERS						
0001 Tailings Filtrate	X	38.6	115.7	0.06	X	X
CHECKS						
0001 Tailings Filtrate	X	38.9	116.4	0.07	X	X
STANDARDS						
0001 GWS-6						
0002 GWS-6						
0003 GWS-6						
0004 GWS-6						
0005 GWS-6						
0006 KCl-0.05M						
0007 CRM-TMDW-500	X			10.66		10.1
0008 CRM-TMDW-500		X	X		X	
BLANKS						
0001 Control Blank	X	X	X	X	X	X



ELEMENTS	Sn	Sr	Ta	TDSEva	Te	Th
UNITS	ug/l	ug/l	ug/l	mg/Kg	ug/l	ug/l
DETECTION LIMIT	0.1	0.02	0.001	20	0.1	0.005
DIGEST						
ANALYTICAL FINISH	/MS	/MS	/MS	/GR	/MS	/MS
SAMPLE NUMBERS						
0001 Tailings Filtrate	X	170.60	0.007	330	X	X
CHECKS						
0001 Tailings Filtrate	X	168.43	0.009	320	X	X
STANDARDS						
0001 GWS-6						
0002 GWS-6						
0003 GWS-6						
0004 GWS-6						
0005 GWS-6						
0006 KCl-0.05M				3695		
0007 CRM-TMDW-500	X	252.49	0.151		3.2	X
0008 CRM-TMDW-500						
BLANKS						
0001 Control Blank	X	X	X	X	X	X



ELEMENTS	Ti	Tl	TotAlk	U	V	W
UNITS	mg/l	ug/l	mgCaCO3/L	ug/l	mg/l	ug/l
DETECTION LIMIT	0.01	0.01	5	0.005	0.01	0.02
DIGEST						
ANALYTICAL FINISH	/OE	/MS	/CALC	/MS	/OE	/MS
SAMPLE NUMBERS						
0001 Tailings Filtrate	X	0.13	22	0.195	X	0.25
CHECKS						
0001 Tailings Filtrate	X	0.13	22	0.181	X	0.27
STANDARDS						
0001 GWS-6						
0002 GWS-6						
0003 GWS-6						
0004 GWS-6			100			
0005 GWS-6						
0006 KCl-0.05M						
0007 CRM-TMDW-500		10.08		10.295		0.13
0008 CRM-TMDW-500	X				0.03	
BLANKS						
0001 Control Blank	X	X	X	X	X	X



ELEMENTS	Y	Zn	Zr
UNITS	ug/l	mg/l	ug/l
DETECTION LIMIT	0.005	0.01	0.02
DIGEST			
ANALYTICAL FINISH	/MS	/OE	/MS
SAMPLE NUMBERS			
0001 Tailings Filtrate	X	0.06	X
CHECKS			
0001 Tailings Filtrate	X	0.05	X
STANDARDS			
0001 GWS-6			
0002 GWS-6			
0003 GWS-6			
0004 GWS-6			
0005 GWS-6			
0006 KCl-0.05M			
0007 CRM-TMDW-500	X		0.02
0008 CRM-TMDW-500		0.07	
BLANKS			
0001 Control Blank	X	X	X



METHOD CODE DESCRIPTION

Method Code Date Tested Package	Analysing Laboratory NATA Laboratory Accreditation	NATA Scope of Accreditation
/CALC 19/09/24 11:07 VOL09	Intertek Genalysis Perth 3244 3237	* No digestion or other pre-treatment undertaken. Results Determined by calculation from other reported data.
/COL 20/09/24 14:47 COL01	Intertek Genalysis Perth 3244 3237	* No digestion or other pre-treatment undertaken. Analysed by UV-Visible Spectrometry.
/GR 18/09/24 11:18 GR01	Intertek Genalysis Perth 3244 3237	* Analysed by Gravimetric Technique.
/MS 20/09/24 14:48 MS	Intertek Genalysis Perth 3244 3237	MS_IM_001 No digestion or other pre-treatment undertaken. Analysed by Inductively Coupled Plasma Mass Spectrometry.
/MTR 20/09/24 14:47 MTR	Intertek Genalysis Perth 3244 3237	* No digestion or other pre-treatment undertaken. Analysed with Electronic Meter Measurement
/OE 20/09/24 14:48	Intertek Genalysis Perth 3244 3237	ICP_IM_001 Analysed by Inductively Coupled Plasma Optical (Atomic) Emission Spectrometry.
/OE 20/09/24 14:48 OE	Intertek Genalysis Perth 3244 3237	ICP_IM_001 Analysed by Inductively Coupled Plasma Optical (Atomic) Emission Spectrometry.
/SIE 17/09/24 19:01 SIE01	Intertek Genalysis Perth 3244 3237	ENV_W077, ENV_W011 No digestion or other pre-treatment undertaken. Analysed by Specific Ion Electrode.

METHOD CODE DESCRIPTION

Method Code	Analysing Laboratory	NATA Scope of Accreditation
Date Tested	NATA Laboratory Accreditation	
Package		
/VOL	Intertek Genalysis Perth	*
20/09/24 14:47	3244 3237	
VOL09	No digestion or other pre-treatment undertaken. Analysed by Volumetric Technique.	

* Denotes not on Scope of Accreditation

CERTIFICATE OF ANALYSIS 360642

Client Details

Client	MPL Laboratories
Attention	MPL
Address	Envirolab Services (WA) Pty Ltd, 16-18 Hayden Court, Myaree, WA, 6154

Sample Details

Your Reference	<u>216010 PFH1870</u>
Number of Samples	1314 LEAF Column test
Date samples received	02/09/2024
Date completed instructions received	02/09/2024

Analysis Details

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

Report Details

Date results requested by	30/09/2024
Date of Issue	08/11/2024
Reissue Details	This report replaces R00 created on 30/09/2024 due to: Project ID Amended
NATA Accreditation Number 2901. This document shall not be reproduced except in full.	
Accredited for compliance with ISO/IEC 17025 - Testing. Tests not covered by NATA are denoted with *	

Results Approved By

Diego Bigolin, Inorganics Supervisor
 Simon Mills, Group R&D Manager
 Tabitha Roberts, Senior Chemist

Authorised By

Nancy Zhang, Laboratory Manager

SW846-1314 LEAF						
Our Reference		360642-2	360642-3	360642-4	360642-5	360642-6
Your Reference	UNITS	PFH1870-01 Column leach T01	PFH1870-01 Column leach T02	PFH1870-01 Column leach T03	PFH1870-01 Column leach T04	PFH1870-01 Column leach T05
Type of sample		1314 LEAF T01	1314 LEAF T02	1314 LEAF T03	1314 LEAF T04	1314 LEAF T05
Date prepared	-	10/09/2024	11/09/2024	12/09/2024	12/09/2024	13/09/2024
Particle Size used	mm	<2.5mm	<2.5mm	<2.5mm	<2.5mm	<2.5mm
Packed Column Bed Dimensions	mm D x mm H	500mm x 300mm	500mm x 300mm	500mm x 300mm	500mm x 300mm	500mm x 300mm
Mass Used	g	679g (Dry)	679g (Dry)	679g (Dry)	679g (Dry)	679g (Dry)
Percolation Time	hrs	9.4	14.1	23.6	12.0	16.2
Percolation Volume (approx.)	mL	136	204	339	339	339
Average Temperature	°C	21	21	21	21	21
Date analysed	-	11/09/2024	11/09/2024	12/09/2024	13/09/2024	13/09/2024
Fractional pH	pH units	4.8	6.2	6.8	7.1	6.9
Fraction EC	µS/cm	350	33	21	12	5

SW846-1314 LEAF						
Our Reference		360642-7	360642-8	360642-9	360642-10	360642-11
Your Reference	UNITS	PFH1870-01 Column leach T06	PFH1870-01 Column leach T07	PFH1870-01 Column leach T08	PFH1870-01 Column leach T09	Leaf 1314 blank
Type of sample		1314 LEAF T06	1314 LEAF T07	1314 LEAF T08	1314 LEAF T09	1314 blank
Date prepared	-	17/09/2024	18/09/2024	23/09/2024	24/09/2024	24/09/2024
Particle Size used	mm	<2.5mm	<2.5mm	<2.5mm	<2.5mm	[NT]
Packed Column Bed Dimensions	mm D x mm H	500mm x 300mm	500mm x 300mm	500mm x 300mm	500mm x 300mm	[NT]
Mass Used	g	679g (Dry)	679g (Dry)	679g (Dry)	679g (Dry)	[NT]
Percolation Time	hrs	101	18.9	121.2	23.6	[NT]
Percolation Volume (approx.)	mL	1,697	339	3,055	339	[NT]
Average Temperature	°C	21	21	21	21	[NT]
Date analysed	-	19/09/2024	19/09/2024	24/09/2024	24/09/2024	24/09/2024
Fractional pH	pH units	6.5	6.5	6.5	6.4	5.9
Fraction EC	µS/cm	9	6	6	6	<1

Miscellaneous Inorganics						
Our Reference		360642-2	360642-3	360642-4	360642-5	360642-6
Your Reference	UNITS	PFH1870-01 Column leach T01	PFH1870-01 Column leach T02	PFH1870-01 Column leach T03	PFH1870-01 Column leach T04	PFH1870-01 Column leach T05
Type of sample		1314 LEAF T01	1314 LEAF T02	1314 LEAF T03	1314 LEAF T04	1314 LEAF T05
Date prepared	-	11/09/2024	11/09/2024	12/09/2024	13/09/2024	13/09/2024
Date analysed	-	11/09/2024	11/09/2024	12/09/2024	13/09/2024	13/09/2024
Chloride, Cl	mg/L	68	<1	<1	<1	<1
Fluoride, F	mg/L	0.3	1.5	0.6	0.1	<0.1

Miscellaneous Inorganics						
Our Reference		360642-7	360642-8	360642-9	360642-10	360642-11
Your Reference	UNITS	PFH1870-01 Column leach T06	PFH1870-01 Column leach T07	PFH1870-01 Column leach T08	PFH1870-01 Column leach T09	Leaf 1314 blank
Type of sample		1314 LEAF T06	1314 LEAF T07	1314 LEAF T08	1314 LEAF T09	1314 blank
Date prepared	-	19/09/2024	19/09/2024	24/09/2024	24/09/2024	27/09/2024
Date analysed	-	19/09/2024	19/09/2024	24/09/2024	24/09/2024	27/09/2024
Chloride, Cl	mg/L	<1	<1	<1	<1	<1
Fluoride, F	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1

Cations in Eluate						
Our Reference		360642-2	360642-3	360642-4	360642-5	360642-6
Your Reference	UNITS	PFH1870-01 Column leach T01	PFH1870-01 Column leach T02	PFH1870-01 Column leach T03	PFH1870-01 Column leach T04	PFH1870-01 Column leach T05
Type of sample		1314 LEAF T01	1314 LEAF T02	1314 LEAF T03	1314 LEAF T04	1314 LEAF T05
Date digested	-	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024
Date analysed	-	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024
Sodium - Dissolved	mg/L	47	7.4	5	3	2
Potassium - Dissolved	mg/L	5.5	<0.5	<0.5	<0.5	<0.5
Calcium - Dissolved	mg/L	2	<0.5	<0.5	<0.5	<0.5
Magnesium - Dissolved	mg/L	2	<0.5	<0.5	<0.5	<0.5

Cations in Eluate						
Our Reference		360642-7	360642-8	360642-9	360642-10	360642-11
Your Reference	UNITS	PFH1870-01 Column leach T06	PFH1870-01 Column leach T07	PFH1870-01 Column leach T08	PFH1870-01 Column leach T09	Leaf 1314 blank
Type of sample		1314 LEAF T06	1314 LEAF T07	1314 LEAF T08	1314 LEAF T09	1314 blank
Date digested	-	27/09/2024	27/09/2024	27/09/2024	27/09/2024	27/09/2024
Date analysed	-	27/09/2024	27/09/2024	27/09/2024	27/09/2024	27/09/2024
Sodium - Dissolved	mg/L	2	1	0.5	<0.5	<0.5
Potassium - Dissolved	mg/L	<0.5	<0.5	0.7	1	<0.5
Calcium - Dissolved	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Magnesium - Dissolved	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5

All metals in Eluate						
Our Reference		360642-2	360642-3	360642-4	360642-5	360642-6
Your Reference	UNITS	PFH1870-01 Column leach T01	PFH1870-01 Column leach T02	PFH1870-01 Column leach T03	PFH1870-01 Column leach T04	PFH1870-01 Column leach T05
Type of sample		1314 LEAF T01	1314 LEAF T02	1314 LEAF T03	1314 LEAF T04	1314 LEAF T05
Date prepared	-	16/09/2024	16/09/2024	16/09/2024	16/09/2024	16/09/2024
Date analysed	-	16/09/2024	16/09/2024	16/09/2024	16/09/2024	16/09/2024
Silver-Dissolved	µg/L	<1	<1	<1	<1	<1
Aluminium-Dissolved	µg/L	440	220	30	10	10
Arsenic-Dissolved	µg/L	1	5	2	<1	<1
Barium-Dissolved	µg/L	28	<1	<1	<1	<1
Bismuth-Dissolved	µg/L	<1	<1	<1	<1	<1
Beryllium-Dissolved	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromine-Dissolved	µg/L	910	23	<10	<10	<10
Cadmium-Dissolved	µg/L	0.2	<0.1	<0.1	<0.1	<0.1
Cobalt-Dissolved	µg/L	6	<1	<1	<1	<1
Chromium-Dissolved	µg/L	2	1	<1	<1	<1
Copper-Dissolved	µg/L	9	2	<1	<1	<1
Caesium-Dissolved	µg/L	<1	<1	<1	<1	<1
Iron-Dissolved	µg/L	60	50	<10	<10	<10
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Lanthanum-Dissolved	µg/L	<1	<1	<1	<1	<1
Lithium-Dissolved	µg/L	1,300	210	95	74	47
Manganese-Dissolved	µg/L	380	6	<5	<5	<5
Molybdenum-Dissolved	µg/L	59	43	8	2	3
Nickel-Dissolved	µg/L	11	<1	<1	<1	<1
Lead-Dissolved	µg/L	2	<1	<1	<1	<1
Niobium-Dissolved	µg/L	<1	<1	<1	<1	<1
Rubidium-Dissolved	µg/L	8	3	<1	<1	<1
Antimony-Dissolved	µg/L	<1	<1	<1	<1	<1
Selenium-Dissolved	µg/L	<1	<1	<1	<1	<1
Tin-Dissolved	µg/L	<1	<1	<1	<1	<1
Strontium-Dissolved	µg/L	14	<1	<1	<1	<1
Tantalum-Dissolved	µg/L	<1	<1	<1	<2	<1
Titanium-Dissolved	µg/L	<1	2.8	<1	<1	<1
Thallium-Dissolved	µg/L	<1	<1	<1	<1	<1
Thorium-Dissolved	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Uranium-Dissolved	µg/L	0.9	0.7	<0.5	<0.5	<0.5
Vanadium-Dissolved	µg/L	<1	4	3	2	1
Tungsten-Dissolved	µg/L	<1	3	2	<1	<1
Zinc-Dissolved	µg/L	37	2	<1	<1	<1

All metals in Eluate						
Our Reference		360642-7	360642-8	360642-9	360642-10	360642-11
Your Reference	UNITS	PFH1870-01 Column leach T06	PFH1870-01 Column leach T07	PFH1870-01 Column leach T08	PFH1870-01 Column leach T09	Leaf 1314 blank
Type of sample		1314 LEAF T06	1314 LEAF T07	1314 LEAF T08	1314 LEAF T09	1314 blank
Date prepared	-	25/09/2024	25/09/2024	25/09/2024	25/09/2024	25/09/2024
Date analysed	-	25/09/2024	25/09/2024	25/09/2024	25/09/2024	25/09/2024
Silver-Dissolved	µg/L	<1	<1	<1	<1	<1
Aluminium-Dissolved	µg/L	<10	<10	<10	<10	<10
Arsenic-Dissolved	µg/L	<1	<1	<1	<1	<1
Barium-Dissolved	µg/L	<1	<1	<1	<1	<1
Bismuth-Dissolved	µg/L	<1	<1	<1	<1	<1
Beryllium-Dissolved	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Bromine-Dissolved	µg/L	<10	<10	<10	<10	<10
Cadmium-Dissolved	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1
Cobalt-Dissolved	µg/L	<1	<1	<1	<1	<1
Chromium-Dissolved	µg/L	<1	<1	<1	<1	<1
Copper-Dissolved	µg/L	<1	<1	<1	<1	<1
Caesium-Dissolved	µg/L	<1	<1	<1	<1	<1
Iron-Dissolved	µg/L	<10	<10	<10	<10	<10
Mercury-Dissolved	µg/L	<0.05	<0.05	<0.05	<0.05	<0.05
Lanthanum-Dissolved	µg/L	<1	<1	<1	<1	<1
Lithium-Dissolved	µg/L	51	71	64	60	<1
Manganese-Dissolved	µg/L	<5	<5	<5	<5	<5
Molybdenum-Dissolved	µg/L	2	<1	<1	<1	<1
Nickel-Dissolved	µg/L	<1	<1	<1	<1	<1
Lead-Dissolved	µg/L	<1	<1	<1	<1	<1
Niobium-Dissolved	µg/L	<1	<1	<1	<1	<1
Rubidium-Dissolved	µg/L	<1	<1	2	2	<1
Antimony-Dissolved	µg/L	<1	<1	<1	<1	<1
Selenium-Dissolved	µg/L	<1	<1	<1	<1	<1
Tin-Dissolved	µg/L	<1	<1	<1	<1	<1
Strontium-Dissolved	µg/L	<1	<1	<1	<1	<1
Tantalum-Dissolved	µg/L	<1	<2	<1	<1	<1
Titanium-Dissolved	µg/L	<1	<1	<1	<1	<1
Thallium-Dissolved	µg/L	<1	<1	<1	<1	<1
Thorium-Dissolved	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Uranium-Dissolved	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Vanadium-Dissolved	µg/L	<1	<1	<1	<1	<1
Tungsten-Dissolved	µg/L	<1	<1	<1	<1	<1
Zinc-Dissolved	µg/L	<1	<1	<1	<1	<1

Metals in Water - Dissolved						
Our Reference		360642-2	360642-3	360642-4	360642-5	360642-6
Your Reference	UNITS	PFH1870-01 Column leach T01	PFH1870-01 Column leach T02	PFH1870-01 Column leach T03	PFH1870-01 Column leach T04	PFH1870-01 Column leach T05
Type of sample		1314 LEAF T01	1314 LEAF T02	1314 LEAF T03	1314 LEAF T04	1314 LEAF T05
Date digested	-	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024
Date analysed	-	17/09/2024	17/09/2024	17/09/2024	17/09/2024	17/09/2024
Sulfur - Dissolved	mg/L	11	1	<0.5	<0.5	<0.5
Silicon*- Dissolved	mg/L	7.5	6.8	4.7	2.9	2.4
Phosphorus - Dissolved	mg/L	0.3	3.1	2.4	1.3	0.92

Metals in Water - Dissolved						
Our Reference		360642-7	360642-8	360642-9	360642-10	360642-11
Your Reference	UNITS	PFH1870-01 Column leach T06	PFH1870-01 Column leach T07	PFH1870-01 Column leach T08	PFH1870-01 Column leach T09	Leaf 1314 blank
Type of sample		1314 LEAF T06	1314 LEAF T07	1314 LEAF T08	1314 LEAF T09	1314 blank
Date digested	-	27/09/2024	27/09/2024	27/09/2024	27/09/2024	27/09/2024
Date analysed	-	27/09/2024	27/09/2024	27/09/2024	27/09/2024	27/09/2024
Sulfur - Dissolved	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5
Silicon*- Dissolved	mg/L	2.6	1.8	1.6	1.6	<0.2
Phosphorus - Dissolved	mg/L	0.53	0.4	0.4	0.3	<0.05

Method ID	Methodology Summary
Inorg-026	Fluoride determined by ion selective electrode (ISE) in accordance with APHA latest edition, 4500-F-C.
Inorg-081	Anions - a range of Anions are determined by Ion Chromatography, in accordance with APHA latest edition, 4110-B. Waters samples are filtered on receipt prior to analysis. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
INORG-125	Leaching Environment Assessment Framework (LEAF) methods of leaching using USEPA methods SW846 1313, 1314, 1315 or 1316. All eluates are filtered through 0.45um prior to analysis unless otherwise noted. Please note the 1315 is not currently designed for Organic Analyses, however, we understand that the method is being used for SVOCs in the US at present.
Metals-020	Determination of various metals by ICP-AES.
Metals-021	Determination of Mercury by Cold Vapour AAS.
Metals-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms (e.g. FeO, PbO, ZnO) are determined stoichiometrically from the base metal concentration.

Client Reference: 216010 PFH1870

QUALITY CONTROL: SW846-1314 LEAF				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	[NT]
Date prepared	-			11/09/2024	7	17/09/2024	19/09/2024		11/09/2024	[NT]
Date analysed	-			[NT]	7	19/09/2024	19/09/2024		[NT]	[NT]

Client Reference: 216010 PFH1870

QUALITY CONTROL: Miscellaneous Inorganics				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	360642-8
Date prepared	-			11/09/2024	7	19/09/2024	19/09/2024		11/09/2024	19/09/2024
Date analysed	-			11/09/2024	7	19/09/2024	19/09/2024		11/09/2024	19/09/2024
Chloride, Cl	mg/L	1	Inorg-081	<1	7	<1	<1	0	105	108
Fluoride, F	mg/L	0.1	Inorg-026	<0.1	7	<0.1	[NT]		100	[NT]

QUALITY CONTROL: Cations in Eluate					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	360642-6
Date digested	-			17/09/2024	4	17/09/2024	17/09/2024		17/09/2024	17/09/2024
Date analysed	-			17/09/2024	4	17/09/2024	17/09/2024		17/09/2024	17/09/2024
Sodium - Dissolved	mg/L	0.5	Metals-020	<0.5	4	5	5	0	97	120
Potassium - Dissolved	mg/L	0.5	Metals-020	<0.5	4	<0.5	<0.5	0	93	116
Calcium - Dissolved	mg/L	0.5	Metals-020	<0.5	4	<0.5	<0.5	0	98	128
Magnesium - Dissolved	mg/L	0.5	Metals-020	<0.5	4	<0.5	<0.5	0	97	127

QUALITY CONTROL: Cations in Eluate					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	360642-8
Date digested	-			[NT]	7	27/09/2024	27/09/2024		27/09/2024	27/09/2024
Date analysed	-			[NT]	7	27/09/2024	27/09/2024		27/09/2024	27/09/2024
Sodium - Dissolved	mg/L	0.5	Metals-020	[NT]	7	2	2	0	99	101
Potassium - Dissolved	mg/L	0.5	Metals-020	[NT]	7	<0.5	<0.5	0	104	103
Calcium - Dissolved	mg/L	0.5	Metals-020	[NT]	7	<0.5	<0.5	0	106	105
Magnesium - Dissolved	mg/L	0.5	Metals-020	[NT]	7	<0.5	<0.5	0	110	109

QUALITY CONTROL: Cations in Eluate					Duplicate			Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date digested	-			[NT]	9	27/09/2024	27/09/2024		[NT]	[NT]
Date analysed	-			[NT]	9	27/09/2024	27/09/2024		[NT]	[NT]
Sodium - Dissolved	mg/L	0.5	Metals-020	[NT]	9	0.5	0.5	0	[NT]	[NT]
Potassium - Dissolved	mg/L	0.5	Metals-020	[NT]	9	0.7	0.7	0	[NT]	[NT]
Calcium - Dissolved	mg/L	0.5	Metals-020	[NT]	9	<0.5	<0.5	0	[NT]	[NT]
Magnesium - Dissolved	mg/L	0.5	Metals-020	[NT]	9	<0.5	<0.5	0	[NT]	[NT]

Client Reference: 216010 PFH1870

QUALITY CONTROL: All metals in Eluate				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	360642-5
Date prepared	-			16/09/2024	4	16/09/2024	16/09/2024		16/09/2024	16/09/2024
Date analysed	-			16/09/2024	4	16/09/2024	16/09/2024		16/09/2024	16/09/2024
Silver-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	98	89
Aluminium-Dissolved	µg/L	10	Metals-022	<10	4	30	40	29	98	87
Arsenic-Dissolved	µg/L	1	Metals-022	<1	4	2	2	0	94	101
Barium-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	94	92
Bismuth-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	91	86
Beryllium-Dissolved	µg/L	0.5	Metals-022	<0.5	4	<0.5	<0.5	0	87	82
Bromine-Dissolved	µg/L	10	Metals-022	<10	4	<10	<10	0	82	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	<0.1	4	<0.1	<0.1	0	100	104
Cobalt-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	95	95
Chromium-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	96	94
Copper-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	94	97
Caesium-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	94	93
Iron-Dissolved	µg/L	10	Metals-022	<10	4	<10	<10	0	92	91
Mercury-Dissolved	µg/L	0.05	Metals-021	<0.05	4	<0.05	<0.05	0	90	75
Lanthanum-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	98	93
Lithium-Dissolved	µg/L	1	Metals-022	<1	4	95	91	4	90	108
Manganese-Dissolved	µg/L	5	Metals-022	<5	4	<5	<5	0	96	96
Molybdenum-Dissolved	µg/L	1	Metals-022	<1	4	8	8	0	92	96
Nickel-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	96	98
Lead-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	96	97
Niobium-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	92	71
Rubidium-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	96	97
Antimony-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	94	95
Selenium-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	98	98
Tin-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	94	82
Strontium-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	99	100
Tantalum-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	85	#
Titanium-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	98	96
Thallium-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	97	99
Thorium-Dissolved	µg/L	0.5	Metals-022	<0.5	4	<0.5	<0.5	0	91	92
Uranium-Dissolved	µg/L	0.5	Metals-022	<0.5	4	<0.5	<0.5	0	92	97
Vanadium-Dissolved	µg/L	1	Metals-022	<1	4	3	3	0	95	94
Tungsten-Dissolved	µg/L	1	Metals-022	<1	4	2	2	0	88	89
Zinc-Dissolved	µg/L	1	Metals-022	<1	4	<1	<1	0	103	105

QUALITY CONTROL: All metals in Eluate				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	360642-8
Date prepared	-			[NT]	7	25/09/2024	25/09/2024		25/09/2024	25/09/2024
Date analysed	-			[NT]	7	25/09/2024	25/09/2024		25/09/2024	25/09/2024
Silver-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	101	95
Aluminium-Dissolved	µg/L	10	Metals-022	[NT]	7	<10	<10	0	89	90
Arsenic-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	95	104
Barium-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	102	106
Bismuth-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	102	72
Beryllium-Dissolved	µg/L	0.5	Metals-022	[NT]	7	<0.5	<0.5	0	114	120
Bromine-Dissolved	µg/L	10	Metals-022	[NT]	7	<10	<10	0	83	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	[NT]	7	<0.1	<0.1	0	99	112
Cobalt-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	105	111
Chromium-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	107	109
Copper-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	104	110
Caesium-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	98	103
Iron-Dissolved	µg/L	10	Metals-022	[NT]	7	<10	<10	0	99	105
Mercury-Dissolved	µg/L	0.05	Metals-021	[NT]	7	<0.05	<0.05	0	100	76
Lanthanum-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	113	114
Lithium-Dissolved	µg/L	1	Metals-022	[NT]	7	51	43	17	108	94
Manganese-Dissolved	µg/L	5	Metals-022	[NT]	7	<5	<5	0	101	111
Molybdenum-Dissolved	µg/L	1	Metals-022	[NT]	7	2	2	0	99	102
Nickel-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	102	109
Lead-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	103	103
Niobium-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	101	84
Rubidium-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	114	101
Antimony-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	100	104
Selenium-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	99	108
Tin-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	100	92
Strontium-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	98	110
Tantalum-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	102	#
Titanium-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	98	109
Thallium-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	105	103
Thorium-Dissolved	µg/L	0.5	Metals-022	[NT]	7	<0.5	<0.5	0	100	100
Uranium-Dissolved	µg/L	0.5	Metals-022	[NT]	7	<0.5	<0.5	0	102	101
Vanadium-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	104	110
Tungsten-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	98	92
Zinc-Dissolved	µg/L	1	Metals-022	[NT]	7	<1	<1	0	105	122

QUALITY CONTROL: All metals in Eluate				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date prepared	-			[NT]	9	25/09/2024	25/09/2024		[NT]	[NT]
Date analysed	-			[NT]	9	25/09/2024	25/09/2024		[NT]	[NT]
Silver-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Aluminium-Dissolved	µg/L	10	Metals-022	[NT]	9	<10	<10	0	[NT]	[NT]
Arsenic-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Barium-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Bismuth-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Beryllium-Dissolved	µg/L	0.5	Metals-022	[NT]	9	<0.5	<0.5	0	[NT]	[NT]
Bromine-Dissolved	µg/L	10	Metals-022	[NT]	9	<10	<10	0	[NT]	[NT]
Cadmium-Dissolved	µg/L	0.1	Metals-022	[NT]	9	<0.1	<0.1	0	[NT]	[NT]
Cobalt-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Chromium-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Copper-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Caesium-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Iron-Dissolved	µg/L	10	Metals-022	[NT]	9	<10	<10	0	[NT]	[NT]
Mercury-Dissolved	µg/L	0.05	Metals-021	[NT]	9	<0.05	<0.05	0	[NT]	[NT]
Lanthanum-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Lithium-Dissolved	µg/L	1	Metals-022	[NT]	9	64	70	9	[NT]	[NT]
Manganese-Dissolved	µg/L	5	Metals-022	[NT]	9	<5	<5	0	[NT]	[NT]
Molybdenum-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Nickel-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Lead-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Niobium-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Rubidium-Dissolved	µg/L	1	Metals-022	[NT]	9	2	2	0	[NT]	[NT]
Antimony-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Selenium-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Tin-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Strontium-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Tantalum-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Titanium-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Thallium-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Thorium-Dissolved	µg/L	0.5	Metals-022	[NT]	9	<0.5	<0.5	0	[NT]	[NT]
Uranium-Dissolved	µg/L	0.5	Metals-022	[NT]	9	<0.5	<0.5	0	[NT]	[NT]
Vanadium-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Tungsten-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]
Zinc-Dissolved	µg/L	1	Metals-022	[NT]	9	<1	<1	0	[NT]	[NT]

Client Reference: 216010 PFH1870

QUALITY CONTROL: Metals in Water - Dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W1	360642-6
Date digested	-			17/09/2024	4	17/09/2024	17/09/2024		17/09/2024	17/09/2024
Date analysed	-			17/09/2024	4	17/09/2024	17/09/2024		17/09/2024	17/09/2024
Sulfur - Dissolved	mg/L	0.5	Metals-020	<0.5	4	<0.5	<0.5	0	104	122
Silicon*- Dissolved	mg/L	0.2	Metals-020	<0.2	4	4.7	4.7	0	104	102
Phosphorus - Dissolved	mg/L	0.05	Metals-020	<0.05	4	2.4	2.4	0	110	128

QUALITY CONTROL: Metals in Water - Dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-W2	360642-8
Date digested	-			[NT]	7	27/09/2024	27/09/2024		27/09/2024	27/09/2024
Date analysed	-			[NT]	7	27/09/2024	27/09/2024		27/09/2024	27/09/2024
Sulfur - Dissolved	mg/L	0.5	Metals-020	[NT]	7	<0.5	<0.5	0	110	108
Silicon*- Dissolved	mg/L	0.2	Metals-020	[NT]	7	2.6	2.5	4	103	106
Phosphorus - Dissolved	mg/L	0.05	Metals-020	[NT]	7	0.53	0.53	0	103	104

QUALITY CONTROL: Metals in Water - Dissolved				Duplicate				Spike Recovery %		
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	[NT]	[NT]
Date digested	-			[NT]	9	27/09/2024	27/09/2024		[NT]	[NT]
Date analysed	-			[NT]	9	27/09/2024	27/09/2024		[NT]	[NT]
Sulfur - Dissolved	mg/L	0.5	Metals-020	[NT]	9	<0.5	<0.5	0	[NT]	[NT]
Silicon*- Dissolved	mg/L	0.2	Metals-020	[NT]	9	1.6	1.5	6	[NT]	[NT]
Phosphorus - Dissolved	mg/L	0.05	Metals-020	[NT]	9	0.4	0.3	29	[NT]	[NT]

Result Definitions

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

Quality Control Definitions

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

Laboratory Acceptance Criteria

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

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

Spikes for Physical and Aggregate Tests are not applicable.

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

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

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

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

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

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

Where matrix spike recoveries fall below the lower limit of the acceptance criteria (e.g. for non-labile or standard Organics <60%), positive result(s) in the parent sample will subsequently have a higher than typical estimated uncertainty (MU estimates supplied on request) and in these circumstances the sample result is likely biased significantly low.

Measurement Uncertainty estimates are available for most tests upon request.

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

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

Report Comments

All metals in water-dissolved:

- # Low spike recovery was obtained for this sample. Sample matrix interference is suspected. However, an acceptable recovery was obtained for the LCS.
- The PQL for Ta for 360642-5 and 8 has been raised due to the low spike recovery. This may reflect other samples where similar in matrix and similar analytical interferences occur.

Certificate of Analysis PFH1870

Client Details

Client	MBS Environmental
Contact	Greg Lekmine
Address	4 Cook St, WEST PERTH, WA, 6005

Sample Details

Your Reference	DLYTSC
Number of Samples	8 Tailings
Date Samples Received	29/08/2024
Date Instructions Received	29/08/2024

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for soils and on an as received basis for other matrices.

Report Details

Date Results Requested by	21/10/2024
Date of Issue	30/10/2024

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Accredited for compliance with ISO/IEC 17025. Tests not covered by NATA are denoted with *.

Authorisation Details

Results Approved By	Ben Carpenter, Metals Technician Heram Halim, Operations Manager Lien Tang, Assistant Operations Manager Lucas Yij, Inorganics Team Leader Michael Mowle, Inorganics Supervisor Stacey Hawkins, ASS/AMD Supervisor Travis Carey, Organics Supervisor Varsha Ho Wing, Inorganics and Metals Supervisor
Laboratory Manager	Michael Kubiak

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Samples in this Report

Envirolab ID	Sample ID	Description	Matrix	Date Sampled	Date Received
PFH1870-01	Tailings Composite		Tailings	29/08/2024	29/08/2024
PFH1870-02	Tailings Composite - Split 1	Hold 1 day	Tailings	29/08/2024	29/08/2024
PFH1870-03	Tailings Composite - Split 2	Hold 3 days	Tailings	29/08/2024	29/08/2024
PFH1870-04	Tailings Composite - Split 3	Hold 7 days	Tailings	29/08/2024	29/08/2024
PFH1870-05	Tailings Composite - Split 4	Hold 14 days	Tailings	29/08/2024	29/08/2024
PFH1870-06	LEAF 1313 - B01		Tailings	29/08/2024	29/08/2024
PFH1870-07	LEAF 1313 - B02		Tailings	29/08/2024	29/08/2024
PFH1870-08	LEAF 1313 - B03		Tailings	29/08/2024	29/08/2024

Certificate of Analysis PFH1870

Liquor Leachate Inorganics (Tailings)

Envirolab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Electrical Conductivity*	µS/cm	2.0	29
pH*	pH units		7.0

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Liquor Leachate Metals (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Date Sampled			
Mercury*	mg/L	0.000050	<0.0050 [3]
Antimony*	mg/L	0.0010	<0.0010
Arsenic*	mg/L	0.0010	<0.0010
Barium*	mg/L	0.0010	0.0020
Beryllium*	mg/L	0.00050	<0.00050
Bismuth*	mg/L	0.0010	<0.0010
Cadmium*	mg/L	0.00010	0.00020
Caesium*	mg/L	0.0010	0.0022
Chromium*	mg/L	0.0010	0.091
Cobalt*	mg/L	0.0010	<0.0010
Copper*	mg/L	0.0010	0.0029
Lanthanum*	mg/L	0.00050	<0.00050
Lead*	mg/L	0.0010	0.0012
Lithium*	mg/L	0.0010	1.4
Manganese	mg/L	0.0010	0.32
Molybdenum*	mg/L	0.0010	0.0060
Nickel*	mg/L	0.0010	0.0027
Niobium*	mg/L	0.0010	0.010
Rubidium*	mg/L	0.0010	0.014
Selenium*	mg/L	0.0010	<0.0010
Silver*	mg/L	0.0010	<0.0010
Strontium*	mg/L	0.0010	0.0036
Tantalum	mg/L	0.0010	0.0082
Thallium*	mg/L	0.0010	<0.0010
Thorium*	mg/L	0.00050	<0.00050
Tin*	mg/L	0.0010	0.0018
Titanium*	mg/L	0.0020	<0.0020
Tungsten*	mg/L	0.010	<0.010
Uranium*	mg/L	0.0010	0.041
Vanadium*	mg/L	0.0010	0.0012
Zinc*	mg/L	0.0010	0.028
Aluminium	mg/L	0.10	0.61
Calcium*	mg/L	0.50	<0.50
Iron	mg/L	0.020	0.21
Magnesium*	mg/L	0.50	<0.50
Phosphorus*	mg/L	0.050	0.33
Potassium*	mg/L	0.50	<0.50
Silicon	mg/L	0.10	1.9
Sodium*	mg/L	0.50	0.76
Sulfur*	mg/L	0.50	0.51

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1:10 Leach Inorganics (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-02 Tailings Composite - Split 1 Hold 1 day 29/08/2024	PFH1870-03 Tailings Composite - Split 2 Hold 3 days 29/08/2024	PFH1870-04 Tailings Composite - Split 3 Hold 7 days 29/08/2024	PFH1870-05 Tailings Composite - Split 4 Hold 14 days 29/08/2024
pH*	pH units		6.9	6.8	7.2	7.2
Electrical Conductivity*	µS/cm	2.0	18	28	29	33

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1:10 Leach Metals (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-02 Tailings Composite - Split 1 Hold 1 day 29/08/2024	PFH1870-03 Tailings Composite - Split 2 Hold 3 days 29/08/2024	PFH1870-04 Tailings Composite - Split 3 Hold 7 days 29/08/2024	PFH1870-05 Tailings Composite - Split 4 Hold 14 days 29/08/2024
Calcium*	mg/L	0.50	<0.50	0.90	0.78	0.90
Potassium*	mg/L	0.50	<0.50	<0.50	<0.50	<0.50
Magnesium*	mg/L	0.50	<0.50	<0.50	<0.50	<0.50
Sodium*	mg/L	0.50	2.3	3.3	3.2	3.3

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1:10 Leach Metals Low Level (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-02 Tailings Composite - Split 1 Hold 1 day 29/08/2024	PFH1870-03 Tailings Composite - Split 2 Hold 3 days 29/08/2024	PFH1870-04 Tailings Composite - Split 3 Hold 7 days 29/08/2024	PFH1870-05 Tailings Composite - Split 4 Hold 14 days 29/08/2024
Lithium*	mg/L	0.0010	0.040	0.053	0.083	0.13

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1:20 1M HCl Leach Metals (Tailings)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Mercury*	mg/L	0.000050	<0.000050
Aluminium	mg/L	0.010	4.1
Antimony*	mg/L	0.0010	0.0010
Arsenic*	mg/L	0.0010	0.0035
Barium*	mg/L	0.0010	0.13
Beryllium*	mg/L	0.00050	0.0070
Bismuth*	mg/L	0.0010	0.051
Cadmium*	mg/L	0.00010	0.0018
Caesium*	mg/L	0.0010	0.027
Chromium*	mg/L	0.0010	2.6
Cobalt*	mg/L	0.0010	0.032
Copper*	mg/L	0.0010	0.16
Iron	mg/L	0.010	38
Lanthanum*	mg/L	0.00050	0.013
Lead*	mg/L	0.0010	0.096
Lithium*	mg/L	0.0010	3.2
Manganese	mg/L	0.0010	20
Molybdenum*	mg/L	0.0010	0.31
Nickel*	mg/L	0.0010	1.6
Niobium*	mg/L	0.0010	0.0030
Rubidium*	mg/L	0.0010	0.071
Selenium*	mg/L	0.0010	<0.0010
Silver*	mg/L	0.0010	<0.0010
Strontium*	mg/L	0.0010	0.26
Tantalum	mg/L	0.0010	<0.0010
Thallium*	mg/L	0.0010	<0.0010
Thorium*	mg/L	0.00050	0.0045
Tin*	mg/L	0.0010	0.0053
Titanium*	mg/L	0.0020	0.012
Tungsten*	mg/L	0.010	<0.010
Uranium*	mg/L	0.0010	0.11
Vanadium*	mg/L	0.0010	0.017
Zinc*	mg/L	0.0010	0.30
Calcium*	mg/L	0.50	51
Magnesium*	mg/L	0.50	2.3
Phosphorus*	mg/L	0.050	41
Potassium*	mg/L	0.50	1.8
Silicon	mg/L	0.10	3.2
Sodium*	mg/L	0.50	1.3
Sulfur*	mg/L	0.50	<0.50

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ASLP Extraction - pH 2.9 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
pH of final leachate	pH units		3.4

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ASLP Metals - pH 2.9 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite Date Sampled 29/08/2024
Calcium*	mg/L	0.50	17
Magnesium*	mg/L	0.50	1.7
Potassium*	mg/L	0.50	0.89
Sodium*	mg/L	0.50	1.1
Phosphorus*	mg/L	0.050	23
Sulfur*	mg/L	0.50	<0.50
Silicon*	mg/L	0.10	1.3

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ASLP Low Level Metals - pH 2.9 (Tailings)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Silver*	µg/L	1.0	<1.0
Aluminium*	µg/L	10	1200
Arsenic*	µg/L	1.0	<1.0
Barium*	µg/L	1.0	44
Beryllium*	µg/L	0.50	2.5
Bismuth*	µg/L	1.0	<1.0
Cadmium*	µg/L	0.10	0.28
Cobalt*	µg/L	1.0	1.6
Chromium*	µg/L	1.0	11
Caesium*	µg/L	1.0	2.1
Copper*	µg/L	1.0	32
Iron*	µg/L	10	15000
Mercury*	µg/L	0.050	<0.050
Lanthanum*	µg/L	0.50	<0.50
Lithium*	µg/L	0.50	2700
Manganese*	µg/L	5.0	17000
Molybdenum*	µg/L	1.0	1.5
Niobium*	µg/L	1.0	<1.0
Nickel*	µg/L	1.0	15
Lead*	µg/L	1.0	3.9
Rubidium*	µg/L	1.0	21
Antimony*	µg/L	1.0	1.3
Selenium*	µg/L	1.0	<1.0
Tin*	µg/L	1.0	<1.0
Strontium*	µg/L	1.0	82
Tantalum*	µg/L	1.0	<1.0
Thorium	µg/L	0.50	<0.50
Titanium*	µg/L	1.0	1.5
Uranium	µg/L	0.50	19
Vanadium*	µg/L	1.0	<1.0
Tungsten*	µg/L	1.0	<1.0
Zinc*	µg/L	5.0	220

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LEAF 1313 Extraction - T01 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Mass used (g)	-		20
Particle Size used (mm)	-		0.30
Volume water used (mL)	-		190
Type of water used	-		UHP
Volume 1N KOH base (mL)	-		14
Volume 2N HNO3 acid (mL)	-		0.0
Target pH (pH units)	-		13
Measured Initial pH (pH units)	-		13
Measured Final pH (pH units)	-		13
Final EC ($\mu\text{S}/\text{cm}$)	-		17000
Extraction time (hrs)	-		24
Moisture (% w/w)	-		0.0
Average Temperature (oC)	-		20

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LEAF 1313 Extraction - T02 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Mass used (g)	-		20
Particle Size used (mm)	-		0.30
Volume water used (mL)	-		200
Type of water used	-		UHP
Volume 1N KOH base (mL)	-		1.5
Volume 2N HNO3 acid (mL)	-		0.0
Target pH (pH units)	-		12
Measured Initial pH (pH units)	-		12
Measured Final pH (pH units)	-		12
Final EC ($\mu\text{S}/\text{cm}$)	-		2100
Extraction time (hrs)	-		24
Moisture (% w/w)	-		0.0
Average Temperature (oC)	-		20

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LEAF 1313 Extraction - T03 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Mass used (g)	-		20
Particle Size used (mm)	-		0.30
Volume water used (mL)	-		200
Type of water used	-		UHP
Volume 1N KOH base (mL)	-		0.10
Volume 2N HNO3 acid (mL)	-		0.0
Target pH (pH units)	-		10
Measured Initial pH (pH units)	-		11
Measured Final pH (pH units)	-		10
Final EC ($\mu\text{S}/\text{cm}$)	-		92
Extraction time (hrs)	-		24
Moisture (% w/w)	-		0.0
Average Temperature (oC)	-		20

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LEAF 1313 Extraction - T04 (Tailings)

EnviroLab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite
Date Sampled			29/08/2024
Mass used (g)	-		20
Particle Size used (mm)	-		0.30
Volume water used (mL)	-		200
Type of water used	-		UHP
Volume 1N KOH base (mL)	-		0.0
Volume 2N HNO3 acid (mL)	-		0.0
Target pH (pH units)	-		9.0
Measured Initial pH (pH units)	-		8.8
Measured Final pH (pH units)	-		8.3
Final EC ($\mu\text{S}/\text{cm}$)	-		230
Extraction time (hrs)	-		24
Moisture (% w/w)	-		0.0
Average Temperature (oC)	-		20

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LEAF 1313 Extraction - T05 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Mass used (g)	-		20
Particle Size used (mm)	-		0.30
Volume water used (mL)	-		200
Type of water used	-		UHP
Volume 1N KOH base (mL)	-		0.0
Volume 2N HNO3 acid (mL)	-		0.0050
Target pH (pH units)	-		8.0
Measured Initial pH (pH units)	-		8.5
Measured Final pH (pH units)	-		8.1
Final EC ($\mu\text{S}/\text{cm}$)	-		370
Extraction time (hrs)	-		24
Moisture (% w/w)	-		0.0
Average Temperature (oC)	-		20

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LEAF 1313 Extraction - T06 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Mass used (g)	-		20
Particle Size used (mm)	-		0.30
Volume water used (mL)	-		200
Type of water used	-		UHP
Volume 1N KOH base (mL)	-		0.0
Volume 2N HNO3 acid (mL)	-		0.010
Target pH (pH units)	-		7.0
Measured Initial pH (pH units)	-		6.7
Measured Final pH (pH units)	-		7.5
Final EC ($\mu\text{S}/\text{cm}$)	-		280
Extraction time (hrs)	-		24
Moisture (% w/w)	-		0.0
Average Temperature (oC)	-		20

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LEAF 1313 Extraction - T07 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite
Date Sampled			29/08/2024
Mass used (g)	-		20
Particle Size used (mm)	-		0.30
Volume water used (mL)	-		200
Type of water used	-		UHP
Volume 1N KOH base (mL)	-		0.0
Volume 2N HNO3 acid (mL)	-		0.020
Target pH (pH units)	-		5.5
Measured Initial pH (pH units)	-		5.3
Measured Final pH (pH units)	-		5.2
Final EC ($\mu\text{S}/\text{cm}$)	-		850
Extraction time (hrs)	-		24
Moisture (% w/w)	-		0.0
Average Temperature (oC)	-		20

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LEAF 1313 Extraction - T08 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Mass used (g)	-		20
Particle Size used (mm)	-		0.30
Volume water used (mL)	-		200
Type of water used	-		UHP
Volume 1N KOH base (mL)	-		0.0
Volume 2N HNO3 acid (mL)	-		0.035
Target pH (pH units)	-		4.0
Measured Initial pH (pH units)	-		4.1
Measured Final pH (pH units)	-		4.4
Final EC ($\mu\text{S}/\text{cm}$)	-		1200
Extraction time (hrs)	-		24
Moisture (% w/w)	-		0.0
Average Temperature (oC)	-		20

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LEAF 1313 Extraction - T09 (Tailings)

Envirolab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Mass used (g)	-		20
Particle Size used (mm)	-		0.30
Volume water used (mL)	-		200
Type of water used	-		UHP
Volume 1N KOH base (mL)	-		0.0
Volume 2N HNO3 acid (mL)	-		0.90
Target pH (pH units)	-		2.0
Measured Initial pH (pH units)	-		2.1
Measured Final pH (pH units)	-		2.3
Final EC ($\mu\text{S}/\text{cm}$)	-		4400
Extraction time (hrs)	-		24
Moisture (% w/w)	-		0.0
Average Temperature (oC)	-		20

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LEAF 1313 Inorganics - Carbons, Nitrogen Species, Sulfur Species T04 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Dissolved Organic Carbon	mg/L	1.0	2.2

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LEAF 1313 Inorganics - Miscellaneous and Common Anions T01 (Tailings)

Envirolab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Fluoride*	mg/L	0.10	0.13

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LEAF 1313 Inorganics - Miscellaneous and Common Anions T02 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Fluoride*	mg/L	0.10	0.14

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LEAF 1313 Inorganics - Miscellaneous and Common Anions T03 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Fluoride*	mg/L	0.10	0.21

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LEAF 1313 Inorganics - Miscellaneous and Common Anions T04 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Fluoride*	mg/L	0.10	<0.50 [3]

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LEAF 1313 Inorganics - Miscellaneous and Common Anions T05 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Fluoride*	mg/L	0.10	0.17

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LEAF 1313 Inorganics - Miscellaneous and Common Anions T06 (Tailings)

Envirolab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Fluoride*	mg/L	0.10	0.19

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LEAF 1313 Inorganics - Miscellaneous and Common Anions T07 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Fluoride*	mg/L	0.10	0.13

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LEAF 1313 Inorganics - Miscellaneous and Common Anions T08 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Fluoride*	mg/L	0.10	0.12

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LEAF 1313 Inorganics - Miscellaneous and Common Anions T09 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Fluoride*	mg/L	0.10	3.3

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LEAF 1313 Inorganics - Ionic Balances and Indexes T01 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Chloride*	mg/L	1.0	23

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LEAF 1313 Inorganics - Ionic Balances and Indexes T02 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Chloride*	mg/L	1.0	24

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LEAF 1313 Inorganics - Ionic Balances and Indexes T03 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Chloride*	mg/L	1.0	25

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LEAF 1313 Inorganics - Ionic Balances and Indexes T04 (Tailings)

Envirolab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Chloride*	mg/L	1.0	2.5

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LEAF 1313 Inorganics - Ionic Balances and Indexes T05 (Tailings)

Envirolab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Chloride*	mg/L	1.0	24

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LEAF 1313 Inorganics - Ionic Balances and Indexes T06 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Chloride*	mg/L	1.0	23

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LEAF 1313 Inorganics - Ionic Balances and Indexes T07 (Tailings)

Envirolab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Chloride*	mg/L	1.0	24

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LEAF 1313 Inorganics - Ionic Balances and Indexes T08 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Chloride*	mg/L	1.0	24

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LEAF 1313 Inorganics - Ionic Balances and Indexes T09 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Chloride*	mg/L	1.0	22

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LEAF 1313 Inorganics - Nutrients T04 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite Date Sampled
Ammonia as N	mg/L	0.0050	<0.0050
Nitrate as N	mg/L	0.0050	0.015
Nitrate as NO3 by calculation	mg/L	0.020	0.067
Nitrite as N	mg/L	0.0050	<0.0050
Nitrite as NO2 by calculation	mg/L	0.020	<0.020
TKN as N by calculation	mg/L	0.10	0.45
Total Nitrogen	mg/L	0.10	0.45

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LEAF 1313 Metals - Low Level T01 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Date Sampled			
Mercury	µg/L	0.050	<0.050
Aluminium	µg/L	10	4300
Antimony	µg/L	1.0	2.3
Arsenic	µg/L	1.0	7.5
Barium	µg/L	1.0	87
Beryllium	µg/L	0.50	<0.50
Bismuth	µg/L	1.0	<1.0
Cadmium	µg/L	0.10	<0.10
Caesium	µg/L	1.0	14
Chromium	µg/L	1.0	32
Cobalt	µg/L	1.0	<1.0
Copper	µg/L	1.0	15
Iron	µg/L	10	82
Lanthanum	µg/L	0.50	<0.50
Lead	µg/L	1.0	<1.0
Lithium	µg/L	1.0	76
Manganese	µg/L	1.0	3.2
Molybdenum	µg/L	1.0	12
Nickel	µg/L	1.0	<1.0
Niobium	µg/L	1.0	<1.0
Rubidium	µg/L	1.0	180
Selenium	µg/L	1.0	<1.0
Silver	µg/L	1.0	<1.0
Strontium	µg/L	1.0	2.9
Tantalum	µg/L	1.0	<1.0
Thallium	µg/L	1.0	<1.0
Thorium	µg/L	0.50	1.0
Tin	µg/L	1.0	7.4
Titanium	µg/L	1.0	<1.0
Tungsten	µg/L	10	41
Uranium	µg/L	1.0	84
Vanadium	µg/L	1.0	2.7
Zinc	µg/L	1.0	50

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LEAF 1313 Metals - Low Level T02 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Date Sampled			
Mercury	µg/L	0.050	<0.050
Aluminium	µg/L	10	3800
Antimony	µg/L	1.0	1.8
Arsenic	µg/L	1.0	4.6
Barium	µg/L	1.0	110
Beryllium	µg/L	0.50	<0.50
Bismuth	µg/L	1.0	1.2
Cadmium	µg/L	0.10	<0.10
Caesium	µg/L	1.0	8.4
Chromium	µg/L	1.0	11
Cobalt	µg/L	1.0	<1.0
Copper	µg/L	1.0	8.0
Iron	µg/L	10	520
Lanthanum	µg/L	0.50	<0.50
Lead	µg/L	1.0	2.5
Lithium	µg/L	1.0	82
Manganese	µg/L	1.0	75
Molybdenum	µg/L	1.0	6.2
Nickel	µg/L	1.0	2.0
Niobium	µg/L	1.0	2.2
Rubidium	µg/L	1.0	85
Selenium	µg/L	1.0	<1.0
Silver	µg/L	1.0	<1.0
Strontium	µg/L	1.0	4.2
Tantalum	µg/L	1.0	1.2
Thallium	µg/L	1.0	<1.0
Thorium	µg/L	0.50	<0.50
Tin	µg/L	1.0	3.8
Titanium	µg/L	1.0	3.5
Tungsten	µg/L	10	<10
Uranium	µg/L	1.0	21
Vanadium	µg/L	1.0	1.2
Zinc	µg/L	1.0	46

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LEAF 1313 Metals - Low Level T03 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Date Sampled			
Mercury	µg/L	0.050	<0.050
Aluminium	µg/L	10	2300
Antimony	µg/L	1.0	1.9
Arsenic	µg/L	1.0	1.7
Barium	µg/L	1.0	190
Beryllium	µg/L	0.50	0.61
Bismuth	µg/L	1.0	1.8
Cadmium	µg/L	0.10	<0.10
Caesium	µg/L	1.0	4.9
Chromium	µg/L	1.0	12
Cobalt	µg/L	1.0	<1.0
Copper	µg/L	1.0	8.0
Iron	µg/L	10	760
Lanthanum	µg/L	0.50	<0.50
Lead	µg/L	1.0	4.7
Lithium	µg/L	1.0	96
Manganese	µg/L	1.0	150
Molybdenum	µg/L	1.0	4.7
Nickel	µg/L	1.0	3.5
Niobium	µg/L	1.0	2.7
Rubidium	µg/L	1.0	40
Selenium	µg/L	1.0	<1.0
Silver	µg/L	1.0	<1.0
Strontium	µg/L	1.0	4.9
Tantalum	µg/L	1.0	2.0
Thallium	µg/L	1.0	<1.0
Thorium	µg/L	0.50	<0.50
Tin	µg/L	1.0	1.7
Titanium	µg/L	1.0	2.8
Tungsten	µg/L	10	<10
Uranium	µg/L	1.0	6.6
Vanadium	µg/L	1.0	<1.0
Zinc	µg/L	1.0	30

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LEAF 1313 Metals - Low Level T04 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Date Sampled			
Mercury	µg/L	0.050	<0.050
Aluminium	µg/L	10	1500
Antimony	µg/L	1.0	1.7
Arsenic	µg/L	1.0	<1.0
Barium	µg/L	1.0	350
Beryllium	µg/L	0.50	<0.50
Bismuth	µg/L	1.0	1.1
Cadmium	µg/L	0.10	<0.10
Caesium	µg/L	1.0	3.9
Chromium	µg/L	1.0	8.3
Cobalt	µg/L	1.0	<1.0
Copper	µg/L	1.0	5.5
Iron	µg/L	10	590
Lanthanum	µg/L	0.50	<0.50
Lead	µg/L	1.0	3.2
Lithium	µg/L	1.0	86
Manganese	µg/L	1.0	170
Molybdenum	µg/L	1.0	4.2
Nickel	µg/L	1.0	3.2
Niobium	µg/L	1.0	2.4
Rubidium	µg/L	1.0	24
Selenium	µg/L	1.0	<1.0
Silver	µg/L	1.0	<1.0
Strontium	µg/L	1.0	7.1
Tantalum	µg/L	1.0	1.2
Thallium	µg/L	1.0	<1.0
Thorium	µg/L	0.50	<0.50
Tin	µg/L	1.0	1.5
Titanium	µg/L	1.0	2.5
Tungsten	µg/L	10	<10
Uranium	µg/L	1.0	2.8
Vanadium	µg/L	1.0	<1.0
Zinc	µg/L	1.0	42

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LEAF 1313 Metals - Low Level T05 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Date Sampled			
Mercury	µg/L	0.050	<0.050
Aluminium	µg/L	10	1400
Antimony	µg/L	1.0	1.9
Arsenic	µg/L	1.0	<1.0
Barium	µg/L	1.0	310
Beryllium	µg/L	0.50	0.52
Bismuth	µg/L	1.0	1.2
Cadmium	µg/L	0.10	<0.10
Caesium	µg/L	1.0	3.8
Chromium	µg/L	1.0	7.6
Cobalt	µg/L	1.0	<1.0
Copper	µg/L	1.0	5.4
Iron	µg/L	10	560
Lanthanum	µg/L	0.50	<0.50
Lead	µg/L	1.0	3.0
Lithium	µg/L	1.0	100
Manganese	µg/L	1.0	220
Molybdenum	µg/L	1.0	4.5
Nickel	µg/L	1.0	2.9
Niobium	µg/L	1.0	2.3
Rubidium	µg/L	1.0	26
Selenium	µg/L	1.0	<1.0
Silver	µg/L	1.0	<1.0
Strontium	µg/L	1.0	8.0
Tantalum	µg/L	1.0	1.1
Thallium	µg/L	1.0	<1.0
Thorium	µg/L	0.50	<0.50
Tin	µg/L	1.0	1.4
Titanium	µg/L	1.0	2.6
Tungsten	µg/L	10	<10
Uranium	µg/L	1.0	3.0
Vanadium	µg/L	1.0	<1.0
Zinc	µg/L	1.0	47

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LEAF 1313 Metals - Low Level T06 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Date Sampled			
Mercury	µg/L	0.050	<0.050
Aluminium	µg/L	10	520
Antimony	µg/L	1.0	1.8
Arsenic	µg/L	1.0	<1.0
Barium	µg/L	1.0	370
Beryllium	µg/L	0.50	<0.50
Bismuth	µg/L	1.0	<1.0
Cadmium	µg/L	0.10	0.12
Caesium	µg/L	1.0	1.6
Chromium	µg/L	1.0	2.7
Cobalt	µg/L	1.0	<1.0
Copper	µg/L	1.0	3.9
Iron	µg/L	10	170
Lanthanum	µg/L	0.50	<0.50
Lead	µg/L	1.0	1.4
Lithium	µg/L	1.0	100
Manganese	µg/L	1.0	290
Molybdenum	µg/L	1.0	3.9
Nickel	µg/L	1.0	2.8
Niobium	µg/L	1.0	<1.0
Rubidium	µg/L	1.0	11
Selenium	µg/L	1.0	<1.0
Silver	µg/L	1.0	<1.0
Strontium	µg/L	1.0	9.6
Tantalum	µg/L	1.0	<1.0
Thallium	µg/L	1.0	<1.0
Thorium	µg/L	0.50	0.50
Tin	µg/L	1.0	1.1
Titanium	µg/L	1.0	<1.0
Tungsten	µg/L	10	<10
Uranium	µg/L	1.0	1.7
Vanadium	µg/L	1.0	<1.0
Zinc	µg/L	1.0	36

Certificate of Analysis PFH1870

LEAF 1313 Metals - Low Level T07 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Date Sampled			
Mercury	µg/L	0.050	<0.050
Aluminium	µg/L	10	90
Antimony	µg/L	1.0	1.8
Arsenic	µg/L	1.0	<1.0
Barium	µg/L	1.0	270
Beryllium	µg/L	0.50	<0.50
Bismuth	µg/L	1.0	<1.0
Cadmium	µg/L	0.10	0.18
Caesium	µg/L	1.0	<1.0
Chromium	µg/L	1.0	<1.0
Cobalt	µg/L	1.0	<1.0
Copper	µg/L	1.0	1.2
Iron	µg/L	10	29
Lanthanum	µg/L	0.50	<0.50
Lead	µg/L	1.0	<1.0
Lithium	µg/L	1.0	310
Manganese	µg/L	1.0	1500
Molybdenum	µg/L	1.0	4.8
Nickel	µg/L	1.0	7.0
Niobium	µg/L	1.0	1.1
Rubidium	µg/L	1.0	7.7
Selenium	µg/L	1.0	<1.0
Silver	µg/L	1.0	<1.0
Strontium	µg/L	1.0	19
Tantalum	µg/L	1.0	<1.0
Thallium	µg/L	1.0	<1.0
Thorium	µg/L	0.50	<0.50
Tin	µg/L	1.0	<1.0
Titanium	µg/L	1.0	<1.0
Tungsten	µg/L	10	<10
Uranium	µg/L	1.0	<1.0
Vanadium	µg/L	1.0	<1.0
Zinc	µg/L	1.0	160

Certificate of Analysis PFH1870

LEAF 1313 Metals - Low Level T08 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Date Sampled			
Mercury	µg/L	0.050	<0.050
Aluminium	µg/L	10	59
Antimony	µg/L	1.0	1.9
Arsenic	µg/L	1.0	<1.0
Barium	µg/L	1.0	140
Beryllium	µg/L	0.50	<0.50
Bismuth	µg/L	1.0	<1.0
Cadmium	µg/L	0.10	0.28
Caesium	µg/L	1.0	<1.0
Chromium	µg/L	1.0	<1.0
Cobalt	µg/L	1.0	1.5
Copper	µg/L	1.0	3.4
Iron	µg/L	10	63
Lanthanum	µg/L	0.50	<0.50
Lead	µg/L	1.0	<1.0
Lithium	µg/L	1.0	490
Manganese	µg/L	1.0	2700
Molybdenum	µg/L	1.0	5.2
Nickel	µg/L	1.0	16
Niobium	µg/L	1.0	1.1
Rubidium	µg/L	1.0	15
Selenium	µg/L	1.0	<1.0
Silver	µg/L	1.0	<1.0
Strontium	µg/L	1.0	28
Tantalum	µg/L	1.0	<1.0
Thallium	µg/L	1.0	<1.0
Thorium	µg/L	0.50	<0.50
Tin	µg/L	1.0	<1.0
Titanium	µg/L	1.0	<1.0
Tungsten	µg/L	10	<10
Uranium	µg/L	1.0	<1.0
Vanadium	µg/L	1.0	<1.0
Zinc	µg/L	1.0	170

Certificate of Analysis PFH1870

LEAF 1313 Metals - Low Level T09 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Date Sampled			
Mercury	µg/L	0.050	<0.050
Aluminium	µg/L	10	8600
Antimony	µg/L	1.0	1.8
Arsenic	µg/L	1.0	4.0
Barium	µg/L	1.0	360
Beryllium	µg/L	0.50	10
Bismuth	µg/L	1.0	<1.0
Cadmium	µg/L	0.10	1.4
Caesium	µg/L	1.0	13
Chromium	µg/L	1.0	68
Cobalt	µg/L	1.0	5.5
Copper	µg/L	1.0	110
Iron	µg/L	10	34000
Lanthanum	µg/L	0.50	4.3
Lead	µg/L	1.0	100
Lithium	µg/L	1.0	7400
Manganese	µg/L	1.0	48000
Molybdenum	µg/L	1.0	4.1
Nickel	µg/L	1.0	57
Niobium	µg/L	1.0	1.5
Rubidium	µg/L	1.0	86
Selenium	µg/L	1.0	<1.0
Silver	µg/L	1.0	<1.0
Strontium	µg/L	1.0	410
Tantalum	µg/L	1.0	2.0
Thallium	µg/L	1.0	<1.0
Thorium	µg/L	0.50	1.1
Tin	µg/L	1.0	<1.0
Titanium	µg/L	1.0	2.0
Tungsten	µg/L	10	<10
Uranium	µg/L	1.0	130
Vanadium	µg/L	1.0	2.0
Zinc	µg/L	1.0	760

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LEAF 1313 Metals T01 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite Date Sampled 29/08/2024
Phosphorus	mg/L	0.050	1.3
Silicon	mg/L	0.10	17
Sulfur	mg/L	0.50	<2.5
Calcium	mg/L	0.50	<2.5
Magnesium	mg/L	0.50	<2.5
Potassium	mg/L	0.50	2600
Sodium	mg/L	0.50	5.5
Hardness (calc) equivalent CaCO3	mg/L	3.0	<15

Certificate of Analysis PFH1870

LEAF 1313 Metals T02 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Phosphorus	mg/L	0.050	0.61
Silicon	mg/L	0.10	12
Sulfur	mg/L	0.50	<0.50
Calcium	mg/L	0.50	<0.50
Magnesium	mg/L	0.50	<0.50
Potassium	mg/L	0.50	270
Sodium	mg/L	0.50	4.7
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0

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LEAF 1313 Metals T03 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite Date Sampled 29/08/2024
Phosphorus	mg/L	0.050	0.78
Silicon	mg/L	0.10	11
Sulfur	mg/L	0.50	<0.50
Calcium	mg/L	0.50	<0.50
Magnesium	mg/L	0.50	<0.50
Potassium	mg/L	0.50	14
Sodium	mg/L	0.50	5.0
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0

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LEAF 1313 Metals T04 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite Date Sampled
Phosphorus	mg/L	0.050	0.20
Silicon	mg/L	0.10	6.6
Sulfur	mg/L	0.50	<0.50
Calcium	mg/L	0.50	<0.50
Magnesium	mg/L	0.50	<0.50
Potassium	mg/L	0.50	1.2
Sodium	mg/L	0.50	3.3
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0

Certificate of Analysis PFH1870

LEAF 1313 Metals T05 (Tailings)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Phosphorus	mg/L	0.050	0.31
Silicon	mg/L	0.10	7.5
Sulfur	mg/L	0.50	<0.50
Phosphorus	mg/L	0.050	0.20
Silicon	mg/L	0.10	6.2
Sulfur	mg/L	0.50	<0.50
Calcium	mg/L	0.50	0.56
Magnesium	mg/L	0.50	<0.50
Potassium	mg/L	0.50	3.4
Sodium	mg/L	0.50	3.9
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0

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LEAF 1313 Metals T06 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite Date Sampled 29/08/2024
Calcium	mg/L	0.50	0.76
Magnesium	mg/L	0.50	<0.50
Potassium	mg/L	0.50	3.1
Sodium	mg/L	0.50	4.4
Hardness (calc) equivalent CaCO3	mg/L	3.0	3.7

Certificate of Analysis PFH1870

LEAF 1313 Metals T07 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite 29/08/2024
Phosphorus	mg/L	0.050	0.92
Silicon	mg/L	0.10	3.3
Sulfur	mg/L	0.50	<0.50
Calcium	mg/L	0.50	2.2
Magnesium	mg/L	0.50	0.91
Potassium	mg/L	0.50	2.9
Sodium	mg/L	0.50	4.7
Hardness (calc) equivalent CaCO3	mg/L	3.0	9.3

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LEAF 1313 Metals T08 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite Date Sampled 29/08/2024
Phosphorus	mg/L	0.050	1.7
Silicon	mg/L	0.10	2.9
Sulfur	mg/L	0.50	<0.50
Calcium	mg/L	0.50	4.0
Magnesium	mg/L	0.50	1.1
Potassium	mg/L	0.50	2.1
Sodium	mg/L	0.50	3.3
Hardness (calc) equivalent CaCO3	mg/L	3.0	14

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LEAF 1313 Metals T09 (Tailings)

Envirolab ID Your Reference	Units	PQL	PFH1870-01 Tailings Composite Date Sampled 29/08/2024
Phosphorus	mg/L	0.050	70
Silicon	mg/L	0.10	7.5
Sulfur	mg/L	0.50	0.50
Calcium	mg/L	0.50	80
Magnesium	mg/L	0.50	5.0
Potassium	mg/L	0.50	3.7
Sodium	mg/L	0.50	4.6
Hardness (calc) equivalent CaCO3	mg/L	3.0	220

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LEAF 1313 Acrylamide T04 (Tailings)

Envirolab ID	Units	PQL	PFH1870-01
Your Reference			Tailings Composite
Date Sampled			29/08/2024
Acrylamide*	mg/L	0.00010	<0.00010

Certificate of Analysis PFH1870

LEAF 1313 Extraction - B01 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-06
Your Reference			LEAF 1313 - B01
Date Sampled			29/08/2024
Mass used (g)	-		NT
Particle Size used (mm)	-		NT
Volume water used (mL)	-		190
Type of water used	-		UHP
Volume 1N KOH base (mL)	-		11
Volume 2N HNO3 acid (mL)	-		0.0
Target pH (pH units)	-		13
Measured Initial pH (pH units)	-		13
Measured Final pH (pH units)	-		13
Final EC ($\mu\text{S}/\text{cm}$)	-		15000
Extraction time (hrs)	-		NT
Moisture (% w/w)	-		0.0
Average Temperature (oC)	-		20

Certificate of Analysis PFH1870

LEAF 1313 Extraction - B02 (Tailings)

EnviroLab ID	Units	PQL	PFH1870-07
Your Reference			LEAF 1313 - B02
Date Sampled			29/08/2024
Mass used (g)	-		NT
Particle Size used (mm)	-		NT
Volume water used (mL)	-		200
Type of water used	-		UHP
Volume 1N KOH base (mL)	-		0.0
Volume 2N HNO3 acid (mL)	-		0.0
Target pH (pH units)	-		7.0
Measured Initial pH (pH units)	-		7.4
Measured Final pH (pH units)	-		6.7
Final EC ($\mu\text{S}/\text{cm}$)	-		190
Extraction time (hrs)	-		NT
Moisture (% w/w)	-		0.0
Average Temperature (oC)	-		20

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LEAF 1313 Extraction - B03 (Tailings)

Envirolab ID	Units	PQL	PFH1870-08
Your Reference			LEAF 1313 - B03
Date Sampled			29/08/2024
Mass used (g)	-		NT
Particle Size used (mm)	-		NT
Volume water used (mL)	-		200
Type of water used	-		UHP
Volume 1N KOH base (mL)	-		0.0
Volume 2N HNO3 acid (mL)	-		0.25
Target pH (pH units)	-		2.0
Measured Initial pH (pH units)	-		2.4
Measured Final pH (pH units)	-		2.4
Final EC ($\mu\text{S}/\text{cm}$)	-		2200
Extraction time (hrs)	-		NT
Moisture (% w/w)	-		0.0
Average Temperature (oC)	-		20

Certificate of Analysis PFH1870

LEAF 1313 Inorganics - Miscellaneous and Common Anions B01 (Tailings)

Envirolab ID	Units	PQL	PFH1870-06
Your Reference			LEAF 1313 - B01
Date Sampled			29/08/2024
Fluoride*	mg/L	0.10	<0.10

Certificate of Analysis PFH1870

LEAF 1313 Inorganics - Miscellaneous and Common Anions B02 (Tailings)

Envirolab ID	Units	PQL	PFH1870-07
Your Reference			LEAF 1313 - B02
Date Sampled			29/08/2024
Fluoride*	mg/L	0.10	<0.10

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LEAF 1313 Inorganics - Miscellaneous and Common Anions B03 (Tailings)

Envirolab ID	Units	PQL	PFH1870-08
Your Reference			LEAF 1313 - B03
Date Sampled			29/08/2024
Fluoride*	mg/L	0.10	<0.10

Certificate of Analysis PFH1870

LEAF 1313 Inorganics - Ionic Balances and Indexes B01 (Tailings)

Envirolab ID	Units	PQL	PFH1870-06
Your Reference			LEAF 1313 - B01
Date Sampled			29/08/2024
Chloride*	mg/L	1.0	31

Certificate of Analysis PFH1870

LEAF 1313 Inorganics - Ionic Balances and Indexes B02 (Tailings)

Envirolab ID	Units	PQL	PFH1870-07
Your Reference			LEAF 1313 - B02
Date Sampled			29/08/2024
Chloride*	mg/L	1.0	1.8

Certificate of Analysis PFH1870

LEAF 1313 Inorganics - Ionic Balances and Indexes B03 (Tailings)

Envirolab ID	Units	PQL	PFH1870-08
Your Reference			LEAF 1313 - B03
Date Sampled			29/08/2024
Chloride*	mg/L	1.0	1.0

Certificate of Analysis PFH1870

LEAF 1313 Metals - Low Level B01 (Tailings)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFH1870-06 LEAF 1313 - B01 29/08/2024
Mercury	µg/L	0.050	<0.050
Aluminium	µg/L	10	<10
Antimony	µg/L	1.0	5.9
Arsenic	µg/L	1.0	<1.0
Barium	µg/L	1.0	66
Beryllium	µg/L	0.50	<0.50
Bismuth	µg/L	1.0	1.2
Cadmium	µg/L	0.10	0.44
Caesium	µg/L	1.0	<1.0
Chromium	µg/L	1.0	<1.0
Cobalt	µg/L	1.0	<1.0
Copper	µg/L	1.0	1.3
Iron	µg/L	10	<10
Lanthanum	µg/L	0.50	<0.50
Lead	µg/L	1.0	3.1
Lithium	µg/L	1.0	<1.0
Manganese	µg/L	1.0	11
Molybdenum	µg/L	1.0	2.0
Nickel	µg/L	1.0	1.2
Niobium	µg/L	1.0	2.5
Rubidium	µg/L	1.0	2.0
Selenium	µg/L	1.0	<1.0
Silver	µg/L	1.0	<1.0
Strontium	µg/L	1.0	1.8
Tantalum	µg/L	1.0	<1.0
Thallium	µg/L	1.0	<1.0
Thorium	µg/L	0.50	1.0
Tin	µg/L	1.0	2.1
Titanium	µg/L	1.0	<1.0
Tungsten	µg/L	10	<10
Uranium	µg/L	1.0	<1.0
Vanadium	µg/L	1.0	<1.0
Zinc	µg/L	1.0	53

Certificate of Analysis PFH1870

LEAF 1313 Metals - Low Level B02 (Tailings)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFH1870-07 LEAF 1313 - B02 29/08/2024
Mercury	µg/L	0.050	<0.050
Aluminium	µg/L	10	43
Antimony	µg/L	1.0	6.3
Arsenic	µg/L	1.0	1.6
Barium	µg/L	1.0	140
Beryllium	µg/L	0.50	<0.50
Bismuth	µg/L	1.0	1.1
Cadmium	µg/L	0.10	0.49
Caesium	µg/L	1.0	<1.0
Chromium	µg/L	1.0	1.3
Cobalt	µg/L	1.0	<1.0
Copper	µg/L	1.0	7.0
Iron	µg/L	10	680
Lanthanum	µg/L	0.50	1.1
Lead	µg/L	1.0	150
Lithium	µg/L	1.0	10
Manganese	µg/L	1.0	68
Molybdenum	µg/L	1.0	1.8
Nickel	µg/L	1.0	2.2
Niobium	µg/L	1.0	2.7
Rubidium	µg/L	1.0	<1.0
Selenium	µg/L	1.0	<1.0
Silver	µg/L	1.0	<1.0
Strontium	µg/L	1.0	2.4
Tantalum	µg/L	1.0	<1.0
Thallium	µg/L	1.0	<1.0
Thorium	µg/L	0.50	0.74
Tin	µg/L	1.0	3.4
Titanium	µg/L	1.0	1.1
Tungsten	µg/L	10	<10
Uranium	µg/L	1.0	<1.0
Vanadium	µg/L	1.0	<1.0
Zinc	µg/L	1.0	150

Certificate of Analysis PFH1870

LEAF 1313 Metals - Low Level B03 (Tailings)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFH1870-08 LEAF 1313 - B03 29/08/2024
Mercury	µg/L	0.050	<0.050
Aluminium	µg/L	10	110
Antimony	µg/L	1.0	2.0
Arsenic	µg/L	1.0	9.2
Barium	µg/L	1.0	75
Beryllium	µg/L	0.50	<0.50
Bismuth	µg/L	1.0	<1.0
Cadmium	µg/L	0.10	0.27
Caesium	µg/L	1.0	<1.0
Chromium	µg/L	1.0	<1.0
Cobalt	µg/L	1.0	<1.0
Copper	µg/L	1.0	1.4
Iron	µg/L	10	33
Lanthanum	µg/L	0.50	<0.50
Lead	µg/L	1.0	<1.0
Lithium	µg/L	1.0	<1.0
Manganese	µg/L	1.0	<1.0
Molybdenum	µg/L	1.0	3.1
Nickel	µg/L	1.0	<1.0
Niobium	µg/L	1.0	1.0
Rubidium	µg/L	1.0	93
Selenium	µg/L	1.0	<1.0
Silver	µg/L	1.0	<1.0
Strontium	µg/L	1.0	1.1
Tantalum	µg/L	1.0	<1.0
Thallium	µg/L	1.0	<1.0
Thorium	µg/L	0.50	0.64
Tin	µg/L	1.0	1.7
Titanium	µg/L	1.0	1.1
Tungsten	µg/L	10	15
Uranium	µg/L	1.0	<1.0
Vanadium	µg/L	1.0	1.3
Zinc	µg/L	1.0	20

Certificate of Analysis PFH1870

LEAF 1313 Metals B01 (Tailings)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFH1870-06 LEAF 1313 - B01 29/08/2024
Phosphorus	mg/L	0.050	<0.050
Silicon	mg/L	0.10	<0.10
Sulfur	mg/L	0.50	<0.50
Calcium	mg/L	0.50	<0.50
Magnesium	mg/L	0.50	<0.50
Potassium	mg/L	0.50	38
Sodium	mg/L	0.50	0.77
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0

Certificate of Analysis PFH1870

LEAF 1313 Metals B02 (Tailings)

Envirolab ID	Units	PQL	PFH1870-07
Your Reference			LEAF 1313 - B02
Date Sampled			29/08/2024
Phosphorus	mg/L	0.050	0.069
Silicon	mg/L	0.10	<0.10
Sulfur	mg/L	0.50	<0.50
Calcium	mg/L	0.50	<0.50
Magnesium	mg/L	0.50	<0.50
Potassium	mg/L	0.50	1.9
Sodium	mg/L	0.50	0.70
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0

Certificate of Analysis PFH1870

LEAF 1313 Metals B03 (Tailings)

Envirolab ID Your Reference Date Sampled	Units	PQL	PFH1870-08 LEAF 1313 - B03 29/08/2024
Phosphorus	mg/L	0.050	<0.25
Silicon	mg/L	0.10	0.51
Sulfur	mg/L	0.50	<2.5
Calcium	mg/L	0.50	<2.5
Magnesium	mg/L	0.50	<2.5
Potassium	mg/L	0.50	2100
Sodium	mg/L	0.50	<2.5
Hardness (calc) equivalent CaCO3	mg/L	3.0	<15

Certificate of Analysis PFH1870

Result Comments

Identifier	Description
[3]	PQL has been raised due to matrix requiring dilution

Certificate of Analysis PFH1870

Method Summary

Method ID	Methodology Summary
Calc - TKN	TKN determined by calculation (Total Nitrogen - NOx).
INORG-001	pH - Measured using pH meter and electrode. Please note that the results for water analyses are indicative only, as analysis can be completed outside of the recommended holding times. Solids are reported from a 1:5 water extract unless otherwise specified. Alternatively, pH is determined in a 1:5 extract using 0.01M calcium chloride or a solid is extracted at a ratio of 1:2.5 (AS1289.4.3.1), pH is measured in the extract.
INORG-001_1:10	Determination of pH in custom leach
INORG-002	Conductivity and Salinity - measured using a conductivity cell at 25°C. Soil results reported from a 1:5 Soil:Water extract unless otherwise specified. Please note Resistivity is estimated by calculation and may not correlate with results otherwise obtained using the Resistivity current method (based on AS 1289.4.4.1), depending on the nature of the soil being analysed.
INORG-002_1:10	Determination of EC in custom leach
INORG-004	Toxicity Characteristic Leaching Procedure (TCLP) based upon AS 4439 (aka ASLP) and USEPA 1311. Additional information as required in AS4439.3 section 10 can be provided on request. Please note that the mass used may be scaled down from the default based on the sample mass available.
INORG-026	Fluoride determined by ion selective electrode (ISE) based on APHA latest edition, 4500-F-C. Solids are reported from a 1:5 water extract unless otherwise specified.
INORG-055	Nitrate/Nitrite/NOx/TKN - determined colourimetrically. Waters samples are filtered on receipt prior to analysis. Soils/solids are analysed following a water extraction.
INORG-057	Ammonia - determined colourimetrically. Water samples are filtered on receipt prior to analysis. Soils and OHS media are analysed following a water extraction. Alternatively, Ammonia can be extracted from soil using 1M KCl.
INORG-079	Carbon forms (inorganic, organic, total) determined using a TOC/NDIR analyser via combustion. Dissolved aqueous forms require filtering prior to determination.
INORG-081	Anions determined by Ion Chromatography. Waters samples are filtered on receipt prior to analysis. Solids are analysed from a water extract. Alternatively determined by colourimetry/turbidity using Discrete Analyser.
INORG-125	Leaching Environment Assessment Framework (LEAF) methods of leaching using USEPA methods SW846 1313, 1314, 1315 or 1316. All eluates are filtered through 0.45µm prior to analysis unless otherwise noted. Please note the 1315 is not currently designed for Organic Analyses, however, we understand that the method is being used for SVOCs in the US at present.
INORG-127	Total Nitrogen by high temperature catalytic combustion with chemiluminescence detection. Organic Carbon forms (inorganic, organic, total) determined using a TOC/NDIR analyser via combustion. Dissolved forms require filtering prior to determination.
METALS-020	Determination of various metals by ICP-OES.
METALS-020_1:10	Metals in custom leach by ICPOES
METALS-020_1MHCL	Determination of various metals by ICP-AES using 1M HCl extraction solution
METALS-020_ASPLP	Determination of various metals by ICP-OES following leaching using leachate specified by AS 4439.3.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-021_1MHCL	Determination of Mercury by Cold Vapour AAS using 1M HCl extraction solution.
METALS-021_ASPLP	Determination of Mercury by Cold Vapour AAS following leaching using leachate specified by AS 4439.3.
METALS-022	Determination of various metals by ICP-MS. Please note for Bromine and Iodine, any forms of these elements that are present are included together in the one result reported for each of these two elements. Salt forms and/or anion/cation forms (e.g. FeO, PbO, ZnO, BO3) are determined stoichiometrically from the base metal concentration.
METALS-022_1:10	Metals in custom leach by ICPMS
METALS-022_1MHCL	Determination of various metals by ICP-MS using a 1M HCl extraction solution.
METALS-022_ASPLP	Determination of various metals by ICP-MS following leaching using leachate specified by AS 4439.3.
ORG-029_ACRYL	Acrylamide in liquids (water/leachate) determined by direct injection by LC/MS/MS.

Certificate of Analysis PFH1870

Result Definitions

Identifier	Description
NR	Not reported
NEPM	National Environment Protection Measure
NS	Not specified
LCS	Laboratory Control Sample
RPD	Relative Percent Difference
>	Greater than
<	Less than
PQL	Practical Quantitation Limit
INS	Insufficient sample for this test
NA	Test not required
NT	Not tested
DOL	Samples rejected due to particulate overload (air filters only)
RFD	Samples rejected due to filter damage (air filters only)
RUD	Samples rejected due to uneven deposition (air filters only)
##	Indicates a laboratory acceptance criteria outlier, for further details, see Result Comments and/or QC Comments

Quality Control Definitions

Blank

This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, and is determined by processing solvents and reagents in exactly the same manner as for samples.

Surrogate Spike

Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

LCS (Laboratory Control Sample)

This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Matrix Spike

A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

Duplicate

This is the complete duplicate analysis of a sample from the process batch. The sample selected should be one where the analyte concentration is easily measurable.

Certificate of Analysis PFH1870

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria. Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction. Spikes for Physical and Aggregate Tests are not applicable. For VOCs in water samples, three vials are required for duplicate or spike analysis.

General Acceptance Criteria (GAC) - Analyte specific criteria applies for some analytes and is reflected in QC recovery tables.

Duplicates: >10xPQL - RPD acceptance criteria will vary depending on the analytes and the analytical techniques but is typically in the range 20%-50% - see ELN-P05 QAQC tables for details (available on request); <10xPQL - RPD are higher as the results approach PQL and the estimated measurement uncertainty will statistically increase. Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

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

Miscellaneous Information

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

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached. We have taken the sampling date as being the date received at the laboratory.

Two significant figures are reported for the majority of tests and with a high degree of confidence, for results <10*PQL, the second significant figure may be in doubt i.e. has a relatively high degree of uncertainty and is provided for information only.

Measurement Uncertainty estimates are available for most tests upon request.

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

Urine Analysis - The BEI values listed are taken from the 2022 edition of *TLVs and BEIs Threshold Limits by ACGIH*.

Air volume measurements are not covered by Envirolab's NATA accreditation.

Data Quality Assessment Summary PFH1870

Client Details

Client	MBS Environmental
Your Reference	DLYTSC
Date Issued	30/10/2024

Recommended Holding Time Compliance

Recommended holding time exceedances exist - See detailed list below

Quality Control and QC Frequency

QC Type	Compliant	Details
Blank	Yes	No Outliers
LCS	No	LCS Outliers Exist - See detailed list below
Duplicates	No	Duplicate Outliers Exist - See detailed list below
Matrix Spike	No	Matrix Spike Outliers Exist - See detailed list below
Surrogates / Extracted Internal Standards	Yes	No Outliers
QC Frequency	Yes	No Outliers

Surrogates/Extracted Internal Standards, Duplicates and/or Matrix Spikes are not always relevant/applicable to certain analyses and matrices. Therefore, said QC measures are deemed compliant in these situations by default. See Laboratory Acceptance Criteria for more information

Data Quality Assessment Summary PFH1870

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
EC KNAG Liquor Leach Solid adhoc	1	29/08/2024	23/10/2024	23/10/2024	No
pH Liquor Leach Solid adhoc	1	29/08/2024	23/10/2024	23/10/2024	No
Hg Liquor Leach Solid adhoc	1	29/08/2024	22/10/2024	25/10/2024	No
ICPOES KNAG Liquor Leach Solid adhoc	1	29/08/2024	22/10/2024	23/10/2024	Yes
Metals (LL) Solid adhoc	1	29/08/2024	22/10/2024	25/10/2024	Yes
EC 1:10 Leach Solid adhoc	2-5	29/08/2024	07/10/2024	07/10/2024	No
pH 1:2 Leach Solid adhoc	2-5	29/08/2024	07/10/2024	07/10/2024	No
1:10 Leachate Metals Solid adhoc	2-5	29/08/2024	14/10/2024	14/10/2024	Yes
1:10 Leachate Metals Solid adhoc	2-5	29/08/2024	14/10/2024	14/10/2024	Yes
Hg 1:20 1M HCl Leach Solid adhoc	1	29/08/2024	11/09/2024	13/09/2024	Yes
ICPMS Metals 1:20 1M HCl Solid adhoc	1	29/08/2024	11/09/2024	13/09/2024	Yes
OES Metals 1:20 1M HCl Leach Solid adhoc	1	29/08/2024	11/09/2024	12/09/2024	Yes
ASLP Extraction pH2.9 Solid adhoc	1	29/08/2024	12/09/2024	13/09/2024	Yes
ASLP Metals 2.9 Solid adhoc	1	29/08/2024	11/09/2024	12/09/2024	Yes
ASLP Metals (LL) 2.9 Solid adhoc	1	29/08/2024	11/09/2024	13/09/2024	Yes
ASLP Metals-Hg (LL) 2.9 Solid adhoc	1	29/08/2024	11/09/2024	13/09/2024	Yes
LEAF 1313 Extraction T01 Solid adhoc	1	29/08/2024	17/09/2024	17/09/2024	No
LEAF 1313 Extraction T02 Solid adhoc	1	29/08/2024	17/09/2024	17/09/2024	No
LEAF 1313 Extraction T03 Solid adhoc	1	29/08/2024	17/09/2024	17/09/2024	No
LEAF 1313 Extraction T04 Solid adhoc	1	29/08/2024	17/09/2024	17/09/2024	No
LEAF 1313 Extraction T05 Solid adhoc	1	29/08/2024	17/09/2024	17/09/2024	No
LEAF 1313 Extraction T06 Solid adhoc	1	29/08/2024	17/09/2024	17/09/2024	No
LEAF 1313 Extraction T07 Solid adhoc	1	29/08/2024	17/09/2024	17/09/2024	No
LEAF 1313 Extraction T08 Solid adhoc	1	29/08/2024	17/09/2024	17/09/2024	No
LEAF 1313 Extraction T09 Solid adhoc	1	29/08/2024	17/09/2024	17/09/2024	No
DOC LEAF 1313 Solid adhoc	1	29/08/2024	25/09/2024	27/09/2024	Yes
Fluoride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Fluoride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Fluoride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Fluoride LEAF 1313 Solid adhoc	1	29/08/2024	02/10/2024	02/10/2024	No

Data Quality Assessment Summary PFH1870

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Fluoride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Fluoride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Fluoride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Fluoride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Fluoride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Chloride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Chloride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Chloride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Chloride LEAF 1313 Solid adhoc	1	29/08/2024	25/09/2024	26/09/2024	Yes
Chloride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Chloride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Chloride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Chloride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Chloride LEAF 1313 Solid adhoc	1	29/08/2024	10/10/2024	10/10/2024	No
Ammonia LEAF 1313 Solid adhoc	1	29/08/2024	02/10/2024	02/10/2024	No
N - Total LEAF 1313 Solid adhoc	1	29/08/2024	25/09/2024	26/09/2024	Yes
Nitrate LEAF 1313 Solid adhoc	1	29/08/2024	02/10/2024	02/10/2024	No
Nitrite LEAF 1313 Solid adhoc	1	29/08/2024	02/10/2024	02/10/2024	No
TKN as N calc LEAF 1313 Solid adhoc	1	29/08/2024	30/10/2024	30/10/2024	No
Hg (LL) LEAF1313 Solid adhoc	1	29/08/2024	11/09/2024	25/09/2024	Yes
Metals (LL) LEAF1313 Solid adhoc	1	29/08/2024	10/10/2024	11/10/2024	Yes
Hg (LL) LEAF1313 Solid adhoc	1	29/08/2024	11/09/2024	25/09/2024	Yes
Metals (LL) LEAF1313 Solid adhoc	1	29/08/2024	10/10/2024	11/10/2024	Yes
Hg (LL) LEAF1313 Solid adhoc	1	29/08/2024	11/09/2024	25/09/2024	Yes
Metals (LL) LEAF1313 Solid adhoc	1	29/08/2024	10/10/2024	11/10/2024	Yes
Hg (LL) LEAF1313 Solid adhoc	1	29/08/2024	11/09/2024	25/09/2024	Yes
Metals (LL) LEAF1313 Solid adhoc	1	29/08/2024	10/10/2024	12/10/2024	Yes
Hg (LL) LEAF1313 Solid adhoc	1	29/08/2024	11/09/2024	25/09/2024	Yes
Metals (LL) LEAF1313 Solid adhoc	1	29/08/2024	10/10/2024	12/10/2024	Yes
Hg (LL) LEAF1313 Solid adhoc	1	29/08/2024	11/09/2024	25/09/2024	Yes
Metals (LL) LEAF1313 Solid adhoc	1	29/08/2024	10/10/2024	12/10/2024	Yes
Hg (LL) LEAF1313 Solid adhoc	1	29/08/2024	11/09/2024	25/09/2024	Yes
Metals (LL) LEAF1313 Solid adhoc	1	29/08/2024	10/10/2024	12/10/2024	Yes
Hg (LL) LEAF1313 Solid adhoc	1	29/08/2024	11/09/2024	25/09/2024	Yes
Metals (LL) LEAF1313 Solid adhoc	1	29/08/2024	10/10/2024	12/10/2024	Yes
Hg (LL) LEAF1313 Solid adhoc	1	29/08/2024	11/09/2024	25/09/2024	Yes
Metals (LL) LEAF1313 Solid adhoc	1	29/08/2024	10/10/2024	15/10/2024	Yes

Data Quality Assessment Summary PFH1870

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Cations LEAF1313 Solid adhoc	1	29/08/2024	14/10/2024	15/10/2024	Yes
Metals LEAF1313 Solid adhoc	1	29/08/2024	14/10/2024	15/10/2024	Yes
Cations LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Metals LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Cations LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Metals LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Cations LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Metals LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Cations LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Metals LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Cations LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Metals LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Cations LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Metals LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Cations LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Metals LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Cations LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Metals LEAF1313 Solid adhoc	1	29/08/2024	17/09/2024	08/10/2024	Yes
Acrylamide LEAF 1313 Solid adhoc	1	29/08/2024	18/09/2024	18/09/2024	No
LEAF 1313 Extraction B01 Solid adhoc	6	29/08/2024	17/09/2024	17/09/2024	No
LEAF 1313 Extraction B02 Solid adhoc	7	29/08/2024	17/09/2024	17/09/2024	No
LEAF 1313 Extraction B03 Solid adhoc	8	29/08/2024	17/09/2024	17/09/2024	No
Fluoride LEAF 1313 Solid adhoc	6	29/08/2024	10/10/2024	10/10/2024	No
Fluoride LEAF 1313 Solid adhoc	7	29/08/2024	10/10/2024	10/10/2024	No
Fluoride LEAF 1313 Solid adhoc	8	29/08/2024	10/10/2024	10/10/2024	No
Chloride LEAF 1313 Solid adhoc	6	29/08/2024	10/10/2024	11/10/2024	No
Chloride LEAF 1313 Solid adhoc	7	29/08/2024	10/10/2024	11/10/2024	No
Chloride LEAF 1313 Solid adhoc	8	29/08/2024	10/10/2024	11/10/2024	No
Hg (LL) LEAF1313 Solid adhoc	6	29/08/2024	11/09/2024	25/09/2024	Yes
Metals (LL) LEAF1313 Solid adhoc	6	29/08/2024	10/10/2024	12/10/2024	Yes
Hg (LL) LEAF1313 Solid adhoc	7	29/08/2024	11/09/2024	25/09/2024	Yes
Metals (LL) LEAF1313 Solid adhoc	7	29/08/2024	10/10/2024	12/10/2024	Yes
Hg (LL) LEAF1313 Solid adhoc	8	29/08/2024	11/09/2024	25/09/2024	Yes
Metals (LL) LEAF1313 Solid adhoc	8	29/08/2024	10/10/2024	11/10/2024	Yes
Cations LEAF1313 Solid adhoc	6	29/08/2024	17/09/2024	08/10/2024	Yes
Metals LEAF1313 Solid adhoc	6	29/08/2024	17/09/2024	08/10/2024	Yes
Cations LEAF1313 Solid adhoc	7	29/08/2024	17/09/2024	08/10/2024	Yes

Data Quality Assessment Summary PFH1870

Recommended Holding Time Compliance

Analysis	Sample Number(s)	Date Sampled	Date Extracted	Date Analysed	Compliant
Metals LEAF1313 Solid adhoc	7	29/08/2024	17/09/2024	08/10/2024	Yes
Cations LEAF1313 Solid adhoc	8	29/08/2024	14/10/2024	15/10/2024	Yes
Metals LEAF1313 Solid adhoc	8	29/08/2024	14/10/2024	15/10/2024	Yes

Outliers: Laboratory Control Samples

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T04 (Solid adhoc) | Batch BFJ0409

Sample ID	Analyte	% Limits	% Recovery
BFJ0409-BS1	Fluoride	80 - 120	206

Data Quality Assessment Summary PFH1870

Outliers: Duplicates

INORG-001_1:10 | 1:10 Leach Inorganics (Solid adhoc) | Batch BFJ1248

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-02	DUP1	pH	30.00	200[4]

INORG-002_1:10 | 1:10 Leach Inorganics (Solid adhoc) | Batch BFJ1248

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-02	DUP1	Electrical Conductivity	30.00	200[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T09 (Solid adhoc) | Batch BFJ2098

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-01	DUP1	Fluoride	30.00	200[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes B01 (Solid adhoc) | Batch BFJ2086

Sample ID	Duplicate ID	Analyte	% Limits	RPD
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INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes B02 (Solid adhoc) | Batch BFJ2086

Sample ID	Duplicate ID	Analyte	% Limits	RPD
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INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes B03 (Solid adhoc) | Batch BFJ2086

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-06	DUP1	Chloride	30.00	200[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T01 (Solid adhoc) | Batch BFJ2114

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-01	DUP1	Chloride	30.00	200[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T02 (Solid adhoc) | Batch BFJ2415

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-01	DUP1	Chloride	30.00	200[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T03 (Solid adhoc) | Batch BFJ2339

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-01	DUP1	Chloride	30.00	200[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T05 (Solid adhoc) | Batch BFJ2340

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-01	DUP1	Chloride	30.00	200[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T06 (Solid adhoc) | Batch BFJ2341

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-01	DUP1	Chloride	30.00	200[4]

Data Quality Assessment Summary PFH1870

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T07 (Solid adhoc) | Batch BFJ2342

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-01	DUP1	Chloride	30.00	200[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T08 (Solid adhoc) | Batch BFJ2343

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-01	DUP1	Chloride	30.00	200[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T09 (Solid adhoc) | Batch BFJ2344

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-01	DUP1	Chloride	30.00	200[4]

METALS-020_ASLP | ASLP Metals - pH 2.9 (Solid adhoc) | Batch BFI1987

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-01	DUP2	Silicon	30.00	32.4[6]

METALS-022 | Liquor Leachate Metals (Solid adhoc) | Batch BFJ4314

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-01	DUP1	Tin	40.00	132[5]

METALS-022_1MHCL | 1:20 1M HCl Leach Metals (Solid adhoc) | Batch BFI1996

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-01	DUP1	Aluminium	20.00	39.5[6]
PFH1870-01	DUP1	Tin	40.00	78.8[5]
PFH1870-01	DUP2	Tin	40.00	52.9[5]

METALS-022_ASLP | ASLP Low Level Metals - pH 2.9 (Solid adhoc) | Batch BFI1995

Sample ID	Duplicate ID	Analyte	% Limits	RPD
PFH1870-01	DUP2	Nickel	30.00	33.1[5]

Data Quality Assessment Summary PFH1870

Outliers: Matrix Spike

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T01 (Solid adhoc) | Batch BFJ2090

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Fluoride	70 - 130	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T02 (Solid adhoc) | Batch BFJ2091

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Fluoride	70 - 130	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T03 (Solid adhoc) | Batch BFJ2092

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Fluoride	70 - 130	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T04 (Solid adhoc) | Batch BFJ0409

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Fluoride	70 - 130	##[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T05 (Solid adhoc) | Batch BFJ2093

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Fluoride	70 - 130	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T06 (Solid adhoc) | Batch BFJ2095

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Fluoride	70 - 130	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T07 (Solid adhoc) | Batch BFJ2096

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Fluoride	70 - 130	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T08 (Solid adhoc) | Batch BFJ2097

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Fluoride	70 - 130	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T09 (Solid adhoc) | Batch BFJ2098

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Fluoride	70 - 130	INS[4]

Data Quality Assessment Summary PFH1870

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes B01 (Solid adhoc) | Batch BFJ2086

Sample ID	Analyte	% Limits	% Recovery
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INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes B02 (Solid adhoc) | Batch BFJ2086

Sample ID	Analyte	% Limits	% Recovery
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INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes B03 (Solid adhoc) | Batch BFJ2086

Sample ID	Analyte	% Limits	% Recovery
PFH1870-06	Chloride	70 - 130	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T02 (Solid adhoc) | Batch BFJ2415

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Chloride	70 - 130	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T03 (Solid adhoc) | Batch BFJ2339

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Chloride	70 - 130	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T05 (Solid adhoc) | Batch BFJ2340

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Chloride	70 - 130	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T06 (Solid adhoc) | Batch BFJ2341

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Chloride	70 - 130	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T07 (Solid adhoc) | Batch BFJ2342

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Chloride	70 - 130	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T08 (Solid adhoc) | Batch BFJ2343

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Chloride	70 - 130	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T09 (Solid adhoc) | Batch BFJ2344

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Chloride	70 - 130	INS[4]

Data Quality Assessment Summary PFH1870

METALS-020 | LEAF 1313 Metals B01 (Solid adhoc) | Batch BFI2002

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Silicon	70 - 130	##[1]

METALS-020 | LEAF 1313 Metals B02 (Solid adhoc) | Batch BFI2009

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Calcium	70 - 130	67.2[1]
PFH1870-01	Phosphorus	70 - 130	##[1]

METALS-020 | LEAF 1313 Metals B03 (Solid adhoc) | Batch BFI1986

Sample ID	Analyte	% Limits	% Recovery
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METALS-020 | LEAF 1313 Metals T01 (Solid adhoc) | Batch BFI1986

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Potassium	70 - 130	##[1]

METALS-020 | LEAF 1313 Metals T02 (Solid adhoc) | Batch BFI1992

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Potassium	70 - 130	##[1]
PFH1870-01	Silicon	70 - 130	##[1]

METALS-020 | LEAF 1313 Metals T03 (Solid adhoc) | Batch BFI1994

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Silicon	70 - 130	##[1]

METALS-020 | LEAF 1313 Metals T04 (Solid adhoc) | Batch BFI1998

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Silicon	70 - 130	##[1]

METALS-020 | LEAF 1313 Metals T05 (Solid adhoc) | Batch BFI2002

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Silicon	70 - 130	##[1]

METALS-020 | LEAF 1313 Metals T07 (Solid adhoc) | Batch BFI2004

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Silicon	70 - 130	##[1]

Data Quality Assessment Summary PFH1870

METALS-020 | LEAF 1313 Metals T09 (Solid adhoc) | Batch BFI2009

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Calcium	70 - 130	67.2[1]
PFH1870-01	Phosphorus	70 - 130	##[1]

METALS-020 | Liquor Leachate Metals (Solid adhoc) | Batch BFJ4315

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Silicon	70 - 130	##[2]

METALS-020_1MHCL | 1:20 1M HCl Leach Metals (Solid adhoc) | Batch BFI1990

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Phosphorus	70 - 130	##[1]

METALS-022 | LEAF 1313 Metals - Low Level B02 (Solid adhoc) | Batch BFJ2081

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Aluminium	70 - 130	##[1]
PFH1870-01	Iron	70 - 130	##[1]
PFH1870-01	Lithium	70 - 130	##[1]
PFH1870-01	Manganese	70 - 130	##[1]

METALS-022 | LEAF 1313 Metals - Low Level T09 (Solid adhoc) | Batch BFJ2081

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Aluminium	70 - 130	##[1]
PFH1870-01	Iron	70 - 130	##[1]
PFH1870-01	Lithium	70 - 130	##[1]
PFH1870-01	Manganese	70 - 130	##[1]

METALS-022_1MHCL | 1:20 1M HCl Leach Metals (Solid adhoc) | Batch BFI1996

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Chromium	70 - 130	##[1]
PFH1870-01	Iron	70 - 130	##[1]
PFH1870-01	Lithium	70 - 130	##[1]
PFH1870-01	Manganese	70 - 130	61.2[1]
PFH1870-01	Molybdenum	70 - 130	131[1]
PFH1870-01	Nickel	70 - 130	##[1]

Data Quality Assessment Summary PFH1870

METALS-022_ASLP | ASLP Low Level Metals - pH 2.9 (Solid adhoc) | Batch BFI1995

Sample ID	Analyte	% Limits	% Recovery
PFH1870-01	Aluminium	70 - 130	50.6[1]
PFH1870-01	Iron	70 - 130	##[1]
PFH1870-01	Lithium	70 - 130	##[1]
PFH1870-01	Manganese	70 - 130	##[1]

Quality Control PFH1870

INORG-001 | Liquor Leachate Inorganics (Solid adhoc) | Batch BFJ4601

Analyte	Units	PQL	Blank	DUP1		LCS %
				PFH1870-01 Samp QC RPD %		
pH	pH units			7.0	7.1 0.847	103

INORG-002 | Liquor Leachate Inorganics (Solid adhoc) | Batch BFJ4602

Analyte	Units	PQL	Blank	DUP1		LCS %
				PFH1870-01 Samp QC RPD %		
Electrical Conductivity	µS/cm	2.0	<2.0	28.7	28.3 1.40	99.8

METALS-021 | Liquor Leachate Metals (Solid adhoc) | Batch BFJ4313

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike % PFH1870-01
				PFH1870-01 Samp QC RPD %			
Mercury	mg/L	0.000050	<0.0050	<0.0050	<0.0050 [NA]	71.2	80.0

METALS-022 | Liquor Leachate Metals (Solid adhoc) | Batch BFJ4314

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike % PFH1870-01
				PFH1870-01 Samp QC RPD %			
Antimony	mg/L	0.0010	<0.0010	<0.0010	<0.0010 [NA]	106	105
Arsenic	mg/L	0.0010	<0.0010	<0.0010	<0.0010 [NA]	94.8	93.5
Barium	mg/L	0.0010	<0.0010	0.00195	0.00193 [NA]	96.3	98.1
Beryllium	mg/L	0.00050	<0.00050	<0.00050	<0.00050 [NA]	87.5	106
Bismuth	mg/L	0.0010	<0.0010	<0.0010	<0.0010 [NA]	87.3	91.7
Cadmium	mg/L	0.00010	<0.00010	0.000200	0.000220 [NA]	102	104
Caesium	mg/L	0.0010	<0.0010	0.00218	0.00278 [NA]	96.3	99.0
Chromium	mg/L	0.0010	<0.0010	0.0915	0.0950 3.79	88.8	84.8
Cobalt	mg/L	0.0010	<0.0010	<0.0010	<0.0010 [NA]	89.4	88.2
Copper	mg/L	0.0010	<0.0010	0.00288	0.00333 [NA]	87.8	86.0
Lanthanum	mg/L	0.00050	<0.00050	<0.00050	<0.00050 [NA]	94.6	96.0
Lead	mg/L	0.0010	<0.0010	0.00124	0.00129 [NA]	91.7	93.6
Lithium	mg/L	0.0010	<0.0010	1.37	1.39 1.47	89.8	120
Manganese	mg/L	0.0010	<0.0010	0.317	0.325 2.32	85.9	77.2
Molybdenum	mg/L	0.0010	<0.0010	0.00596	0.00589 1.18	106	105
Nickel	mg/L	0.0010	<0.0010	0.00272	0.00248 [NA]	88.8	86.3
Niobium	mg/L	0.0010	<0.0010	0.0100	0.00951 5.12	105	105
Rubidium	mg/L	0.0010	<0.0010	0.0139	0.0141 1.50	91.7	88.8
Selenium	mg/L	0.0010	<0.0010	<0.0010	<0.0010 [NA]	102	103
Silver	mg/L	0.0010	<0.0010	<0.0010	<0.0010 [NA]	98.0	99.2
Strontium	mg/L	0.0010	<0.0010	0.00357	0.00364 [NA]	90.3	89.3
Tantalum	mg/L	0.0010	<0.0010	0.00819	0.00841 2.65	120	117
Thallium	mg/L	0.0010	<0.0010	<0.0010	<0.0010 [NA]	90.9	94.8
Thorium	mg/L	0.00050	<0.00050	<0.00050	<0.00050 [NA]	92.1	94.0
Tin	mg/L	0.0010	<0.0010	0.00183	0.00894 132 [5]	109	106
Titanium	mg/L	0.0020	<0.0020	<0.0020	<0.0020 [NA]	86.6	84.9
Tungsten	mg/L	0.010	<0.010	<0.010	<0.010 [NA]	96.7	96.2
Uranium	mg/L	0.0010	<0.0010	0.0408	0.0411 0.806	91.3	88.6
Vanadium	mg/L	0.0010	<0.0010	0.00119	0.00120 [NA]	91.1	89.1
Zinc	mg/L	0.0010	<0.0010	0.0277	0.0317 13.5	88.9	86.8

Quality Control PFH1870

METALS-020 | Liquor Leachate Metals (Solid adhoc) | Batch BFJ4315

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	PFH1870-01		
Aluminium	mg/L	0.10	<0.10	0.606 0.619 2.06		107	96.0
Calcium	mg/L	0.50	<0.50	<0.50 <0.50 [NA]		97.5	96.3
Iron	mg/L	0.020	<0.020	0.206 0.201 2.65		91.3	94.3
Magnesium	mg/L	0.50	<0.50	<0.50 <0.50 [NA]		98.0	96.3
Phosphorus	mg/L	0.050	<0.050	0.330 0.323 2.20		101	96.0
Potassium	mg/L	0.50	<0.50	<0.50 <0.50 [NA]		98.2	97.0
Silicon	mg/L	0.10	<0.10	1.89 1.83 3.00		111	#[2]
Sodium	mg/L	0.50	<0.50	0.760 0.761 [NA]		98.4	96.4
Sulfur	mg/L	0.50	<0.50	0.508 <0.50 [NA] [5]		129	124

INORG-001_1:10 | 1:10 Leach Inorganics (Solid adhoc) | Batch BFJ1248

Analyte	Units	PQL	Blank	DUP1		LCS %
				PFH1870-02	PFH1870-02	
pH	pH units		5.6	INS INS 200 [4]		102
Electrical Conductivity	µS/cm	2.0	<2.0	INS INS 200 [4]		99.7

METALS-020_1:10 | 1:10 Leach Metals (Solid adhoc) | Batch BFJ2613

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-02	PFH1870-03		
Calcium	mg/L	0.50	<0.50	<0.50 <0.50 [NA]		102	105
Potassium	mg/L	0.50	<0.50	<0.50 <0.50 [NA]		99.1	103
Magnesium	mg/L	0.50	<0.50	<0.50 <0.50 [NA]		104	108
Sodium	mg/L	0.50	<0.50	2.34 2.38 [NA]		102	108

METALS-022_1:10 | 1:10 Leach Metals Low Level (Solid adhoc) | Batch BFJ2612

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-02	PFH1870-03		
Lithium	mg/L	0.0010	<0.0050	0.0404 0.0404 0.148		83.9	85.9

METALS-021_1MHCL | 1:20 1M HCl Leach Metals (Solid adhoc) | Batch BFI1988

Analyte	Units	PQL	Blank	DUP1		DUP2		LCS %	Spike %
				PFH1870-01	PFH1870-01	PFH1870-01	PFH1870-01		
Mercury	mg/L	0.000050	<0.000050	<0.000050 <0.000050 [NA]		<0.000050 <0.000050 [NA]		91.2	92.0

METALS-020_1MHCL | 1:20 1M HCl Leach Metals (Solid adhoc) | Batch BFI1990

Analyte	Units	PQL	Blank	DUP1		DUP2		LCS %	Spike %
				PFH1870-01	PFH1870-01	PFH1870-01	PFH1870-01		
Calcium	mg/L	0.50	<0.50	50.8 65.2 24.8		50.8 50.4 0.890		102	99.0
Magnesium	mg/L	0.50	<0.50	2.26 2.94 26.3		2.26 2.32 [NA]		102	100
Phosphorus	mg/L	0.050	<0.050	41.4 49.4 17.8		41.4 41.8 1.06		104	#[1]
Potassium	mg/L	0.50	<0.50	1.78 2.55 [NA]		1.78 1.73 [NA]		102	102
Silicon	mg/L	0.10	<0.10	3.17 4.64 37.6		3.17 3.22 1.34		106	128
Sodium	mg/L	0.50	<0.50	1.30 1.63 [NA]		1.30 1.26 [NA]		94.7	94.9
Sulfur	mg/L	0.50	<0.50	<0.50 <0.50 [NA]		<0.50 <0.50 [NA]		104	104

Quality Control PFH1870

METALS-022_1MHCL | 1:20 1M HCl Leach Metals (Solid adhoc) | Batch BFI1996

Analyte	Units	PQL	Blank	DUP1		DUP2		LCS %	Spike %
				PFH1870-01	PFH1870-01	PFH1870-01	PFH1870-01		
				Samp QC RPD %	Samp QC RPD %				
Aluminium	mg/L	0.010	<0.010	4.11 6.13 39.5 [6]	4.11 4.02 2.22	101	84.4		
Antimony	mg/L	0.0010	<0.0010	0.00100 <0.0010 [NA] [5]	0.00100 <0.0010 [NA] [5]	95.7	103		
Arsenic	mg/L	0.0010	<0.0010	0.00352 0.00414 [NA]	0.00352 0.00310 [NA]	103	103		
Barium	mg/L	0.0010	<0.0010	0.128 0.164 24.7	0.128 0.128 0.328	99.0	103		
Beryllium	mg/L	0.00050	<0.00050	0.00703 0.0100 35.3	0.00703 0.00698 0.714	90.0	90.0		
Bismuth	mg/L	0.0010	<0.0010	0.0514 0.0555 7.74	0.0514 0.0440 15.5	99.3	104		
Cadmium	mg/L	0.00010	<0.00010	0.00178 0.00242 30.5	0.00178 0.00173 2.85	96.7	103		
Caesium	mg/L	0.0010	<0.0010	0.0272 0.0364 28.8	0.0272 0.0270 0.923	104	97.1		
Chromium	mg/L	0.0010	<0.0010	2.62 3.34 24.4	2.62 2.62 0.171	105	##[1]		
Cobalt	mg/L	0.0010	<0.0010	0.0323 0.0426 27.5	0.0323 0.0328 1.35	106	108		
Copper	mg/L	0.0010	<0.0010	0.159 0.212 28.7	0.159 0.160 0.902	109	118		
Iron	mg/L	0.010	<0.010	38.5 46.8 19.5	38.5 39.4 2.42	100	##[1]		
Lanthanum	mg/L	0.00050	<0.00050	0.0127 0.0126 0.710	0.0127 0.0114 10.9	99.6	98.6		
Lead	mg/L	0.0010	<0.0010	0.0960 0.127 27.7	0.0960 0.0924 3.80	98.0	111		
Lithium	mg/L	0.0010	<0.0010	3.24 3.57 9.64	3.24 3.36 3.58	99.0	##[1]		
Manganese	mg/L	0.0010	<0.0010	20.5 23.9 15.3	20.5 21.2 3.44	105	61.2[1]		
Molybdenum	mg/L	0.0010	<0.0010	0.308 0.406 27.5	0.308 0.310 0.751	99.2	131[1]		
Nickel	mg/L	0.0010	<0.0010	1.62 2.10 25.7	1.62 1.62 0.263	94.4	##[1]		
Niobium	mg/L	0.0010	<0.0010	0.00297 0.00343 [NA]	0.00297 0.00306 [NA]	[NA]	91.2		
Rubidium	mg/L	0.0010	<0.0010	0.0709 0.0975 31.7	0.0709 0.0716 1.05	103	111		
Selenium	mg/L	0.0010	<0.0010	<0.0010 <0.0010 [NA]	<0.0010 <0.0010 [NA]	97.7	107		
Silver	mg/L	0.0010	<0.0010	<0.0010 <0.0010 [NA]	<0.0010 <0.0010 [NA]	94.6	101		
Strontium	mg/L	0.0010	<0.0010	0.264 0.344 26.3	0.264 0.267 1.09	103	120		
Tantalum	mg/L	0.0010	<0.0010	<0.0010 <0.0010 [NA]	<0.0010 <0.0010 [NA]	[NA]	107		
Thallium	mg/L	0.0010	<0.0010	<0.0010 <0.0010 [NA]	<0.0010 <0.0010 [NA]	98.5	102		
Thorium	mg/L	0.00050	<0.00050	0.00449 0.00527 16.0	0.00449 0.00487 8.12	90.0	99.1		
Tin	mg/L	0.0010	<0.0010	0.00531 0.0122 78.8 [5]	0.00531 0.00913 52.9 [5]	98.8	105		
Titanium	mg/L	0.0020	<0.0020	0.0120 0.0156 26.3	0.0120 0.0115 4.52	98.6	99.5		
Tungsten	mg/L	0.010	<0.010	<0.010 <0.010 [NA]	<0.010 <0.010 [NA]	97.7	114		
Uranium	mg/L	0.0010	<0.0010	0.112 0.167 39.0	0.112 0.114 1.78	95.9	98.3		
Vanadium	mg/L	0.0010	<0.0010	0.0171 0.0221 25.7	0.0171 0.0165 3.27	107	106		
Zinc	mg/L	0.0010	<0.0010	0.302 0.401 28.3	0.302 0.311 2.96	106	126		

Analyte	Units	PQL	Blank	LCS %
Niobium	mg/L	0.001		94.4
Tantalum	mg/L	0.001		71.0

INORG-004 | ASLP Extraction - pH 2.9 (Solid adhoc) | Batch BFJ0377

Analyte	Units	PQL	Blank	DUP1	LCS %
				PFH1870-01	
				Samp QC RPD %	
pH of final leachate	pH units		5.95	3.35 3.40 1.48	101

METALS-020_ASPL | ASPL Metals - pH 2.9 (Solid adhoc) | Batch BFI1987

Analyte	Units	PQL	Blank	DUP1		DUP2		LCS %	Spike %
				PFH1870-01	PFH1870-01	PFH1870-01	PFH1870-01		
				Samp QC RPD %	Samp QC RPD %				
Calcium	mg/L	0.50	<0.50	16.7 17.9 6.73	16.7 19.7 16.6	95.5	99.7		
Magnesium	mg/L	0.50	<0.50	1.69 1.79 [NA]	1.69 2.10 [NA] [6]	96.3	100		
Phosphorus	mg/L	0.050	<0.050	22.7 22.8 0.638	22.7 26.6 15.9	99.2	102		
Potassium	mg/L	0.50	<0.50	0.892 0.996 [NA]	0.892 1.13 [NA] [6]	101	104		
Silicon	mg/L	0.10	<0.10	1.28 1.61 22.9	1.28 1.78 32.4 [6]	99.0	122		
Sodium	mg/L	0.50	<0.50	1.05 1.09 [NA]	1.05 1.18 [NA]	88.8	93.1		
Sulfur	mg/L	0.50	<0.50	<0.50 <0.50 [NA]	<0.50 <0.50 [NA]	97.6	101		

Quality Control PFH1870

METALS-021_ASPL | ASPL Low Level Metals - pH 2.9 (Solid adhoc) | Batch BFI1989

Analyte	Units	PQL	Blank	DUP1		DUP2		LCS %	Spike %
				PFH1870-01		PFH1870-01			
				Samp	QC RPD %	Samp	QC RPD %		
Mercury	µg/L	0.050	<0.050	<0.050	<0.050 [NA]	<0.050	<0.050 [NA]	104	99.2

METALS-022_ASPL | ASPL Low Level Metals - pH 2.9 (Solid adhoc) | Batch BFI1995

Analyte	Units	PQL	Blank	DUP1		DUP2		LCS %	Spike %
				PFH1870-01		PFH1870-01			
				Samp	QC RPD %	Samp	QC RPD %		
Aluminium	µg/L	10	<10	1150	1370 17.2	1150	1320 13.6	103	50.6[1]
Antimony	µg/L	1.0	<1.0	1.26	<1.0 [NA] [5]	1.26	<1.0 [NA] [5]	94.8	91.0
Arsenic	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	<1.0	<1.0 [NA]	116	103
Barium	µg/L	1.0	<1.0	43.9	44.9 2.26	43.9	49.4 11.7	103	104
Beryllium	µg/L	0.50	<0.50	2.47	2.52 [NA]	2.47	2.64 6.46	92.5	78.6
Bismuth	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	<1.0	<1.0 [NA]	96.7	89.6
Cadmium	µg/L	0.10	<0.10	0.285	0.315 [NA]	0.285	0.375 [NA]	104	99.6
Caesium	µg/L	1.0	<1.0	2.06	2.29 [NA]	2.06	2.35 [NA]	104	100
Chromium	µg/L	1.0	<1.0	11.0	12.1 9.64	11.0	12.9 16.6	107	101
Cobalt	µg/L	1.0	<1.0	1.64	1.86 [NA]	1.64	2.22 [NA] [5]	106	101
Copper	µg/L	1.0	<1.0	31.9	35.7 11.4	31.9	39.5 21.5	110	101
Iron	µg/L	10	<10	15200	14900 1.77	15200	17200 12.3	110	##[1]
Lanthanum	µg/L	0.50	<0.50	<0.50	<0.50 [NA]	<0.50	<0.50 [NA]	103	101
Lead	µg/L	1.0	<1.0	3.88	3.76 [NA]	3.88	3.27 [NA]	102	94.9
Lithium	µg/L	0.50	<0.50	2660	2620 1.58	2660	2930 9.49	89.4	##[1]
Manganese	µg/L	5.0	<5.0	16500	16800 1.75	16500	19300 15.5	107	##[1]
Molybdenum	µg/L	1.0	<1.0	1.47	1.23 [NA]	1.47	1.19 [NA]	101	101
Nickel	µg/L	1.0	<1.0	14.9	17.6 16.3	14.9	20.8 33.1 [5]	107	99.8
Niobium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	<1.0	<1.0 [NA]	98.4	99.4
Rubidium	µg/L	1.0	<1.0	20.6	23.3 12.2	20.6	24.8 18.5	106	99.0
Selenium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	<1.0	<1.0 [NA]	97.8	106
Silver	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	<1.0	<1.0 [NA]	98.6	95.7
Strontium	µg/L	1.0	<1.0	82.5	88.1 6.60	82.5	90.0 8.74	104	93.5
Tantalum	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	<1.0	<1.0 [NA]	98.0	104
Thorium	µg/L	0.50	<0.50	<0.50	<0.50 [NA]	<0.50	<0.50 [NA]	99.1	87.3
Tin	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	<1.0	<1.0 [NA]	101	94.2
Titanium	µg/L	1.0	<1.0	1.53	1.54 [NA]	1.53	1.48 [NA]	104	99.7
Tungsten	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	<1.0	<1.0 [NA]	97.4	96.6
Uranium	µg/L	0.50	<0.50	19.1	19.8 3.96	19.1	19.2 0.445	98.6	88.4
Vanadium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	<1.0	<1.0 [NA]	107	104
Zinc	µg/L	5.0	<5.0	217	235 7.84	217	256 16.7	111	88.0

INORG-079 | LEAF 1313 Inorganics - Carbons, Nitrogen Species, Sulfur Species T04 (Solid adhoc) | Batch BFI4581

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01			
				Samp	QC RPD %		
Dissolved Organic Carbon	mg/L	1.0	<1.0	INS	INS [NA] [4]	[NA]	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T01 (Solid adhoc) | Batch BFJ2090

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01			
				Samp	QC RPD %		
Fluoride	mg/L	0.10	<0.10	INS	INS [NA] [4]	113	INS[4]

Quality Control PFH1870

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T02 (Solid adhoc) | Batch BFJ2091

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Fluoride	mg/L	0.10	<0.10	INS INS [NA] [4]	113	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T03 (Solid adhoc) | Batch BFJ2092

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Fluoride	mg/L	0.10	<0.10	INS INS [NA] [4]	113	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T04 (Solid adhoc) | Batch BFJ0409

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Fluoride	mg/L	0.10	<0.10	## ## [NA] [4]	206	##[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T05 (Solid adhoc) | Batch BFJ2093

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Fluoride	mg/L	0.10	<0.10	INS INS [NA] [4]	113	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T06 (Solid adhoc) | Batch BFJ2095

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Fluoride	mg/L	0.10	<0.10	INS INS [NA] [4]	113	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T07 (Solid adhoc) | Batch BFJ2096

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Fluoride	mg/L	0.10	<0.10	INS INS [NA] [4]	113	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T08 (Solid adhoc) | Batch BFJ2097

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Fluoride	mg/L	0.10	<0.10	INS INS [NA] [4]	113	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions T09 (Solid adhoc) | Batch BFJ2098

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Fluoride	mg/L	0.10	<0.10	INS INS 200 [4]	113	INS[4]

Quality Control PFH1870

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T01 (Solid adhoc) | Batch BFJ2114

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Chloride	mg/L	1.0	<1.0	INS INS 200 [4]	89.0	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T02 (Solid adhoc) | Batch BFJ2415

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Chloride	mg/L	1.0	<1.0	INS INS 200 [4]	89.0	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T03 (Solid adhoc) | Batch BFJ2339

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Chloride	mg/L	1.0	<1.0	INS INS 200 [4]	89.0	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T04 (Solid adhoc) | Batch BFI4570

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Chloride	mg/L	1.0	<1.0	INS INS [NA] [4]	92.8	101

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T05 (Solid adhoc) | Batch BFJ2340

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Chloride	mg/L	1.0	<1.0	INS INS 200 [4]	89.0	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T06 (Solid adhoc) | Batch BFJ2341

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Chloride	mg/L	1.0	<1.0	INS INS 200 [4]	89.0	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T07 (Solid adhoc) | Batch BFJ2342

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Chloride	mg/L	1.0	<1.0	INS INS 200 [4]	89.0	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T08 (Solid adhoc) | Batch BFJ2343

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Chloride	mg/L	1.0	<1.0	INS INS 200 [4]	89.0	INS[4]

Quality Control PFH1870

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes T09 (Solid adhoc) | Batch BFJ2344

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Chloride	mg/L	1.0	<1.0	INS INS 200 [4]	89.0	INS[4]

INORG-127 | LEAF 1313 Inorganics - Nutrients T04 (Solid adhoc) | Batch BFI4560

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Total Nitrogen	mg/L	0.10	<0.10	INS INS [NA] [4]	115	124

INORG-057 | LEAF 1313 Inorganics - Nutrients T04 (Solid adhoc) | Batch BFJ0308

Analyte	Units	PQL	Blank	LCS %
Ammonia as N	mg/L	0.0050	<0.0050	97.6
Nitrate as N	mg/L	0.0050	<0.0050	108
Nitrate as NO3 by calculation	mg/L	0.020	<0.020	[NA]
Nitrite as N	mg/L	0.0050	<0.0050	[NA]
Nitrite as NO2 by calculation	mg/L	0.020	<0.020	[NA]

METALS-021 | LEAF 1313 Metals - Low Level T01 (Solid adhoc) | Batch BFI1985

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-01
Mercury	µg/L	0.050	<0.050	<0.050 <0.050 [NA]	108	123

Quality Control PFH1870

METALS-022 | LEAF 1313 Metals - Low Level T01 (Solid adhoc) | Batch BFJ2073

Analyte	Units	PQL	Blank	DUP1	LCS %	Spike % PFH1870-01
				PFH1870-01 Samp QC RPD %		
Aluminium	µg/L	10	<10	4280 4390 2.50	96.4	87.1
Antimony	µg/L	1.0	<1.0	2.29 1.48 [NA] [5]	103	110
Arsenic	µg/L	1.0	<1.0	7.52 7.22 4.07	101	104
Barium	µg/L	1.0	<1.0	87.4 89.7 2.61	102	108
Beryllium	µg/L	0.50	<0.50	<0.50 <0.50 [NA]	89.4	102
Bismuth	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	94.9	81.5
Cadmium	µg/L	0.10	<0.10	<0.10 <0.10 [NA]	106	101
Caesium	µg/L	1.0	<1.0	13.8 13.8 0.290	103	106
Chromium	µg/L	1.0	<1.0	31.8 31.9 0.377	98.2	95.2
Cobalt	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	99.1	93.0
Copper	µg/L	1.0	<1.0	15.2 15.2 0.198	97.3	86.8
Iron	µg/L	10	<10	82.3 79.4 3.60	106	102
Lanthanum	µg/L	0.50	<0.50	<0.50 <0.50 [NA]	102	105
Lead	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	98.3	91.5
Lithium	µg/L	1.0	<1.0	76.4 77.8 1.87	93.4	106
Manganese	µg/L	1.0	<1.0	3.16 3.34 [NA]	96.1	97.5
Molybdenum	µg/L	1.0	<1.0	11.8 10.7 9.75	104	111
Nickel	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	98.4	88.3
Niobium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	100	99.4
Rubidium	µg/L	1.0	<1.0	183 188 2.55	99.6	102
Selenium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	105	102
Silver	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	100	95.6
Strontium	µg/L	1.0	<1.0	2.92 3.16 [NA]	102	104
Tantalum	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	112	104
Thallium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	98.3	92.0
Thorium	µg/L	0.50	<0.50	1.01 0.595 [NA] [5]	98.3	94.2
Tin	µg/L	1.0	<1.0	7.36 7.02 4.80	108	107
Titanium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	94.9	101
Tungsten	µg/L	10	<10	40.9 31.6 [NA] [5]	96.4	88.2
Uranium	µg/L	1.0	<1.0	84.1 83.7 0.507	97.7	94.1
Vanadium	µg/L	1.0	<1.0	2.68 2.42 [NA]	99.6	100
Zinc	µg/L	1.0	<1.0	50.1 50.6 1.08	97.6	91.5

METALS-021 | LEAF 1313 Metals - Low Level T02 (Solid adhoc) | Batch BFI1991

Analyte	Units	PQL	Blank	DUP1	LCS %	Spike % PFH1870-01
				PFH1870-01 Samp QC RPD %		
Mercury	µg/L	0.050	<0.050	<0.050 <0.050 [NA]	108	108

Quality Control PFH1870

METALS-022 | LEAF 1313 Metals - Low Level T02 (Solid adhoc) | Batch BFJ2074

Analyte	Units	PQL	Blank	DUP1	LCS %	Spike % PFH1870-01
				PFH1870-01 Samp QC RPD %		
Aluminium	µg/L	10	<10	3840 3910 1.74	95.9	78.1
Antimony	µg/L	1.0	<1.0	1.80 1.09 [NA] [5]	105	105
Arsenic	µg/L	1.0	<1.0	4.60 4.60 [NA]	99.9	101
Barium	µg/L	1.0	<1.0	106 109 3.24	107	105
Beryllium	µg/L	0.50	<0.50	<0.50 <0.50 [NA]	98.2	99.7
Bismuth	µg/L	1.0	<1.0	1.16 1.11 [NA]	93.9	87.1
Cadmium	µg/L	0.10	<0.10	<0.10 <0.10 [NA]	103	104
Caesium	µg/L	1.0	<1.0	8.42 8.18 2.83	108	106
Chromium	µg/L	1.0	<1.0	11.4 12.2 7.00	94.2	95.1
Cobalt	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	94.3	95.0
Copper	µg/L	1.0	<1.0	7.96 8.02 0.750	91.6	91.8
Iron	µg/L	10	<10	523 520 0.600	103	92.4
Lanthanum	µg/L	0.50	<0.50	<0.50 <0.50 [NA]	107	105
Lead	µg/L	1.0	<1.0	2.54 2.62 [NA]	97.8	96.2
Lithium	µg/L	1.0	<1.0	81.9 83.5 1.83	98.7	101
Manganese	µg/L	1.0	<1.0	74.5 76.6 2.72	95.2	95.7
Molybdenum	µg/L	1.0	<1.0	6.24 5.94 4.93	107	107
Nickel	µg/L	1.0	<1.0	1.95 1.88 [NA]	92.4	92.9
Niobium	µg/L	1.0	<1.0	2.23 1.86 [NA]	99.6	96.5
Rubidium	µg/L	1.0	<1.0	85.4 86.1 0.799	101	101
Selenium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	101	101
Silver	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	101	98.8
Strontium	µg/L	1.0	<1.0	4.17 4.12 [NA]	101	103
Tantalum	µg/L	1.0	<1.0	1.22 1.22 [NA]	105	115
Thallium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	98.2	97.1
Thorium	µg/L	0.50	<0.50	<0.50 <0.50 [NA]	96.9	95.9
Tin	µg/L	1.0	<1.0	3.80 3.40 [NA]	109	107
Titanium	µg/L	1.0	<1.0	3.53 3.45 [NA]	95.4	96.1
Tungsten	µg/L	10	<10	<10 <10 [NA]	97.8	95.4
Uranium	µg/L	1.0	<1.0	20.5 21.2 3.26	96.4	95.4
Vanadium	µg/L	1.0	<1.0	1.24 1.20 [NA]	97.0	99.1
Zinc	µg/L	1.0	<1.0	45.8 45.2 1.47	94.9	94.6

METALS-021 | LEAF 1313 Metals - Low Level T03 (Solid adhoc) | Batch BFI1993

Analyte	Units	PQL	Blank	DUP1	LCS %	Spike % PFH1870-01
				PFH1870-01 Samp QC RPD %		
Mercury	µg/L	0.050	<0.050	<0.050 <0.050 [NA]	107	108

Quality Control PFH1870

METALS-022 | LEAF 1313 Metals - Low Level T03 (Solid adhoc) | Batch BFJ2075

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	PFH1870-01		
				Samp QC RPD %			
Aluminium	µg/L	10	<10	2270	2270 0.0905	101	70.9
Antimony	µg/L	1.0	<1.0	1.90	1.06 [NA] [5]	103	99.6
Arsenic	µg/L	1.0	<1.0	1.66	1.58 [NA]	102	102
Barium	µg/L	1.0	<1.0	192	187 2.62	105	101
Beryllium	µg/L	0.50	<0.50	0.610	0.505 [NA]	96.9	98.7
Bismuth	µg/L	1.0	<1.0	1.80	1.74 [NA]	94.0	88.3
Cadmium	µg/L	0.10	<0.10	<0.10	<0.10 [NA]	103	106
Caesium	µg/L	1.0	<1.0	4.90	4.80 [NA]	105	105
Chromium	µg/L	1.0	<1.0	11.6	12.0 2.71	96.5	97.0
Cobalt	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	97.2	98.1
Copper	µg/L	1.0	<1.0	7.99	8.02 0.437	94.1	95.8
Iron	µg/L	10	<10	756	767 1.41	103	86.5
Lanthanum	µg/L	0.50	<0.50	<0.50	<0.50 [NA]	103	103
Lead	µg/L	1.0	<1.0	4.72	4.58 [NA]	97.9	97.8
Lithium	µg/L	1.0	<1.0	96.4	94.1 2.43	97.4	99.0
Manganese	µg/L	1.0	<1.0	152	150 1.29	96.6	97.4
Molybdenum	µg/L	1.0	<1.0	4.68	4.65 [NA]	106	105
Nickel	µg/L	1.0	<1.0	3.49	3.58 [NA]	95.8	95.6
Niobium	µg/L	1.0	<1.0	2.66	2.36 [NA]	99.6	92.5
Rubidium	µg/L	1.0	<1.0	39.6	39.4 0.658	102	101
Selenium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	102	102
Silver	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	100	98.9
Strontium	µg/L	1.0	<1.0	4.89	4.62 [NA]	104	103
Tantalum	µg/L	1.0	<1.0	1.96	2.42 [NA] [5]	108	80.0
Thallium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	98.1	97.9
Thorium	µg/L	0.50	<0.50	<0.50	<0.50 [NA]	97.5	94.2
Tin	µg/L	1.0	<1.0	1.72	1.55 [NA]	107	107
Titanium	µg/L	1.0	<1.0	2.85	2.91 [NA]	95.5	95.3
Tungsten	µg/L	10	<10	<10	<10 [NA]	96.6	95.8
Uranium	µg/L	1.0	<1.0	6.60	6.52 1.30	96.2	96.6
Vanadium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	99.2	100
Zinc	µg/L	1.0	<1.0	30.1	28.0 7.29	97.5	98.1

METALS-021 | LEAF 1313 Metals - Low Level T04 (Solid adhoc) | Batch BFI1997

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	PFH1870-01		
				Samp QC RPD %			
Mercury	µg/L	0.050	<0.050	<0.050	<0.050 [NA]	109	107

Quality Control PFH1870

METALS-022 | LEAF 1313 Metals - Low Level T04 (Solid adhoc) | Batch BFJ2076

Analyte	Units	PQL	Blank	DUP1	LCS %	Spike % PFH1870-01
				PFH1870-01 Samp QC RPD %		
Aluminium	µg/L	10	<10	1490 1520 1.84	114	109
Antimony	µg/L	1.0	<1.0	1.72 1.18 [NA] [5]	104	101
Arsenic	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	101	102
Barium	µg/L	1.0	<1.0	354 360 1.73	104	102
Beryllium	µg/L	0.50	<0.50	<0.50 0.555 [NA] [5]	94.4	96.4
Bismuth	µg/L	1.0	<1.0	1.12 1.14 [NA]	94.3	89.1
Cadmium	µg/L	0.10	<0.10	<0.10 <0.10 [NA]	104	106
Caesium	µg/L	1.0	<1.0	3.88 4.00 [NA]	104	102
Chromium	µg/L	1.0	<1.0	8.26 7.90 4.46	96.3	96.5
Cobalt	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	97.3	98.2
Copper	µg/L	1.0	<1.0	5.49 5.32 3.05	94.6	95.9
Iron	µg/L	10	<10	590 571 3.30	103	95.2
Lanthanum	µg/L	0.50	<0.50	<0.50 <0.50 [NA]	103	101
Lead	µg/L	1.0	<1.0	3.20 3.36 [NA]	98.0	97.8
Lithium	µg/L	1.0	<1.0	86.5 89.0 2.87	97.2	99.0
Manganese	µg/L	1.0	<1.0	171 174 1.54	96.5	97.4
Molybdenum	µg/L	1.0	<1.0	4.20 4.11 [NA]	106	105
Nickel	µg/L	1.0	<1.0	3.16 3.14 [NA]	95.7	95.9
Niobium	µg/L	1.0	<1.0	2.42 2.38 [NA]	98.9	95.0
Rubidium	µg/L	1.0	<1.0	24.2 24.5 1.15	101	101
Selenium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	102	103
Silver	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	102	99.8
Strontium	µg/L	1.0	<1.0	7.10 6.90 2.79	102	103
Tantalum	µg/L	1.0	<1.0	1.16 1.24 [NA]	110	90.0
Thallium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	97.6	96.6
Thorium	µg/L	0.50	<0.50	<0.50 <0.50 [NA]	98.0	94.7
Tin	µg/L	1.0	<1.0	1.52 1.30 [NA]	109	107
Titanium	µg/L	1.0	<1.0	2.46 2.71 [NA]	95.4	96.2
Tungsten	µg/L	10	<10	<10 <10 [NA]	97.3	95.4
Uranium	µg/L	1.0	<1.0	2.82 2.84 [NA]	97.3	95.4
Vanadium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	99.1	99.2
Zinc	µg/L	1.0	<1.0	41.9 39.6 5.63	113	102

METALS-021 | LEAF 1313 Metals - Low Level T05 (Solid adhoc) | Batch BFI1999

Analyte	Units	PQL	Blank	DUP1	LCS %	Spike % PFH1870-01
				PFH1870-01 Samp QC RPD %		
Mercury	µg/L	0.050	<0.050	<0.050 <0.050 [NA]	108	108

Quality Control PFH1870

METALS-022 | LEAF 1313 Metals - Low Level T05 (Solid adhoc) | Batch BFJ2077

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	PFH1870-01		
				Samp	QC RPD %		
Aluminium	µg/L	10	<10	1380	1410 2.47	93.6	77.4
Antimony	µg/L	1.0	<1.0	1.92	1.21 [NA] [5]	102	100
Arsenic	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	102	99.5
Barium	µg/L	1.0	<1.0	310	308 0.651	102	97.2
Beryllium	µg/L	0.50	<0.50	0.525	<0.50 [NA] [5]	93.6	95.5
Bismuth	µg/L	1.0	<1.0	1.18	1.06 [NA]	94.2	88.0
Cadmium	µg/L	0.10	<0.10	<0.10	<0.10 [NA]	104	106
Caesium	µg/L	1.0	<1.0	3.77	3.66 [NA]	103	100
Chromium	µg/L	1.0	<1.0	7.62	7.90 3.54	97.8	95.9
Cobalt	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	98.5	96.9
Copper	µg/L	1.0	<1.0	5.44	5.58 2.54	96.4	95.7
Iron	µg/L	10	<10	557	545 2.27	104	102
Lanthanum	µg/L	0.50	<0.50	<0.50	<0.50 [NA]	102	101
Lead	µg/L	1.0	<1.0	2.98	2.96 [NA]	96.9	97.2
Lithium	µg/L	1.0	<1.0	103	104 0.841	96.8	101
Manganese	µg/L	1.0	<1.0	219	221 0.639	96.2	90.9
Molybdenum	µg/L	1.0	<1.0	4.46	4.28 [NA]	105	105
Nickel	µg/L	1.0	<1.0	2.94	3.05 [NA]	97.3	95.4
Niobium	µg/L	1.0	<1.0	2.26	2.02 [NA]	99.2	94.4
Rubidium	µg/L	1.0	<1.0	26.3	25.4 3.54	101	99.3
Selenium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	103	103
Silver	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	102	99.6
Strontium	µg/L	1.0	<1.0	8.01	8.13 1.49	102	101
Tantalum	µg/L	1.0	<1.0	1.09	1.58 [NA] [5]	109	77.0
Thallium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	98.1	96.5
Thorium	µg/L	0.50	<0.50	<0.50	<0.50 [NA]	98.4	94.7
Tin	µg/L	1.0	<1.0	1.42	1.15 [NA] [5]	108	107
Titanium	µg/L	1.0	<1.0	2.58	2.44 [NA]	98.4	96.5
Tungsten	µg/L	10	<10	<10	<10 [NA]	95.8	96.1
Uranium	µg/L	1.0	<1.0	3.04	2.98 [NA]	96.8	96.0
Vanadium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	99.9	98.5
Zinc	µg/L	1.0	<1.0	47.2	44.1 6.75	98.3	96.1

METALS-021 | LEAF 1313 Metals - Low Level T06 (Solid adhoc) | Batch BFI2001

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	PFH1870-06		
				Samp	QC RPD %		
Mercury	µg/L	0.050	<0.050	<0.050	<0.050 [NA]	108	106

Quality Control PFH1870

METALS-022 | LEAF 1313 Metals - Low Level T06 (Solid adhoc) | Batch BFJ2078

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01 Samp QC RPD %			
Aluminium	µg/L	10	<10	516	519 0.458	97.6	71.5
Antimony	µg/L	1.0	<1.0	1.84	1.48 [NA] [5]	105	102
Arsenic	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	101	102
Barium	µg/L	1.0	<1.0	370	371 0.219	103	102
Beryllium	µg/L	0.50	<0.50	<0.50	<0.50 [NA]	91.6	96.0
Bismuth	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	95.0	91.0
Cadmium	µg/L	0.10	<0.10	0.115	0.115 [NA]	105	106
Caesium	µg/L	1.0	<1.0	1.58	1.80 [NA]	103	104
Chromium	µg/L	1.0	<1.0	2.72	3.12 [NA]	97.5	97.9
Cobalt	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	98.4	98.8
Copper	µg/L	1.0	<1.0	3.92	3.97 [NA]	96.0	96.8
Iron	µg/L	10	<10	166	172 3.46	106	95.3
Lanthanum	µg/L	0.50	<0.50	<0.50	<0.50 [NA]	102	102
Lead	µg/L	1.0	<1.0	1.36	1.44 [NA]	98.1	98.1
Lithium	µg/L	1.0	<1.0	104	104 0.605	96.3	101
Manganese	µg/L	1.0	<1.0	289	290 0.394	96.3	96.8
Molybdenum	µg/L	1.0	<1.0	3.88	3.84 [NA]	106	105
Nickel	µg/L	1.0	<1.0	2.76	2.72 [NA]	97.4	97.0
Niobium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	100	98.1
Rubidium	µg/L	1.0	<1.0	11.4	11.2 1.86	99.8	101
Selenium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	104	103
Silver	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	101	101
Strontium	µg/L	1.0	<1.0	9.62	9.41 2.16	101	102
Tantalum	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	106	76.5
Thallium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	97.8	99.2
Thorium	µg/L	0.50	<0.50	0.500	<0.50 [NA] [5]	99.0	97.9
Tin	µg/L	1.0	<1.0	1.11	<1.0 [NA] [5]	109	108
Titanium	µg/L	1.0	<1.0	<1.0	1.08 [NA] [5]	96.6	97.1
Tungsten	µg/L	10	<10	<10	<10 [NA]	97.1	96.1
Uranium	µg/L	1.0	<1.0	1.68	1.72 [NA]	97.7	97.6
Vanadium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	99.9	100
Zinc	µg/L	1.0	<1.0	36.4	34.6 4.99	96.7	97.4

METALS-021 | LEAF 1313 Metals - Low Level T07 (Solid adhoc) | Batch BFI2003

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01 Samp QC RPD %			
Mercury	µg/L	0.050	<0.050	<0.050	<0.050 [NA]	108	108

Quality Control PFH1870

METALS-022 | LEAF 1313 Metals - Low Level T07 (Solid adhoc) | Batch BFJ2079

Analyte	Units	PQL	Blank	DUP1	LCS %	Spike % PFH1870-01
				PFH1870-01 Samp QC RPD %		
Aluminium	µg/L	10	<10	89.9 101 11.9	103	103
Antimony	µg/L	1.0	<1.0	1.85 1.12 [NA] [5]	103	103
Arsenic	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	104	104
Barium	µg/L	1.0	<1.0	271 276 1.96	102	101
Beryllium	µg/L	0.50	<0.50	<0.50 <0.50 [NA]	91.5	99.5
Bismuth	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	95.3	89.4
Cadmium	µg/L	0.10	<0.10	0.175 0.130 [NA] [5]	106	107
Caesium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	102	103
Chromium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	99.7	99.6
Cobalt	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	101	101
Copper	µg/L	1.0	<1.0	1.20 1.36 [NA]	98.8	99.0
Iron	µg/L	10	<10	29.5 36.3 [NA] [5]	106	111
Lanthanum	µg/L	0.50	<0.50	<0.50 <0.50 [NA]	102	102
Lead	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	98.0	98.3
Lithium	µg/L	1.0	<1.0	311 314 0.881	95.4	107
Manganese	µg/L	1.0	<1.0	1540 1550 0.987	98.7	106
Molybdenum	µg/L	1.0	<1.0	4.81 4.70 [NA]	106	106
Nickel	µg/L	1.0	<1.0	6.96 7.96 13.4	99.9	99.4
Niobium	µg/L	1.0	<1.0	1.06 <1.0 [NA] [5]	99.5	97.8
Rubidium	µg/L	1.0	<1.0	7.70 8.24 6.65	103	103
Selenium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	105	106
Silver	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	102	100
Strontium	µg/L	1.0	<1.0	19.1 19.0 0.761	104	103
Tantalum	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	107	96.6
Thallium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	98.3	97.9
Thorium	µg/L	0.50	<0.50	<0.50 <0.50 [NA]	97.3	97.5
Tin	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	110	108
Titanium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	99.3	97.8
Tungsten	µg/L	10	<10	<10 <10 [NA]	96.3	96.9
Uranium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	96.8	97.0
Vanadium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	102	102
Zinc	µg/L	1.0	<1.0	162 163 0.410	99.4	101

METALS-021 | LEAF 1313 Metals - Low Level T08 (Solid adhoc) | Batch BFI2006

Analyte	Units	PQL	Blank	DUP1	LCS %	Spike % PFH1870-01
				PFH1870-01 Samp QC RPD %		
Mercury	µg/L	0.050	<0.050	<0.050 <0.050 [NA]	109	106

Quality Control PFH1870

METALS-022 | LEAF 1313 Metals - Low Level T08 (Solid adhoc) | Batch BFJ2080

Analyte	Units	PQL	Blank	DUP1	LCS %	Spike % PFH1870-01
				PFH1870-01 Samp QC RPD %		
Aluminium	µg/L	10	<10	58.8 63.5 7.66	101	95.9
Antimony	µg/L	1.0	<1.0	1.92 1.18 [NA] [5]	105	103
Arsenic	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	103	100
Barium	µg/L	1.0	<1.0	144 144 0.306	102	101
Beryllium	µg/L	0.50	<0.50	<0.50 <0.50 [NA]	90.8	100
Bismuth	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	95.3	90.1
Cadmium	µg/L	0.10	<0.10	0.275 0.255 [NA]	106	107
Caesium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	102	102
Chromium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	99.6	96.9
Cobalt	µg/L	1.0	<1.0	1.54 1.62 [NA]	100	97.9
Copper	µg/L	1.0	<1.0	3.38 3.26 [NA]	97.5	95.8
Iron	µg/L	10	<10	63.0 73.1 14.8	105	100
Lanthanum	µg/L	0.50	<0.50	<0.50 <0.50 [NA]	102	102
Lead	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	97.9	98.2
Lithium	µg/L	1.0	<1.0	490 490 0.0990	94.7	103
Manganese	µg/L	1.0	<1.0	2750 2740 0.465	98.5	72.9
Molybdenum	µg/L	1.0	<1.0	5.24 5.23 0.191	105	106
Nickel	µg/L	1.0	<1.0	16.3 16.6 1.85	98.8	96.8
Niobium	µg/L	1.0	<1.0	1.08 <1.0 [NA] [5]	99.6	100
Rubidium	µg/L	1.0	<1.0	15.2 15.1 0.725	102	99.7
Selenium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	105	105
Silver	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	102	101
Strontium	µg/L	1.0	<1.0	27.9 27.7 0.808	102	100
Tantalum	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	106	105
Thallium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	99.7	98.8
Thorium	µg/L	0.50	<0.50	<0.50 <0.50 [NA]	99.4	98.4
Tin	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	109	109
Titanium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	98.5	94.0
Tungsten	µg/L	10	<10	<10 <10 [NA]	96.9	96.9
Uranium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	98.6	96.9
Vanadium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	101	99.9
Zinc	µg/L	1.0	<1.0	169 168 0.514	98.7	95.0

METALS-021 | LEAF 1313 Metals - Low Level T09 (Solid adhoc) | Batch BFI2008

Analyte	Units	PQL	Blank	DUP1	LCS %	Spike % PFH1870-01
				PFH1870-01 Samp QC RPD %		
Mercury	µg/L	0.050	<0.050	<0.050 <0.050 [NA]	108	108

Quality Control PFH1870

METALS-022 | LEAF 1313 Metals - Low Level T09 (Solid adhoc) | Batch BFJ2081

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike % PFH1870-01
				PFH1870-01			
				Samp	QC RPD %		
Aluminium	µg/L	10	<10	8600 8490	1.34	119	##[1]
Antimony	µg/L	1.0	<1.0	1.84 1.22	[NA] [5]	104	102
Arsenic	µg/L	1.0	<1.0	4.04 3.92	[NA]	101	101
Barium	µg/L	1.0	<1.0	357 358	0.405	103	98.7
Beryllium	µg/L	0.50	<0.50	10.2 9.75	[NA]	90.4	99.8
Bismuth	µg/L	1.0	<1.0	<1.0 <1.0	[NA]	95.3	89.2
Cadmium	µg/L	0.10	<0.10	1.40 1.43	2.48	106	107
Caesium	µg/L	1.0	<1.0	13.2 13.3	0.567	102	99.6
Chromium	µg/L	1.0	<1.0	67.9 68.4	0.638	98.2	97.7
Cobalt	µg/L	1.0	<1.0	5.52 5.38	2.48	99.1	98.7
Copper	µg/L	1.0	<1.0	110 110	0.237	96.8	95.8
Iron	µg/L	10	<10	33600 33900	0.812	106	##[1]
Lanthanum	µg/L	0.50	<0.50	4.31 4.30	0.349	103	99.2
Lead	µg/L	1.0	<1.0	105 106	1.06	98.5	95.3
Lithium	µg/L	1.0	<1.0	7410 7370	0.523	93.7	##[1]
Manganese	µg/L	1.0	<1.0	47800 47200	1.14	98.6	##[1]
Molybdenum	µg/L	1.0	<1.0	4.08 4.06	[NA]	106	108
Nickel	µg/L	1.0	<1.0	57.0 56.8	0.343	97.6	96.4
Niobium	µg/L	1.0	<1.0	1.48 1.08	[NA] [5]	99.9	99.0
Rubidium	µg/L	1.0	<1.0	85.8 83.5	2.72	100	101
Selenium	µg/L	1.0	<1.0	<1.0 <1.0	[NA]	105	103
Silver	µg/L	1.0	<1.0	<1.0 <1.0	[NA]	101	101
Strontium	µg/L	1.0	<1.0	408 405	0.743	101	99.5
Tantalum	µg/L	1.0	<1.0	1.98 1.86	[NA]	110	123
Thallium	µg/L	1.0	<1.0	<1.0 <1.0	[NA]	98.8	95.5
Thorium	µg/L	0.50	<0.50	1.10 0.675	[NA] [5]	99.3	97.2
Tin	µg/L	1.0	<1.0	<1.0 <1.0	[NA]	109	110
Titanium	µg/L	1.0	<1.0	1.96 1.36	[NA] [5]	95.4	98.7
Tungsten	µg/L	10	<10	<10 <10	[NA]	97.5	96.7
Uranium	µg/L	1.0	<1.0	131 131	0.0191	98.4	93.1
Vanadium	µg/L	1.0	<1.0	1.98 1.97	[NA]	99.8	101
Zinc	µg/L	1.0	<1.0	756 746	1.31	120	93.5

METALS-020 | LEAF 1313 Metals T01 (Solid adhoc) | Batch BFI1986

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike % PFH1870-01
				PFH1870-01			
				Samp	QC RPD %		
Phosphorus	mg/L	0.050	<0.050	1.31 1.24	5.51	113	115
Silicon	mg/L	0.10	<0.10	17.2 15.8	8.45	107	110[1]
Sulfur	mg/L	0.50	<0.50	<2.5 <2.5	[NA]	113	114
Calcium	mg/L	0.50	<0.50	<2.5 <2.5	[NA]	106	108
Magnesium	mg/L	0.50	<0.50	<2.5 <2.5	[NA]	108	102
Potassium	mg/L	0.50	<0.50	2600 2540	2.09	106	##[1]
Sodium	mg/L	0.50	<0.50	5.51 5.20	[NA]	107	103
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0	<15 <15	[NA]	[NA]	[NA]

Quality Control PFH1870

METALS-020 | LEAF 1313 Metals T02 (Solid adhoc) | Batch BFI1992

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	Samp QC RPD %		
Phosphorus	mg/L	0.050	<0.050	0.612	0.629 2.69	100	107
Silicon	mg/L	0.10	<0.10	12.4	12.9 3.73	106	##[1]
Sulfur	mg/L	0.50	<0.50	<0.50	<0.50 [NA]	98.1	108
Calcium	mg/L	0.50	<0.50	<0.50	<0.50 [NA]	90.3	104
Magnesium	mg/L	0.50	<0.50	<0.50	<0.50 [NA]	92.4	102
Potassium	mg/L	0.50	<0.50	274	273 0.358	103	##[1]
Sodium	mg/L	0.50	<0.50	4.66	4.90 5.00	91.3	110
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0	<3.0	<3.0 [NA]	[NA]	[NA]

METALS-020 | LEAF 1313 Metals T03 (Solid adhoc) | Batch BFI1994

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	Samp QC RPD %		
Phosphorus	mg/L	0.050	<0.050	0.778	0.769 1.18	104	110
Silicon	mg/L	0.10	<0.10	10.8	10.8 0.871	109	##[1]
Sulfur	mg/L	0.50	<0.50	<0.50	<0.50 [NA]	101	107
Calcium	mg/L	0.50	<0.50	<0.50	<0.50 [NA]	93.0	103
Magnesium	mg/L	0.50	<0.50	<0.50	<0.50 [NA]	94.9	103
Potassium	mg/L	0.50	<0.50	14.2	14.2 0.0494	100	107
Sodium	mg/L	0.50	<0.50	5.04	5.04 0.0417	94.4	107
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0	<3.0	<3.0 [NA]	[NA]	[NA]

METALS-020 | LEAF 1313 Metals T04 (Solid adhoc) | Batch BFI1998

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	Samp QC RPD %		
Phosphorus	mg/L	0.050	<0.050	0.196	0.198 [NA]	105	109
Silicon	mg/L	0.10	<0.10	6.59	6.97 5.51	111	##[1]
Sulfur	mg/L	0.50	<0.50	<0.50	<0.50 [NA]	103	107
Calcium	mg/L	0.50	<0.50	<0.50	<0.50 [NA]	94.9	103
Magnesium	mg/L	0.50	<0.50	<0.50	<0.50 [NA]	96.1	104
Potassium	mg/L	0.50	<0.50	1.20	1.25 [NA]	98.9	104
Sodium	mg/L	0.50	<0.50	3.27	3.37 3.07	97.8	105
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0	<3.0	<3.0 [NA]	[NA]	[NA]

METALS-020 | LEAF 1313 Metals T05 (Solid adhoc) | Batch BFI2000

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	Samp QC RPD %		
Phosphorus	mg/L	0.050	<0.050	0.310	0.282 9.53	103	106
Silicon	mg/L	0.10	<0.10	7.52	7.13 5.21	107	96.6
Sulfur	mg/L	0.50	<0.50	<0.50	<0.50 [NA]	101	110
Calcium	mg/L	0.50	<0.50	0.557	0.588 [NA]	92.0	103
Magnesium	mg/L	0.50	<0.50	<0.50	<0.50 [NA]	94.3	106
Potassium	mg/L	0.50	<0.50	3.45	3.41 1.00	98.4	103
Sodium	mg/L	0.50	<0.50	3.87	3.76 2.86	94.6	106
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0	<3.0	<3.0 [NA]	[NA]	[NA]

METALS-020 | LEAF 1313 Metals T05 (Solid adhoc) | Batch BFI2002

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	Samp QC RPD %		
Phosphorus	mg/L	0.050	<0.050	0.201	0.196 [NA]	107	109
Silicon	mg/L	0.10	<0.10	6.24	6.34 1.72	113	##[1]
Sulfur	mg/L	0.50	<0.50	<0.50	<0.50 [NA]	105	110

Quality Control PFH1870

METALS-020 | LEAF 1313 Metals T06 (Solid adhoc) | Batch BFI2002

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	RPD %		
Calcium	mg/L	0.50	<0.50	0.764	0.764	96.2	103
Magnesium	mg/L	0.50	<0.50	<0.50	<0.50	99.6	106
Potassium	mg/L	0.50	<0.50	3.07	3.07	100	105
Sodium	mg/L	0.50	<0.50	4.38	4.43	99.2	106
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0	3.71	3.70	[NA]	[NA]

METALS-020 | LEAF 1313 Metals T07 (Solid adhoc) | Batch BFI2004

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	RPD %		
Phosphorus	mg/L	0.050	<0.050	0.917	0.933	107	106
Silicon	mg/L	0.10	<0.10	3.32	3.37	111	#[1]
Sulfur	mg/L	0.50	<0.50	<0.50	<0.50	105	108
Calcium	mg/L	0.50	<0.50	2.25	2.27	95.7	98.9
Magnesium	mg/L	0.50	<0.50	0.906	0.915	97.8	100
Potassium	mg/L	0.50	<0.50	2.87	2.79	98.8	107
Sodium	mg/L	0.50	<0.50	4.67	4.76	98.1	102
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0	9.35	9.45	[NA]	[NA]

METALS-020 | LEAF 1313 Metals T08 (Solid adhoc) | Batch BFI2007

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	RPD %		
Phosphorus	mg/L	0.050	<0.050	1.74	1.85	108	107
Silicon	mg/L	0.10	<0.10	2.90	2.39	113	95.6
Sulfur	mg/L	0.50	<0.50	<0.50	<0.50	105	110
Calcium	mg/L	0.50	<0.50	3.95	4.12	96.2	109
Magnesium	mg/L	0.50	<0.50	1.09	1.15	99.1	105
Potassium	mg/L	0.50	<0.50	2.10	2.30	99.7	105
Sodium	mg/L	0.50	<0.50	3.26	3.52	98.4	105
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0	14.4	15.0	[NA]	[NA]

METALS-020 | LEAF 1313 Metals T09 (Solid adhoc) | Batch BFI2009

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	RPD %		
Phosphorus	mg/L	0.050	<0.050	70.3	70.1	108	#[1]
Silicon	mg/L	0.10	<0.10	7.45	7.46	113	126
Sulfur	mg/L	0.50	<0.50	0.502	<0.50	105	109
Calcium	mg/L	0.50	<0.50	79.9	80.2	96.6	67.2[1]
Magnesium	mg/L	0.50	<0.50	5.02	5.02	98.8	103
Potassium	mg/L	0.50	<0.50	3.70	3.72	98.4	102
Sodium	mg/L	0.50	<0.50	4.59	4.59	98.8	106
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0	220	221	[NA]	[NA]

ORG-029_ACRYL | LEAF 1313 Acrylamide T04 (Solid adhoc) | Batch BFI3259

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	RPD %		
Acrylamide	mg/L	0.00010	<0.00010	<0.00010	<0.00010	81.1	81.0

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions B01 (Solid adhoc) | Batch BFJ2099

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-06	RPD %		
Fluoride	mg/L	0.10	<0.10	INS	INS	113	INS[4]

Quality Control PFH1870

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions B02 (Solid adhoc) | Batch BFJ2099

Analyte	Units	PQL	Blank	DUP1 PFH1870-06 Samp QC RPD %	LCS %	Spike % PFH1870-07
Fluoride	mg/L	0.10	<0.10	INS INS [NA] [4]	113	INS[4]

INORG-026 | LEAF 1313 Inorganics - Miscellaneous and Common Anions B03 (Solid adhoc) | Batch BFJ2099

Analyte	Units	PQL	Blank	DUP1 PFH1870-06 Samp QC RPD %	LCS %	Spike % PFH1870-07
Fluoride	mg/L	0.10	<0.10	INS INS [NA] [4]	113	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes B01 (Solid adhoc) | Batch BFJ2086

Analyte	Units	PQL	Blank	DUP1 PFH1870-06 Samp QC RPD %	LCS %	Spike % PFH1870-06
Chloride	mg/L	1.0	<1.0	INS INS 200 [4]	88.6	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes B02 (Solid adhoc) | Batch BFJ2086

Analyte	Units	PQL	Blank	DUP1 PFH1870-06 Samp QC RPD %	LCS %	Spike % PFH1870-06
Chloride	mg/L	1.0	<1.0	INS INS 200 [4]	88.6	INS[4]

INORG-081 | LEAF 1313 Inorganics - Ionic Balances and Indexes B03 (Solid adhoc) | Batch BFJ2086

Analyte	Units	PQL	Blank	DUP1 PFH1870-06 Samp QC RPD %	LCS %	Spike % PFH1870-06
Chloride	mg/L	1.0	<1.0	INS INS 200 [4]	88.6	INS[4]

METALS-021 | LEAF 1313 Metals - Low Level B01 (Solid adhoc) | Batch BFI2001

Analyte	Units	PQL	Blank	DUP1 PFH1870-01 Samp QC RPD %	LCS %	Spike % PFH1870-06
Mercury	µg/L	0.050	<0.050	<0.050 <0.050 [NA]	108	106

Quality Control PFH1870

METALS-022 | LEAF 1313 Metals - Low Level B01 (Solid adhoc) | Batch BFJ2078

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01 Samp QC RPD %			
Aluminium	µg/L	10	<10	516	519 0.458	97.6	71.5
Antimony	µg/L	1.0	<1.0	1.84	1.48 [NA] [5]	105	102
Arsenic	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	101	102
Barium	µg/L	1.0	<1.0	370	371 0.219	103	102
Beryllium	µg/L	0.50	<0.50	<0.50	<0.50 [NA]	91.6	96.0
Bismuth	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	95.0	91.0
Cadmium	µg/L	0.10	<0.10	0.115	0.115 [NA]	105	106
Caesium	µg/L	1.0	<1.0	1.58	1.80 [NA]	103	104
Chromium	µg/L	1.0	<1.0	2.72	3.12 [NA]	97.5	97.9
Cobalt	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	98.4	98.8
Copper	µg/L	1.0	<1.0	3.92	3.97 [NA]	96.0	96.8
Iron	µg/L	10	<10	166	172 3.46	106	95.3
Lanthanum	µg/L	0.50	<0.50	<0.50	<0.50 [NA]	102	102
Lead	µg/L	1.0	<1.0	1.36	1.44 [NA]	98.1	98.1
Lithium	µg/L	1.0	<1.0	104	104 0.605	96.3	101
Manganese	µg/L	1.0	<1.0	289	290 0.394	96.3	96.8
Molybdenum	µg/L	1.0	<1.0	3.88	3.84 [NA]	106	105
Nickel	µg/L	1.0	<1.0	2.76	2.72 [NA]	97.4	97.0
Niobium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	100	98.1
Rubidium	µg/L	1.0	<1.0	11.4	11.2 1.86	99.8	101
Selenium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	104	103
Silver	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	101	101
Strontium	µg/L	1.0	<1.0	9.62	9.41 2.16	101	102
Tantalum	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	106	76.5
Thallium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	97.8	99.2
Thorium	µg/L	0.50	<0.50	0.500	<0.50 [NA] [5]	99.0	97.9
Tin	µg/L	1.0	<1.0	1.11	<1.0 [NA] [5]	109	108
Titanium	µg/L	1.0	<1.0	<1.0	1.08 [NA] [5]	96.6	97.1
Tungsten	µg/L	10	<10	<10	<10 [NA]	97.1	96.1
Uranium	µg/L	1.0	<1.0	1.68	1.72 [NA]	97.7	97.6
Vanadium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	99.9	100
Zinc	µg/L	1.0	<1.0	36.4	34.6 4.99	96.7	97.4

METALS-021 | LEAF 1313 Metals - Low Level B02 (Solid adhoc) | Batch BFI2008

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01 Samp QC RPD %			
Mercury	µg/L	0.050	<0.050	<0.050	<0.050 [NA]	108	108

Quality Control PFH1870

METALS-022 | LEAF 1313 Metals - Low Level B02 (Solid adhoc) | Batch BFJ2081

Analyte	Units	PQL	Blank	DUP1	LCS %	Spike % PFH1870-01
				PFH1870-01 Samp QC RPD %		
Aluminium	µg/L	10	<10	8600 8490 1.34	119	##[1]
Antimony	µg/L	1.0	<1.0	1.84 1.22 [NA] [5]	104	102
Arsenic	µg/L	1.0	<1.0	4.04 3.92 [NA]	101	101
Barium	µg/L	1.0	<1.0	357 358 0.405	103	98.7
Beryllium	µg/L	0.50	<0.50	10.2 9.75 [NA]	90.4	99.8
Bismuth	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	95.3	89.2
Cadmium	µg/L	0.10	<0.10	1.40 1.43 2.48	106	107
Caesium	µg/L	1.0	<1.0	13.2 13.3 0.567	102	99.6
Chromium	µg/L	1.0	<1.0	67.9 68.4 0.638	98.2	97.7
Cobalt	µg/L	1.0	<1.0	5.52 5.38 2.48	99.1	98.7
Copper	µg/L	1.0	<1.0	110 110 0.237	96.8	95.8
Iron	µg/L	10	<10	33600 33900 0.812	106	##[1]
Lanthanum	µg/L	0.50	<0.50	4.31 4.30 0.349	103	99.2
Lead	µg/L	1.0	<1.0	105 106 1.06	98.5	95.3
Lithium	µg/L	1.0	<1.0	7410 7370 0.523	93.7	##[1]
Manganese	µg/L	1.0	<1.0	47800 47200 1.14	98.6	##[1]
Molybdenum	µg/L	1.0	<1.0	4.08 4.06 [NA]	106	108
Nickel	µg/L	1.0	<1.0	57.0 56.8 0.343	97.6	96.4
Niobium	µg/L	1.0	<1.0	1.48 1.08 [NA] [5]	99.9	99.0
Rubidium	µg/L	1.0	<1.0	85.8 83.5 2.72	100	101
Selenium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	105	103
Silver	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	101	101
Strontium	µg/L	1.0	<1.0	408 405 0.743	101	99.5
Tantalum	µg/L	1.0	<1.0	1.98 1.86 [NA]	110	123
Thallium	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	98.8	95.5
Thorium	µg/L	0.50	<0.50	1.10 0.675 [NA] [5]	99.3	97.2
Tin	µg/L	1.0	<1.0	<1.0 <1.0 [NA]	109	110
Titanium	µg/L	1.0	<1.0	1.96 1.36 [NA] [5]	95.4	98.7
Tungsten	µg/L	10	<10	<10 <10 [NA]	97.5	96.7
Uranium	µg/L	1.0	<1.0	131 131 0.0191	98.4	93.1
Vanadium	µg/L	1.0	<1.0	1.98 1.97 [NA]	99.8	101
Zinc	µg/L	1.0	<1.0	756 746 1.31	120	93.5

METALS-021 | LEAF 1313 Metals - Low Level B03 (Solid adhoc) | Batch BFI1985

Analyte	Units	PQL	Blank	DUP1	LCS %	Spike % PFH1870-01
				PFH1870-01 Samp QC RPD %		
Mercury	µg/L	0.050	<0.050	<0.050 <0.050 [NA]	108	123

Quality Control PFH1870

METALS-022 | LEAF 1313 Metals - Low Level B03 (Solid adhoc) | Batch BFJ2073

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01 Samp QC RPD %			
Aluminium	µg/L	10	<10	4280	4390 2.50	96.4	87.1
Antimony	µg/L	1.0	<1.0	2.29	1.48 [NA] [5]	103	110
Arsenic	µg/L	1.0	<1.0	7.52	7.22 4.07	101	104
Barium	µg/L	1.0	<1.0	87.4	89.7 2.61	102	108
Beryllium	µg/L	0.50	<0.50	<0.50	<0.50 [NA]	89.4	102
Bismuth	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	94.9	81.5
Cadmium	µg/L	0.10	<0.10	<0.10	<0.10 [NA]	106	101
Caesium	µg/L	1.0	<1.0	13.8	13.8 0.290	103	106
Chromium	µg/L	1.0	<1.0	31.8	31.9 0.377	98.2	95.2
Cobalt	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	99.1	93.0
Copper	µg/L	1.0	<1.0	15.2	15.2 0.198	97.3	86.8
Iron	µg/L	10	<10	82.3	79.4 3.60	106	102
Lanthanum	µg/L	0.50	<0.50	<0.50	<0.50 [NA]	102	105
Lead	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	98.3	91.5
Lithium	µg/L	1.0	<1.0	76.4	77.8 1.87	93.4	106
Manganese	µg/L	1.0	<1.0	3.16	3.34 [NA]	96.1	97.5
Molybdenum	µg/L	1.0	<1.0	11.8	10.7 9.75	104	111
Nickel	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	98.4	88.3
Niobium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	100	99.4
Rubidium	µg/L	1.0	<1.0	183	188 2.55	99.6	102
Selenium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	105	102
Silver	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	100	95.6
Strontium	µg/L	1.0	<1.0	2.92	3.16 [NA]	102	104
Tantalum	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	112	104
Thallium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	98.3	92.0
Thorium	µg/L	0.50	<0.50	1.01	0.595 [NA] [5]	98.3	94.2
Tin	µg/L	1.0	<1.0	7.36	7.02 4.80	108	107
Titanium	µg/L	1.0	<1.0	<1.0	<1.0 [NA]	94.9	101
Tungsten	µg/L	10	<10	40.9	31.6 [NA] [5]	96.4	88.2
Uranium	µg/L	1.0	<1.0	84.1	83.7 0.507	97.7	94.1
Vanadium	µg/L	1.0	<1.0	2.68	2.42 [NA]	99.6	100
Zinc	µg/L	1.0	<1.0	50.1	50.6 1.08	97.6	91.5

METALS-020 | LEAF 1313 Metals B01 (Solid adhoc) | Batch BFI2002

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01 Samp QC RPD %			
Phosphorus	mg/L	0.050	<0.050	0.201	0.196 [NA]	107	109
Silicon	mg/L	0.10	<0.10	6.24	6.34 1.72	113	#[1]
Sulfur	mg/L	0.50	<0.50	<0.50	<0.50 [NA]	105	110
Calcium	mg/L	0.50	<0.50	0.764	0.764 [NA]	96.2	103
Magnesium	mg/L	0.50	<0.50	<0.50	<0.50 [NA]	99.6	106
Potassium	mg/L	0.50	<0.50	3.07	3.07 0.0325	100	105
Sodium	mg/L	0.50	<0.50	4.38	4.43 1.10	99.2	106
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0	3.71	3.70 [NA]	[NA]	[NA]

Quality Control PFH1870

METALS-020 | LEAF 1313 Metals B02 (Solid adhoc) | Batch BFI2009

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	Samp QC RPD %		
Phosphorus	mg/L	0.050	<0.050	70.3	70.1 0.289	108	##[1]
Silicon	mg/L	0.10	<0.10	7.45	7.46 0.0349	113	126
Sulfur	mg/L	0.50	<0.50	0.502	<0.50 [NA] [5]	105	109
Calcium	mg/L	0.50	<0.50	79.9	80.2 0.360	96.6	67.2[1]
Magnesium	mg/L	0.50	<0.50	5.02	5.02 0.0179	98.8	103
Potassium	mg/L	0.50	<0.50	3.70	3.72 0.331	98.4	102
Sodium	mg/L	0.50	<0.50	4.59	4.59 0.0370	98.8	106
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0	220	221 0.328	[NA]	[NA]

METALS-020 | LEAF 1313 Metals B03 (Solid adhoc) | Batch BFI1986

Analyte	Units	PQL	Blank	DUP1		LCS %	Spike %
				PFH1870-01	Samp QC RPD %		
Phosphorus	mg/L	0.050	<0.050	1.31	1.24 5.51	113	115
Silicon	mg/L	0.10	<0.10	17.2	15.8 8.45	107	110[1]
Sulfur	mg/L	0.50	<0.50	<2.5	<2.5 [NA]	113	114
Calcium	mg/L	0.50	<0.50	<2.5	<2.5 [NA]	106	108
Magnesium	mg/L	0.50	<0.50	<2.5	<2.5 [NA]	108	102
Potassium	mg/L	0.50	<0.50	2600	2540 2.09	106	##[1]
Sodium	mg/L	0.50	<0.50	5.51	5.20 [NA]	107	103
Hardness (calc) equivalent CaCO3	mg/L	3.0	<3.0	<15	<15 [NA]	[NA]	[NA]

QC Comments

Identifier	Description
[1]	Spike recovery is not applicable due to the relatively high analyte background in the sample (>3* spike level). However, the LCS recovery is within acceptance criteria.
[2]	Spike recovery is outside routine acceptance criteria (70-130%), this may be due to suspected non-homogeneity and/or matrix interference effects. However, an acceptable recovery was achieved for the LCS.
[4]	Note: There was insufficient sample to perform all QC according to our internal guidelines.
[5]	Duplicate %RPD may be flagged as an outlier to routine laboratory acceptance, however, where one or both results are <10*PQL, the RPD acceptance criteria increases exponentially.
[6]	The laboratory duplicate RPD acceptance criteria has been exceeded. Sample heterogeneity suspected. 3 sets of data have been provided to help demonstrate the degree of non-homogeneity within the sample as well as assessing the analytical precision.